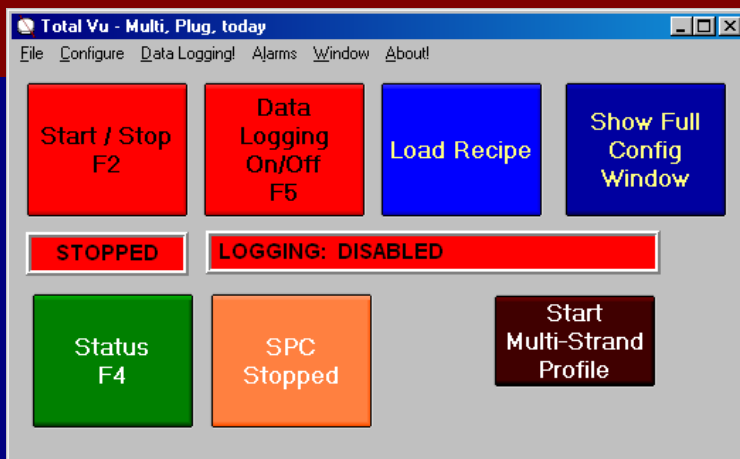


# Total Vu 250™

## *Monitoring and Control Software*



## User's Guide

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## About This Document

The Total Vu Software manual provides step-by-step instructions for configuring LaserLinc's Total Vu Software. Installation of hardware, such as TLAser400 cards, is provided separately. The manual is divided into chapters that correspond to Total Vu Software configuration windows, as described in the [Overview](#) chapter.

For technical support, please call your salesperson, the corporate office, or submit problem reports and suggestions on our website. If there are features discussed that you do not see in your software, they might be an option that is not installed. LaserLinc also offers onsite installation and training services. For service and for information about options, please contact your sales person or a service representative at the corporate office.

This manual assumes an understanding of basic Windows concepts, such as how to select menu items with a mouse or the keyboard. For more information about Windows, please consult your Windows documentation.

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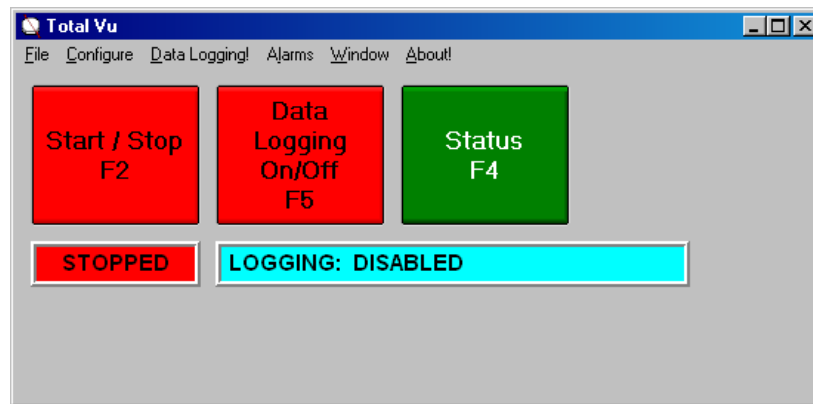
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## Overview of Total Vu Software

Total Vu Software from LaserLinc is a dynamic product designed to operate on a standard Windows computer in concert with micrometers from LaserLinc *and* other manufacturers, making it simple to blend a new micrometer with older models that are already in use.

Total Vu Software's main program window contains menus across the top of the window and push buttons for system control. If this window is closed, the Total Vu Software program closes. The Total Vu Software main program window menu items are: File, Configure, Data Logging, Window, and About; buttons include: Start/Stop, Data Logging On/Off, and Status.



*Total Vu Software program window.*

## Description of Buttons

**Start/Stop:** To start or stop scanning. When scanning is stopped, the button is red and the status panel below the button reads “STOPPED”; clicking on the button starts the scanning process. The color will change to green and the status panel will read “RUNNING”. The Start/Stop button can also be activated with the F2 function key.

**Data Logging On/Off:** To start or pause the recording of measurement readings to the open log files. When off, the status window under the data logging button reads “LOGGING: DISABLED”. The Data Logging button can also be activated with the F5 function key.

**Status:** Clicking on the **Status** button will open the **Status** window. To close the **Status** window, click on the **X** in the upper right corner of the window or by press the **Esc** key. The **Status** button can also be activated with the **F4** function key.

The **Status** panel displays overall system status and scanner status for a particular gauge. Scanners are available from the drop-down list at the top of the screen. The real-time scan rate, edge count from each axis, and error condition (such as **INDEX ERROR** or **MISSING AXIS**) for the selected gauge are shown on this window.

**Data Logging** status is also displayed on the **Status** window. Moving the mouse over the **LOGGING** label will provide more information about logging, if logging is enabled.

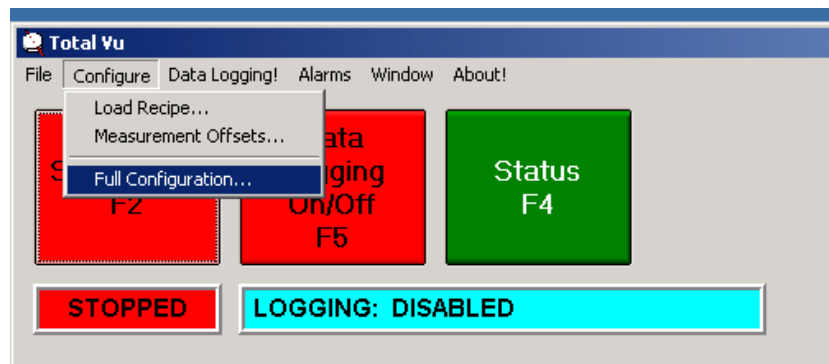
The remainder of the **Status** display panel contains labels that indicate the status condition. If a particular status condition is detected, the corresponding label is displayed; otherwise, the label is hidden. The table below shows the **Status** labels and the conditions that they represent.

For more information on status labels, please see [Appendix A: Table of Status Labels and Conditions](#).

## Description of Menus

**File:** Contains the **Exit** menu. Select **Exit** to exit the Total Vu Software.

**Configure:** Contains **Load Recipe...**, **Measurement Offsets...**, and **Full Configuration...** Depending on later setup and modifications, the **Configure** menu might also show **Profile Scanners...** and **Calibrate Scanner**.



*Total Vu Software program window menus with Full Configuration selected.*

**Load Recipe:** Main Program Window\Configure\Load Recipe

When selected, the **Recipe Management** window will appear. From this window, you can load and unload recipes. If the option for **Hide Recipe Management Buttons** is unchecked in the

display options (Main Program Window\Configure\Full Configuration\Display), you can also copy, edit, rename, delete, and create new recipes from this window.

**Measurement Offsets:** Main Program Window\Configure\Measurement Offsets

Selecting **Measurement Offsets** will bring up a window with two tabs: **Offsets** and **Calculate**.

**Offsets:** The **Offsets** tab consists of a grid with all of the measurements defined in the system with their offset parameter settings, and two buttons: **Apply** and **Edit**. The first column of the grid shows the measurement names; the second column shows the offset settings, both the value and whether the offset is enabled. If the checkbox next to the value is checked, then the offset is enabled. (This checkbox corresponds to the **Use Offset** checkbox that is on the **Properties** tab of the **Measurement Configuration** window.)

**Calculate:** The **Calculate** tab allows the operator to calculate the offset value automatically for one or more measurements based on a sample of a known size. This calculation might be used with a measurement standard or to match the Total Vu Software measurement values with that of another measurement device.

**Full Configuration:** Main Program Window\Configure\Full Configuration

With **Full Configuration**, the **Full Configure** window opens to provide access to system configuration wizards.

**DataLogging!:** The **Data Logging!** menu item opens the **Logging Configuration** window. Icons for all of the defined logs appear in the window. The menu for this window provides access to log management options and actions to create new measurement logs.

**Alarms:** Contains the **Clear All** command and a separate **Clear** menu item for each defined alarm. Clicking one of these menu items clears the corresponding alarm output, if the alarm is active and the conditions that activated it are no longer present. The **Clear All** menu option clears all active alarms. **NOTE:** The **Alarms** menu appears only if the **Digital I/O** option is installed.

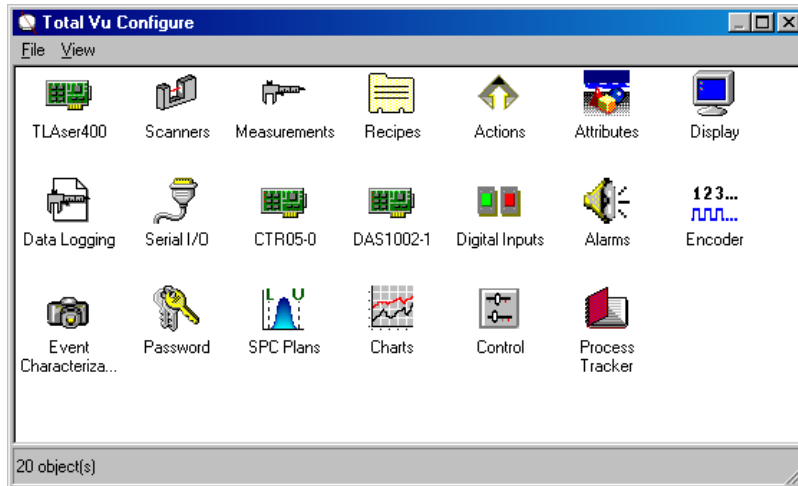
**Window:** Allows the user to open or create windows to view live production information, such as the position of a part in the scanner window, measurement data, and trend charts.

**About!:** Displays the About Total Vu Software window. This window contains information about the Total Vu Software application including version number, installed options, and contact information for the company.

## Full Configuration

Main Program Window\Configure\Full Configuration

The Full Configure window operates like a control panel, with icons providing access to system configuration options and wizards. What follows is a brief description of the configuration options available from the icons. More detailed descriptions of each configuration are contained in subsequent chapters.



*Full Configure window; icons vary depending on the package installed.*

**TLAs400:** Displays hardware and driver information and access to assignment of Windows system resources.

**Scanners:** Enables the operator to add new scanners, switch or delete scanners, change properties of scanners, calibrate scanners, turn glass logic on and off.

**Measurements:** For adding new measurements, deleting measurements, and changing the properties of measurements (such as scan averaging, flaw detection, resolution, etc.). You can configure measurements with a wide array of properties and products, including corrugated materials, stranded outer layers, functional measurements (such as average wall thickness, relative standard deviation, side of a right triangle, weight, etc.).

**Recipes:** These contain specification limits, offsets, and calibration information for a particular product.

**Actions:** Actions enable the user to select processes to run for a particular need (e.g. turning flaw detection on or off). Actions are triggered with buttons, which are added and configured in the Display configuration window, or with digital inputs or alarms.

**Attributes:** A method for entering external information. Examples of attributes include operator name, product name, customer number, external measurements, notes, etc.

**Display:** For adjusting how program windows appear, what operators are able to access from them, and how you can manipulate them (i.e. minimize, close, or resize). Buttons are created and configured here.

**Data Logging:** Log files store measurement readings. The log files produced are text files in the comma separated value (csv) format suitable for import to other applications. The information storage mechanism is extremely customizable, allowing users to create the necessary file types for importing into other database, spreadsheet, or SPC applications.

**Serial I/O:** Brings up serial communications settings. For example, if you want a measurement to be sent out the RS232 port, you can configure the setting here. In addition, other devices can use a serial port to input measurements.

**Analog I/O (Optional):** Provides access to configuring the Analog I/O card. You can use analog inputs and outputs in control and for some measurement devices.

**Alarms:** The Alarms configuration window covers adding new alarms, deleting alarms, and changing properties of existing alarms.

**Digital Inputs:** The Digital Inputs configuration window is used for configuring digital inputs to control a particular software function (Part of the Digital I/O option).

**Encoder (Optional):** For configuring and calibrating the encoder, a device used to measure the length of a product or the speed of a line.

**Event Characterization (Optional):** For taking a snapshot of an error. You can set Event Characterization to keep measurements before and after an error occurs.

**Password:** Enabling a password prevents unauthorized access to the configuration window.

**SPC Plans:** With SPC (Statistical Process Control), statistical techniques are used to measure and analyze variation in production processes.

**Charts:** Users can add or delete trend charts from this icon. The histogram chart comes with the full SPC option, or you can purchase it separately; x-bar and range charts are also part of the full SPC option.

**Control (Optional):** This feature is used for automated adjustments to production machinery to maintain product specifications.

**Process Tracker (Optional):** With Process Tracker, operators can track events such as software start/stop, control adjustments, calibrations, etc.

## Notes on Specifications and Measurement Display

**Specifications (Specs):** Each measurement that the system takes can have specifications associated with it. Specifications designate the limits within which the product can vary while it is produced. There are several terms associated with specifications.

**Nominal:** The ideal or design value for the product being made and measured. This is usually halfway between the upper and lower specification limits.

**Specification Tolerances (Upper and Lower) (UST, LST):** These are the upper (maximum) and lower (minimum) limits on the size of the product as specified by the engineering drawing.

**Warning Tolerances (Upper and Lower) (UWT, LWT):** Values that the operator can set to mark a change in the data display if the product is approaching the specification tolerances.

**Reasonable Tolerances (Upper and Lower) (URT, LRT):** For measurements so far out of specification that they make no sense. If the option for **Reject Unreasonable** is checked when entering specifications (see chapter on [recipes](#)), measurements that fall outside of the reasonable tolerances will be discarded. They will not be logged and they will not be used to trigger an alarm.

Reasonable tolerances take on a significant role in the control process.

**Data Display:** Measurements are displayed on a color background. The color depends on where the measurements fall within the tolerances in use.

If only specification tolerances are defined, measurement values will be displayed:

- On a **Green** background if they are equal to or greater than the **Lower Specification Tolerance (LST)** or equal or less than the **Upper Specification Tolerance (UST)**.
- On a **Red** background if they are less than the **LST** or greater than the **UST**.

If warning tolerances are defined in addition to the specification tolerances, measurement values will be displayed:

- On a **Green** background if they are equal to or less than the **Upper Warning Tolerance (UWT)** and more than or equal to the **Lower Warning Tolerance (LWT)** are displayed.
- On a **Yellow** background if they are greater than the **UWT** but less than the **UST** or, less than the **LWT** but greater than the **LST**.
- On a **Red** background, if they are less than the **LST** or greater than the **UST**.

If specification tolerances, warning tolerances, and reasonable tolerances are all defined, the measurement values will be displayed:

- On a **Green** background if they are equal to or less than the **UWT** and more than or equal to the **LWT**.

- On a **Yellow** background if they are greater than the UWT but less than the UST, or, less than the LWT, but greater than the LST.
- On a **Red** background if they are less than the LST or greater than the UST.
- On a **Gray** background if they are less than the Lower Reasonable Tolerance (LRT) or greater than the Upper Reasonable Tolerance (URT).

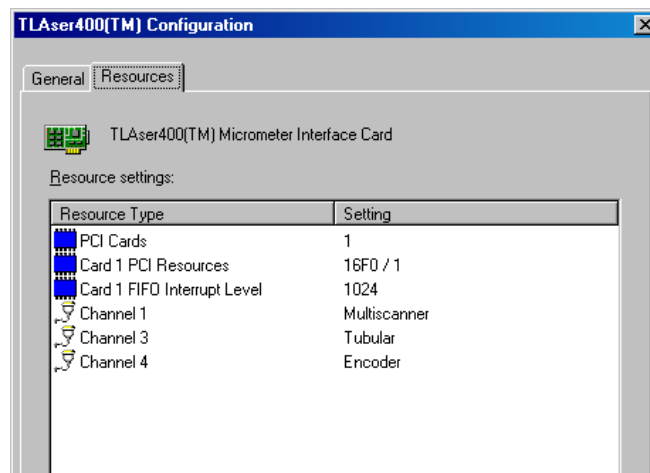
As described in more detail in the [Recipes](#) chapter, if the **Reject Unreasonable** box was checked, the software will ignore measurements that are displayed in gray.

## TLAser400 Card

The TLAser400 Interface Card and compatibility modules link your laser micrometer to Total Vu Software. The TLAser400 icon in Total Vu Software's **Full Configure** window displays the card's configuration options and information.

### Configuring the TLAser400 Card

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the icon for the TLAser400 card to access its configuration information.



*TLAser400 card configuration window showing the Resources tab.*

The window contains two tabs: **General** and **Resources**.

The **General** tab contains two groupings, device status and compatibility modules. Device status indicates whether the TLAser400 card was properly initialized at system startup (Initialized—



yes/no), whether the card was properly programmed at system startup (Programmed—yes/no), and the firmware revision code. Additionally, the size of the card's event buffer is displayed as a number of scan events that the buffer will hold.

The compatibility modules grouping displays channel configuration information. There are three columns for information about each channel: the channel number, the type of compatibility module, and whether a scanner is connected to the channel. If a compatibility module is not installed for the channel, the type will be labeled **Not Installed**.

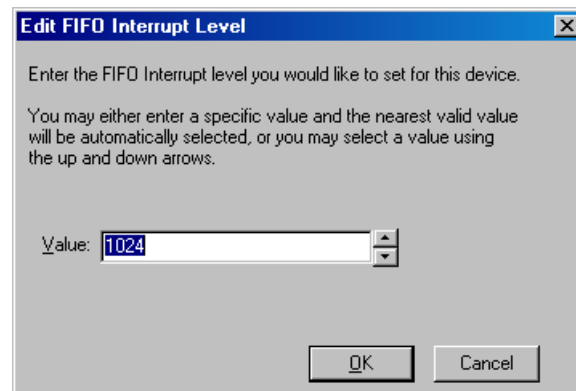
The **Resources** tab displays the settings of the card resources. The first row indicates the number of cards and what version they are.

The PCI Vendor ID and Interrupt Level are displayed. The extra rows are for each card channel that has an installed compatibility module. In some cases, resource settings can be modified using the **Change Resource...** button or by double-clicking on the resource icon. Windows will usually automatically configure the card correctly and no user-intervention will be needed.

Editing the **Channel** settings on the **Resources** tab allows the operator to assign a scanner to the selected channel. This is the same as selecting a channel in the [Scanners](#) configuration window.

The **PCI Resources** resource allows the operator to view the hardware resources assigned to the card by the BIOS and operating system. The plug-and-play subsystem does this automatically—the operator cannot modify these resources. The **PCI Cards** resource is also plug-and-play and cannot be modified from this window.

## FIFO Interrupt Level



The value in the **FIFO Interrupt Level** parameter is the number of scan events. Less than one percent of uses need to change the setting from the factory default setting of 1024. To explain the meaning of this parameter and to answer why or when it should be changed and how to determine an appropriate setting will require a detailed explanation of laser scan micrometers and how the card operates.

The TLAser400 Card is essentially a specialized analog-to-digital converter. It converts the signals from a laser scan micrometer to precise, high-resolution timing information. For a basic explanation of the operation of a laser scan micrometer, visit <http://www.laserlinc.com/laserdemo.html>

Continuing from the description on the website: the TLAser400 Card digitizes the signals coming from the receiver of the laser scan micrometer. Every time the system detects a transition in the level of laser light from dark to light or light to dark, the card generates an event. The data for the event is stored in a buffer on the card. The size of this buffer is shown on the **General** tab of the TLAser400 configuration screen, under the column labeled “**Event Buffer**”. When the number of events in the buffer reaches the FIFO Interrupt Level, Total Vu Software will process all of the data in the buffer at once, as quickly as possible. The FIFO Interrupt Level can be set anywhere from two to the size of the buffer. However, if this parameter value is set to the event buffer value, the buffer will likely overflow, i.e. measurement data will be lost (Event data is generated continuously, so if the buffer fills to capacity during the period between the event data’s reaching the specified level and the start of the software’s removal of data *from* the buffer, that data will be lost).

In a typical application—measurement of a single product—the number of events generated per scan for a single-axis micrometer is five; for a dual-axis micrometer, nine or ten, depending on the make, model and configuration of the micrometer; and for a triple-axis micrometer, thirteen. Based on the scan rate(s) and the type(s) of micrometers connected to the TLAser400 Card, you can calculate the number of events per second that the card produces. Dividing this number by the FIFO Interrupt Level will give you the approximate frequency at which the Total Vu Software will process the buffer.

For example, if there is one single-axis micrometer, with a sampling rate of 100 per second, measuring a single diameter, connected to the card, the card will produce 500 events per second. With the default FIFO Interrupt Level of 1024, more than two seconds will pass between reads by the Total Vu Software. Another example: a TLAser230 measuring four products with a sampling rate of 4000 per second/per axis will generate 22 events per scan and 88,000 events per second. With an Interrupt Level of 1024, the Total Vu Software will read the data from the card about 86 times per second.

If the per-second number of reads from the card is too high, the PC might exhibit a slow response to the operator (screen refresh, mouse movement and mouse clicks). If the number of reads from the card is too low, updates of new data might appear sluggish, although response to operator input and screen redraws will be fine. Data updates will appear sluggish because of the long delay between reads from the card. If you calculate the number of reads-per-second to be less than four, you should probably adjust the FIFO Interrupt Level to a value that will yield four to ten reads per second. If you have more than one scanner connected to a given TLAser400 card, remember that you must use the total events generated by ALL scanners on the card, because events from ALL scanners are queued in the same buffer.

## Scanner Setup and Modification

All laser-scanning micrometers (scanners) operate in a similar manner. The transmitter in the scanner projects a laser beam across the path of a part. The part creates a shadow that persists for a period proportional to the size of the part. A lens on the other side of the measurement field focuses the laser beam onto a photocell. The photocell generates a high voltage when light is present and a low voltage when no light is present. A photocell in the receiver picks up the light or absence of light and passes that reading on to the TLAser400 Interface Card.

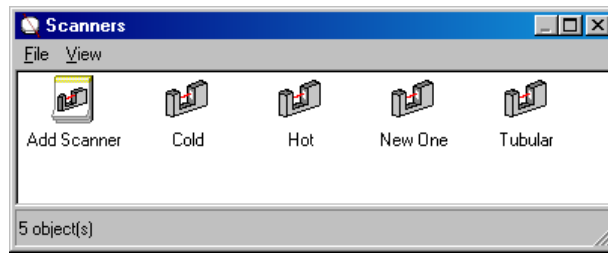
The micrometers that the TLAser400 Interface Card and accompanying Total Vu Software supports are those that pass along the signal generated by the photocell. Each transition from high to low voltage or from low to high voltage from the photocell, termed a *Scan Event*, is tagged with the time that the event occurred. The interval between certain scan events represents the proportional size of the object. On their own, the intervals between scan events have little use. However, Total Vu Software, with *Scanner Calibration*, can generate measurement readings from the time interval between scan events. Scanner calibration equates a time interval to a known object size. The calibrations are done using two calibration standards of known sizes. From these two known sizes, and the corresponding time intervals these standards generate, measurement readings are produced.

In most cases, the measurements defined for a scanner will determine the number of scan events that should be generated for each scan. If the number of scan events generated disagrees with the number of scan events expected, an error condition results. Not enough scan events will generate the error condition **MISSING**. Typically, **MISSING** is an indication that a portion of the product is out of the measurement field. More scan events than expected will generate the error condition **TOO MANY**. Typically, **TOO MANY** is an indication of scan events generated by either an extraneous object in the measurement field or debris on the scanner windows.

### Setting up a New Scanner

This procedure follows connection of the scanner and cards and installation of Total Vu Software.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** window. If this is the first scanner to be added, the only icon will be for **Add Scanner**.



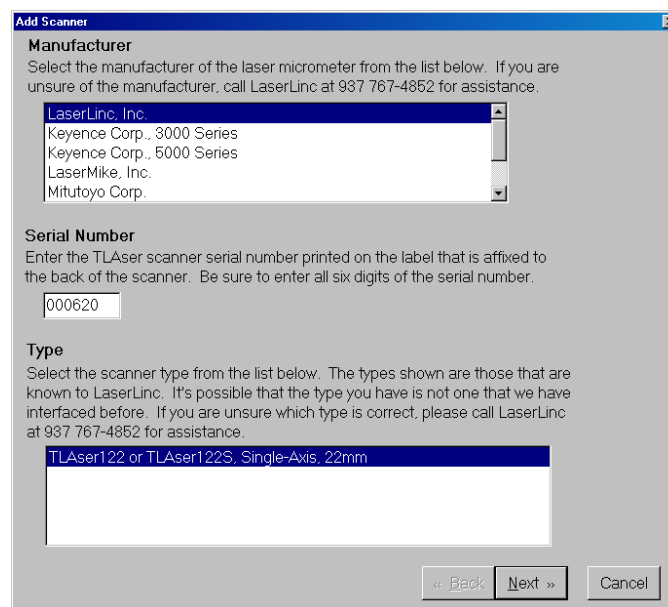
*Scanners window showing the Add Scanner wizard and several scanners that have already been defined.*

Double-click the Add Scanner icon. This is a wizard, which will guide you through the setup process.

Or, an alternate way: Go to the File menu of the Scanners configuration window and select New.

#### 1 Manufacturer, Serial Number, and Type (screen 1).

The screen shows a list of scanner manufacturers. Besides LaserLinc scanners, LaserLinc's Total Vu Software is designed to work with scanners from other manufacturers.



*Screen 1, with a LaserLinc scanner selected.*

#### 1.1 For manufacturers other than LaserLinc, select the manufacturer.

After selecting the manufacturer, various types from that manufacturer appear in the Type field.

- 1.2 For a LaserLinc micrometer, enter the serial number in the **Serial Number** field.

The serial number is on the back of the scanner. (Please be sure to enter all six digits including leading zeros.) After the serial number is entered, the model will appear in the **Type** field.

**Note:** LaserLinc micrometers store and reference scanner calibrations by serial number. If you change the serial number (i.e. switch scanners), you will either have to select a pre-existing calibration for that serial number or re-calibrate the scanner. (If a message appears saying the serial number of the LaserLinc scanner is not found, call LaserLinc for help at 937/318-2440.)

- 1.3 When you are finished selecting your model, click **Next** or press **Enter** to move to the next screen.

## 2 Channel and Location (screen 2).

- 2.1 Select the **channel**.

The **channel** depends on which micrometer the card is being used for. The software only gives acceptable choices.

**Note:** The cable is labeled with the correct channel and must be plugged into a PCI card with a module in the same channel's slot. If you are using a TLAser 222 micrometer, a module will be needed in the noted slot and one in the following slot (e.g. cable marked for channel 1, modules needed in slots 1 and 2). The Triton 3-axis micrometers need a module in the stated slot plus the following two slots (e.g. cable marked for channel 2, modules needed in slots 2, 3, and 4). All other gauges need only one module installed in the indicated channel.

- 2.2 Enter the **Location**, if needed.

The **Location** field is optional and depends on the particular use intended for the device. For example, if a product is being marked with a stamp showing length, and the scanner is 30 feet up the line from the device marking the material, the location parameter should be 30 (this way, if the measurements from the scanner are logged to disk with a length stamp, the length stamp will correspond to the length value printed on the product).

- 2.3 Click **Next** or press **Enter** to move to the next screen.

## 3 Glass Logic and Number of Scanning Facets (screen 3).

- 3.1 If needed, check the **Glass Logic** box.

For scanning transparent or translucent parts: glass logic tells the device to ignore light that penetrates the product. At this point in setup, glass logic can either be checked or left blank; you can change glass logic later if a product requires its use.

### 3.2 Enter the number of **Facets** (optional).

A facet is a mirror on the side of a scanning motor. The setting for **Number of Scanning Facets** is important only under certain conditions. If you are unsure, leave this parameter with the default value.

## 4 **Ignore Scans** (screen 4).

Typically, this feature is used when measuring parts that are discrete (rather than a continuous process such as extrusion). You can discard scans at the beginning or end of a part. The fields for **Ignore Beginning of Part** and **Ignore End of Part** are grayed out until you check the box for **Use Ignore Scans**. For example, the TLAser122 Device measures at 400 scans per second, so entering the number 400 will tell the software to ignore the first or last second of scanning, or both, depending on which boxes you check.

4.1 If this feature is desired, check the box for **Use Ignore Scans**.

4.2 Enter the number of scans to discard when the part is detected in the scanner's measurement field.

4.3 Enter the number of scans to discard at the end of scanning (end of scanning in this scenario is when the part is removed from the scanner's measurement field).

4.4 Click **Next** or press **Enter** to move to the next screen.

Here, the wizard jumps to screen eight. Two of the screens have parameters that are applicable only to specific, rarely-used micrometers. The third skipped screen is for calibration, which will be done after the micrometer has been configured.

## 5 **Naming the scanner** (screen 8).

5.1 Enter a name for the new scanner. (Choose a name that means something to you: generally an aspect of the manufacturing process for which the scanner is to be used).

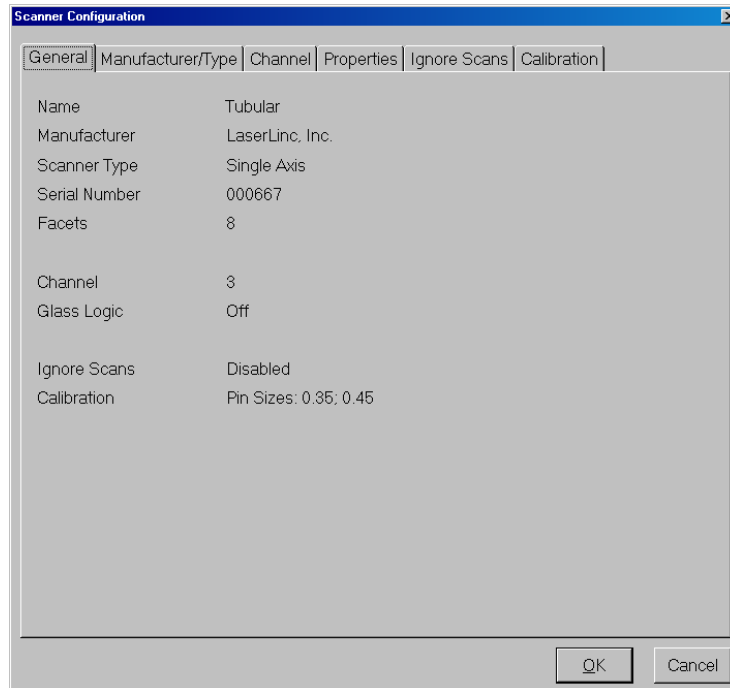
Names must begin with any letter, digit, or symbol other than these symbols: [ ] |. The name can be up to 30 characters and it must not already be in use by another scanner.

5.2 After naming the scanner, click **Finish**.

You have now completed the **Add Scanner** wizard. An icon for the new device will appear in the window with the **Add Scanner** wizard.

## Modifying or Changing an Existing Scanner

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** configuration window. You will see the icon for the **Add Scanner** wizard and the icon or icons for your existing scanners.



*The **General** tab of a scanner's modification window.*

- 1 Double-click the icon for the scanner you wish to modify. It opens with the **General** tab showing. The **General** tab is an overview of your settings, not a place to make modifications.
- 2 Select the tab you wish to modify.
  - 2.1 **Manufacturer and Type** tab.
    - 2.1.1 If the serial number is incorrect, enter the correct serial number.

It is possible to enter the wrong serial number for your scanner, but if the number was valid, the scanner would have appeared in the **Type** list and you would have been able to proceed with the rest of your setup.

If a gauge is replaced with the same type of gauge, you would enter the serial number of the new gauge here.

2.1.2 If you are finished, click **OK** or press **Enter**, otherwise select another tab to modify.

## 2.2 Channel tab.

2.2.1 Select the correct channel.

This parameter would apply if you selected the incorrect channel during initial setup, or if you are adding micrometers to the system and are thus moving a scanner to a different channel.

2.2.2 If you are finished, click **OK** or press **Enter**, otherwise select another tab to modify.

## 2.3 Properties tab.

2.3.1 Select or de-select **Glass Logic** as needed.

2.3.2 If you are finished, click **OK** or press **Enter**, otherwise select another tab to modify.

## 2.4 Ignore Scans tab.

2.4.1 Select or de-select **Ignore Scans** as needed.

2.4.2 If selecting **Ignore Scans**, enter the number of scans to ignore at the beginning and/or at the end of the part.

2.4.3 If you are finished, click **OK** or press **Enter**, otherwise select another tab to modify.

## 2.5 Calibration tab.

Calibration is covered in the section **Calibrating a Scanner**.

## Deleting an Existing Scanner

- Open the Total Vu Software.
- Go to the Configure drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** configuration window. You will see the icon for the **Add Scanner** wizard and the icon or icons for your existing scanners.



- 1 Select the scanner you wish to delete and press the **Delete** key.

You will get a warning message asking if you are sure you want to delete this scanner. If you are sure, click **Yes**. Otherwise, click **No** to cancel.

**Note: Deleting a scanner will also delete all associated measurements. If recipes have been created, the affected measurements will be deleted from the recipes.**

## Calibrating a Scanner

### Notes on calibration pin sizes

When calibrating a laser micrometer for a specified range, it is best to use calibration pins within the limits of the range. Laser micrometers in general are most accurate when measuring parts that are the same size as the calibration pins. Therefore, if a part ranging in size from .05 to .25 will be measured, then calibration pins of .08 and .2 would best calibrate the gauge for this range. After calibration, verification can be done to determine the accuracy of the gauge throughout the range. LaserLinc can assist with choosing the correct calibration pin sizes.

If multiple calibration pins are available, the use of more than two will result in better accuracy. For example, if a gauge is to be calibrated for a range of .008 up to .75", multiple calibration pins will make a difference. This example calls for the use of the following pins: .01, .08, .15, .25, .5, and .7. Using this calibration, the gauge will be extremely accurate throughout the entire range.

Calibration converts the raw timing from the micrometer to meaningful data. Measurement accuracy is directly related to scanner calibration. Measurement accuracy for a product whose size does not fall at or near the calibration standards is less accurate as one that does. In these cases, measurement accuracy will be increased if a calibration is used that is at or near the target product size.

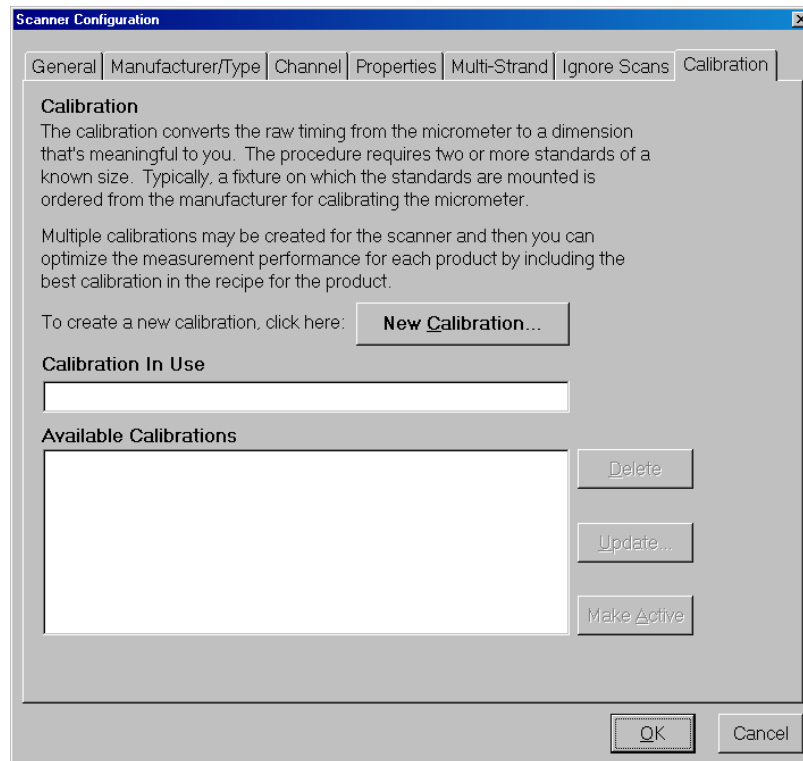
The calibration procedure requires two or more standards of a known size. Typically, a calibration fixture in which the standards are mounted is ordered from the manufacturer. Micrometers that are used with a V-Block to hold parts can be calibrated without the use of a special calibration fixture—calibration pins can be laid in the V-Block.

Total Vu Software supports multiple calibrations for a scanner. This multiple calibration feature is useful when wide ranges of product sizes are to be measured and measurement accuracy is of prime importance. By using the appropriate saved calibration, the scanner does not have to be re-calibrated each time a different product is to be measured.

For example, consider a company that produces various sizes of tubing. Rather than calibrate the scanner to encompass the entire range of tube sizes or calibrate the scanner each time a different size tube is being manufactured, the scanner can be calibrated once for each size of tube. You can do each separate calibration close to the nominal size of the tube (pin sizes of 1/4 inch and 3/8 inch for a 1/4 inch tube; pin sizes of 3/8 inch and 1/2 inch for a 3/8 inch tube, etc.) Then, when manufacturing a particular size tube, activate the matching calibration for that size tube.

- Open the Total Vu Software.
- Go to the Configure drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** configuration window. You will see the icon for the **Add Scanner** wizard and the icon or icons for your existing scanners.

- 1 Double-click the icon for the scanner you wish to calibrate. It opens with the **General** tab showing.



*The Scanner Configuration window with the Calibration tab selected.*

- 2 Select the **Calibration** tab.

If this is a new calibration, the fields for **Calibration in Use** and **Available Calibrations** will be blank.

The Total Vu Software is a “unitless” system. The units used in a calibration will be the units of measure displayed when that calibration is active. For example, one set of pins, 0.25” and 0.50” could also be defined as 6.35mm and 12.7mm. The same pins could be used to calibrate the system twice. When prompted for standard sizes, if the operator specifies 0.25 and 0.5 for the pin sizes, the calibration will result in the scanner measuring in inches when the resulting calibration is active. If 6.35 and 12.7 are specified, the scanner will measure in millimeters when the resulting calibration is active.

2.1 Click the **New Calibration** button.

2.1.1 Enter a standard size and click **Add Standard**.

2.1.2 Enter a second standard size and click **Add Standard**.

2.1.3 Click **Next** or press **Enter** to move on to the next screen.

2.2 Select the first standard that you wish to measure.

2.2.1 If the standard is clear or translucent, check the **Use Glass Logic** box.

This setting does not enable or disable glass logic for the rest of the system, only for calibration.

2.2.2 Click **Measure Standard** or press **Enter**.

This parameter will be grayed out until you select the standard.

2.2.3 When the scan is finished select the next standard and click **Measure Standard** or press **Enter**.

2.2.4 If more than two standards are being used for this calibration, repeat section 2.2.3 until all standards have been measured.

2.2.5 Click **Next** or press **Enter** to move on to the next screen.

2.3 Enter a calibration description in the **Calibration Description** field or accept the default.

If you will have calibrations in more than one unit, you might want to append the units (e.g. in, mm, um) onto the default calibration name so that, in the future, you will know which calibrations are in what units. The calibration description you enter must not match a description already in the **Existing Calibrations** list.

2.3.1 Click **Finish** or press **Enter**.

## Updating an Existing Scanner Calibration

- Open the Total Vu Software.
- Go to the Configure drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** configuration window. You will see the icon for the **Add Scanner** wizard and the icon or icons for your existing scanners.

- 1 Double-click the icon for the scanner you wish to calibrate. It opens with the **General** tab showing.
- 2 Select the **Calibration** tab.

There will be a calibration description in the **Calibration In Use** field. This is the active calibration. That description will also appear in the **Available Calibrations** field. If there are other calibration descriptions, they will also appear in the **Available Calibrations** field.

- 2.1 Select the calibration description in the list of available calibrations.
- 2.2 Click **Update**.

This parameter will take you to the **Measure Standards** screen.

- 2.2.1 Select the first standard by clicking on it.
- 2.2.2 If the standard is clear, such as for fiber optics, glass rods, etc., then check the **Use Glass Logic** box.

This setting does not enable or disable glass logic for the rest of the system, only for calibration.

- 2.2.3 Click **Measure Standard** or press **Enter**.

This parameter will be grayed out until you select the standard.

- 2.2.4 When the scan is finished select the next standard and click **Measure Standard** or press **Enter**.
- 2.2.5 If more than two standards are being used for this calibration, repeat section 2.2.4 until all standards have been measured.
- 2.2.6 Click **Next** or press **Enter** to move on to the next screen.

### 2.2.7 Click **Finish** or press **Enter**.

Because you are updating an existing description, there is no need to change the calibration description.

## Activating or Changing an Existing Scanner Calibration

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** configuration window. You will see the icon for the **Add Scanner** wizard and the icon or icons for existing scanner(s).

- 1 Double-click the icon for the scanner you wish to calibrate. It opens with the **General** tab showing.
- 2 Select the **Calibration** tab.

There will be a calibration description in the **Calibration In Use** field. This is the active calibration. That description will also appear in the **Available Calibrations** field. To activate a different calibration, there must be at least one other calibration description in the **Available Calibrations** field.

2.1 Select the inactive calibration description in the list of available calibrations.

2.2 Click **Make Active**.

2.3 Click **OK** or press **Enter**.

## Deleting an Existing Scanner Calibration

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Scanners** icon to open the **Scanners** configuration window. You will see the icon for the **Add Scanner** wizard and the icon or icons for your existing scanners.

- 1 Double-click the icon for the scanner you wish to calibrate. It opens with the **General** tab showing.

## 2 Select the Calibration tab.

There will be a calibration description in the **Calibration In Use** field. This is the active calibration. That description will also appear in the **Available Calibrations** field. You cannot delete the active calibration.

2.1 Select the inactive calibration description in the list of available calibrations.

2.2 Click **Delete**. A warning dialog will appear.

2.3 If you are sure you wish to delete the calibration, click **Yes**.

2.4 Click **OK** or press **Enter**.

## Actions Specific for Scanners

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for scanners.

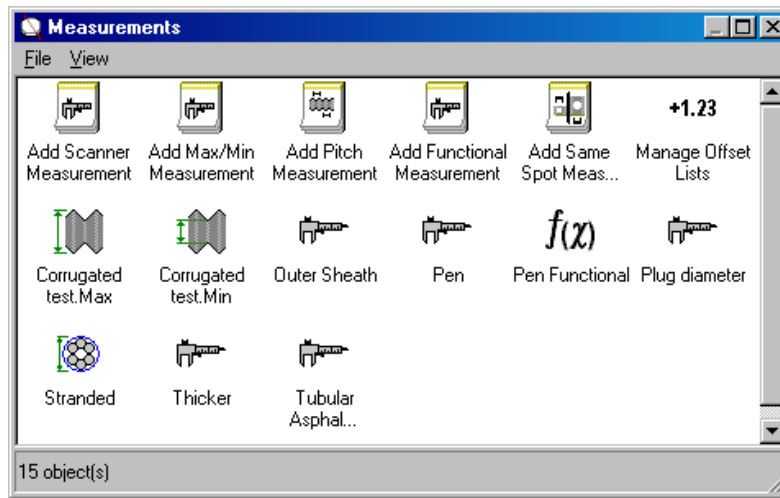
- *Ignore Scans*: Ignores or discards a specified number of scans before and/or after the action is executed.
- *Load Calibration*: Loads a pre-selected calibration or prompts the operator to select the calibration from a drop-down list.
- *Clean Scanner*: Halts all measurements from the scanner while the scanner is cleaned. When cleaning is finished, measurement resumes.
- *Clear Multi-Strand Scanner Profile*: Clears the profile that establishes the expected position of each strand. This action will disable the multi-strand measurements that come from the selected scanners.
- *Start Multi-Strand Scanner Profile Wizard*: Opens the **Profile Scanner** window to allow the operator to profile one or more multi-strand scanners.
- *Start Scanning*: Starts scanning on all scanners.
- *Stop Scanning*: Stops scanning on all scanners.
- *Start/Stop Scanning*: Starts or stops scanning on all scanners.

## Setting Up Measurements

This chapter assumes that there is already at least one scanner set up. Measurements will not update until the scanner has been calibrated.

Total Vu Software imposes no limit on the number of measurements that you can define for a particular scanner. For example, you might define a diameter measurement for product size along with a one for product position in the measurement field. On a dual-axis scanner, an X-axis diameter, a Y-axis diameter, and an X-axis diameter–Y-axis diameter measurement can be defined to provide separate X and Y product sizes along with product eccentricity testing. As a final example, a diameter measurement with a small scans-to-average value and associated specification limits and a diameter measurement with a high scans-to-average value can be defined to provide high speed diameter-checking, usually for faults or flaws, along with overall average product size checking against specifications.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Measurement** icon to open the **Measurements** configuration window. In the window you will see icons for **Add Scanner Measurement**, **Add Functional Measurement**, and **Manage Offset Lists**; depending on your package, you might also see icons for **Add Max/Min Measurement**, **Add Pitch Measurement**, **Add Same Spot Measurement**, and **Manage Offset Lists**.



The *Measurements* screen. In this screen shot, the first row shows the setup wizards; the second and third rows show various user-defined measurements.

## Creating a New Scanner Measurement

Double-click the **Add Scanner Measurement** icon. This is a wizard, which will guide you through the setup process. The first screen shows the list of available scanners.

### 1 Source Scanner (screen 1).

- 1.1 Select the scanner for which you plan to create the measurement.
- 1.2 When you are finished selecting your scanner, click **Next** or press **Enter** to move to the next screen.

### 2 Measurement Type, Number of Strands, and First Strand Number (screen 2).

**Number of Strands** and **First Strand Number** appear only if you have the **Multi-Strand** package **AND** select either **Multi-Strand Diameter** or **Multi-Strand Position** in the list of measurement types.

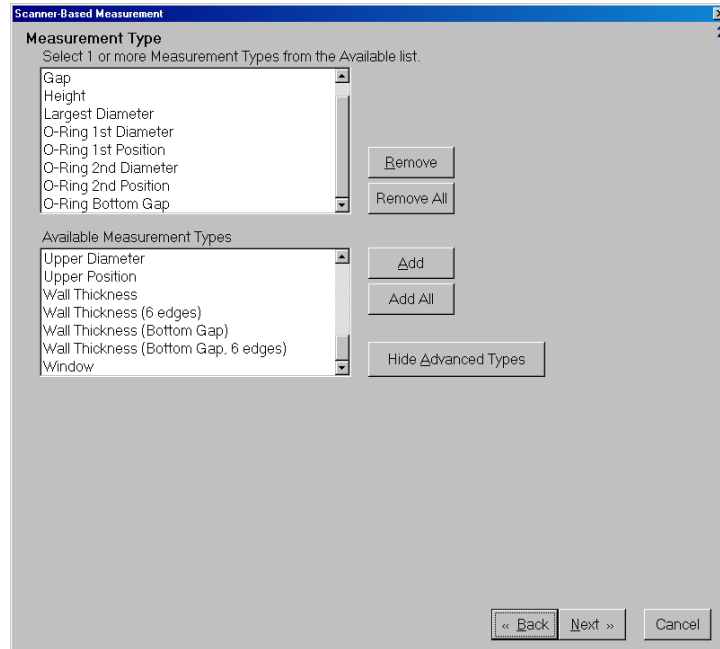
#### 2.1 Select the **Measurement Type** from the list.

The most common **Measurement Types** appear in the list. For single-, dual-, and triple-axis gauges, the most commonly used measurements are **OD**, **XY Average Diameter**, and **ABC Average Diameter**, respectively.

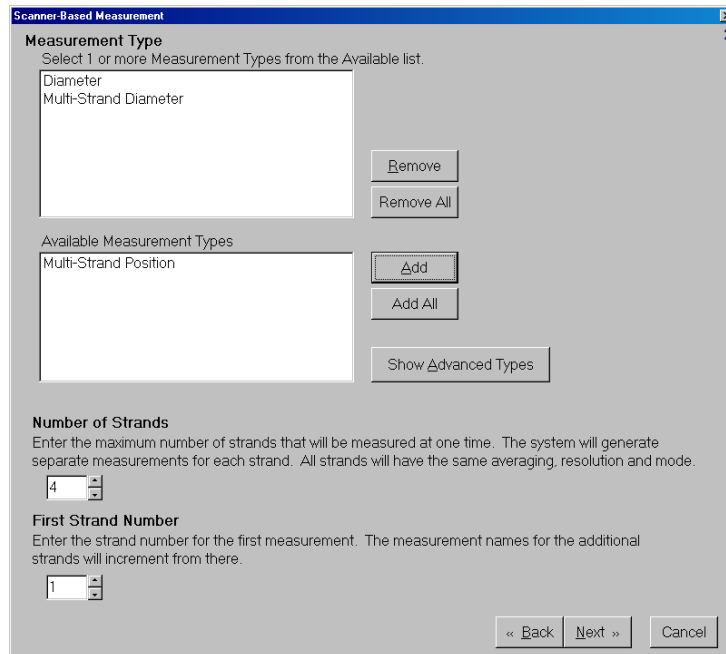
- 2.1.1 If the measurement you need is not in the list, click on the button **Show Advanced Types** and select from the list.



These measurements are used for several processes, including height, O-ring (two segments in the field), wall thickness, etc. You can create multiple measurements by holding down the **Ctrl** key and clicking on the desired measurements.



*Screen 2, with Advanced Types showing.*



*Screen 2, with Number of Strands and First Strand Number showing.*

## 2.2 Number of Strands.

- 2.2.1 Use the up/down arrows or enter a number for the maximum number of strands that will be measured at one time.

The system will generate separate measurement icons for each strand. All strands will have the same averaging resolution and mode.

## 2.3 First Strand Number.

- 2.3.1 Use the up/down arrows or enter a number for the first strand measurement.

The measurement numbers for the other strands will increase incrementally from there.

- 2.4 Click **Next** or press **Enter** to move to the next screen.

## 3 Measurement Mode, Reset Before Next Measurement, Clear Previous Value, and Edge Count Error Ends Part (screen 3).

The **Measurement Mode** specifies when the measurement begins; in continuous mode, the next measurement begins when the last one ends; in manual mode, an action or digital input triggers one measurement, and then the system waits for the next trigger to take another measurement. Most applications require continuous measurements.

**Note:** The parameters for **Reset Before Next Measurement**, **Clear Previous Value**, and **Edge Count Error Ends Part** appear only with a choice of **Part, Manual**.

- 3.1 Check the radio button for **Continuous** or **Part, Manual**.

- 3.2 If **Reset Before Next Measurement** is desired, check the box.

With **Reset Before Next Measurement**, the scan averaging is reset before the next measurement starts. This parameter ensures that none of the scans of the previous part will be included in the new measurement.

- 3.3 If **Clear Previous Value** is desired, check the box.

With **Clear Previous Value**, the value shown for the measurement will be cleared when the next measurement starts.

- 3.4 If **Edge Count Error Ends Part** is desired, check the box.

With **Edge Count Error Ends Part**, the **No Part** error will be used as an automatic indicating of the end of the part (i.e. the end of the measurement).

- 3.5 Click **Next** or press **Enter** to move to the next screen.

#### 4 Averaging Mode, Averaging Period, Running Average, and Discard Rejected Scans (screen 4).

All source micrometers scan at a fixed rate. For averaging by number of scans, the **Averaging Period** specifies how many of these scans to accumulate and average for each reported measurement value. The measurement update rate will be the scan rate of the micrometer divided by the **Averaging Period**.

The fewer scans averaged together, the less repeatable the measurement will be. Factory specifications are typically based on a two-second averaging period. One half- to one-second averaging times are usually similar, in repeatability, to the specified repeatability of the gauge. Averaging less than that will result in an increase in the repeatability error. For example: a TLAser 222 with a scan rate of 400 scans-per-second (-per axis) would provide excellent repeatability with averaging of 100 to 400 scans.

##### 4.1 Averaging Mode.

###### 4.1.1 If averaging by number of scans, select the radio button for **By Scans**.

Averaging by scans specifies the number of consecutive scans that are averaged to produce a single measurement reading. It is important to determine the needs specific to the material and process that you are monitoring. A higher number of scans averaged for a measurement is more accurate but takes longer; a lower number is less accurate but provides more measurements per second with lower latency. Additionally, lower scan averaging will provide a better picture of small defects and short-term trends. If the system “views” a flaw for only four scans, but averaging is set to 400 scans, the flaw will likely be “averaged out”.

###### 4.1.2 If averaging by distance, select the radio button for **By Distance**.

For example, if you want a measurement for every 6" of product. Knowing a measurement every specified distance might provide a better way to correlate the measurement data with a particular piece of machinery on the production line. Averaging by distance also has an advantage when using SPC. If averaging is done by scans or by time, the product that moves through the gauge more slowly will be given more weight (as more measurements will be taken) than the product moving more quickly (where there will be fewer measurements per foot). If **By Distance** is used, this is not the case, because one measurement will represent each specified distance, regardless of the speed.

Another reason might be to satisfy a customer demand. If a customer needs evidence that every foot of product has been inspected, you can use **Average by Distance** to document every foot of product.

**Note:** Averaging by distance requires the addition of an encoder.

## 4.2 Averaging Period.

4.2.1 In the box, enter the period over which you wish to accumulate scans.

If you have checked **By Distance**, the number you enter is in the units of measure specified in your encoder setup; if you checked **By Scans**, the number you enter is the number of scans. Scans collected during the averaging period will be averaged together before reporting the measurement value. When averaging by distance, this value indicates the distance over which averaging is done.

## 4.3 Running Average.

When **Running Average** is checked, the value reported will be that of the most recent scan plus the previous averaging period. For example, with the averaging period set to 500 and running average not checked, the measurement will update once every 500 scans. With running average checked, the measurement updates on every scan and the value is the average of that scan plus the previous 499 scans.

Running average ALWAYS yields a measurement rate equal to the scan rate. Running average should be avoided except when there is a specific need, because it will always yield a large volume of data. Examples of applications where running average is useful would include, small feature identification including threads, convolutions, corrugations, or flaws.

4.3.1 If **Running Average** is desired, select the box.

## 4.4 Discard Rejected Scans.

When **Discard Rejected Scans** is checked and unreasonable limits are specified for the measurement, scans that exceed the URL (upper reasonable limits) or are below the LRL (lower reasonable limits) will not be included in the average for the measurement.

4.4.1 If you wish to discard rejected scans, select the box.

4.5 Click **Next** or press **Enter** to move to the next screen.

## 5 Resolution, Offset, Calibration, and Indexing (screen 5).

Note: **Calibration** and **Indexing** are hidden until you select **Show Advanced Properties**.

The resolution is the number of digits to the right of the decimal point that will be displayed and recorded for the measurement. The resolution depends on either the product specifications or the number of decimal places the operator needs to see. For example: with specifications of  $.25'' \pm .0005''$ , you might choose five decimal places; with  $6'' \pm .008''$  you might choose four places.

Too many decimal places can be confusing if the operator is unfamiliar with the accuracy of digital measurement, because there will always be variation in a product; the more decimal places, the more that variation is visible.

- 5.1 Select the measurement resolution from the list of available resolutions.

When the **Use Offset** box is checked, the value is added to the measurement value before it is reported. A negative offset results in a smaller final measurement value.

- 5.2 Select which **Calibration**, if any, to use for the measurement.

It should be noted that a calibration associated with a measurement supersedes the calibration associated with the scanner. Changing scanner calibrations, either from the scanner/calibration path, or by associating a calibration with a recipe, and loading the recipe, will have no effect on the calibration associated with a measurement.

- 5.3 Indexing.

For some micrometers, indexing can improve measurement repeatability. The scanner calibration wizard creates a calibration for each facet of the scanning prism or mirror. Using the calibration that is matched to the facet that generated the scan can optimize measurement performance.

Indexing is particularly recommended if using flaw detection or with very low scan averaging (very low would be a number less than the number of scanning facets in the micrometer).

- 5.3.1 If **Indexed Calibrations** is desired, check the box.

- 5.4 Click **Next** or press **Enter** to move to the next screen.

## 6 Flaw Detection (screen 6).

Note: for a full exposition on the technical details and optimal parameter setup for Flaw Detection, please see LaserLinc's application note on the subject. The document is available for download at [http://public.laserlinc.com/LaserLinc\\_Defect\\_Detection.pdf](http://public.laserlinc.com/LaserLinc_Defect_Detection.pdf).

When you select the **Flaw Detection Mode**, a configuration screen for each mode will appear. The default is to have **Flaw Detection Mode** disabled. The choices are: **Absolute**, **Relative**, and **Both**.

Under **Absolute**, the configuration options are: **Absolute Flaw Size**, **Flaw Averaging**, **Flaw Length**, and **Location Offset**. Under **Relative**, **Relative Flaw Size** replaces **Absolute Flaw Size**. With a choice of **Both**, **Absolute Flaw Size** and **Relative Flaw Size** are both available.

- 6.1 **Absolute**.

- 6.1.2 **Flaw Length**.

- 6.1.2.a From the dropdown list select either **Scans** or **Seconds**.

- 6.1.2.b Enter the minimum number out of how many scans or seconds.
- 6.1.2.c Enter the number of non-flawed scans that must occur consecutively to conclude the flaw in progress (if any).
- 6.1.3 **Absolute Flaw Size:** Select **As a Dimension**, **% of Nominal** or **From Specifications**.
  - 6.1.3.a **As a Dimension:** A flaw is detected when the flaw average differs from the nominal value by the specified value.  
  
**Note:** Nominal refers to the nominal in the active specification recipe.
  - 6.1.3.b **% of Nominal: Flaw:** A flaw is detected when the flaw average differs from the nominal value by the specified percentage.
  - 6.1.3.c **From Specifications:** A flaw is detected when the flaw average exceeds the USL or LSL values.
- 6.1.4 **Flaw Averaging.**
  - 6.1.4.a Use the Up/Down arrows to select the number of scans to average for detecting flaws.
- 6.1.5 **Location Offset:** This value is added to the encoder distance reported with the flaw.
- 6.2 **Relative.**
  - 6.2.1 **Relative Flaw Size:** select either **As a Dimension** or **% Change**.
    - 6.2.1.a **As a Dimension:** A flaw is detected when the flaw average differs from the measurement average by the specified value.
    - 6.2.2.b **% Change:** A flaw is detected when the flaw average differs from the measurement average by the specified percentage.
  - 6.1.6 Click **Next** or press **Enter** to move to the next screen.
- 7 **Select Spec Limits** (not required) (screen 7).
  - 7.1 If **Tolerance Reporting** is desired, check the box.

Tolerance reporting is not yet operational. However, to see what it *does* do, check the tolerance reporting box(es) in the process tracker configuration, check the tolerance reporting box under the measurement configuration, set up a recipe for the measurement, then measure a part so that you get both good (green) and bad (red) measurements and see what appears in the **Process Tracker** window.

7.2 Click **Next** or press **Enter** to move to the next screen.

## 8 Measurement Complete Action (not required) (screen 8).

8.1 The selected action will be done after every new measurement value.

For setting up and configuring actions, please refer to the [Actions](#) chapter.

8.2 Click **Next** or press **Enter** to move to the next screen.

## 9 Measurement Name (screen 9).

9.1 Enter a name for the selected **Measurement Type** on the selected scanner.

The names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

Sample names: Line 1 XY Avg, Extruded 3 X, Y, ABC Avg, Coiler 5 OD, Ovality, Height, etc. For the benefit of the operator, names should be chosen in a way that clarifies what the measurements are for and where they are.

9.2 If you selected both **Multi-Strand Diameter** and **Multi-Strand Position**, you will need two separate names.

9.2.1 After entering the first name, click **Next** or press **Enter**.

9.2.2 Enter the second name.

9.3 Click **Finish** or press **Enter**.

An icon for your new **Scanner Measurement**, or icons for each strand of the new **Multi-strand Measurement** will appear in the **Measurements** window.

**Note:** To measure multi-stranded product, the software first needs to be “taught” the location of each strand within the measurement field. After the necessary information has been recorded, if a strand breaks (leaves the field), the software can determine which strand is broken and can continue measuring the remaining strands. After the multi-strand measurements have been created, a new option, **Profile Scanners...**, will appear in the **Configure** menu in Total Vu Software’s main window. With **Profile Scanners...**, you can run the **Multi-Strand Profile** to prepare the scanner for measuring. You can also be access the **Multi-Strand Profile** by creating a button and action combination on the Total Vu Software desktop. For a description of the **Multi-Strand Profile** wizard, please see the chapter: [Menu-based Total Vu Software Configurations](#).

### Creating Measurements with the Max/Min Measurement Wizard

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Measurement** icon to open the **Measurements** configuration window. In the window you will see icons for **Add Scanner Measurement**, **Add Functional Measurement**, and **Manage Offset Lists**; depending on your package, you might also see icons for **Add Max/Min Measurement**, **Add Pitch Measurement**, **Add Same Spot Measurement**, and **Manage Offset Lists**.

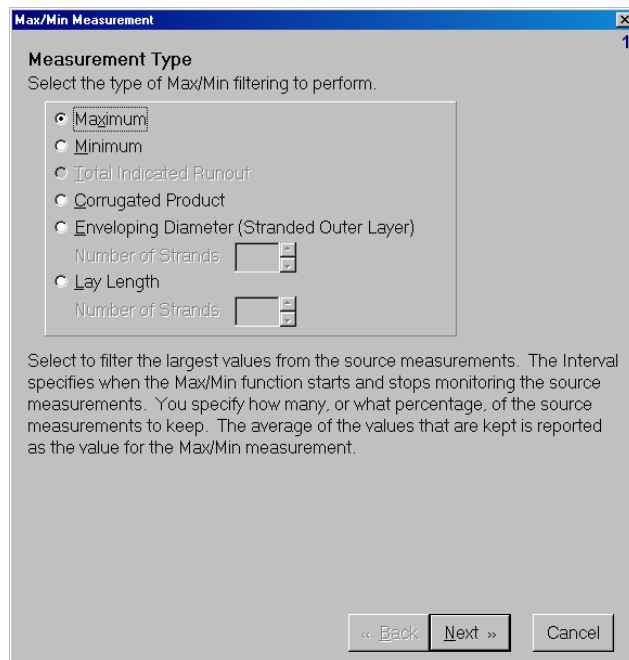
Double-click the **Add Max/Min Measurement** icon. This is a wizard, which will guide you through the setup process.

The first screen shows a list called **Measurement Type** (Maximum, Minimum, Total Indicated Runout (not yet operational), Corrugated Product, Enveloping Diameter, and Lay Length). The screen numbering for the steps in this wizard vary according to which measurement type is selected. The Table below describes the uses of the measurement types.

MEASUREMENTS TYPES	
NAME OF MEASUREMENT	DESCRIPTION OF MEASUREMENT TYPE
MAXIMUM	For filtering the largest values from the source measurements. The Interval specifies when the Max/Min function starts and stops monitoring the source measurements. You specify how many, or what percentage, of the source measurements to keep. The average of the values that are kept is reported as the value for the Max/Min Measurement.
MINIMUM	For filtering the smallest values from the source measurements. The Interval specifies when the Max/Min function starts and stops monitoring the source measurements. You specify how many, or what percentage, of the source measurements to keep. The average of the values that are kept is reported as the value for the Max/Min Measurement.



MEASUREMENTS TYPES	
NAME OF MEASUREMENT	DESCRIPTION OF MEASUREMENT TYPE
CORRUGATED PRODUCT	For measuring the Maximum and Minimum diameters of a corrugated product. On a corrugated product, the maximum and minimum diameters alternate. The corrugated product measurement type will generate two measurements: a maximum and a minimum. You must provide specifications for both (on the Specs tabs or from a recipe). For this filter, you should choose the Automatic option for the Interval Start and the Corrugation Cycle option for the Interval Stop.
ENVELOPING DIAMETER	(STRANDED OUTER LAYER) This filter is designed to measure a product where the outer layer is composed of some number of strands that wrap around the product. Select Enveloping Diameter to track the diameter of the circle that “envelopes” the product. For these products it is important to know the number of strands that wrap around the product to form its outer layer.
LAY LENGTH (Requires Zero Latency Encoder option)	Also called Pitch. Measures lay length of twisted pair cable, stranded products such as wire, and products with a helical wrap, such as armored cable.



Screen one of the Max/Min Measurement wizard.

## Creating Max/Min Measurements

### 1 Measurement Type—Maximum/Minimum (screen 1).

Although Maximum and Minimum are separate measurements, the setup process is identical, so they are grouped here.

#### 1.1 Check the radio button for **Maximum** or **Minimum** (depending on which you need at this point).

##### 1.1.1 Click **Next** or press **Enter** to move to the next screen.

### 2 Sources (screen 3).

#### 2.1 Select one or more measurements from the **Available Source Measurements List**.

#### 2.2 Click to **Add**.

Why would you select more than one source measurement? For example: If you are trying to find the maximum diameter on a product that is supposed to be round but isn't always. You could use a two-axis micrometer and look for the maximum diameter from either axis.

#### 2.3 Click **Next** or press **Enter** to move to the next screen.

### 3 Interval (screen 4).

The interval defines when the max/min filter starts and stops searching for maximums and/or minimums. When the interval is over, the maximum and/or minimum value is reported.

#### 3.1 Select the start of the interval (choices are: automatic, the start of the part, an action, or an external source such as an alarm or digital input). For automatic, there are no other choices, so it is not detailed below.

For:

##### 3.1.1 **Digital Input**, click the radio button.

3.1.1.a And from the drop-down list that appears, select the input device.

##### 3.1.2 **Alarm**, click the radio button.

3.1.2.a And from the drop-down list that appears, select the alarm.

##### 3.1.3 **Start of Part**, click the radio button.

3.1.3.a And from the drop-down list that appears, select the scanner that will detect the beginning of the part.

3.1.4 **Action** (if one has been or will be created), choose action.

**Note:** To start (or stop) this action, you can place a button on the main interface.

3.2 Select the stopping point for the interval (this can be from counting a number of measurements, number of seconds, distance, end of part, corrugation cycle, action, or digital input).

For:

3.2.1 **Measurement Count**, click the radio button.

3.2.1.a And in the box that appears, enter the number that will define the size of the pool of measurements from which the largest (or smallest) will be taken.

3.2.2 **Seconds**, click the radio button.

3.2.2.a And in the box that appears, enter the duration of the interval, in seconds.

3.2.3 **Distance**, click the radio button.

3.2.3.a And in the box that appears, enter the desired distance, in the units specified in the encoder setup.

3.2.4 **Digital Input**, click the radio button.

3.2.4.a And from the drop-down list that appears, select the input device.

3.2.5 **End of Part**, click the radio button.

3.2.5.a And from the drop-down list that appears, select the scanner that will be used to detect the end of the part.

3.2.6 **Action** (if one has been or will be created), select action.

3.3 Click **Next** or press **Enter** to move to the next screen.

4 **Running Average, Number to Keep, and Resolution** (screen 5).

With **Running Average**, the source measurement data will be “smoothed” using a “moving” average. The results of the running average will be sorted for maximums and/or minimums.

4.1 If a **Running Average** is desired:

4.1.1 Check the **Use Running Average** radio button.

4.1.2 Enter the number of measurements you wish to average.

4.2 **Number to Keep:** Defines the number of measurements to keep and average from the source or sources chosen in screen three. The number to keep can be specified as an absolute number or as a percentage. The measurements that are kept from the interval are collected and their average value is reported as the maximum or minimum.

4.2.1 For **Number to Keep:**

4.2.1.a Click the radio button.

4.2.1.b Enter the number of measurements you wish to keep.

4.2.2 For **Percent of Total:**

4.2.2.a Click the radio button.

4.2.2.b Enter the percent of total and the maximum number to keep.

4.3 **Resolution:** From the drop-down menu, select the number of places in the measurement value for display to the right of the decimal point.

4.4 Click **Next** or press **Enter** to move to the next screen.

5 **Select Spec Limits** (not required)(screen 6).

There are rare circumstances in which someone would want specifications for a measurement but would want to bypass the recipe mechanism. One example is a specification that never changes, regardless of recipe. Another possibility is when using OPC—a special extension to Microsoft's Object Linking and Embedding (OLE) feature. Specifications can be downloaded to Total Vu Software from other applications using OPC. In that case, the measurement always needs to have a specification assigned to it.

5.1 Click **Next** or press **Enter** to move to the next screen.

6 **Measurement Complete Action** (screen 8).

6.1 The selected action will be done after every new measurement value.

For setting up and configuring actions, please refer to the chapter on [actions](#).

6.2 Click **Next** or press **Enter** to move to the next screen.

7 **Measurement Name** (screen 9).

7.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

- 7.2 Click **Finish** or press **Enter**.

An icon for the new **Maximum** or **Minimum** measurement will appear in the **Measurements** window.

## Creating Corrugated Product Measurements

- 1 **Measurement Type—Corrugated Product** (screen 1).

- 1.1 Check the radio button for **Corrugated Product**.

- 1.2 Click **Next** or press **Enter** to move to the next screen.

- 2 **Source** (screen 2).

- 2.1 Select the measurement to filter for maximums and/or minimums.

- 2.2 Click **Next** or press **Enter** to move to the next screen.

- 3 **Interval** (screen 4).

The Interval defines when the max/min filter starts and stops searching for maximums and/or minimums. When the interval is over, the maximum and/or minimum value is reported.

- 3.1 Select the start of the interval (this can be automatic, from the start of the part, from an action, or from an external source such as an alarm or digital input—for corrugated product, automatic is the most common). For automatic, there are no other choices, so it is not detailed below.

For:

- 3.1.1 **Digital Input**, click the radio button.

- 3.1.1.a And from the drop-down list that appears, select the input device.

- 3.1.2 **Alarm**, click the radio button.

- 3.1.2.a And from the drop-down list that appears, select the alarm.

- 3.1.3 **Start of Part**, click the radio button.

3.1.3.a And from the drop-down list that appears, select the scanner that will detect the beginning of the part.

3.1.4 **Action** (if one has been or will be created), choose action.

**Note:** To start (or stop) this action, you can place a button on the main interface.

3.2 Select the stopping point for the interval (this can be from counting a number of measurements, number of seconds, distance, end of part, corrugation cycle, action, or digital input.)

**Corrugation Cycle** is almost exclusively the best choice for corrugated product. In a corrugated product, the software automatically looks for alternating peaks and valleys in the product. With **Corrugation Cycle**, when the software identifies a peak or valley, it will automatically begin searching for the alternate valley or peak. It is rare that this would not be the choice for corrugated product.

For:

3.2.1 **Measurement Count**, click the radio button.

3.2.1.a And in the box that appears, enter the number that will define the size of the pool of measurements from which the largest (or smallest) will be taken.

3.2.2 **Seconds**, click the radio button.

3.2.2.a And in the box that appears, enter the duration of the interval, in seconds.

3.2.3 **Distance**, click the radio button.

3.2.3.a And in the box that appears, enter the desired distance, in the units specified in the encoder setup.

3.2.4 **Digital Input**, click the radio button.

3.2.4.a And from the drop-down list that appears, select the input device.

3.2.5 **End of Part**, click the radio button.

3.2.5.a And from the drop-down list that appears, select the scanner that will be used to detect the end of the part.

3.2.6 **Action** (if one has been or will be created), select action.

3.3 Click **Next** or press **Enter** to move to the next screen.

#### 4 Running Average, Number to Keep, and Resolution (screen 5).

**Running Average:** the source measurement data will be “smoothed” using a “moving” average. The results of the running average will be sorted for maximums and/or minimums.

##### 4.1 If a Running Average is desired:

4.1.1 Check the **Use Running Average** radio button.

4.1.1 Enter the number of measurements you wish to average.

4.2 **Number to Keep:** Defines the number of measurements to keep and average from the source or sources chosen in screen three. The number to keep can be specified as an absolute number or as a percentage. The measurements that are kept from the interval are collected and their average value is reported as the maximum or minimum.

##### 4.2.1 If Number to Keep is desired:

4.2.1.a Click the radio button.

4.2.1.b Enter the number of measurements you wish to keep.

##### 4.2.2 If Percent of Total is desired:

4.2.2.a Click the radio button.

4.2.2.b Enter the percent of total and the maximum number to keep.

4.3 **Resolution:** From the drop-down menu, select the number of places in the measurement value to display on the right of the decimal point.

4.4 Click **Next** or press **Enter** to move to the next screen.

#### 5 Select Spec Limits for Peak (not required)(screen 6).

5.1 Click **Next** or press **Enter** to move to the next screen.

#### 6 Select Spec Limits for Valley (not required)(screen 7).

6.1 Click **Next** or press **Enter** to move to the next screen.

#### 7 Measurement Complete Action (screen 8).

7.1 The selected action will be done after every new measurement value.

7.2 Click **Next** or press **Enter** to move to the next screen.

## 8 Measurement Name (screen 9).

### 8.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

Additionally, there are options for Peak/Valley, Max/Min, OD/ID, High/Low, and Custom. With Peak/Valley, Max/Min, OD/ID, and High/Low, the software automatically assigns a name based on the measurement name and the choice of Peak/Valley, etc. For example, if you enter a measurement name of Ridged Hose and choose Peak/Valley, you will get measurements entitled Ridged Hose Peak and Ridged Hose Valley.

With the choice of Custom, boxes appear for entering names for the Maximum and Minimum.

### 8.2 Select the radio button for Peak/Valley, Max/Min, OD/ID, High/Low, or Custom.

8.2.1 If you selected Custom, enter the names for Maximum and Minimum.

### 8.2 Click Finish or press Enter to exit the wizard.

Icons for the new Corrugated Product measurement (maximum and minimum) will appear in the Measurements window.

## Creating Enveloping Diameter (Stranded Outer Layer) Measurements

### 1 Measurement Type—Enveloping Diameter (screen 1).

1.1 Check the radio button for Enveloping Diameter.

1.2 Using the up/down arrows, specify the number of strands that wrap the product.

1.3 Click Next or press Enter to move to the next screen.

### 2 Sources (screen 2).

2.1 Select the measurement to filter for maximums and/or minimums.

2.2 Click Next or press Enter to move to the next screen.

### 3 Interval (screen 4).

The Interval defines when the max/min filter starts and stops searching for maximums and/or minimums. When the interval is over, the maximum and/or minimum value is reported.



- 3.1 Select the start of the Interval (this can be automatic, from the start of the part, from an action, or from an external source such as an alarm or digital input). For **Automatic**, there are no other choices, so it is not detailed below.

For:

- 3.1.1 **Digital Input**, click the radio button.

- 3.1.1.a And from the drop-down list that appears, select the input device.

- 3.1.2 **Alarm**, click the radio button.

- 3.1.2.a And from the drop-down list that appears, select the alarm.

- 3.1.3 **Start of Part**, click the radio button.

- 3.1.3.a And from the drop-down list that appears, select the scanner that will detect the beginning of the part.

- 3.1.4 **Action** (if one has been or will be created), choose action.

**Note:** To start (or stop) this action, you can place a button on the main interface.

- 3.2 Select the stopping point for the interval (this can be from counting a number of measurements, number of seconds, distance, end of part, corrugation cycle, action, or digital input).

For:

- 3.2.1 **Measurement Count**, click the radio button.

- 3.2.1.a And in the box that appears, enter the number that will define the size of the pool of measurements from which the largest (or smallest) will be taken.

- 3.2.2 **Seconds**, click the radio button.

- 3.2.2.a And in the box that appears, enter the duration of the interval, in seconds.

- 3.2.3 **Distance**, click the radio button.

- 3.2.3.a And in the box that appears, enter the desired distance, in the units specified in the encoder setup.

- 3.2.4 **Digital Input**, click the radio button.

- 3.2.4.a And from the drop-down list that appears, select the input device.
- 3.2.5 **End of Part**, click the radio button.
  - 3.2.5.a And from the drop-down list that appears, select the scanner that will be used to detect the end of the part.
  - 3.2.6 **Action** (if one has been or will be created), select action.
- 3.3 Click **Next** or press **Enter** to move to the next screen.
- 4 **Running Average, Number to Keep, and Resolution** (screen 5).

**Running Average:** the source measurement data will be “smoothed” using a “moving” average. The results of the running average will be sorted for maximums and/or minimums.

  - 4.1 If a **Running Average** is desired:
    - 4.1.1 Check the **Use Running Average** radio button.
    - 4.1.2 Enter the number of measurements you wish to average.
  - 4.2 **Number to Keep:** Define the number of measurements to keep and average from the source or sources chosen in screen three. The number to keep can be specified as an absolute number or as a percentage. The measurements that are kept from the interval are collected and their average value is reported as the maximum or minimum.
    - 4.2.1 If **Number to Keep** is desired:
      - 4.2.1.a Click the radio button.
      - 4.2.1.b Enter the number of measurements you wish to keep.
    - 4.2.2 If **Percent of Total** is desired:
      - 4.2.2.a Click the radio button
      - 4.2.2.b Enter the percent of total and the maximum number to keep.
  - 4.3 **Resolution:** From the drop-down menu, select the number of places in the measurement value to display to the right of the decimal point.
  - 4.4 Click **Next** or press **Enter** to move to the next screen.
- 5 **Select Spec Limits** (not required)(screen 6).
  - 5.1 Click **Next** or press **Enter** to move to the next screen.

## 6 Measurement Complete Action (screen 8).

6.1 The selected action will be done after every new measurement value.

6.2 Click **Next** or press **Enter** to move to the next screen.

## 7 Measurement Name (screen 9).

7.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

7.2 Click **Finish** or press **Enter** to exit the wizard.

An icon for the new **Enveloping Diameter** measurement will appear in the **Measurements** window.

## Creating Lay Length Measurements

### 1 Measurement Type—Lay Length (screen 1).

**Note:** Lay Length requires the Zero Latency Encoder option.

1.1 Check the radio button for **Lay Length**.

1.1.1 Using the up/down arrows, specify the number of strands in this product.

1.2 Click **Next** or press **Enter** to move to the next screen.

### 2 Source (screen 2).

2.1 Select the measurement to monitor for Lay Length.

2.2 Click **Next** or press **Enter** to move to the next screen.

### 3 Interval (screen 4).

The Interval defines when the max/min filter starts and stops searching for maximums and/or minimums. When the interval is over, the maximum and/or minimum value is reported.

3.1 Select the start of the Interval (this can be automatic, from the start of the part, from an action, or from an external source such as an alarm or digital input). For **Automatic**, there are no other choices, so it is not detailed below.

For:

3.1.1 **Digital Input**, click the radio button.

3.1.1.a And from the drop-down list that appears, select the input device.

3.1.2 **Alarm**, click the radio button.

3.1.2.a And from the drop-down list that appears, select the alarm.

3.1.3 **Start of Part**, click the radio button.

3.1.3.a And from the drop-down list that appears, select the scanner that will detect the beginning of the part.

3.1.4 **Action** (if one has been or will be created), choose action.

**Note:** To start (or stop) this action, you can place a button on the main interface.

3.2 Select the stopping point for the interval (this can be from counting a number of measurements, number of seconds, distance, end of part, corrugation cycle, action, or digital input).

For:

3.2.1 **Measurement Count**, click the radio button.

3.2.1.a And in the box that appears, enter the number that will define the size of the pool of measurements from which the largest (or smallest) will be taken.

3.2.2 **Seconds**, click the radio button.

3.2.2.a And in the box that appears, enter the duration of the interval, in seconds.

3.2.3 **Distance**, click the radio button.

3.2.3.a And in the box that appears, enter the desired distance, in the units specified in the encoder setup.

3.2.4 **Digital Input**, click the radio button.

3.2.4.a And from the drop-down list that appears, select the input device.

3.2.5 **End of Part**, click the radio button.

3.2.5.a And from the drop-down list that appears, select the scanner that will be used to detect the end of the part.

3.2.6 Action (if one has been or will be created), select action.

3.3 Click **Next** or press **Enter** to move to the next screen.

#### 4 Running Average, Number to Keep, and Resolution (screen 5).

**Running Average:** the source measurement data will be “smoothed” using a “moving” average. The results of the running average will be sorted for maximums and/or minimums.

4.1 If a **Running Average** is desired:

4.1.1 Check the **Use Running Average** radio button.

4.1.2 Enter the number of measurements you wish to average.

4.2 **Number to Keep:** Defines the number of measurements to keep and average from the source or sources chosen in screen three. The number to keep can be specified as an absolute number or as a percentage. The measurements that are kept from the interval are collected and their average value is reported as the maximum or minimum.

4.2.1 If **Number to Keep** is desired:

4.2.1.a Click the radio button.

4.2.1.b Enter the number of measurements you wish to keep.

4.2.2 If **Percent of Total** is desired:

4.2.2.a Click the radio button.

4.2.2.b Enter the percent of total and the maximum number to keep.

4.3 **Resolution:** From the drop-down menu, select the number of places in the measurement value to display to the right of the decimal point.

4.4 Click **Next** or press **Enter** to move to the next screen.

#### 5 Select Spec Limits (not required)(screen 6).

5.1 Click **Next** or press **Enter** to move to the next screen.

## 6 Measurement Complete Action (screen 8).

- 6.1 The selected action will be done after every new measurement value.
- 6.2 Click **Next** or press **Enter** to move to the next screen.

## 7 Measurement Name (screen 9).

- 7.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

- 7.2 Click **Finish** or press **Enter** to exit the wizard.

An icon for the new **Lay Length** measurement will appear in the **Measurements** window.

## Creating a Pitch Measurement with the Add Pitch Measurement Wizard

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Measurement** icon to open the **Measurements** configuration window. In the window you will see icons for **Add Scanner Measurement**, **Add Functional Measurement**, and **Manage Offset Lists**; depending on your package, you might also see icons for **Add Max/Min Measurement**, **Add Pitch Measurement**, **Add Same Spot Measurement**, and **Manage Offset Lists**.

Double-click the **Add Pitch Measurement** icon. This is a wizard, which will guide you through the setup process.

## 1 Measurement Type and Corrugated Product (screen 1).

The first screen is divided into sections for choosing the **Measurement Type** (Pitch: **Peak-to-Peak**, **Peak-to-Valley**, and **Peaks per Unit Length**) and for choosing the **Corrugated Product** for which you want to measure a pitch-related property.

**Note:** a measurement for corrugated product must have been previously created with the **Add Max/Min Measurement** wizard.

- 1.1 Select the **Measurement Type**.
- 1.2 Select the **Corrugated Product**.
- 1.3 Click **Next** or press **Enter** to move to the next screen.

## 2 Number to Average (or Unit of Length), Running Average, and Resolution (screen 2).

If you chose **Peaks per Unit Length** in section 1.1, then instead of **Number to Average** you will see a parameter for **Unit of Length** and instead of **Running Average** you will see **Averaging Period**.

### 2.1 For Pitch: **Peak-to-Peak** or Pitch: **Peak-to-Valley**:

#### 2.1.1 Enter the **Number to Average**.

**Number to Average** is the number of pitch values to average together before reporting a new value for this measurement.

#### 2.1.2 If **Running Average** is desired, check the box.

If checked, the value will be reported as the average of a user-specified number of the most recent measurements.

### 2.2 For **Peaks per Unit Length**:

#### 2.2.1 From the drop-down list, select the unit of length over which to count peaks.

For example, if **Foot** is selected, then the measurement value is the number of peaks per foot.

#### 2.2.2 In the box, enter a value for the **Averaging Period**.

This value is the length of product over which to count peaks.

### 2.3 Select the **Resolution**.

### 2.4 Click **Next** or press **Enter** to move to the next screen.

## 3 Select **Spec Limits** (not required)(screen 3).

### 3.1 Click **Next** or press **Enter** to move to the next screen.

## 4 Measurement Name (screen 4).

### 4.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

### 4.2 Click **Finish** or press **Enter** to exit the wizard.

An icon for the new **Pitch Measurement** will appear in the **Measurements** window.

## Creating a Functional Measurement with the Functional Measurement Wizard

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Measurement** icon to open the **Measurements** configuration window. In the window you will see icons for **Add Scanner Measurement**, **Add Functional Measurement**, and **Manage Offset Lists**; depending on your package, you might also see icons for **Add Max/Min Measurement**, **Add Pitch Measurement**, **Add Same Spot Measurement**, and **Manage Offset Lists**.

Double-click the **Add Functional Measurement** icon. This is a wizard, which will guide you through the setup process.

### 1 Operation (screen 1).

#### 1.1 Select the math operation that you would like to do.

OPERATION	EQUATION (IF ANY)
Add	$A + B + \dots + Z$
Subtract	$A - B$
Absolute Subtraction	$ \text{Maximum} - \text{Minimum} $
Average	$(A + B + \dots + Z) / \text{Number of Operands}$
Product.	$A * B * \dots * Z$
Ratio	$A/B$
Larger/Smaller	$\text{Max}(A, B) \setminus \text{Min}(A, B)$
Deviation	$A - \text{Nominal of } A$
Running Average	Average of most recent N values for A
Maximum	$\text{Max}(A, B, \dots, Z)$
Minimum	$\text{Min}(A, B, \dots, Z)$
Worst	$\text{Max}(A \text{ Deviation}, B \text{ Deviation}, \dots, Z \text{ Deviation})$
Average Wall Thickness	$(A - B) \setminus 2$
Inside Diameter	$A - (B * 2)$



OPERATION	EQUATION (IF ANY)
Eccentricity/Ovality (Difference)	proprietary
Eccentricity/Ovality (4-axis)	proprietary
Circumference	Average Diameter * Pi
Area of Circle/Ellipse	$Pi * (A^2) * (B^2)$
Relative Standard Deviation (RSD)	Standard Deviation\Average * 100
Standard Deviation (Immediate)	Standard Deviation(A, B, ..., Z)
RSD (Immediate)	RSD(A, B, ..., Z)
Side of Right Triangle	$Sqrt((A * A) - (B * B))$
Hypotenuse (Pythagorean Theorem)	$(Sqrt(A * A) + (B * B))$
Straightness	proprietary
Weight	$(A^2) * (A^2) * Length * Pi$ * Density (B)
Hex Flat-to-Flat Distance	proprietary

1.2 Click **Next** or press **Enter** to move to the next screen.

## 2 Operands (screen 2).

For Operations: Subtract, Ratio, Larger/Smaller, Deviation, Running Average, Average Wall Thickness, Inside Diameter, Eccentricity/Ovality (Difference), Eccentricity/Ovality (4-axis), Area of Circle/Ellipse, Relative Standard Deviation (RSD), Side of Right Triangle, Hypotenuse (Pythagorean Theorem, Straightness, Weight, Hex Flat-to-Flat Distance).

2.1 Supply the operands for the operation.

Use the drop-down lists and/or edit the boxes. You can enter a constant value in place of selecting a measurement. However: there must be at least one operand that is a measurement.

2.2 Click **Next** or press **Enter** to move to the next screen.

## 3 Operands (screen 3).

For Operations: Add, Absolute Subtraction, Average, Product, Maximum, Minimum, Worst, Circumference, Standard Deviation (Immediate), RSD (Immediate).

3.1 Select the operands to the function. For some operations, you can also supply a constant operand by checking the **Include Constant Operand** box (shown only if allowed).

3.2 Click **Next** or press **Enter** to move to the next screen.

4 **Number to Average, Running Average, Offset, and Resolution** (screen 4).

4.1 Enter the number of times to compute the function before reporting a new measurement value. The value will be the average of the results of the function.

With averaging of one, all operands must update at least once to compute and report a new value for the measurement. With averaging of two, the value for the measurement is not reported until all operands have updated again *after* the first function result is computed. To compute the value of the function a second time, all operands must first report new values. Then, those two function results are summed and the average is reported as the new measurement value.

4.2 If **Running Average** is desired, check the box.

If checked, the value will be reported as the average of a user-specified number of the most recent measurements. Each complete set of new constituent measurements (one of each operand) will result in one new functional measurement.

4.3 If you will be using an **Offset**, check the box.

When the **Use Offset** box is checked the value below is added to the computed value of the function before it is reported. A negative **Offset** results in a smaller final measurement value.

4.4 Select the **Resolution**.

4.5 Click **Next** or press **Enter** to move to the next screen.

5 **Measurement Mode** (screen 5).

The measurement mode specifies when the measurement begins.

5.1 For **Continuous** measuring, check the appropriate box.

In **Continuous Mode**, the next measurement begins after the last one ends.

5.2 For **Manual** measuring, check the appropriate box.

In **Manual Mode**, an action or a digital input must trigger the measurement.

5.2.1 If you chose manual and wish to use **Reset Before Next Sample**, check the box.

Reset Before Next Sample ensures that the measurement averaging starts fresh when triggered. Buffers are cleared of latent data that might have lingered from a previous sample. Resetting is useful for discrete samples but generally not useful for continuous products (wire, cable, tube, etc.).

5.3 Click **Next** or press **Enter** to move to the next screen.

6 Select **Spec Limits** (not required)(screen 6).

6.1 Click **Next** or press **Enter** to move to the next screen.

7 **Measurement Name** (screen 7).

7.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

7.2 Click **Finish** or press **Enter** to exit the wizard.

An icon for the new **Functional Measurement** will appear in the **Measurements** window.

### Creating a Same Spot Measurement with the Same Spot Measurement Wizard

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Measurement** icon to open the **Measurements** configuration window. In the window you will see icons for **Add Scanner Measurement**, **Add Functional Measurement**, and **Manage Offset Lists**; depending on your package, you might also see icons for **Add Max/Min Measurement**, **Add Pitch Measurement**, **Add Same Spot Measurement**, and **Manage Offset Lists**.

Double-click the **Add Same Spot Measurement** icon. This is a wizard, which will guide you through the setup process.

The **Same Spot** measurement buffers data from the upstream location until the product gets to the downstream location where the **Same Spot** measurement is completed. For **Same Spot** applications, the encoder setup is critical. The accuracy of the **Same Spot** measurement will be adversely impacted, potentially seriously, if the distance between the gauges is not specified accurately.

**Note:** You must have at least two scanners on a line, with continuous scanning, to do a **Same Spot** measurement, and you must set up a measurement for both the upstream (before) and the downstream (after) scanners, for whatever type of measurement you wish to do. Screens in this wizard are not numbered.

## 1 New Same Spot Measurement.

1.1 Select measurements for **upstream**.

1.2 Select measurements for **downstream**.

**Note:** The measurements for upstream and downstream must be on different scanners.

1.3 Select the operation used to compute the change in the product size (selecting from: Average Wall Thickness, Shrinkage, Material Added, Material Removed).

The equations for these choices are:

Average Wall Thickness	$(\text{Downstream} - \text{Upstream})/2$
Shrinkage	$\text{Upstream} - \text{Downstream}$
Material Added	$\text{Downstream} - \text{Upstream}$
Material Removed	$\text{Upstream} - \text{Downstream}$

1.4 In the window, enter the **Separation Distance** (in the units specified in your encoder configuration).

This value is the distance between the upstream and downstream scanners.

1.5 Click **Next** or press **Enter** to move to the next screen.

## 2 Averaging Distance, Resolution, and Offsets.

2.1 Enter the distance (in the units specified in the encoder configuration) over which to average scans of the product.

Averaging scans over a length of product rather than using a specific number of scans makes the same spot measurement immune to fluctuations in line speed.

2.2 Select the resolution for the new measurement.

2.3 If an offset distance is needed, check the box for **Use Offset** and enter a value.

When the **Use Offset** box is checked, the value below is added to the measurement before the measurement is reported. Note that a negative offset results in a smaller final measurement value.

2.4 Click **Next** or press **Enter** to move to the next screen.

## 3 Specification Limits (not required).

Specification limits can be assigned here. The drop-down list is loaded with all of the existing specification limits. When each limit is selected, the settings are displayed.

- 3.1 If you will be using a specification limit, select it from the drop-down list.
- 3.2 Click **Next** or press **Enter** to move to the next screen.

#### 4 Measurement Name.

- 4.1 Enter the name for the new measurement.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

- 4.2 Click **Next** or press **Enter** to move to the next screen.

#### 5 Verification.

- 5.1 The screen shows the Same Spot parameters that you have chosen. Verify that they are correct.
- 5.2 If a parameter needs to be modified, click the **Back** button to return to the appropriate screen; otherwise, click **Finish** or press **Enter** to exit the wizard.

An icon for the new **Same Spot Measurement** and icons for downstream and upstream (measurement name-DS and measurement name-US) will appear in the **Measurements** window. The DS and US icons cannot be edited directly. Modifications made in the main icon will apply to DS and US.

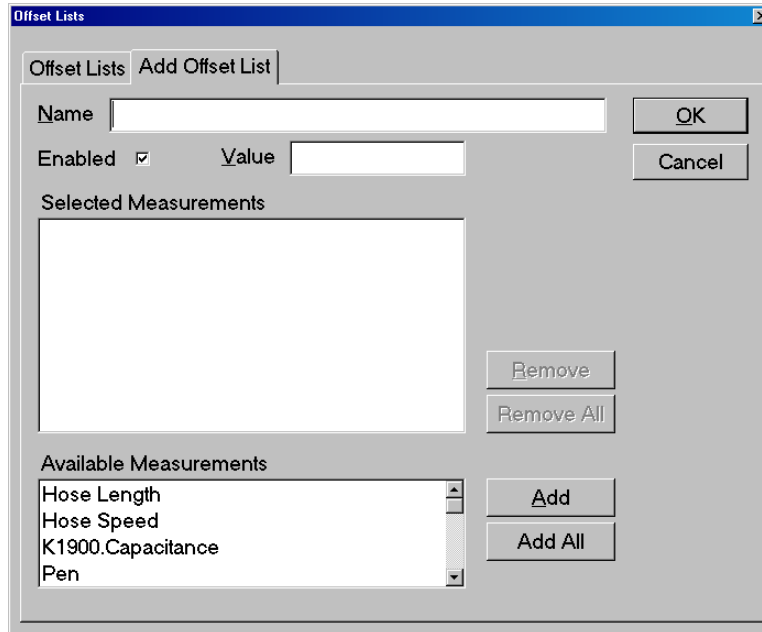
### Managing Offset Lists with the Offset List Wizard

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Measurement** icon to open the **Measurements** configuration window. In the window you will see icons for **Add Scanner Measurement**, **Add Functional Measurement**, and **Manage Offset Lists**; depending on your package, you might also see icons for **Add Max/Min Measurement**, **Add Pitch Measurement**, **Add Same Spot Measurement**, and **Manage Offset Lists**.

Double-click the **Manage Offset Lists** icon. This is a wizard, which will guide you through the process.

Offset Lists are used for multi-axis and “duplicate” measurement situations. For example, with dual-axis X, Y, XY average measurements: to put an offset on the diameter of the product, the same offset value should be applied to X, Y, and XY average. By using an offset list, you ensure that changing an offset on any of the three puts the same offset on all three.

Another example is “duplicate” measurements—a product that has a diameter measurement with one-second averaging for SPC and data-collection, another for the same product that has a diameter measurement with a 10-second running average for control. Because they are measurements of the same product, an Offset on one of the measurements needs to be on both.



*The Add Offset List window.*

- 1 If you are adding a new Offset click Add.

A new tab will appear entitled: Add Offset List. The screen has blanks for Name and Value, and a list of available measurements.

- 1.1 Enter a name for the Offset in the blank for Name.
- 1.2 Enter a value for the Offset in the blank for Value.
- 1.3 Select from the list of available measurements and click Add.
- 1.4 Click OK.

The value for the offset will now appear under the **General** tab for the measurement selected in section 1.3, list of available measurements. To see the value, go back to the **Measurements** configuration window and double-click the icon for the measurement selected in 1.3 and view the **General** tab.

- 2 If you are editing an existing Offset, select an Offset List from the existing Offsets and click **Edit**.
  - 2.1 A new tab will appear entitled: **Edit Offset List**. Make whatever modifications need to be made.
  - 2.2 Click **OK**.

### Actions Specific for Measurements

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for measurements.

- *Sample Discrete Measurements*: Takes one reading for each of the selected discrete measurements. You need to specify whether to restart the averaging before sampling.
- *Reset Measurements*: Clear tolerance status and reset measurement averaging for each of the selected measurements.
- *Change Measurement Offset*: Changes the measurement offset.

For flaw detection:

- *Turn Flaw Detection On*: Enables flaw detection on the selected measurements. When flaw detection is turned on, the flaw detection logic is reset to ensure that no old data is used.
- *Turn Flaw Detection Off*: Disables flaw detection on the selected measurements. No flaws will be reported from the affected measurements.
- *Turn Flaw Detection On/Off*: If the previous execution of this action enabled flaw detection, then flaw detection will be disabled; if the previous execution disabled flaw detection, then flaw detection will be re-enabled and the flaw detection logic will be reset for the affected measurements.
- *Generate Flaw Report*: Prints and/or saves to disk a flaw report for the selected measurements. You can select options to clear flaws automatically after the report or turn flaw detection on or off.
- *Clear Flaws*: Clears flaws from all of the selected measurements.

For max/min measurements:

- *Start Max/Min Data Collection Interval*: Starts collecting and sorting measurement values to find maximums or minimums. To activate, you must select the max/min measurements.
- *Stop Max/Min Data Collection Interval*: Stops collecting measurement values and reports the average of the largest or smallest values according to the data processing rules in the max/min measurement configuration.

- *Start/Stop Max/Min Data Collection Interval:* If the last execution of the action started the max/min interval, the next will stop it, and the measurement value will update; if the last execution stopped the interval, the next will start it.



## Creating and Working with Recipes

**Recipes** are groupings of settings that provide a convenient means of assigning one or more specifications to measurements. Recipes can also be used to associate measurement offsets and specific scanner calibrations with a particular product. A recipe can include all of the different dimensional specifications for a product, as well as a speed specification if the encoder option is enabled, and after creation, the recipe is available for an operator to load. With recipes, you can quickly and seamlessly switch from scanning the production of one product to another.

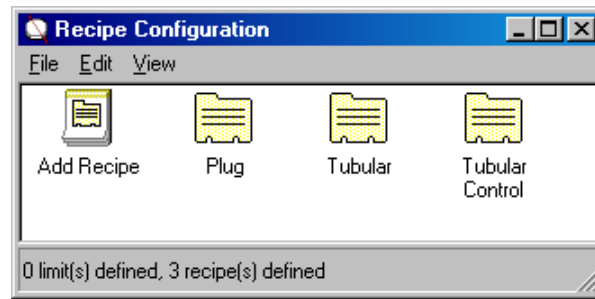
**Specification Limits** are used to define a set of values to be compared with a measured product size. Alarms can be generated if the measured product size falls outside the defined limits. A single set of specification limits can be assigned to multiple measurements. An unlimited number of specification limits can be defined.

Recipes contain zero or more specification limits and each set of specification limits is associated with one or more measurement(s) that will receive the specification limits when the recipe is activated. Specification recipes might also contain information regarding offsets or specific calibrations that need to be used with the product. Recipes are useful when running more than one product on a line, and allow an operator to quickly switch from one set of product specifications to another. Recipes are preferred over specification limits because they are generally more flexible and encompass all of the features of specification limits. Therefore specification limits by default are not visible in the configuration window.

**Note:** The **Specification Limits** feature is provided for backward compatibility only—do not use this feature unless your previous installation and program configuration used specification limits and you do not want to re-enter them using the **Recipe** feature.

### Creating A New Recipe

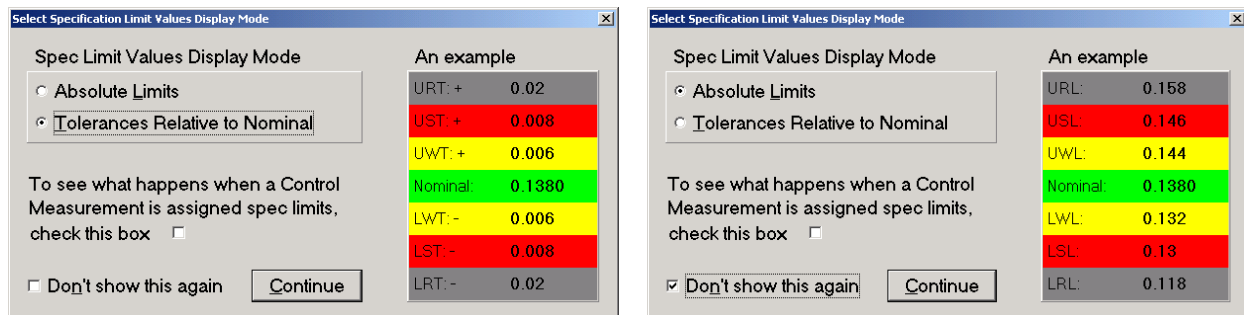
- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Recipes** icon to open the **Recipes Configuration** window. In the window you will see an icon for **Add Recipe**.



The *Recipe configuration window*, showing the *Add Recipe wizard* and several user-defined recipes that have already been created. Note that the *View* is set to show *Recipes only*. You can also set the *View* to *Recipes and Specifications and Specifications only*

Double-click the *Add Recipe* icon. This is a wizard, which will guide you through the setup process.

- 1 The first screen is mainly to show specification examples, but checking the box for either **Absolute Limits** or **Tolerances Relative to Nominal** will set that choice as your default.



The first screen, with *Tolerances Relative to Nominal* checked on the right and *Absolute Limits* checked on the left.

- 1.1 If you do not wish to see the screen each time you add a recipe, check the box for **Don't show this again**.
- 1.2 Check the radio button for **Absolute Limits** or **Tolerances Relative to Nominal**.

**Absolute Limits:** A specification is absolute if the upper and lower limits are indicated as an actual measurement value (as opposed to a deviation from nominal value). Those upper and lower limits are entered at **USL** (Upper Spec Limit) and **LSL** (Lower Spec Limit).

**Tolerances Relative to Nominal:** Nominal is specified as an absolute measurement; **Tolerances** are specified as preset deviations from the nominal. Actual limits will be computed internally by adding upper tolerances and subtracting lower tolerances to/from the nominal.

You can change the default later by selecting the **View** menu in the **Add Recipe** window and then selecting **Limits as Absolutes** or **Limits as Tolerances**, depending on which is already selected.

1.3 Click **Continue** or press **Enter** to move to the next screen.

2 Enter a name for the new recipe in the box.

The names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique.

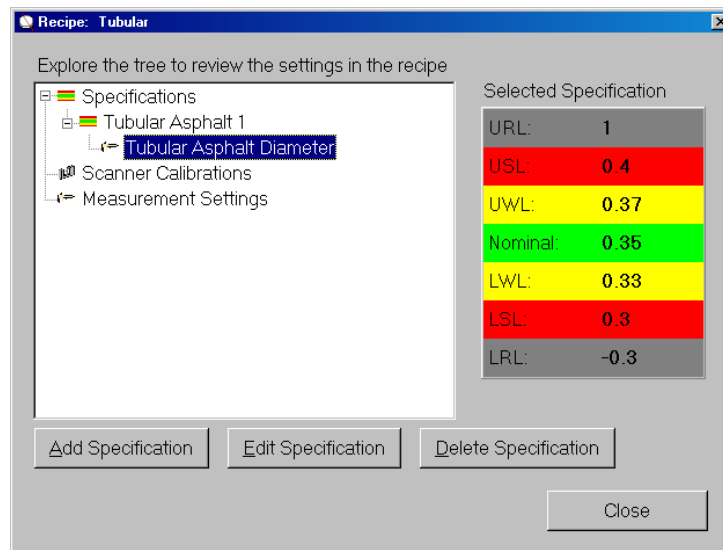
Below the box for the name of the new recipe is a list of **Existing Recipe Names**. The new name cannot match any of the names listed in the box. Most operators find a descriptive recipe naming system to be helpful; recipes are typically identified by product name or number.

2.1 Click **Next** or press **Enter** to move to the next screen.

3 **Specifications, Scanner Calibrations, and Measurement Settings**

This screen shows a tree for formatting settings. You can add new settings, edit existing ones, and delete settings. If there are no settings, the only active button will be for **Add Specification**.

**Note:** When you are in this screen, if you put the mouse over the area showing specification limits and right click, you can change to/from **View Spec Limits as Nominal and Tolerances** and **View Spec Limits as Absolute Values**.



*Recipe settings tree, with the specification selected.*

- 3.1 Select **Specification** in the tree, and either double-click the selection or click the **Add Specification** button.

A window will appear for entering specification limits.

- 3.1.1 Enter a description for the specification limits.

The software does not require a description, but a description is useful if there will be more than one specification in the recipe. If you do not enter a description, the default will be the name of the recipe, which would be confusing if there are several specifications, all with the same name. Examples of descriptions are “OD”, “Ovality”, and “Control”.

- 3.1.2 Enter the specification limits values.

If you are entering limits as **Tolerances Relative to Nominal**, the header will say **Limits as Tolerances**; if you are entering **Absolute Limits**, the header will say **Limits as Absolute Values**

What you enter here for specification limits depends on your product specifications. There are checkboxes for:

- **Symmetrical Tolerances**—if tolerances above and below the nominal are symmetrical, selecting **Symmetrical Tolerances** allows you to enter only the tolerance for **UST (Upper Spec Tolerance)**; the **LST (Lower Spec Tolerance)** will appear automatically.
- **Use Warning Tolerances**—values between the **UST** and the **LST** that will alert the operator to a tolerance approaching the limit, so that the operator can be prepared to adjust if necessary. If **Symmetrical Tolerances** is selected, you need enter only the **UWT**; the **LWT** will appear automatically.
- **Use Reasonable Tolerances**—are values so far out of the range of the tolerances that the likely cause is a setup error (something entered incorrectly), or a change made somewhere on a line that throws off other measurements).
- **Reject Unreasonable**—grayed out unless **Use Reasonable Tolerances** is checked: checking this keeps the “unreasonable” data values from being logged as production data.

The names of the specification limits are different for tolerances and absolutes. For tolerances you have: **URT+** (**Upper Reasonable Tolerance**), **UST+** (**Upper Spec Tolerance**), **UWT+** (**Upper Warning Tolerance**), **Nominal**, **LWT-** (**Lower Warning Tolerance**), **LST-** (**Lower Spec Tolerance**), and **LRT-** (**Lower Reasonable Tolerance**). For absolutes, you have: **URL** (**Upper Reasonable Limit**), **USL** (**Upper Spec Limit**),

UWL (Upper Warning Limit), Nominal, LWL (Lower Warning Limit), LSL (Lower Spec Limit), and LRL (Lower Reasonable Limit).

- 3.1.3 Select one or more measurements from the list of available measurements.
- 3.1.4 Click **OK** or press **Enter** to go back to the screen for **Specifications, Scanner Calibrations, and Measurement Settings**.

Your new specification will appear in the tree under **Specifications**; if you click on the plus sign to the left of the name of the specification, the tree will expand to show the name of the measurement used for this specification.

- 3.2 Select **Scanner Calibrations** in the tree, and either double-click the selection or click the **Add Calibration** button.

This setting is used if more than one calibration exists for the scanner from which the measurements are derived. If only one calibration is in use, there is no need to specify one. This feature is useful for applications where products are manufactured to specifications in more than one unit of measure. If products are manufactured to a millimeter specification and others to an inches specification, you can associate a millimeter calibration with the first and an inches calibration with the second. In this way, changing the recipe will automatically change the units of measure.

- 3.2.1 If a specific calibration is to be used with this recipe, than select **Scanner Calibrations** in the tree. If no calibration is specified here, the default calibration will be used.

A window will appear showing a list of available scanners on the left and a blank window on the right.

- 3.2.1 From the list on the left, select the scanner you will be using.

In the right-hand box, a list of calibrations will appear.

- 3.2.2 From the list of calibrations, select the one you wish to use.

- 3.2.3 Click **OK** or press **Enter** to go back to the screen for **Specifications, Scanner Calibrations, and Measurement Settings**.

The name of the scanner will appear in the tree under **Scanner Calibrations**; if you click on the plus sign to the left of the name of the scanner, the tree will expand to show the pin sizes for this calibration.

- 3.3 The next item in the tree is for **Measurement Settings**. This is used only if the product needs to have an offset associated with it. For products without an offset, go on to section 3.3.2.

- 3.3.1 If you are using offsets, select **Measurement Settings** in the tree, and either double-click the selection or click the **Measurement Settings** button.

A window will appear showing a list of available measurements.

- 3.3.1.a From the list, select the measurement you will be using.

- 3.3.1.b Click **OK** or press **Enter**.

A screen will appear for entering the offset.

- 3.3.1.c Enter a value for the offset. The offset will be added to the measurement value. For an offset that reduces the measurement, use a negative offset (e.g.  $-0.01$ ).

- 3.3.2 Click **OK** or press **Enter** to go back to the screen for **Specifications**, **Scanner Calibrations**, and **Measurement Settings**.

The name of the measurement will appear in the tree under **Measurement Settings**; if you click on the plus sign to the left of the name of the measurement, the tree will expand to show the offset.

- 3.2.3 Click **Finish**.

An icon for your new **Recipe** will appear in the **Recipes** configuration window.

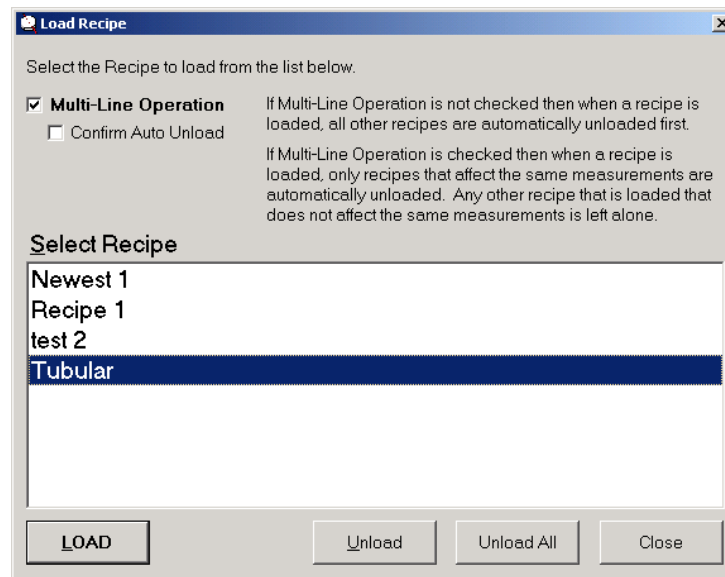
### Loading A Recipe and Multi-Line Operation

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Load Recipe...**

A window will appear showing available recipes.

Or, alternatively, if there is a **Load Recipe** button (standard with most Total Vu Software packages), clicking that will lead to the same screen of available recipes. If your package lacks a **Load Recipe** button you can use actions to create one (please see the chapter on [actions](#)).

The other setting here besides options for loading and unloading recipes is a checkbox for **Multi-Line Operation**, which is used when one computer is used to control multiple production lines. Multi-Line Operation allows a recipe to be used on a production line without unloading a recipe being used by another line. With Multi-Line Operation selected, only specifications that pertain to the same measurements as a newly loaded recipe will be replaced. Any measurement specification that is not addressed in a new recipe will remain unchanged.



*The Load Recipe screen; the window shows a list of available recipes.*

- 1 If **Multi-Line Operation** is desired, check the box.

A new box will appear called **Confirm Auto Unload**. If **Confirm Auto Unload** is checked, the operator is warned, before the new recipe is loaded, which recipes will be automatically unloaded; then the operator has the opportunity to cancel if necessary. This is helpful for verifying proper recipe configuration.

- 1.1 If you want the operator to be able to cancel automatic loading/unloading of recipes, check the box for **Confirm Auto Unload**.

- 2 Select the recipe you wish to load and click the **Load** button.

If **Multi-Line Operation** is being used, the active recipe will remain loaded (unless it affects the same measurements as the new recipe); if **Multi-Line Operation** is not being used, the active recipe will be unloaded automatically when the new recipe is loaded.

- 3 If you are finished, click **Close**.

## Operator Manipulation of Recipes

The screen for **Load Recipe** has another level of control that is activated or deactivated in Total Vu Software's **Display** configuration window.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Display** icon. In the window you will see a screen with several tabs across the top.

## 1 Options tab.

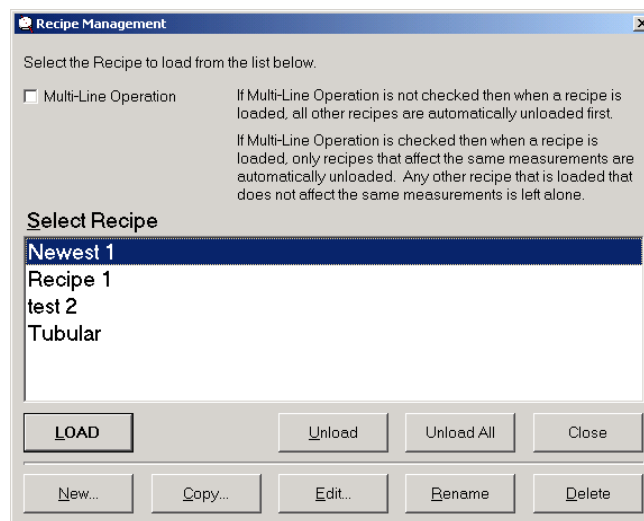
1.1 If you do not want operators to be able to manipulate recipes, then under the **Options** tab, check the box for **Hide Recipe Management Buttons**.

1.2 Click **OK**.

## Recipe Management

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Load Recipe...**

A window will appear showing available recipes and buttons for creating new ones and copying, editing, renaming, and deleting existing ones.



*The Load Recipe screen showing options after the box for Hide Recipe Management Buttons is unchecked; the window shows a list of available recipes.*



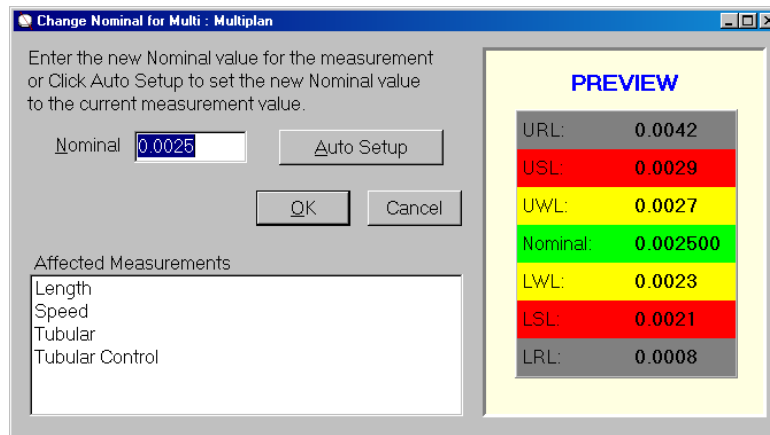
- 1 For using **Multi-Line Operation**, check the box.
- 2 Select the recipe you wish to load and click the **Load** button.
- 3 If you wish to access the recipe configuration window and its specification tree from here, click the buttons for **New...**, **Copy...**, or **Edit...**
  - 3.1 **New...:** This button takes you to the screen for entering a new recipe.
  - 3.2 **Copy...:** With the copy button, you can duplicate an existing recipe to use when running a new product. Specifications particular to that product will need to replace the existing ones, but most information will remain the same.
  - 3.3 **Edit...:** This button takes you to the recipe settings tree, from which you can make modifications as needed. A recipe can only be edited when it is unloaded; clicking the **Edit...** button when a recipe is loaded will produce a warning: “Recipe ‘Name’ is currently in use. Do you want to unloaded it so that you can change it?”

**Note:** The recipe will not be re-loaded automatically.
  - 3.4 **Rename:** For example, if the name of a product is being changed and the name of the recipe is specific to that name, with this button you can easily change the name.
  - 3.5 **Delete:** To delete recipes that are no longer needed. (Clicking delete will produce a warning: “Are you sure you want to delete Recipe ‘Recipe Name’ ”)? Like other items, a recipe can be deleted by selecting its icon in the recipes window and pressing **Delete** on the keyboard.
- 4 When you are finished, click **Close**.

### Changing the Nominal Value from a Measurement Display Window

Display windows are covered in the chapter [Menu-based Total Vu Software Configurations](#).

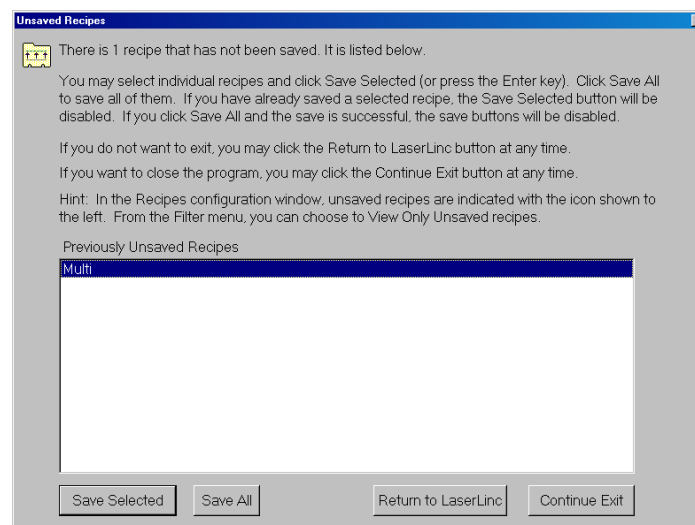
When a **Measurement Display** window is open, if you right-click in the display panel of a particular measurement, you can change the nominal value.



*Window for changing the nominal value of a recipe.*

- Enter a new nominal value for the measurement(s), or click **Auto Setup** to set the new nominal value to the current measurement value.
- Click **OK** or press **Enter**.
- Confirm your change to the nominal by clicking **Accept**.

Once you have clicked **Accept**, the new nominal is stored in the recipe, but the recipe still needs to be saved. Saving can be done at this point as discussed previously in the section on recipe management, but if for some reason you fail to do so, before shutting down the software the system will show a reminder.



- Click **Save Selected** to save the change to the recipe.
- Click **Continue Exit** to exit the program

## Setting up and Managing Specification Limits

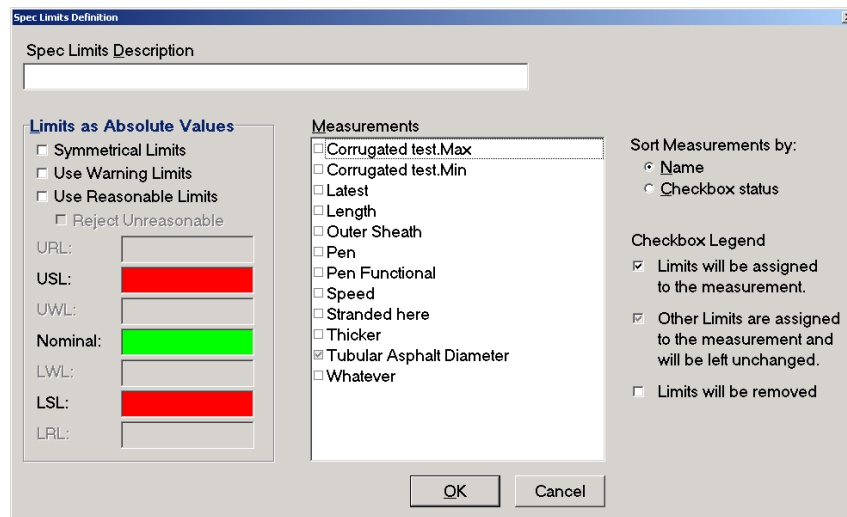
This section is applicable only if you are already using specification limits and you do not want to re-enter them using the Recipe feature.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Recipes** icon to open the **Recipes** configuration window. In the window you will see an icon for **Add Recipe**.

If the **View** is set to show **Recipes**, switch the **View** to **Only Limits**, or, if you are using **Limits** and **Recipes**, set the **View** to **All Limits and Recipes**.

After changing the **View** you will see an icon for **Add Spec**.

- 1 Double-click the **Add Spec** icon to open the **Spec Limits Definition** window.



*The Spec Limits Definition window.*

The window has setup features that are similar to the recipes setup, including the column for entering limits.

- 1.1 Enter a description for the specification limit.

Examples of descriptions are “OD”, “Ovality”, and “Control”.

- 1.2 Enter the specification limit values.

If you are entering limits as **Tolerances Relative to Nominal**, the header will say **Limits as Tolerances**; if you are entering **Absolute Limits**, the header will say **Limits as Absolute Values**

What you enter here for specification limits depends on your product specifications. There are checkboxes for:

- **Symmetrical Tolerances**—if tolerances above and below the nominal are symmetrical, selecting **Symmetrical Tolerances** allows you to enter the tolerance for **UST (Upper Spec Tolerance)**, and the **LST (Lower Spec Tolerance)** will appear automatically.
- **Use Warning Tolerances**—values between the **UST** and the **LST** that will alert the operator to a tolerance approaching the limit, so the operator can be prepared to adjust if necessary. If **Symmetrical Tolerances** is selected, you need only enter the **UWT**—the **LWT** will appear automatically.
- **Use Reasonable Tolerances**—are values so far out of the range of the tolerances that the likely cause is a setup error (something entered incorrectly), or a change made somewhere on a line that throws off other measurements).
- **Reject Unreasonable**—grayed out unless **Use Reasonable Tolerances** is checked: checking this keeps the “unreasonable” data values from being logged as production data.

The names of the specification limits are different for tolerances and absolutes. For tolerances you have: **URT+** (**Upper Reasonable Tolerance**), **UST+** (**Upper Spec Tolerance**), **UWT+** (**Upper Warning Tolerance**), **Nominal**, **LWT-** (**Lower Warning Tolerance**), **LST-** (**Lower Spec Tolerance**), and **LRT-** (**Lower Reasonable Tolerance**). For absolutes, you have: **URL** (**Upper Reasonable Limit**), **USL** (**Upper Spec Limit**), **UWL** (**Upper Warning Limit**), **Nominal**, **LWL** (**Lower Warning Limit**), **LSL** (**Lower Spec Limit**), and **LRL** (**Lower Reasonable Limit**).

1.3 Check the box next to each measurement to receive the specification.

1.4 Sort Measurements by:

1.4.1 Select the radio button for either **Name** or **Checkbox status**.

The **Checkbox Legend** shows the status of the Limits assigned to the various measurements.

1.5 Click **OK** or press **Enter**.

Your new **Specification** will appear in the **Specification Limits** window.

## Actions Specific for Recipes and Spec Limits

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for recipes.

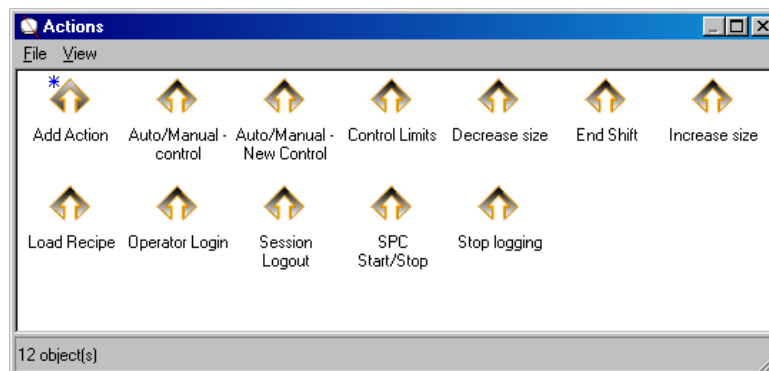
- *Unload All Recipes*: Unloads active recipes.
- *Load Recipe*: Loads a pre-selected recipe or prompt the operator to select a recipe to load.
- *Reset Tolerance Counts*: Resets tolerance counts for all of the selected measurements.
- *Change Nominal*: Changes the nominal value for the selected measurement's recipe.

## Setting Up and Using Actions

Actions are shortcuts for initiating system commands. Triggers include a button on the main screen, digital input, OPC, or an event such as completion of a measurement. Some of the actions can give the operator the ability to manage processes that would otherwise be automatic, such as starting trend chart graphing.

### Creating A New Action

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Action** icon to open the **Actions** window. In the window you will see an icon for the **Add Action** wizard.



*The Action window, showing icons for Add Action and several Actions that have already been created.*

Double-click the Add Action icon. This is a wizard, which will guide you through the setup process.

Or, an alternate way: Go to the **File** menu of the **Actions** configuration window and select **New**.

The screen shows a tab for **New Action**.

## 1 Action tab.

### 1.1 In the box for Action Name, enter a name for your action.

Names can be the same as the name of the actual action that is to be assigned.

### 1.2 From the drop-down list, select your choice of action.

With some actions, a second tab (or even multiple tabs) will appear. The table below shows the tabs associated with actions; actions without other tabs are not shown.

### 1.3 If you wish to limit access to an action, select the box for Password Required to Execute.

**Note:** Other parameters will appear on the **New Action** tab after some of the actions are chosen. Those will be detailed with the appropriate action.

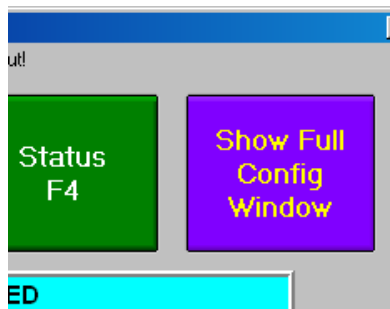
- Click OK or press Enter.

## OR

- Click on the next tab.

### *Try This*

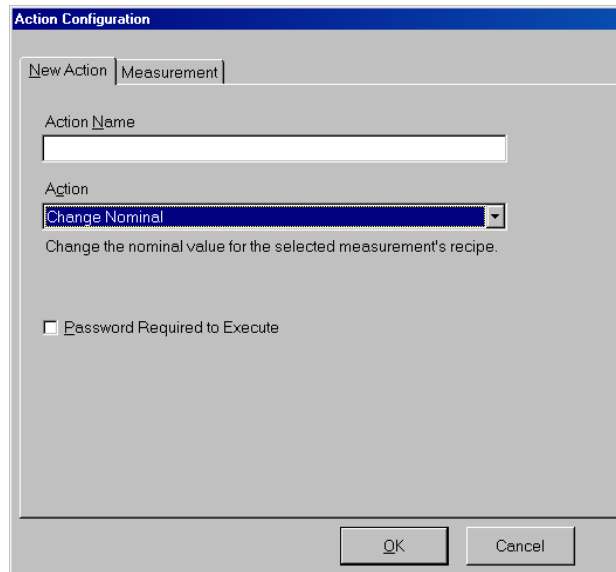
- Create the action for Show Full Configuration window.
- Open the Display icon and create a button for the action.
- Then click the button whenever you need to access Total Vu Software's Full Configure window.



*Detail of the Total Vu Software main window with the button for the action Show Full Configuration Window.*

TABLE OF ADDITIONAL TABS AND THEIR ASSOCIATED ACTION				
ACTION	NEW TAB(S)			
Assign Action to Button	Action			
Enable Buttons, Disable Buttons, Show Buttons, Hide Buttons	Buttons			
Accept Attribute Values, Clear Attribute Values	Attributes			
Count Up Attribute Values, Count Down Attribute Values, Reset Counter Attributes	Counter Attribute			
Ignore Scans, Load Calibration, Clean Scanner, Clear Multi-Strand Scanner Profile	Scanners			
Execute List of Actions	Actions			
Sample Discrete Measurements	Discrete Measurements			
Reset Tolerance Counts, Change Nominal, Reset Measurements, Change Measurement Offset, Turn Flaw Detection On, Turn Flaw Detection Off, Turn Flaw Detection On/Off, Clear Flaws	Measurements			
Start Max/Min Data Collection Interval, Stop Max/Min Data Collection Interval, Start/Stop Max/Min Data Collection Interval	Max/Min Measurements			
SPC Start Sample, SPC Start Subgroup, SPC Calculate Control Limits, SPC Reset Plans, SPC Start, SPC Stop, SPC Start/Stop	SPC Plans			
Generate SPC Summary Report	SPC Summary Report	More Report Options	Attributes	SPC Plans
Print Histogram, Clear Histogram	Histograms			
Start Graphing on Trend Charts, Stop Graphing on Trend Charts, Start/Stop Graphing on Trend Charts, Clear Trend Charts	Trend Charts			
Start Data Logging of Selected Logs, Stop Data Logging of Selected Logs, Start/Stop Data Logging of Selected Logs, Start New File for Selected Logs, Erase and Restart Existing File for Selected Logs, Log a Record for Selected Logs	Measurement Logs			
Control: Automatic Mode, Control: Manual Mode, Control: Automatic/Manual Mode, Control: Jog*	Control Loops	Jog Properties* (only with Control: Jog)		
Generate Flaw Report	Flaw Report	More Report Options	Measurements	
Reset Encoder, Pause Encoder, Resume Encoder, Resume/Pause Encoder	Encoder			
Clear Selected Alarms, Turn On Selected Alarms, Turn Off Selected Alarms, Test Selected Alarms	External Alarm			





*The New Action Tab; the action "Change Nominal" is selected, with second tab for Measurement hidden.*

2 **Action tab** (with action: *Assign Action to Button*).

There are two lists in this tab, one for actions and one for buttons. You can assign an action to a button. This is a useful tool for initiating a set of possible actions at any point.

2.1 Select one action.

2.2 Select one button.

2.3 Click OK or press Enter.

3 **Button tab** (with actions: *Enable Buttons, Disable Buttons, Show Buttons, Hide Buttons*).

These choices are designed to limit operator choices, if necessary.

3.1 Choose from the list of available buttons.

3.2 Click OK or press Enter.

4 **External Alarms tab** (with actions: *Clear Selected Alarms, Turn On Selected Alarms, Turn Off Selected Alarms, Test Selected Alarms*).

With the choice of actions for alarms, a new parameter appears on the **New Action** tab.

4.1 If you wish this action to apply to all to apply to all alarms, check the box for **Act on all External Alarms**.

**Note:** If you select the option for Act on all External Alarms, the Alarms tab will not appear.

4.2 If you did not check the box for Act on all External Alarms, select from the list of available External Alarms.

4.3 Click OK or press Enter.

- 5 SPC Plans tab (with actions: *SPC Start Sample*, *SPC Start Subgroup*, *SPC Calculate Control Limits*, *SPC Reset Plans*, *SPC Start*, *SPC Stop*, *SPC Start/Stop*).

With the choice of actions for SPC Plans, a new parameter appears on the New Action tab.

5.1 If you wish this action to apply to all to apply to all SPC Plans, check the box for Act on all SPC Plans.

**Note:** If you select the option for Act on all SPC Plans, the SPC Plans tab will not appear.

5.2 If you did not check the box for Act on all External Alarms, select from the list of available SPC Plans.

5.3 Click OK or press Enter.

- 6 SPC Summary Report, More Report Options, Attributes, and SPC Plans tabs (with action: *Generate SPC Summary Report*.)

6.1 SPC Summary Report tab: Select the options for generating the SPC Summary report.

The report can be saved to a Comma Separated Value (.csv) file and/or printed directly to the default printer. Statistics can be reset after the report has been saved and/or printed. You can also control whether SPC restarts or stops after generating the report.

6.2 More Report Options tab: Select...

6.2.1 Whether you want to reset statistics after generating a report.

6.2.2 The SPC state after generating the report (Off, On, or Unchanged).

6.3 Attributes tab: From the list of available attributes, select the ones that you want to be logged in the report.

6.4 SPC Plans tab: Select Measurement(s) from the list of available SPC Plans.

6.5 Click OK or press Enter.

- 7 Histograms tab (with actions: *Print Histogram*, *Clear Histogram*).

With the choice of actions for histogram, a new parameter appears on the New Action tab.

7.1 If you wish this action to apply to all histograms, check the box for **Act on all Histograms**.

**Note:** If you select the option for **Act on all Histograms**, the **Histogram** tab will not appear.

7.2 If you did not check the box for **Act on all Histograms**, select from the list of available histograms.

7.3 Click **OK** or press **Enter**.

- 8 **Trend Charts** tab (with actions: *Start Graphing on Trend Charts*, *Stop Graphing on Trend Charts*, *Start/Stop Graphing on Trend Charts*, *Clear Trend Charts*).

With the choice of actions for trend charts, a new parameter appears on the **New Action** tab.

8.1 If you wish this action to apply to all trend charts, check the box for **Act on all Trend Charts**.

**Note:** If you select the option for **Act on all Trend Charts**, the **Trend Charts** tab will not appear.

8.2 If you did not check the box for **Act on all Trend Charts**, select from the list of available Trend Charts.

8.3 Click **OK** or press **Enter**.

- 9 **Max/Min Measurements** tab (with actions: *Start Max/Min Data Collection Interval*, *Stop Max/Min Data Collection Interval*, *Start/Stop Max/Min Data Collection Interval*).

With the choice of actions for Max/Min, a new parameter appears on the **New Action** tab.

9.1 If you wish this action to apply to all Max/Min measurements, check the box for **Act on all Max/Min Measurements**.

**Note:** If you select the option for **Act on all Max/Min Measurements**, the **Max/Min Measurements** tab will not appear.

9.2 If you did not check the box for **Act on all Max/Min Measurements**, select from the list of available Max/Min measurements.

9.3 Click **OK** or press **Enter**.

- 10 **Measurement Logs** tab (with actions: *Start Data Logging of Selected Logs*, *Stop Data Logging of Selected Logs*, *Start/Stop Data Logging of Selected Logs*, *Start New File for Selected Logs*, *Erase and Restart Existing File for Selected Logs*, *Log a Record for Selected Logs*).

10.1 Select from the list of available measurement logs.

10.2 Click **OK** or press **Enter**.

- 11 **Attributes** tab (with actions: *Accept Attribute Values*, *Clear Attribute Values*).

With the choice of actions for attributes, a new parameter appears on the **New Action** tab.

11.1 If you wish this action to apply to all attributes, check the box for **Act on all Attributes**.

**Note:** If you select the option for **Act on all Attributes**, the **Attributes** tab will not appear.

11.2 If you did not check the box for **Act on all Attributes**, select from the list of available attributes.

11.3 Click **OK** or press **Enter**.

- 12 **Counter Attribute** tab (with actions: *Count Up Attribute Values*, *Count Down Attribute Values*, *Reset Counter Attributes*).

12.1 Select from the list of available attributes.

12.2 Click **OK** or press **Enter**.

- 13 **Measurements** tab (with actions: *Reset Tolerance Counts*, *Change Nominal*, *Reset Measurements*, *Change Measurement Offset*, *Turn Flaw Detection On*, *Turn Flaw Detection Off*, *Turn Flaw Detection On/Off*, *Clear Flaws*).

With the choice of actions for *Reset Tolerance Counts*, *Reset Measurements*, *Turn Flaw Detection On*, *Turn Flaw Detection Off*, *Turn Flaw Detection On/Off*, and *Clear Flaws*, a new parameter appears on the **New Action** tab.

13.1 If you wish this action to apply to all measurements, check the box for **Act on all Measurements**.

**Note:** If you select the option for **Act on all Measurements**, the **Measurements** tab will not appear.

13.2 If you did not check the box for **Act on all Measurements**, or selected an action for which the parameter did not appear, select from the list of available measurements.

13.3 Click **OK** or press **Enter**.

- 14 **Control Loops** and **Jog Properties** tabs (with actions: *Control: Automatic Mode*, *Control: Manual Mode*, *Control: Automatic/Manual Mode*, *Control: Jog*).

**Note:** **Jog Properties** tab appears only with action for **Control: Jog**.

With the choice of actions for control, a new parameter appears on the **New Action** tab.

14.1 If you wish this action to apply to all control loops, check the box for **Act on all Control Loops**. **Note:** this parameter does not appear with the choice of **Control: Jog**.

**Note:** If you select the option for **Act on all Control Loops**, the **Control Loops** tab will not appear.

14.2 **Control Loops** tab: If you did not check the box for **Act on all Control Loops**, select from the available control loops.

14.3 **Jog Properties** tab (*Control: Jog* only)

14.3.1 **Jog Direction, Jog Mode, and Jog Resolution:** These vary depending on whether the control loop chosen is digital, MOP, or analog.

In **Continuous** mode, **Jogging** continues while a **Jog** action is held down, and stops when the action is released. The **Jog Resolution** parameter determines the rate of change of the output.

In **Discrete Mode**, a single click or activation of a **Jog** action triggers a fixed change in the output to the controlled device. The **Jog Resolution** parameter specifies the amount of the fixed change.

14.3.1.a **Jog Direction (Digital):** Use the radio button to select which counter output to activate.

14.3.1.b **Jog Mode (Digital):** Choose between **Continuous** and **Discrete**.

14.3.1.c **Jog Resolution (Digital):** For **Discrete**, specify the amount of change (in seconds) to make in the output when the **Jog** function is used. In **Continuous**, **Jog Resolution** is grayed out because the duration of the jog is the length of time the button is held down (**Jogging** will stop when the button is released).

14.3.1.d **Jog Direction (MOP):** Use the radio button to select between **Clockwise** and **Counter-clockwise**.

14.3.1.e **Jog Mode (MOP):** Choose between **Continuous** and **Discrete**.

14.3.1.f **Jog Resolution (MOP):** Specify the amount of change (in seconds) to make in the output when the **Jog** function is used.

14.3.1.g **Jog Direction (Analog):** Use the radio button to select between **Increase** and **Decrease**.

14.3.1.h **Jog Mode (Analog):** Choose between **Continuous** and **Discrete**.

- 14.3.1.i **Jog Resolution (Analog):** Specify the amount of change (in Volts) to make in the output when the **Jog** function is used. The **Jog Resolution** parameter determines the rate of change of the output.

14.4 Click **OK** or press **Enter**.

- 15 **Scanners** tab (with actions: *Ignore Scans*, *Load Calibration*, *Clean Scanner*, *Clear Multi-Strand Scanner Profile*).

With the choice of actions for *Clear Multi-Strand Scanner Profile*, a new parameter appears on the **New Action** tab.

15.1 If you wish the action for *Clear Multi-Strand Scanner Profile* to apply to all scanners, check the box for **Act on all Scanners**.

15.2 If you did not choose the action for *Clear Multi-Strand Scanner Profile*, select from the list of available Scanners.

15.3 Click **OK** or press **Enter**.

- 16 **Discrete Measurements** tab (with action: *Sample Discrete Measurements*).

With the choice of action *Sample Discrete Measurements*, a new parameter appears on the **New Action** tab.

16.1 If you wish this action to apply to all discrete measurements, check the box for **Act on all Discrete Measurements**.

**Note:** If you select the option for **Act on all Discrete Measurements**, the **Discrete Measurements** tab will not appear.

16.2 If you did not check the box for **Act on all Discrete Measurements**, select from the list of available discrete measurements.

16.3 Click **OK** or press **Enter**.

- 17 **Flaw Report**, **More Report Options**, and **Measurements** tabs (with action: **Generate Flaw Report**).

17.1 If you wish this action to apply to all measurements, check the box for **Act on all Measurements**.

**Note:** If you select the option for **Act on all Measurements**, the **Measurements** tab will not appear.

Print and/or save to disk a flaw report for the selected measurements. You can select options for flaws to be cleared automatically after the report or to turn flaw detection on or off.

17.2 **Flaw Report** tab: Select the options for generating the flaw report.

The report can be saved to a **Comma Separated Value (.CSV)** file and/or printed directly to the default printer. Flaws can be cleared after the report has been saved and/or printed.

17.3 **More Report Options** tab: Select if you want...

17.2.1 To include Measurement Name(s) in the flaw report.

17.2.2 To generate a separate report for each measurement.

17.2.3 The flaw detection state after the report to be **Off**, **On**, or **Unchanged**.

17.4 **Measurements** tab: If you did not check the box for **Act on all Measurements**, select the measurements and attributes that you want to be logged in the report.

17.5 Click **OK** or press **Enter**.

18 **Actions** tab (with action: *Execute List of Actions*).

With this action, you can choose and execute a list of actions.

18.1 There are several options to choose before moving to the **Actions** tab:

18.1.1 Choose whether you want to execute the action if Data Logging is **ON**.

18.1.2 Choose whether you want to execute the action if SPC is **ON**.

18.1.3 Check if you want a single step action list.

This allows you to single-step through the list of actions. Each time this action is executed, only the next action the list is executed and not the entire list.

18.1.4 Check if you want to abort on action failure.

If an action in the list fails, the remaining actions will not be executed. The next time the action is executed, it starts at the top of the list.

18.2 Select previously-defined actions for the list.

18.3 Organize the actions in the order you want them to be executed.

18.4 Click **OK** or press **Enter**.

19 Encoder tab (with action: *Reset Encoder*, *Pause Encoder*, *Resume Encoder*, *Resume/Pause Encoder*).

19.1 If choosing the action *Reset Encoder*, there are several options to choose before moving to the Encoder tab:

19.1.1 Enter a value for the distance after the encoder has been reset.

This will be the new length value.

19.1.2 Choose the encoder state after the encoder has been reset (**Paused**, **Counting**, or **Unchanged**).

19.2 Select one encoder from the list.

19.4 Click **OK** or press **Enter**.



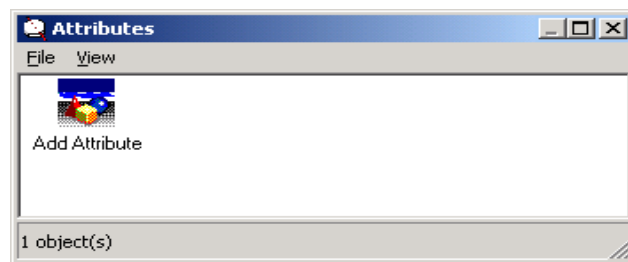
## Creating Attributes

**Attributes** are a way of keeping track of the various characteristics of a production process and are meant to be individualized by each operator. For example, data might need to be entered at the start of a run, at a predetermined point in the run, or at the end of the run—you can create an attribute for entering the data and displaying it on a trend chart or logging it to a data file.

Use attributes to provide a context for the information that the system is collecting and to provide other pieces of information: for example, what machine the data is coming from, the name or ID of the operator, part numbers, job numbers, spool ID, lot number, tracking information; qualitative rather than quantitative information such as colors, surface quality (smooth or rough), and data that an operator needs to enter manually.

### Creating A New Attribute

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Attribute** icon to open the **Attributes** window. In the window you will see an icon for **Add Attribute**.



*The Attributes window; after creation, new Attributes will show up here.*

Double-click the **Add Attribute** icon. This is a wizard, which will guide you through the setup process. Or, an alternate way: Go to the **File** menu of the **Attributes** configuration window and select **New**.

The first screen shows radio buttons for selecting from the available attribute types. These include: System, Check Box, Edit Box, Memo, Drop Down List, Displayed List, Radio Buttons, Measurement, and Counter. The setup screens vary with attribute type.

First screen, with **System** checked (note: the actual screen has buttons for **Back**, **Next**, and **Cancel** that have been cropped out of this screen shot).

Examples of the nine attribute types (left to right) **Drop Down List** (here shown for Operator ID) **Edit Box** (for noting minor flaws during a production cycle) **Memo Box** (for longer notes during a production cycle); **Check Box** (yes or no); **Displayed List** (here showing the particular colors used in a line producing rubber hose); **Radio Buttons** (showing types of hose) **System** (Line 4, noting the name of the production line and its computer station; **Measurement** (Outer Sheath, for an operator-entered measurement); **Counter** (Number of Spools—an encoder is used if the customer wants to track length of a product). Note: a button has been created and tied to an action for the operator to press at the end of a shift to reset the attributes for the next operator; depending on the type of work involved, you can add actions to any one or group of attributes,

## System Attributes

A **System** attribute is a fixed item that shows up on the screen that an operator cannot modify (for example a number assigned to the computer, number of the production line, etc.). In most instances, this is something that is done once. However, there are types of information that might be useful being read in from a database, such as customer order numbers, or information that would come from a manufacturing scheduling software application.

### 1 Select the radio button for **System**.

1.1 Click **Next** or press **Enter** to move to the next screen.

### 2 **Attribute Name** (screen 2).

2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).

2.2 Click **Next** or press **Enter** to move to the next screen.

### 3 **Attribute Value** (screen 3).

Here, value refers to information rather than an amount of something. Values can either be specified here or read in from a file. An entered value can be the name of the computer, name of the production line (these types of values—or names—would usually be entered once and only modified if, for example, the computer is moved to another line or the line numbering changes; values read in from a file might contain information about a customer for which the particular process is being run.

3.1 If specifying the value for the new attribute, enter it here.

3.2 If reading the value for the new attribute from a file, select the radio button for **From File**.

When **From File** is selected, several new parameters will appear.

3.2.1 **File Name**.

3.2.1.a Enter the name of the file from which the attribute value will be read.

3.2.1.b Or, select the **Browse** button to find the file.

3.2.2 Select the **File Delimiter**.

3.2.3 **File Position**: Specify the column within the file where the attribute value will be.

3.2.4 **Header Row:** If the file has a header row, select **Ignore the first line in the file**.

**Note:** When ignoring, the attribute value is always read from the chosen column on the second line of the file; if not ignored, the attribute value is always read from the first line of the file.

3.3 Click **Next** or press **Enter** to move to the next screen.

#### 4 Display System Attribute Value (screen 11).

You can choose to have the system attribute value displayed in a read-only edit box on the main form.

4.1 If you wish to display the value, select **yes**; otherwise select **no**.

4.2 Click **Next** or press **Enter** to move to the next screen.

If you selected **no**, an icon for the new **System Attribute** will appear in the **Attributes** window; if you selected **yes**, you will move to the next screen.

#### 5 Display Label and Label Placement (screen 12).

5.1 If you wish to label the control, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.

5.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.

5.3 Click **Next** or press **Enter** to move to the next screen.

#### 6 Location and Size, Appearance, Hint, and Tab Order (screen 13).

At this point in the process, a blank white window will have appeared in the Total Vu Software window. The parameters in this screen control the appearance and position of the window.

**Note:** On some PCs, the movement of the window will leave traces on the screen that will disappear when you refresh the screen.

##### 6.1 Location and Size.

You can edit the position and dimensions of the new attribute by changing the parameters; the location of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

6.1.1 Using either the up/down arrows, the **Page Up** or **Page Down** buttons on your keyboard, or by entering a number, adjust the size and location to place the attribute as desired.

You will see the new attribute move across the screen while you adjust the its size and location.

## 6.2 Appearance.

You can change the color and font of the attribute by clicking on the appropriate button.

6.2.1 To choose a color other than the default white, click the **Change Color** button.

6.2.2 To choose a different font for the label, click the **Change Font** button.

## 6.3 Hint.

You can enter a hint that will appear when the operator moves the mouse over the attribute.

6.3.1 If you wish to have a hint, enter the text in the box.

## 6.4 Tab Order.

Doesn't apply to **System** attributes because they are fixed.

## 6.5 Click Finish or press Enter.

An icon for the new **System Attribute** will appear in the **Attributes** window, and the attribute will be visible on the Total Vu Software window.

## Check Box Attributes

**Check Boxes** allow the operator to say yes/no for various inspections, etc.

### 1 Select the radio button for **Check Box**.

1.1 Click **Next** or press **Enter** to move to the next screen.

### 2 **Attribute Name** (screen 2).

2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).

2.2 Click **Next** or press **Enter** to move to the next screen.

- 3 Value When Checked, Value When NOT Checked, Allow Grayed, and Default State of Check Box (screen 4).
  - 3.1 Enter a value to be used when the attribute condition is checked.
  - 3.2 Enter a value to be used when the attribute condition is not checked.
  - 3.3 If you wish to allow a grayed state:
    - 3.3.1 Check the box for **Allow Grayed State**.
    - 3.3.2 Enter a value to be used when the attribute box is grayed  
Example: **Not Tested**.
  - 3.4 Select the default state for the **Check Box** (**Not Checked**, **Checked**, or **Grayed**).
  - 3.5 Click **Next** or press **Enter** to move to the next screen.
- 4 **Automatically Clear** (screen 10).
  - 4.1 If you would like the displayed value to be cleared after the attribute is accepted, check the box for **Automatically Clear Value**.
  - 4.2 Enter a value to be used when the attribute condition is not checked.
  - 4.3 Click **Next** or press **Enter** to move to the next screen.
- 5 **Display Label and Label Placement** (screen 12).
  - 5.1 If you wish to label the control, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.
  - 5.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.
  - 5.3 Click **Next** or press **Enter** to move to the next screen.
- 6 **Location and Size, Appearance, Hint, and Tab Order** (screen 13).

At this point in the process, a check box will have appeared in the Total Vu Software window. The parameters in this screen control the appearance and position of the check box.

  - 6.1 **Location and Size**.

You can move and resize the check box by changing the parameters; the placement of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

- 6.1.1 Using either the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard, adjust the size and location to place the check box as desired.

You will see the check box move across the screen while you adjust its size and location.

## 6.2 Appearance.

You can change the color of the check box by clicking on the appropriate button.

**Note:** This does not change the color of the actual check box; it adds a color border on three sides of the box.

- 6.2.1 To choose a color other than the default white, click the **Change Color...** button.

A colors window will appear with examples of basic and custom colors.

- 6.2.1.a Pick a color from the window.

- 6.2.1.b Click **OK**.

The color you chose will appear around the check box labeled **Preview**, to the right of the **Change Color...** button. Checking the check box will show how the check box attribute will look on your screen.

## 6.3 Hint.

You can enter a hint that will appear when the operator moves the mouse over the check box.

- 6.3.1 If you wish to have a hint, enter the text in the box.

## 6.4 Tab Order.

- 6.4.1 Enter the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

## 6.5 Click **Finish** or press **Enter**.

An icon for the new **Check Box Attribute** will appear in the **Attributes** window, and the **Check Box** itself will be visible on the Total Vu Software window.

## Edit Box Attributes

**Edit Boxes** provide a place for manually entered text such as names, part numbers, etc.

- 1 Select the radio button for **Edit Box**.

- 1.1 Click **Next** or press **Enter** to move to the next screen.

- 2 **Attribute Name** (screen 2).

- 2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).

- 2.2 Click **Next** or press **Enter** to move to the next screen.

- 3 **Maximum Length, Minimum Length, Default Value, and Legal Input** (screen 6).

To keep edit messages succinct, you might wish to limit the number of characters that an operator can use; also, you might want to set a minimum length (for example, if you are using an edit box for an operators to enter ID number, and the number is five digits, you could put a minimum or maximum length of five).

- 3.1 To limit the number of characters used in the edit box, check the box for **Use Maximum Length**.

- 3.1.1 Use the up/down arrows to select the **Maximum Length**.

- 3.2 To set a minimum number of characters to be used in the edit box, check the box for **Use Minimum Length**.

- 3.2.1 Use the up/down arrows to select the **Minimum Length**.

- 3.3 To set a default value, check the box for **Use Default Value**.

- 3.3.1 Enter text or a number for the **Default Value**.

- 3.4 If specifying **Legal Input**, enter a value. This will be validated against what an operator enters in the edit box; if left blank, no validation is done.

Examples of **Legal Input** include: four digits [0-9][0-9][0-9][0-9]; two letters followed by a space followed by one or more digits [a-z][a-z][0-9]. If the edit box is to be used for comments, there might be no particular need for a restriction.

Rules for legal input can be complex. Please contact LaserLinc if you would like help with this setting.

- 3.5 Click **Next** or press **Enter** to move to the next screen.



- 4 Automatically Clear and Value Required (screen 10).
  - 4.1 If you need the displayed value to be cleared after the attribute is accepted, check the box for **Automatically Clear Value**. This will ensure that there are no accidental duplicate values.
  - 4.2 If you want an operator to have to enter a value before the process continues, check the box for **Value Required**.
  - 4.3 Click **Next** or press **Enter** to move to the next screen.
- 5 Display Label and Label Placement (screen 12).
  - 5.1 If you wish to label the edit box, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.
  - 5.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.
  - 5.3 Click **Next** or press **Enter** to move to the next screen.
- 6 Location and Size, Appearance, Hint, and Tab Order (screen 13).

At this point in the process, an edit box will have appeared in the Total Vu Software window. The parameters in this screen control the appearance and position of the edit box.

#### 6.1 Location and Size.

You can move and resize the edit box by changing the parameters; the placement of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

- 6.1.1 Using either the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard, adjust the size and location to place the edit box as desired.

You will see the edit box move across the screen while you adjust its size and location.

#### 6.2 Appearance.

You can change the color of the edit box by clicking on the appropriate button.

- 6.2.1 To choose a color other than the default white, click the **Change Color...** button.

A colors window will appear with examples of basic and custom colors.

- 6.2.1.a Pick a color from the window.

## 6.2.1.b Click OK.

The color you chose will appear in the box to the right of the **Preview** label; if you chose a dark color, the text will be hard to read unless you change it to a lighter color.

6.2.2 To choose a different font for the label, click the **Change Font...** button.

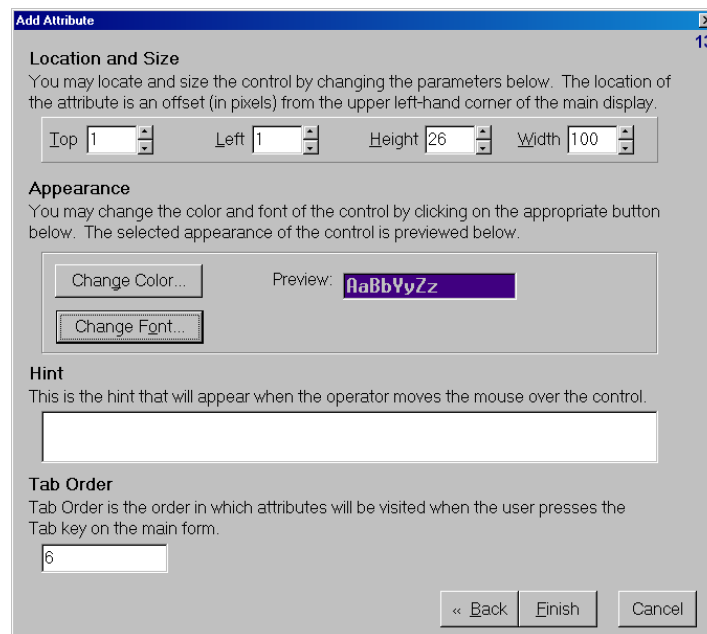
A fonts window will appear.

## 6.2.1.a Pick a font from the window.

## 6.2.2.b Choose from the other font attributes: style, color, size, underline, strike-out, and scripts.

## 6.2.2.c Click OK.

A sample of the font will appear in the box to the right of the **Preview** label.



*Screen 13, showing a color and font in the Preview pane.*

## 6.3 Hint.

You can enter a hint that will appear when the operator moves the mouse over the edit box.

6.3.1 If you wish to have a hint, enter the text in the box.

#### 6.4 Tab Order.

6.4.1 Enter the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

#### 6.5 Click **Finish** or press **Enter**.

An icon for the new **Edit Box Attribute** will appear in the attributes window, and the edit box itself will be visible on the Total Vu Software window.

## Memo Attributes

An operator can use **Memo Attributes** to enter comments, setup notes, etc.

### 1 Select the radio button for **Memo**.

1.1 Click **Next** or press **Enter** to move to the next screen.

### 2 Attribute Name (screen 2).

2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).

2.2 Click **Next** or press **Enter** to move to the next screen.

### 3 Maximum Length, Minimum Length, Default Value, and Legal Input (screen 6).

3.1 To limit the number of characters used in the memo, check the box for **Use Maximum Length**.

3.1.1 Use the up/down arrows to select the **Maximum Length**.

3.2 To set a minimum number of characters to be used in the memo, check the box for **Use Minimum Length**.

3.2.1 Use the up/down arrows to select the **Minimum Length**.

3.3 To set a default value, check the box for **Use Default Value**.

- 3.3.1 Enter text that will be the default value. This text will be used if the memo field is left empty.
  - 3.4 If specifying **Legal Input**, enter a value. What an operator enters in the memo will be validated against this value; if left blank, no validation is done. Generally, the **Legal Input** parameter is not useful for **Memo** attributes.
  - 3.5 Click **Next** or press **Enter** to move to the next screen.
- 4 **Automatically Clear, Value Required, and Carriage Return Replacement** (screen 10).
  - 4.1 If you need the displayed value to be cleared after the attribute is accepted, check the box for **Automatically Clear Value**.
  - 4.2 If you want an operator to have to enter a value before the process continues, check the box for **Value Required**.
  - 4.3 **Carriage Return Replacement**.

This section applies mainly to the contents of an operator-entered memo being stored and used in a spreadsheet, in which case the code for a carriage (hard) return might interfere with the formatting of the spreadsheet. We have the option for **Carriage Return Replacement**. In place of all carriage returns, the software will use the character selected here. The choices are **Keep** (if the information from the memo is being stored in a text file rather than a spreadsheet; **Strip** (to remove all carriage returns); **Space** (to replace all carriage returns with a space), and **other** (if there is a specific symbol you wish to use).

    - 4.3.1 Select the radio button for your choice of **Carriage Return Replacement**.
  - 4.4 Click **Next** or press **Enter** to move to the next screen.
- 5 **Display Label and Label Placement** (screen 12).
  - 5.1 If you wish to label the memo, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.
  - 5.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.
  - 5.3 Click **Next** or press **Enter** to move to the next screen.
- 6 **Location and Size, Appearance, Hint, and Tab Order** (screen 13).

At this point in the process, a memo box will have appeared in the Total Vu Software window. The parameters in this screen control the appearance and position of the memo box.

  - 6.1 **Location and Size**.

You can move and resize the memo box by changing the parameters; the placement of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

6.1.1 Using either the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard, adjust the size and location to place the memo box as desired.

You will see the memo box move across the screen while you adjust its size and location.

## 6.2 Appearance.

You can change the color of the memo box by clicking on the appropriate button.

6.2.1 To choose a color other than the default white, click the **Change Color...** button.

A colors window will appear with examples of basic and custom colors.

6.2.1.a Pick a color from the window.

6.2.1.b Click **OK**.

The color you chose will appear in the box to the right of the **Preview** label; if you chose a dark color, the text will be hard to read unless you change it to a lighter color.

6.2.2 To choose a different font for the label, click the **Change Font...** button.

A fonts window will appear.

6.2.2.a Pick a font from the window.

6.2.2.b Choose from the other font attributes: style, color, size, underline, strikeout, and scripts.

6.2.2.c Click **OK**.

A sample of the font will appear in the box to the right of the **Preview** label.

## 6.3 Hint.

You can enter a hint that will appear when the operator moves the mouse over the memo box.

6.3.1 If you wish to have a hint, enter the text in the box.

#### 6.4 Tab Order.

6.4.1 Enter the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

#### 6.5 Click **Finish** or press **Enter**.

An icon for the new **Memo Attribute** will appear in the **Attributes** window, and the memo box itself will be visible on the Total Vu Software window.

### Drop Down Lists, Displayed Lists, and Radio Buttons

These three attribute options are somewhat interchangeable and are handled in a similar way. Some information is best for one or the other, but can be handled well by any of them.

For example, use **Drop Down Lists** to limit choices. A minimum of at least three choices is best (otherwise a **Displayed List** would be better). An example of things you might want to put in a **Drop Down List** include operator name or ID. A **Drop Down List** has the advantage of saving screen space—either one item or a blank window is visible; clicking the arrow causes the rest of the items to appear. In a **Displayed List**, how many items are visible depends on the size you make the window; if not all items are visible, a scroll bar appears for navigating through the list. For **Radio Buttons**, the window **must** be sized large enough to display all items.

You can set up a **Drop Down List** so that the operator can enter a value not in the list, but **Displayed Lists** and **Radio Buttons** limit operators to the pre-established list of options only.

1 Select the radio button for the attribute you wish to create here.

1.1 Click **Next** or press **Enter** to move to the next screen.

2 **Attribute Name** (screen 2).

2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).

2.2 Click **Next** or press **Enter** to move to the next screen.

3 **List Items, Use Recipe Names, and Default Value** (screen 5).

The items that are displayed to the operator appear in the **Operator Choices** column. The attribute values for the corresponding selection appear in the **Associated Attribute Value** column. The **Associated Attribute Value** would not be visible to, or needed by the operator, and might be their name if the list item is their ID number, or vice versa.

**Add Attribute**

**List Items**  
The choices that are displayed to the operator are listed in the Operator Choices column. The attribute values for the corresponding item are listed in the Associated Attribute Value column. Click on the Add / Edit... button to modify the entries in the list.

Operator Choices	Associated Attribute Value
blue/white stripe	1004
green with blue dots	1206
orange and black	1110

Add / Edit...      Use selected entry as the Default Value

**Use Recipe Names**  
If checked, the recipe names will be used as the list items.  
 Use Recipe Names as Operator Choices

**Default Value**  
If checked, the value below is used when no selection is made.  
 Use Default Value

<< Back    Next >>    Cancel

*Screen showing List Choices of product types that have been entered. The operator choices reflect a usage that is clear, but casual; the associated values reflect a code for the color that would be logged with other production data.*

3.1 To add or edit an item, click the **Add/Edit...** button.

A new screen will appear, with options for inserting new list items and modifying existing ones.

3.1.1 To insert a new item, click **Insert New Item**.

3.1.1.a Enter the text for the list item that you wish to display in the **Operator Choices** box.

3.1.1.b Enter the **Associated Attribute Value**.

**Note:** If the **Associated Attribute Value** is left blank, the default will be the **Operator Choices** value.

3.1.1.c Click **OK**

3.1.2 For modifying items, select that item in the list and click **Modify List Items**.

3.1.2.a Change the text for the list item that is displayed in the **Operator Choices** box.

3.1.2.b If necessary, change the **Associated Attribute Value**.

3.1.2.c Click OK

3.1.3 To remove an item, select that item in the list and click **Remove Item**.

3.1.3.a Click OK

3.2 If you wish to use recipe names as the list items, check the box for **Use Recipe Names as List Items**.

3.3 To set a default value (or name), check the box for **Use Default Value**.

3.3.1 Enter a text for the default value.

3.4 Click **Next** or press **Enter** to move to the next screen.

4 **Automatically Clear, Value Required, Operator Entry, and Legal Input** (screen 10).

4.1 If you need the displayed value to be cleared after the attribute is accepted, check the box for **Automatically Clear Value**.

This parameter is of value when the attribute exists only briefly. This attribute will identify that situation. Examples could be “spool changed”, or “shift change”. Automatic clearing of a value would NOT be appropriate for things that identify the continuous state of the production. Examples would be “product color” or “spool ID”.

4.2 If you want an operator to have to enter a value before the process continues, check the box for **Value Required**.

4.3 For **Drop Down List** only: If you wish to allow operator to enter list items, check the boxes for **Allow Operator Entry** and **Add Operator Entry to List**. Automatic clearing of a value is helpful when there is a known list of common choices and options that cannot be anticipated or are so rare that cluttering the list of common choice with them is impractical.

4.4 Enter the **Legal Input** value.

4.5 Click **Next** or press **Enter** to move to the next screen.

**Note:** the option for **Legal Input** appears only if you check the box for **Allow Operator Entry** when creating a **Drop Down List**.

5 **Display Label and Label Placement** (screen 12).

5.1 If you wish to label the attribute, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.

5.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.



5.3 Click **Next** or press **Enter** to move to the next screen.

## 6 Location and Size, Appearance, Hint, and Tab Order (screen 13).

At this point in the process, a drop down list, displayed list, or a group of radio buttons will have appeared in the Total Vu Software window. The parameters in this screen control the appearance and position.

### 6.1 Location and Size.

You can move and resize the drop down list, displayed list, or radio buttons by changing the parameters; the placement of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

6.1.1 Using either the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard, adjust the size and location to place the control as desired.

You will see the drop down list, displayed list, or radio buttons move across the screen while you adjust the size and location.

### 6.2 Appearance.

You can change the color of the drop down list, displayed list, or radio buttons by clicking on the appropriate button.

6.2.1 To choose a color other than the default, click the **Change Color...** button.

A colors window will appear with examples of basic and custom colors.

6.2.1.a Pick a color from the window.

6.2.1.b Click **OK**.

The color you chose will appear to the right of the **Preview** label; if you chose a dark color, the text will be hard to read unless you change it to a lighter color.

6.2.2 To choose a different font for the label, click the **Change Font...** button.

A fonts window will appear.

6.2.1.a Pick a font from the window.

6.2.2.b Choose from the other font attributes: style, color, size, underline, strike-out, and scripts.

#### 6.2.2.c Click OK.

A sample of the font will appear in the box to the right of the **Preview** label.

### 6.3 Hint.

You can enter a hint that will appear when the operator moves the mouse over the drop down list, displayed list, or radio buttons.

6.3.1 If you wish to have a hint, enter the text in the box.

### 6.4 Tab Order.

6.4.1 Enter the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

### 6.5 Click Finish or press Enter.

An icon for the new **Drop Down List**, **Displayed List**, or **Radio Buttons Attributes** will appear in the **Attributes** window, and the control will be visible on the Total Vu Software window.

## Measurement Attributes

Operators can use **Measurement Attributes** for a non-automated measurement (something that might have been previously written by hand on a sheet of paper, such as viscosity of a sample, wall measurement, or weight). A measurement attribute is the same as any other measurement: it can be displayed, logged, trended, statistics can be compiled, specification limits can be applied to it, etc.—the only difference is that the operator types in the value.

### 1 Select the radio button for **Measurement**.

1.1 Click **Next** or press **Enter** to move to the next screen.

### 2 **Attribute Name** (screen 2).

2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).

2.2 Click **Next** or press **Enter** to move to the next screen.

**Add Attribute** 8

**Offset**  
If checked, the value below is added to the entered value before it is reported. A negative Offset results in a smaller final measurement value.

Use Offset

**Default Value**  
If checked, the value below is used when the entered value is empty.

Use Default Value

Nominal

Constant

**Resolution**  
Select the number of places to display in the measurement value to the right of the decimal point.

0.123456

*Screen 8, showing an Offset of .25, a default value of Nominal, and a Resolution six places to the right of the decimal point.*

### 3 Offset, Default Value, and Resolution (screen 8).

#### 3.1 If you wish to use an offset, click the **Use Offset** button.

If checked, the value is added to the entered value before it is reported. A negative offset results in a smaller final measurement value.

##### 3.1.1 Enter the **Offset Value** in the box.

#### 3.2 If you wish to use a default value, check the box for **Use Default Value**.

3.2.1 Check **Nominal** or **Constant** (if you check **Constant**, you will then need to enter a value for the constant).

#### 3.3 From the drop-down list, select the **Resolution**.

#### 3.4 Click **Next** or press **Enter** to move to the next screen.

### 4 Select Spec Limits (not required) (screen 9).

#### 4.1 Click **Next** or press **Enter** to move to the next screen.

- 5 **Automatically Clear and Value Required** (screen 10).
  - 5.1 If you need the displayed value to be cleared after the attribute is accepted, check the box for **Automatically Clear Value**.
  - 5.2 If you want an operator to have to enter a value before the process continues, check the box for **Value Required**.
  - 5.3 Click **Next** or press **Enter** to move to the next screen.
- 6 **Display Label and Label Placement** (screen 12).
  - 6.1 If you wish to label the measurement attribute, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.
  - 6.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.
  - 6.3 Click **Next** or press **Enter** to move to the next screen.
- 7 **Location and Size, Appearance, Hint, and Tab Order** (screen 13).

At this point in the process, a measurement attribute (an edit box for entering the measurement) will have appeared in the Total Vu Software window. The parameters in this screen control the appearance and position.

#### 7.1 **Location and Size.**

You can move and resize the measurement attribute by changing the parameters; the placement of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

- 7.1.1 Using either the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard, adjust the size and location to place the control as desired.

You will see the measurement attribute move across the screen while you adjust its size and location.

#### 7.2 **Appearance.**

You can change the color of the measurement attribute by clicking on the appropriate button.

- 7.2.1 To choose a color other than the default white, click the **Change Color...** button.

A colors window will appear with examples of basic and custom colors.

7.2.1.a Pick a color from the window.

7.2.1.b Click **OK**.

The color you chose will appear to the right of the **Preview** label; if you chose a dark color, the text will be hard to read unless you change it to a lighter color.

7.2.2 To choose a different font for the label, click the **Change Font...** button.

A fonts window will appear.

7.2.1.a Pick a font from the window.

7.2.2.b Choose from the other font attributes: style, color, size, underline, strikeout, and scripts.

7.2.2.c Click **OK**.

A sample of the font will appear in the box to the right of the **Preview** label.

7.3 **Hint.**

You can enter a hint that will appear when the operator moves the mouse over the measurement attribute.

7.3.1 If you wish to have a hint, enter the text in the box.

7.4 **Tab Order.**

7.4.1 Enter the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

7.5 Click **Finish** or press **Enter**.

An icon for the new **Measurement Attribute** will appear in the **Attributes** window, and the **Measurement Attribute** itself will be visible on the Total Vu Software window.

## Counter Attributes

You can use **Counter Attributes** to track a particular process, such as the number of spools of cable. For example, when a spool is filled, an operator would press a button on the screen (an action), which would add a number to the counter.

- 1 Select the radio button for **Counter**.
  - 1.1 Click **Next** or press **Enter** to move to the next screen.
- 2 **Attribute Name** (screen 2).
  - 2.1 Enter the name for the new attribute.

Names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names already used (which you will see listed on screen 2 under **Existing Attributes**).
  - 2.2 Click **Next** or press **Enter** to move to the next screen.
- 3 **Initial Counter Value, Counter Increment, and Maximum Counter Value** (screen 7).
  - 3.1 Specify the initial value of the counter (the default is zero).
  - 3.2 Specify the increment to be used when counting up/down.
  - 3.3 If you want a maximum counter value, check the box for **Use Maximum Value**
    - 3.3.1 Enter the desired maximum value.
      - 3.3.1 If you want to auto-wrap (reset the value back to the initial value after completion of the process), check the box for **Auto-Wrap Counter Value**.
  - 3.4 Click **Next** or press **Enter** to move to the next screen.
- 4 **Automatically Clear and Operator Entry** (screen 10).
  - 4.1 If checked, the displayed value will be cleared after the attribute is accepted.
    - 4.1.1 If you wish to clear the value automatically, check the box for **Automatically Clear Value**.
  - 4.2 If checked, counter values can be entered directly.
    - 4.2.1 If you want the operator to be able to enter values directly, check the box for **Allow Operator Entry**.
  - 4.3 Click **Next** or press **Enter** to move to the next screen.
- 5 **Display Label and Label Placement** (screen 12).
  - 5.1 If you wish to label the counter, select **Display Label**; otherwise click **Next** or press **Enter** to move to the next screen.

5.2 If you selected **Display Label**, select the placement of the label, either **Above**, **Below**, **Left**, or **Right**.

5.3 Click **Next** or press **Enter** to move to the next screen.

## 6 Location and Size, Appearance, Hint, and Tab Order (screen 13).

At this point in the process, a counter will have appeared in the Total Vu Software window. The parameters in this screen control its appearance and position.

### 6.1 Location and Size.

You can move and resize the counter by changing the parameters; the placement of the attribute is an offset (in pixels) from the upper left-hand corner of the main display.

6.1.1 Using either the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard, adjust the size and location to place the counter as desired.

You will see the counter move across the screen while you adjust its size and location.

### 6.2 Appearance.

You can change the color of the counter by clicking on the appropriate button.

6.2.1 To choose a color other than the default white, click the **Change Color...** button.

A colors window will appear with examples of basic and custom colors.

6.2.1.a Pick a color from the window.

6.2.1.b Click **OK**.

The color you chose will appear in the box to the right of the **Preview** label; if you chose a dark color, the text will be hard to read unless you change it to a lighter color.

6.2.2 To choose a different font for the label, click the **Change Font...** button.

A fonts window will appear.

6.2.2.a Pick a font from the window.

6.2.2.b Choose from the other font attributes: style, color, size, underline, strikeout, and scripts.

#### 6.2.2.c Click OK.

A sample of the font will appear in the box to the right of the **Preview** label.

### 6.3 Hint.

You can enter a hint that will appear when the operator moves the mouse over the counter.

6.3.1 If you wish to have a hint, enter the text in the box.

### 6.4 Tab Order.

6.4.1 Enter the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

### 6.5 Click **Finish** or press **Enter**.

An icon for the new **Counter Attribute** will appear in the **Attributes** window, and the **Counter** itself will be visible on the Total Vu Software window.

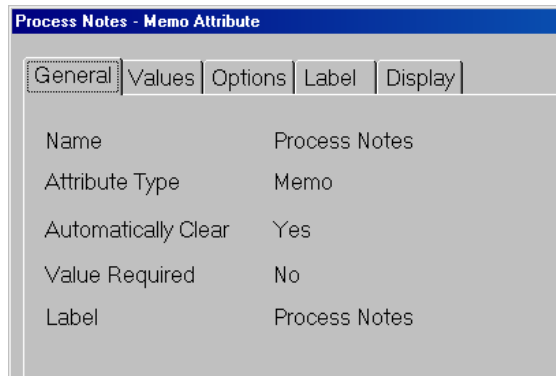
## Modifying an Attribute

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Attribute** icon to open the **Attributes** configuration window. In the window you will see the **Add Attribute** icons and icons for existing attributes.

Double-click the icon for the attribute you wish to modify.

You will see tabs for **General**, **Values**, **Options**, **Label**, and **Display**. As with other Total Vu Software items, the **General** tab is an overview of settings; you would use the other tabs for modifications.





*Modification window for a Memo Attribute, with the General tab showing.*

Or:

### ***Try This***

- In the **Full Configuration** window, double-click the **Display** to access the **Display** configuration utility.
- In the **Options** tab, check the box for **Allow Reconfiguration of Main Display**.
- Click **OK**.
- Close the **Full Configuration** window.
- Now, when you right-click on an attribute in the main **Total Vu Software** window, you will see two choices: **Move** and **Properties**.
- Select **Move** and drag the attribute to a new location.
- Select **Properties** to bring up that attribute's modification window.

## **Actions Specific for Attributes**

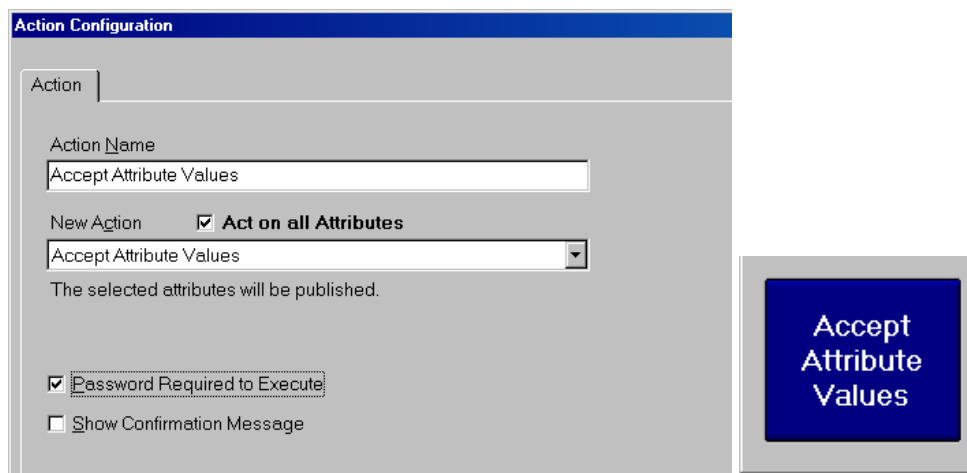
Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for attributes.

- *Accept Attribute Values:* The selected attributes will be published.
- *Clear Attribute Values:* The selected attributes will be cleared.
- *Count Up Attribute Values:* The selected attributes will be counted up.
- *Count Down Attribute Values:* The selected attributes will be counted down.
- *Reset Counter Attributes:* The selected counter attributes will be reset.

## Creating a Button to Accept Attribute Values

### *Try This*

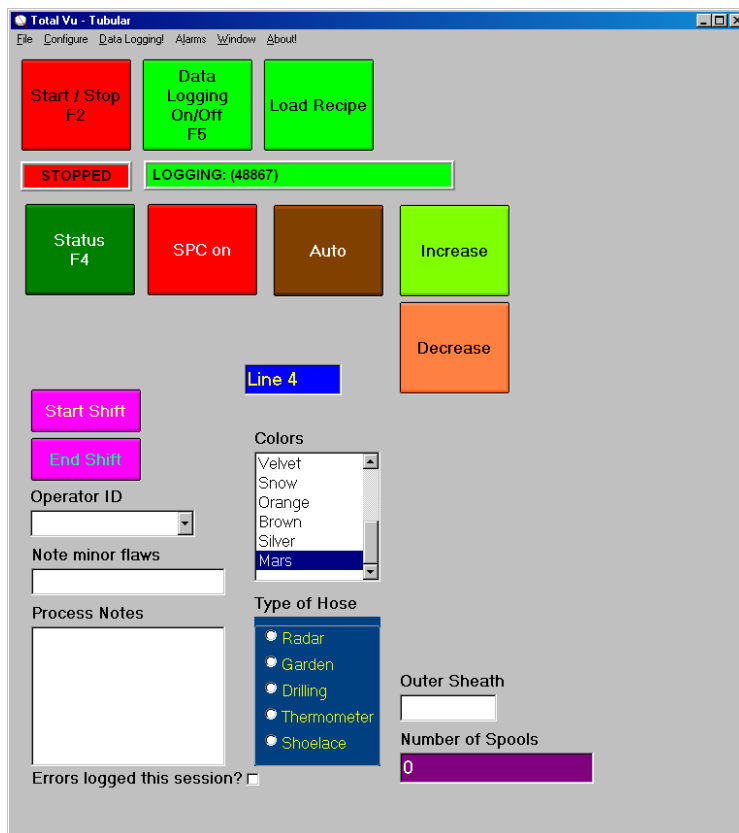
- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Actions** icon to open the **Actions** configuration window. In the window you will see an icon for **Add Action** and any previously-defined actions.
- Create the action for **Accept Attribute Value**.
- Open the **Display** icon and create a button for the **Action**.
- Click the button whenever you need to accept an attribute value.



*Left: Action Configuration window with Accept Attribute Values selected; note options for enabling password and confirmation. On the right, a button for Accept Attribute Values on the Total Vu Software desktop.*

## Display Configuration: Adding and Modifying Buttons

Buttons are tied to actions (sometimes attributes *and* actions); they are used to execute tasks. Some buttons are standard in your Total Vu Software package (Start/Stop, Data Logging On/Off, Load Recipe, Status). Others you can create as needed, as well as modify their placement, size, and color.



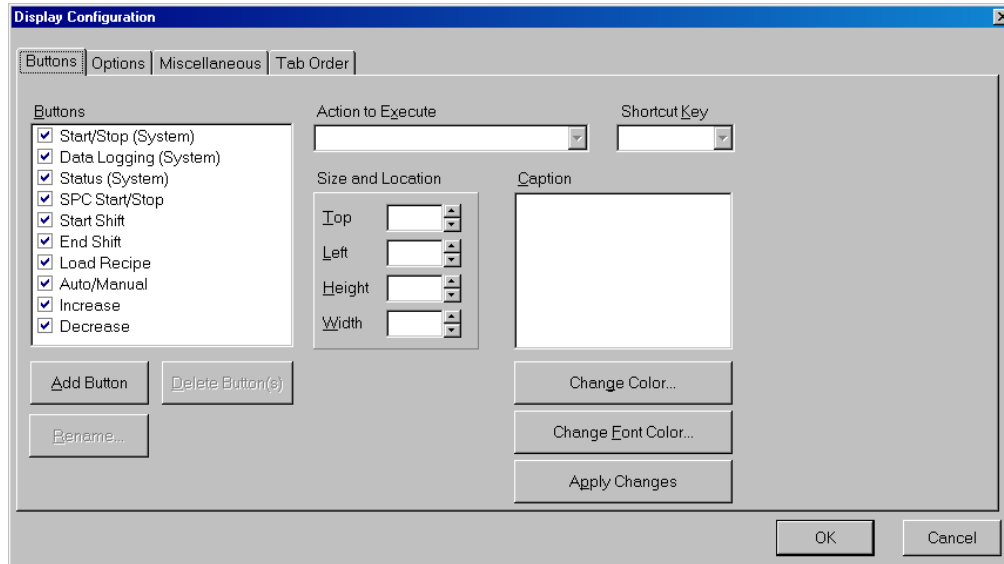
*Total Vu Software window showing standard and added buttons.*

## Creating A New Button

**Note:** Actions **MUST** to be created ahead of time, or they will not show up in the list of actions. If you are creating a button to make an action available from the main screen, the action must either be

a standard one, or you must define it before you create the button to which it will be assigned. Refer to the chapter on [actions](#) if this is the case.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Display** icon to open the **Display Configuration** window.



*The Display configuration window.*

The screen shows a row of tabs: **Buttons**, **Options**, **Miscellaneous**, and **Tab Order**. This section will cover the **Buttons** tab; the other tabs deal with separate **Display** configurations.

## 1 Buttons tab.

The **Buttons** tab has several sections: **Buttons**, **Action to Execute**, **Size and Location**, **Shortcut Key**, and **Caption**, and controls for modifying button and font color.

### 1.1 To add a new button, click **Add Button**.

A window will open for entering the name of the new button. The name must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

The most straightforward button name is one that matches the action you wish to execute with the button.

#### 1.1.1 Enter the **Button Name**.

### 1.1.2 Click **OK** or press **Enter**.

The new button will appear in the list.

### 1.1.3 Click **Apply Changes** so you can see the new button in the Total Vu Software window.

## 1.2 Action to Execute.

### 1.2.1 From the drop-down list, select the action you wish to execute with the button.

**Note:** actions **MUST** to be created ahead of time, or they will not show up in the list of actions.

## 1.3 Shortcut Key.

### 1.3.1 If desired, select a **Shortcut Key** for the button.

## 1.4 Size and Location.

The first two settings boxes under **Size and Location** are for **Location**; the second two are for **Size**.

### 1.4.1 In the boxes for **Top** and **Left**, use the up/down arrows or the **Page Up** or **Page Down** keys to move the button to your desired location.

### 1.4.2 In the boxes for **Height** and **Width**, use the up/down arrows or the **Page Up** or **Page Down** keys to modify the size of the button.

## 1.5 Caption.

The default caption is the same as the button name; you can set the caption to be on more than one line.

### 1.5.1 If desired, modify the caption.

## 1.6 Change Color... and Change Font Color...

When you select the name of a button in the list, the **Change Color...** button shows the current color.

### 1.6.1 Click **Change Color...**

#### 1.6.1.a Select a color from the palette.

#### 1.6.1.b Click **OK**.

The **Change Color...** button will now be in the color you chose.

1.6.1.c To see the color on the button itself, click **Apply Changes**.

1.6.2 Click **Change Font Color...**

1.6.2.a Select a color from the palette.

1.6.2.b Click **OK**.

The label in the **Change Color...** button will now be in the color you chose.

1.6.2.c To see the color on the button itself, click **Apply Changes**.

1.7 Click **OK** or press **Enter**.

## Modifying, Renaming, and Deleting Buttons

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Display** icon to open the **Display Configuration** window.

1 **Buttons** tab.

1.1 To delete a button:

1.1.1 Select that button in the list.

1.1.2 Click **Delete**.

1.1.3 A warning will appear; if you are sure you want to delete the button, click **Yes** or press **Enter**.

1.2 To change the color of a button or its caption:

1.2.1 Select that button in the list.

1.2.2 Click **Change Color...**

1.2.2.a Select a color from the palette.

1.2.2.b Click **OK**.

The **Change Color...** button will now be in the color you chose.

1.2.2.c To see the color on the button itself, click **Apply Changes**.

1.2.3 Click **Change Font Color...**

1.2.3.a Select a color from the palette.

1.2.3.b Click **OK**.

The label in the **Change Color...** button will now be in the color you chose.

1.2.3.c To see the color on the button itself, click **Apply Changes**.

1.3 To rename a button.

1.3.1 Select that button in the list.

1.3.2 Click **Rename...**

A window will open for changing the name of the button. The name must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

1.3.3 Change the **Button Name**.

1.3.4 Click **OK** or press **Enter**.

The button will appear in the list of buttons with its new name.

1.4 Click **OK** or press **Enter**.

1.5 To hide a button.

1.5.1 Uncheck the box beside that button in the list.

1.5.2 Click **OK** or press **Enter**.

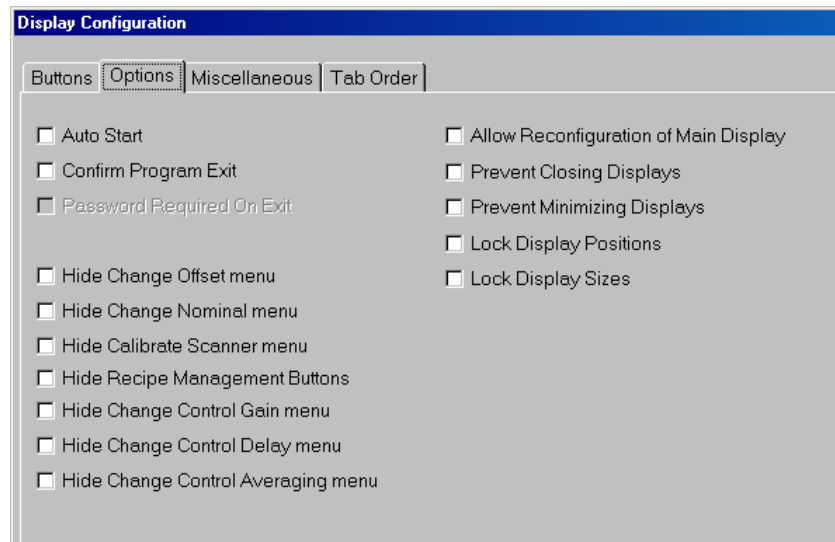
The button will disappear from the Total Vu Software desktop.

### **Making Modifications in the Options, Miscellaneous, and Tab Order Tabs**

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Display** icon to open the **Display Configuration** window.

## 1 Options tab.

The various checkboxes in the **Options** tab offer configuration options for how much control you want the operator to have over the system. For example, **Confirm Program Exit** (and with that, an option requiring password to exit), **Hide Calibrate Scanner menu**, **Prevent Closing Displays**, **Lock Display Positions**, etc. Please see [Appendix B: Security](#) for information on configuring password protection for the main program window.



*The Options tab.*

### *Try This*

- Check the box for Allow Reconfiguration of Main Display.
- Click OK.
- Close the Full Configuration window.
- Now, when you right-click on a button you will see several choices: **Move**, **Move ALL Buttons to Default Locations**; **Move ALL Status Panels to Default Locations**; and **Move ALL Buttons and Status Panels to Default Locations**.
- Select **Move** and drag a button to a new location.

## 2 Miscellaneous tab.

### 2.1 Latch Visible Spec Limit Alarms.

This causes the value panel to “latch” a red, out-of-spec indication; the indicator will stay red until the operator double-clicks the panel. The “latch” has no affect on measurement values—they will continue to update.

### 2.2 Help Hint Display Time.

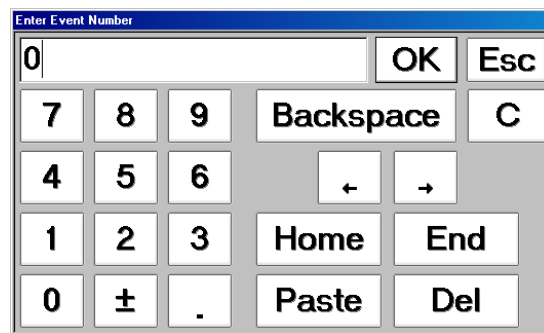


- 2.2.1 Use the up/down arrows or **Page Up** or **Page Down** keys to change how long the hints appear on the screen.

### 2.3 Touch Screen.

- 2.3.1 Select the radio button for your type of Touch Screen.

The options are: **None**, **Manual**, and **Automatic**. **Manual** means that the operator must double-click the edit box to open an on-screen keyboard. With **Automatic**, the on-screen keyboard will appear automatically when the operator selects an edit box. **None** turns off the on-screen keyboard feature.



*The Touch Screen keyboard.*

### 3 Tab Order.

This applies only to attributes that have already been created; Tab order is the order in which attributes will be visited when the operator presses the **Tab** key in the main Total Vu Software program window.

- 4 Click **OK** or press **Enter**.

## Actions Specific for Buttons and Display

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for display features.

### Macro Actions

- *Execute List of Actions*: Executes a user-selected list of actions. You will first need to define a set of actions, then select them and list them to execute in the order that you want them executed.
- *Reset Action List*: Makes the next action to execute the first one in the list.

### System Actions

- *Show Full Configuration Window*: Shows the Full Configure window.
- *Open Specified File*: Opens a specified file (such as: .exe, .xls, .doc).

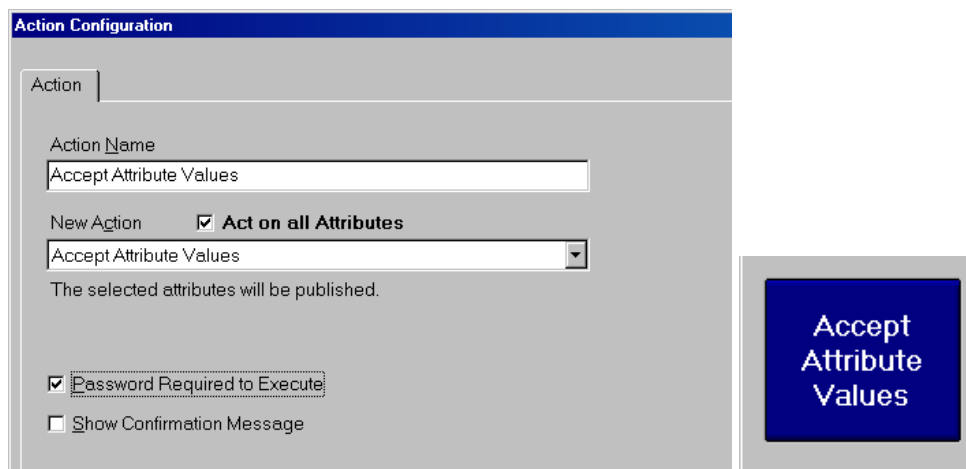
### Button Actions

- *Assign Action to Button*: Changes the action associated with a selected button to a pre-selected action.
- *Enable Buttons*: Enables the selected buttons to trigger their associated action(s).
- *Disable Buttons*: Disables the selected buttons from triggering their associated action(s).
- *Show Buttons*: Shows the selected buttons on the main form.
- *Hide Buttons*: Hides the selected buttons.

## Creating a Button to Accept Attribute Values

### *Try This*

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Actions** icon to open the **Actions** configuration window. In the window you will see an icon for **Add Action** and any previously-defined actions.
- Create the action for **Accept Attribute Value**.
- Open the **Display** icon and create a button for the **Action**.
- Click the button whenever you need to accept an attribute value.



*Left: Action Configuration window with Accept Attribute Values selected; note options for enabling password and confirmation. On the right, a button for Accept Attribute Values on the Total Vu Software desktop.*



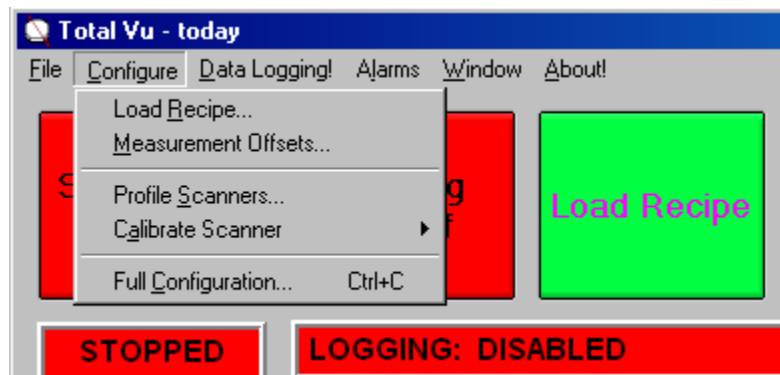
## Menu-based Total Vu Software Configurations

Although most of Total Vu Software's configurations are handled in the **Full Configure** window, some configurations are accessed from the various menus in the Total Vu Software main window, and some from menus AND from separate configurations. Those menu-based configurations will be discussed in this chapter.

### Configure Menu

Some of the options in the **Configure** menu are shortcuts to options within various wizards in the **Full Configure** window: you can access **Calibrate Scanner** from the icon for a particular scanner; **Recipes...** (discussed in the [Recipes](#) chapter) from the Total Vu window from a button and an action combination. **Profile Scanners...** can also be accessed from a button and an action, but is not part of a larger configuration group. **Measurement Offsets...** can be accessed only from the **Configure** menu.

**Note:** You can hide the **Measurement Offsets...** option by checking the box for **Hide Change Offset menu** in the **Options** tab of the **Display** configuration wizard.



*The Configure menu, with Load Recipe, Measurement Offsets..., Profile Scanners..., Calibrate Scanner, and Full Configuration...*

## Measurement Offsets.

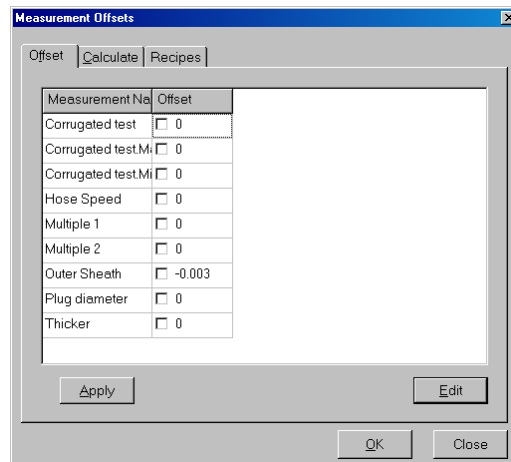
- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Measurement Offsets...** to open the **Measurement Offsets** utility.

Offsets are usually entered during initial setup of a measurement, but if adding an offset to one or more measurements becomes necessary later, it is easy to do with the **Measurement Offsets** utility.

The **Measurement Offsets** utility consists of three tabs: **Offset**, **Calculate**, and **Recipes**.

### 1 The **Offset** tab.

The **Offset** tab consists of a table of all the measurements defined in the system with their offset amounts and checkbox showing whether the offset is enabled.



*The Measurement Offsets utility showing the Offset tab.*

### 1.2 To edit an offset value:

- 1.2.1 Select the cell and click the **Edit** button or press **Enter**.
- 1.2.2 Enter a new value.
- 1.2.3 Click **Apply** button or press **Enter** to accept the new value.

### 1.3 To edit offset values for several measurements simultaneously:

**Note:** Measurements must be consecutive.

- 1.3.1 Select a range of cells and click the **Edit** button or press **Enter**.
- 1.3.2 Enter a new value.
- 1.3.3 Click **Apply** button or press **Enter**.

The new value will be copied to all of the selected cells. Clicking on the checkbox of one of the measurements in the selected range will copy the state (checked or unchecked) of that checkbox to the checkboxes of the other measurements.

- 1.4 If you are finished, click the **OK** button to save the settings and exit the screen.
- 1.5 If you do not wish to save the settings, click the **Close** button to ignore changes made since the last time the **Apply** button was clicked.

## 2 The **Calculate** tab.

The **Calculate** tab allows an operator to calculate the offset value for one or more measurements based on a sample of a known size.

**Note:** If the measurement is derived from a scanner, to calculate an offset value a scanner must be on and scanning.

- 2.1 Select measurement(s) for which you wish to calculate a new offset value.
- 2.2 For the offset calculation, enter the desired value for the measurement(s) in question.
- 2.3 Click the **Calculate Offset Values Now** button.

When the button is clicked, it changes to: **Abort Calculation Procedure**.

On activation of the button, the software collects measurement data for five seconds and takes an average of all values completed during that time. The resulting offset value is the difference between this averaged measurement and the value entered in section 2.2.

After completion, the calculated values for the selected measurements will be shown on the **Offset** tab. This calculation procedure is not affected by whether the offset for the measurement was enabled or disabled—the calculated offset value is based solely on the difference between the computed measurement and the value entered in section 2.2.

## 3 The **Recipes** tab.

An offset recipe saves all the current measurement offsets to a file so that they can be recalled later. This is particularly important with multi-strand scanning. For a setup of wires, whether of sizes or positions, it is possible to access the results from the gauge and set offsets to match values from off-line testing.

## Profile Scanners

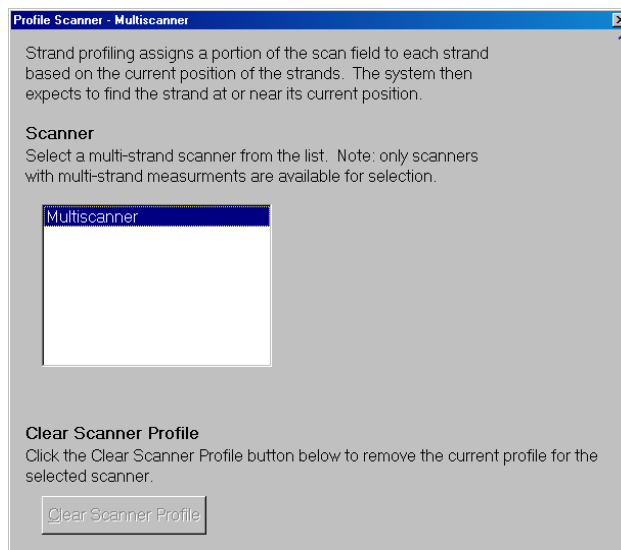
The **Multi-Strand Profile** is necessary if you will be measuring more than two products simultaneously with one gauge. When measuring multiple products simultaneously, the software must be “taught” the location of each product within the measurement field. If a strand breaks (goes away), the software can determine which strand broke and can continue measuring the remaining strands. Strand profiling assigns to each strand a portion of the scan field that is based on its profiled position in the field. The system then expects to find the strand at or near its profiled position.

**Note:** The profile will appear only if there is at least one scanner set up to measure multiple strands.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Profile Scanners...** to open the **Multi-Strand Profile** utility.

Or:

Create the action **Start Multi-Strand Profile** and add a button for it on the Total Vu Software desktop.



*The first screen of the Multi-Strand Profile; the **Clear Scanner Profile** button is grayed out because a profile has not yet been generated.*

### 1 Scanner and Clear Scanner Profile (screen 1).

**Clear Scanner Profile** is used to delete an existing profile. This is generally done when scanner fixtures are adjusted or if a new profile of the same strands is run. The button for **Clear Scanner Profile** will be grayed out unless a multi-strand profile exists.

- 1.1 Select a scanner from the list.

If there is only one scanner with a multi-strand measurement assigned to it, that scanner will be selected by default.

- 1.2 If necessary, click the button for **Clear Scanner Profile**.

- 1.3 Click **Next** or press **Enter** to move to the next screen.

- 2 **Number of Strands and Maximum Product Size** (screen 1 or 2).

If the scanner has glass logic checked, a category appears for **Maximum Product Size**.

- 2.1 **Number of Strands:** Use the up/down arrows to enter the number of strands in the scanner's measurement field.

The initial number is the maximum number of strands that was entered in the **Add Scanner Measurement** wizard—the scanner can run with fewer strands.

- 2.2 **Maximum Product Size:** Enter an amount for the maximum size of the product.

To identify each strand properly when profiling with glass logic, a value for **Maximum Product Size** is needed. The size of the strands must not exceed this value. Total Vu Software will add 20 percent to the size you enter so a good rule of thumb is to enter the USL for the product being profiled. With glass logic, the actual number of edges that are detected are “reduced” based on determining which edges result from laser bleed-through.

- 2.3 Click **Next** or press **Enter** to move to the next screen.

- 3 **Profiling** (screen 3).

Profiling begins automatically when the wizard reaches this screen. The window shows the **Status**, **Sample Rate** (the speed of the scanner), **Edge Count/# of Edges Expected**, and **Sample Count**.

The Status messages are: **OK**, **NO SCAN**, **BEAM BLOCKED**, **TOO MANY: <N> EDGES**, **TOO FEW: <N> EDGES**, **PROFILING COMPLETE**, and **PROFILE ABORTED**.

- 3.1 If necessary, click the **Abort Profiling** button.

**Or:**

- 3.2 If there was a problem with the profile, click the **Profile Again** button.

- 3.3 When the Status label shows **PROFILING COMPLETE**, either:

- 3.3.1 Click **Finish** or press **Enter**.



3.3.2 Or, click **Next** or press **Enter** to move to the next screen.

The option for **Next** will appear only if you profiled fewer strands than the gauge was originally configured for.

#### 4 Active Strands (screen 4).

This screen appears if you profiled fewer strands than the gauge was originally configured to measure.

4.1 From the list of available positions, select the strand positions that will remain active.

The measurements assigned to the position are listed after the position number.

4.2 Click **Add**.

4.3 If you have no other scanners to profile, click **Finish**.

4.4 If you are not finished, click **Profile Another Scanner** or **Back**.

### Window Menu: Opening and Configuring Desktop Windows

The **Window** menu allows the operator to open or create windows to view live production information, such as the position of a part in the scanner window, measurement data, trend charts, etc.

Clicking on the **Window** menu gives access to permanent system windows (**Flaw Count**, **Error Log** or **Process Tracker**, depending on your options, and **General Status**), a wizard for creating various windows, and a place to open charts that have been created with the **Charts** wizard. Other than the permanent windows and **Charts**, if the window is closed it will need to be recreated.

**Note:** when you close a window, the system displays a warning message that must be acknowledged; this helps prevent accidental closing.

### Opening Flaw Count, General Status, Error Log, or Process Tracker

- Open the Total Vu Software.
- Go to the **Window** drop-down menu.
- Select **Flaw Count**, **General Status**, **Error Log**, or **Process Tracker**. (**Note:** **General Status** can also be accessed by pressing the **Status** button on screen or pressing the **F4** key on your keyboard and **Error Log** appears only if you do not have the **Process Tracker** option.)

These are the permanent system windows. **Flaw Count** displays a summary of flaws in a product; **General Status** shows logging and 400 Card status, scanner selections, and whether scanning is

occurring; if scanning is occurring, **General Status** shows scans and edges; **Error Log** displays error messages, and the **Process Tracker** allows users to keep a file that contains records of when selected actions or events occurred. **Process Tracker** configuration will be handled elsewhere.

### 1 Select Error Log.

This opens a window that has columns for **Time**, **Date**, **Length**, **Event Type**, **Subtype**, **Source**, and **Description**. There is little configuration; the window merely displays the errors that the software records.

Time	Date	Inches	Event Type	Subtype	Source	Description
04:37:37 PM	20-Jun-07	0.0000	ERROR	SETUP	Great Big On	External Alarm cannot be configured. Output Pin 0 is not e
04:37:37 PM	20-Jun-07	0.0000	ERROR	SETUP	Scanless	External Alarm cannot be configured. Output Pin 0 is not e

Record New Event    Hide    Snap to Most Recent Event

### 1 Select Flaw Count.

This brings up a window listing the measurements that have flaw detection enabled and the corresponding number of lumps and neckdowns. During normal operation, when a flaw is detected the background of the **Flaw Count** window turns red for 15 seconds.

- 1.1 Click the **Clear All** to erase the recorded flaws that have been detected and reset the counts to zero.
- 1.2 To bring up a window that allows modification of the number of seconds the flaw alarm is displayed, right-click anywhere on the window.
- 1.3 To format and print a report, click the **Report** button.

A window will appear with two tabs: **Options** and **Report Output**. With some **Options**, tabs for **Measurements** and **File Naming** appear.

#### 1.3.1 Options tab.

##### 1.3.1.a Select one of four report options:

- All events on one report;
- One report for each measurement;
- One report, specific measurements;

- Separate reports, specific measurements.

1.3.1.b If you want to clear flaws after generating the report, check the box **Clear Flaws After Reporting**.

With the third and fourth options, the **Measurements** tab appears.

1.3.2 **Measurements** tab.

1.3.2.a Select one or more measurement(s) from the list.

These will be the only measurements included in the reports.

1.3.2.b Click **Add**.

1.3.3 **Report Output** tab.

1.3.3.a Select either **Save To Disk** or **Print**, or both.

The report can be saved to a **Comma Separated Value (.csv)** file and can also be printed directly to the default printer.

- With **Save To Disk**: select either **New File**, **Append**, or **Overwrite**,  
*and*
- If desired, check the box for **Include Header**.

When **Save to Disk** is selected, the **File Naming** tab appears.

- With **Print**: To switch from the default font and point size, click the button for **Change Font...**

Choose a font, style, size, and color.

Click **OK** or press **Enter** to return to the **Report Output** tab.

*and*

- If desired, check the box for **Include Header**. If the **Include Header** box is checked, the first line of the report will be a descriptive header for each column.

1.3.3.b If you would like to include a column in the report for the name of the measurement containing the flaw, check the box for **Include Measurement Name**.

1.3.4 **File Naming** tab.

For more information on file naming, please see the section on Auto File Naming in the chapter on [data logging](#).

1.3.4.a From the drop-down list, select a variable.

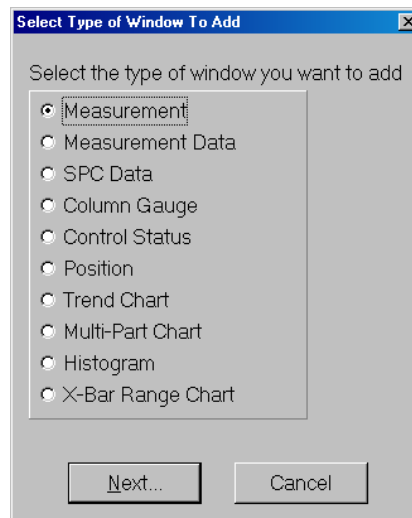
1.3.4.b Click the **Insert Variable** button.

1.3.4.c From the drop-down list, select a file extension or type one in (e.g. .flaw).

1.4 Click the button for **Generate Report**.

## Creating A New Display Window

- Open the Total Vu Software.
- Go to the Window drop-down menu.
- Select New Window. You will see a screen with various radio buttons.



*The New Window configuration utility. **Note:** the list of items depends on your particular Total Vu Software options.*

The last four items, except for **Multi-Part Chart**, which is used only for a few specific processes, are dealt with in the chapter on [charts](#), and will not be discussed here.

## Measurement Display Window

A **Measurement Display Window** shows an operator the exact measurements being taken at any moment. The window can display one or more measurements simultaneously, from different lines, different gauges, different devices, any measurement that an operator needs to see.

- 1 Select the radio button for **Measurement**.

- 1.1 Click **Next** or press **Enter** to move to the next screen.

The next screen has two tabs: **Measurements** and **Display**.

- 2 **Measurements** tab.

- 2.1 Select from the list of available measurements

- 2.1.1 Click **Add**.

- 2.2 Or, if you wish to use all measurements, click the **Add All** button.

- 2.3 If you are ready to move on, select the **Display** tab.

- 3 **Display** tab.

- 3.1 Enter a title for your window.

This is the text that appears at the top of the window, in the caption bar; the text also appears as the caption for the corresponding task bar button.

The title should be something related to the product being measured, and/or the type of measurement, and/or the type of display (for identification in the task bar).

- 3.1 Use the up/down arrows to set a point size for the measurement value.

- 3.2 If you do not want to show measurement names, uncheck the **Show Measurement Names** box.

The default is for the box to be checked, because hiding the names would be unusual.

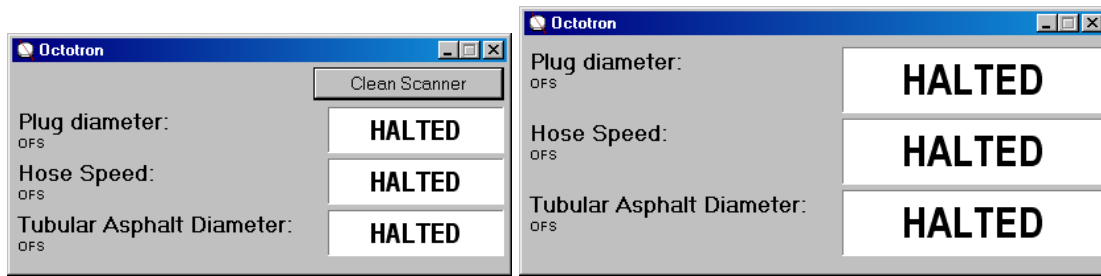
- 3.3 If desired, check the box to display the **Clean Scanner** button.

- 3.3.1 Choose the scanner. (Checking the **Clean Scanner** button activates the drop-down menu.)

The **Clean Scanner** button allows an operator to halt measuring while the micrometer windows are cleaned of dust and debris. This prevents erroneous measurements from being reported or recorded.

- 3.4 Click **OK** or press **Enter**.

The **Measurement Display Window** will appear on your screen, although the window might be partially or fully hidden by other Total Vu Software windows.



*A newly-created Measurement Display Window; the right-hand version shows the display type set at a larger size and the Clean Scanner button unchecked.*

## Measurement Data Display Window

Like the Measurement Display Window, the Measurement Data Display Window can show one or more measurements simultaneously. The window also permits the display of other characteristics of the measurement (maximum, average, range, standard deviation, etc.) in addition to current value.

- 1 Select the radio button for Measurement Data.
  - 1.1 Click Next or press Enter to move to the next screen.
- 2 Measurements (screen 2).
  - 2.1 Select from the list of available measurements
    - 2.1.1 Click Add.
  - 2.2 Or, if you wish to use all measurements, click the Add All button.
  - 2.3 Click Next or press Enter to move to the next screen.
- 3 Fields (screen 3).
  - 3.1 From the list of available fields, select the measurement characteristics that you want to display.
  - 3.2 Click Add.
  - 3.3 Or, if you wish to use all the fields, click the Add All button.
  - 3.4 If desired, use the Up/Down buttons to adjust the order. The order of the fields in the selection box will be the order in which the fields will be displayed in the Measurement Data Display Window.
  - 3.5 Click Next or press Enter to move to the next screen.

#### 4 Orientation, Spacing, Labels, and Label Alignment (screen 4).

The **Label Alignment** section appears only after selecting the **Show Labels** option and the radio buttons **Data for a Measurement in the Same Row** or **Data for a Measurement in the Same Column**.

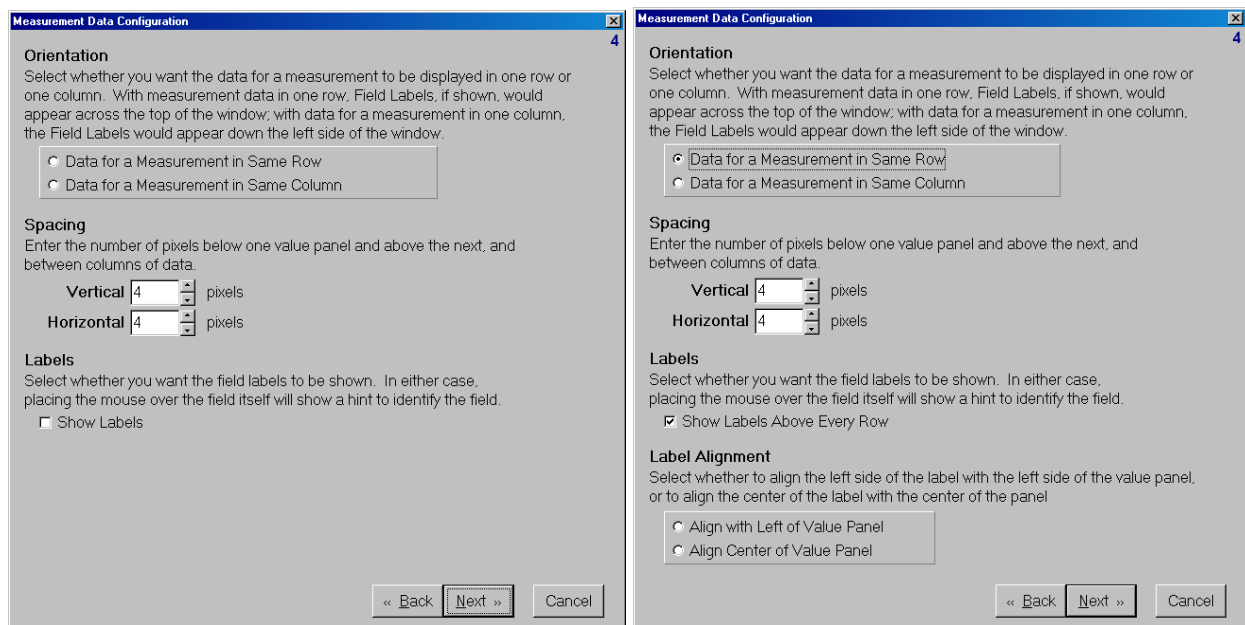
4.1 **Orientation:** Select the radio button for displaying the data for a measurement on one row or one column.

With data in one row, field labels, if shown, would appear across the top of the window; with data in one column, the field labels would appear down the left side of the window.

4.2 **Spacing:** Use the up/down arrows to enter:

4.2.1 The number of pixels below one value panel and above the next.

4.2.2 The number of pixels between columns of data.



Screen 4; on the left, **Label Alignment** is hidden but is visible on the right.

4.3 **Labels:** If you want field labels to show, check the box.

The options for **Labels** and **Label Alignment** will vary depending on your selections for “Same Row” or “Same Column”. With or without labels, placing the mouse over the field itself will show the name of the field.

#### 4.4 Label Alignment.

- 4.4.1 For data in the same row, select whether to line up the left side of the label with the left side of the value panel.
- 4.4.2 For data in the same column, enter the vertical offset of the center of the label from the vertical center of the value panel.

The result is shown on the **Preview** panel in screen 5.

- 4.5 Click **Next** or press **Enter** to move to the next screen.

### 5 Fonts, Value Panel Width, and Background Colors (screen 5).

- 5.1 Configure the fonts used to display the field labels and measurement values.

- 5.1.1 Click the button for **Select Label Font...**

A window will open with choices for font, font style, size, effects, and color.

- 5.1.1.a Choose the font and style you prefer.
- 5.1.1.b Click **Apply** to see the label in the **Preview** window.
- 5.1.1.c Click **OK** to return to screen 5.

- 5.1.2 Click the button for **Select Value Font...**

A window will open with choices for font, font style, size, effects, and color.

- 5.1.2.a Choose the font and style you prefer.
- 5.1.2.b Click **Apply** to see the label in the **Preview** window.
- 5.1.2.c Click **OK** to return to screen 5.

- 5.2 Use the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard to select a width for the field value panels.

You will be able to see the result in the **Preview** panel.

- 5.3 Select the background color for the data values and for the window.

Again, you will be able to see the result in the **Preview** panel.

- 5.4 Click **Next** or press **Enter** to move to the next screen.



## 6 Window Caption (screen 7).

### 6.1 Enter the caption for the window.

Captions must begin with a letter or a digit. [ ] and | are illegal. The caption can be up to 30 characters and it must be unique. It cannot match any of the captions listed in the box.

### 6.2 Click Finish or press Enter.

The **Measurement Data Display Window** will appear on your screen, although the window might be partially or fully hidden by other Total Vu Software windows.

## **SPC Data Display Window**

The **SPC Data Display Window** looks similar to the **Measurement Data Display Window** and shares some label names, but is based on SPC plans rather than measurements.

## 1 Select the radio button for **SPC Data**.

### 1.1 Click **Next** or press **Enter** to move to the next screen.

## 2 **Measurements** (screen 1).

### 2.1 Select an SPC Plan from the list of those available.

### 2.2 Click **Next** or press **Enter** to move to the next screen.

## 3 **Fields** (screen 3).

### 3.1 Select the measurement values, or fields, that you want to display on this screen.

### 3.2 Click **Add**.

### 3.3 Or, if you wish to use all the fields, click the **Add All** button.

### 3.4 If desired, use the **Up/Down** buttons to adjust the order.

### 3.5 Click **Next** or press **Enter** to move to the next screen.

## 4 **Orientation, Spacing, Labels, and Label Alignment** (screen 4).

The **Label Alignment** section appears only after selecting the **Show Labels** option and whether you want your date in the same row or same column.

- 4.1 **Orientation:** Select the radio button to display the data for a measurement in one row or one column.

With data in one row, field labels, if shown, would appear across the top of the window; with data in one column, the field labels would appear down the left side of the window.

- 4.2 **Spacing:** Use the up/down arrows to enter:

- 4.2.1 The number of pixels below one value panel and above the next.

- 4.2.2 The number of pixels between columns of data.

- 4.3 **Labels:** If you want field labels to show, check the box.

With or without labels, placing the mouse over a field will show the name of the field.

- 4.4 **Label Alignment.**

- 4.4.1 For data in the same row, select whether to line up the left side of the label with the left side of the value panel or the center of the value panel.

- 4.4.2 For data in the same column, enter the vertical offset of the center of the label from the vertical center of the value panel.

The result is shown on the **Preview** panel in screen 5.

- 4.5 Click **Next** or press **Enter** to move to the next screen.

## 5 **Fonts, Value Panel Width, and Background Colors** (screen 5).

- 5.1 Configure the fonts used to display the field labels and values.

- 5.1.1 Click the button for **Select Label Font...**

A window will open with choices for font, font style, size, effects, and color.

- 5.1.1.a Choose the font and style you prefer.

- 5.1.1.b Click **Apply** to see the label in the **Preview** window.

- 5.1.1.c Click **OK** to return to screen 5.

- 5.1.2 Click the button for **Select Value Font...**

A window will open with choices for font, font style, size, effects, and color.

- 5.1.2.a Choose the font and style you prefer.

5.1.2.b Click **Apply** to see the label in the **Preview** window.

5.1.2.c Click **OK** to return to screen 5.

5.2 Use the up/down arrows or the **Page Up** or **Page Down** buttons on your keyboard to select a width for the field value panels.

You will be able to see the result in the **Preview** panel.

5.3 **Background Colors.**

5.3.1 Select the background color for the data window

5.3.2 Select the background color for the value.

Again, you will be able to see the result in the **Preview** panel.

5.4 Click **Next** or press **Enter** to move to the next screen.

6 **Window Caption** (screen 7).

6.1 Enter the caption for the window.

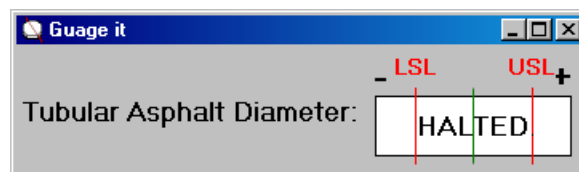
Captions must begin with a letter or a digit. [ ] and | are illegal. The caption can be up to 30 characters and it must be unique. It cannot match any of the captions listed in the box.

6.2 Click **Finish** or press **Enter**.

The **SPC Data Display Window** will appear on your screen, although the window might be partially or fully hidden by other Total Vu Software windows

### Column Gauge Display Window

The **Column Gauge Display Window** displays the measurement values as a graphical representation of the deviation from the nominal. This window contains rows with the measurement names and the corresponding column gauges. Specifications must be assigned to the displayed measurements for the column gauges to work properly.



*An example of a Column Gauge window.*

- 1 Select the radio button for **Column Gauge**.

- 1.1 Click **Next** or press **Enter** to move to the next screen.

The next screen has two tabs: **Measurements** and **Display**.

- 2 **Measurements** tab.

- 2.1 Select from the list of available measurements.

- 2.1.1 Click **Add**.

- 2.2 Or, if you wish to use all measurements, click the **Add All** button.

- 2.3 After you have added all desired measurements, select the **Display** tab.

- 3 **Display** tab.

- 3.1 Enter a title for your window.

The title should be something related to the product being measured, or the type of measurement(s).

- 3.1 Use the up/down arrows to set a point size for the measurement value.

- 3.2 If you do not want to show measurement names, uncheck the box.

The default is for the box to be checked, because hiding the names would be unusual.

- 3.3 If desired, check the box to display the **Clean Scanner** button.

- 3.3.1 Choose the scanner. (Checking the **Clean Scanner** button activates the drop-down menu.)

The **Clean Scanner** button allows an operator to halt measuring while the micrometer windows are cleaned of dust and debris. This prevents erroneous measurements from being made. The **Clean Scanner** option is rarely chosen.

- 3.4 Click **OK** or press **Enter**.

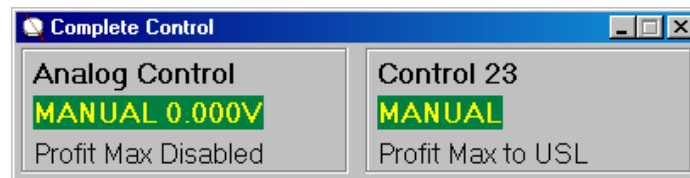
The **Column Gauge Display Window** will appear on your screen, although the window might be partially or fully hidden by other Total Vu Software windows

## Control Status Display Window

The **Control Status Display Window** monitors the status of a control loop or loops on a production line. For detailed information about Control configuration please see the separate chapter on [control](#).

- 1 Select the radio button for **Control Status**.
  - 1.1 Click **Next** or press **Enter** to move to the next screen.
- 2 Select from the list of **Available Control Loops**
  - 2.1 Click **Add**.
  - 2.2 Or, if you wish to use all available control loops, click the **Add All** button.
- 3 Use the up/down arrows to specify the number of rows and columns used to display the selected Control Loops
- 4 Enter the caption text for the **Control Status** window.
- 5 Click **OK** or press **Enter**.

The **Control Status Display Window** will appear on your screen, although the window might be partially or fully hidden by other Total Vu Software windows



*Control Status Window showing two control loops.*

## Position Display Window

The **Position Display Window** shows the relative size and position of a product in a scanner's measurement field. Typically, this display is used to center a part in the measurement field. You can zoom in and out from the menu or keyboard (this is discussed later in **Modifying a Display Window**). When the window is open and the line is operating, a part normally shows up in the field, along with grid or axis lines if they are chosen. A red background in the window represents an error, such as an extra part (**TOO MANY** error) in the field. If, for example, one window of a dual-axis scanner is blocked, a red band shows on the blocked axis.

- 1 Select the radio button for **Position**.
  - 1.1 Click **Next** or press **Enter** to move to the next screen.
- 2 From the drop-down list at the top, choose the scanner.
- 3 Next, there are several configuration choices.
  - 3.1 To keep the **Position Window** in the foreground, check the box for **Always On Top**.
  - 3.2 If desired, check the box for **Show Grid Lines**.

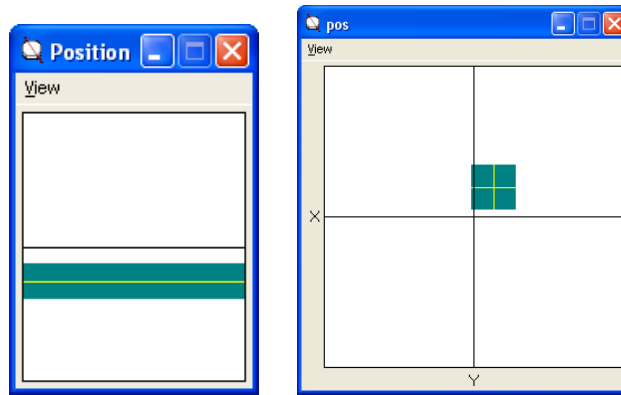
When **Show Grid Lines** is checked, the radio button for **as Percentage of the Field** becomes active.

**Note:** **Show Axis Labels** is grayed out; the parameter has not yet been implemented.

- 3.4 If you are showing grid lines, select the radio button for **as Percentage of the Field**.
  - 3.4.1 Use the up/down arrows or enter a number for the percent of spacing you desire for your grid lines.

**Note:** **as Position Values** is grayed out; the parameter has not yet been implemented.
- 3.5 Click the colored area to open a color window for choosing **Part Color**.
  - 3.4.1 Choose a color.
  - 3.4.2 Click **OK** or press **Enter** to return to the Part Display Configuration Screen.
- 3.6 Enter a caption for the **Position** window.

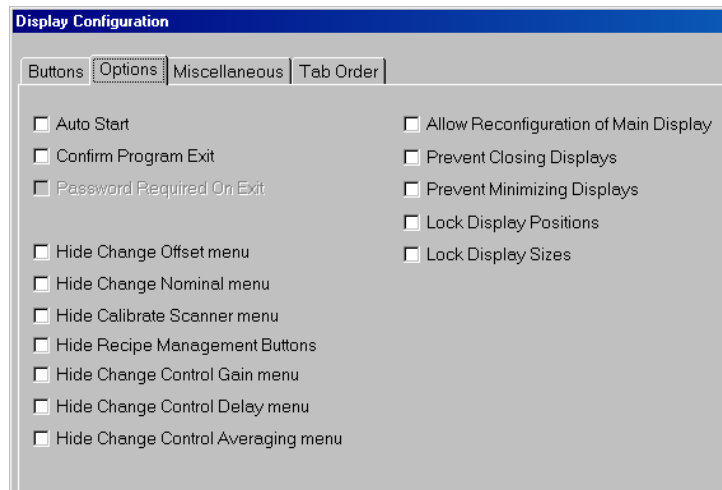
The **Position Display Window** will appear on your screen; if you did not select **Always On Top**, the window might be partially or fully hidden by other Total Vu Software windows



*Position Display Window; the window on the left shows the display from a single-axis gauge and the right shows a part in the field of a dual-axis gauge.*

### Locking and Unlocking Display Windows from the Display Configuration Wizard

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Display** icon to open the **Display Configuration** window.



*The Options tab of the Display configuration window.*

Go to the **Options** tab.

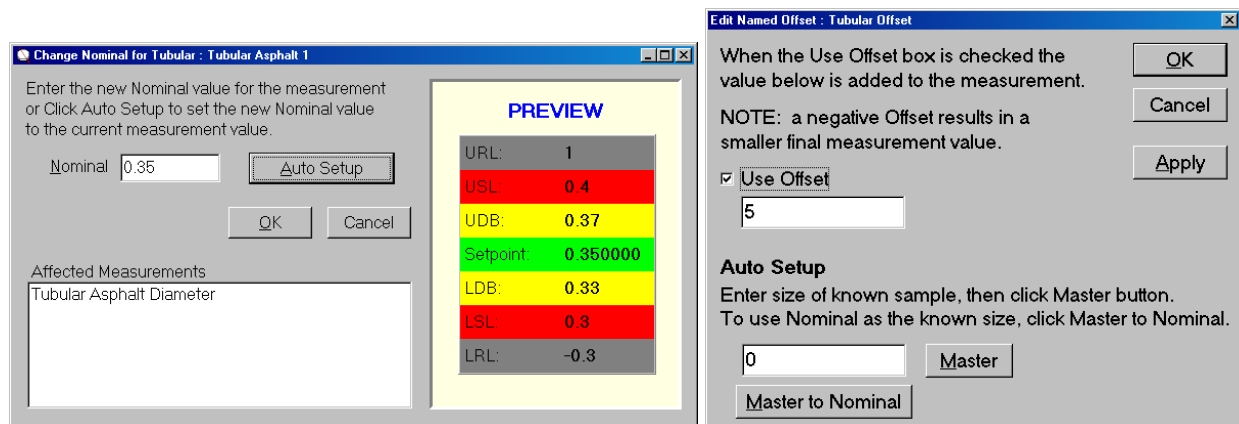
You can select from several options to prevent modification of windows after they have been created.

- **Prevent Closing Displays:** If checked, an operator can minimize the windows but not close them.
- **Prevent Minimizing Displays:** If checked, windows cannot be minimized.
- **Lock Display Positions:** If checked, windows cannot be moved; right-click to access their configuration is enabled.
- **Lock Display Sizes:** If checked, windows cannot be resized, and right-click will not access their configuration.

## Modifying a Display Window

Configuration options depend on the type of display window. Some of the options are shortcuts or alternate ways to edit a piece of a larger configuration. For example, with **Change Nominal...** you can change the nominal value of a loaded recipe without having to go to the **Load Recipe...** option of the **Configure** menu or the **Recipes Configuration** in the **Total Vu Software Full Configure** window.

**Note:** For all display windows, you can go to the **Options** tab of the **Display** configuration to lock out an operator's ability to access **Change Offset...**, **Change Nominal...**, **Change Gain...**, **Change Delay...**, **Change Setpoint...**, and **Change Averaging...**



*Two configuration windows accessed from a Display Window: Change Nominal...—a change made here will be reflected in the Recipe; and Change Offset—you can also make the same modification from the Properties tab of the particular measurement.*

With a display window open, right-click it...

- **Measurement Display Window:** With the cursor over the background, configuration options for **Properties...** and **Point Size...** are available; with the cursor over the measurement name or measurement value, **Change Offset...** and **Change Nominal...** are also available.



- **Measurement Data and SPC Data Display Window:** With the cursor over the labels, a configuration option for **Window Configuration...** is available; with the cursor over the measurement values, **Change Offset...** and **Change Nominal...** are also available.
- **Column Gauge Display Window:** With the cursor over the background, a configuration option for **Properties...** is available; with the cursor over the labels or measurement value, **Change Offset...** and **Change Nominal...** are also available
- **Control Status Display Window:** With the cursor anywhere, configuration options for **Change Gain...**, **Change Delay...**, **Change Setpoint...**, **Change Averaging...**, **Print Control Setup**, and **Open Process Tracker** are available. For Analog Control, **Set Voltage...** will also be available.
- **Position Display Window:** With the cursor over the part window, the **Position** configuration opens. You can zoom in or out by selecting the **View** menu or **Ctrl [+]** or **Ctrl [-]** on the keyboard.

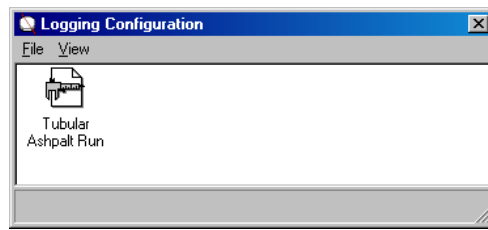
## Data Logging

**Data Logging** is part of Total Vu Software's built-in data-collection system. With **Data Logging**, you can capture as much as every scan along with a time, date, and encoder stamp. For short bursts of data-collection, this might be reasonable; however, for long runs the data-collection is better suited to intervals such as one measurement per foot, one measurement per minute, or one measurement each time a digital input is triggered. You can add multiple logs, each collecting different information, perhaps at different intervals. Although logging every scan for long periods is technically feasible, the resulting data file would be too large and unwieldy.

**Note:** When a log file is created, and multiple measurements are to be logged (*X*, *Y*, *Speed*, *Max*, *Min*, etc.), the log file cannot collect information faster than the slowest updating measurement. So, if *X*, *Y*, and *Maximum* are the three values being logged and *X* and *Y* update ten times per second, but *Maximum* updates only once per minute, then only one line will be written to the log file every minute, when the maximum value updates. All other data from *X* and *Y* will not be written to a log file, but other processes of the software will still use the data. To collect all of the *X* and *Y* data as well as the *Maximum* values, two separate log files need to be created and run at the same time. If the logged data includes time and date, or length stamp, you can integrate the data later and sort it by length or date/time to yield a single file with *X*, *Y*, and *Maximum*, in proper order.

### Creating A Data Log

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Data Logging** icon to open the **Logging Configuration** window.



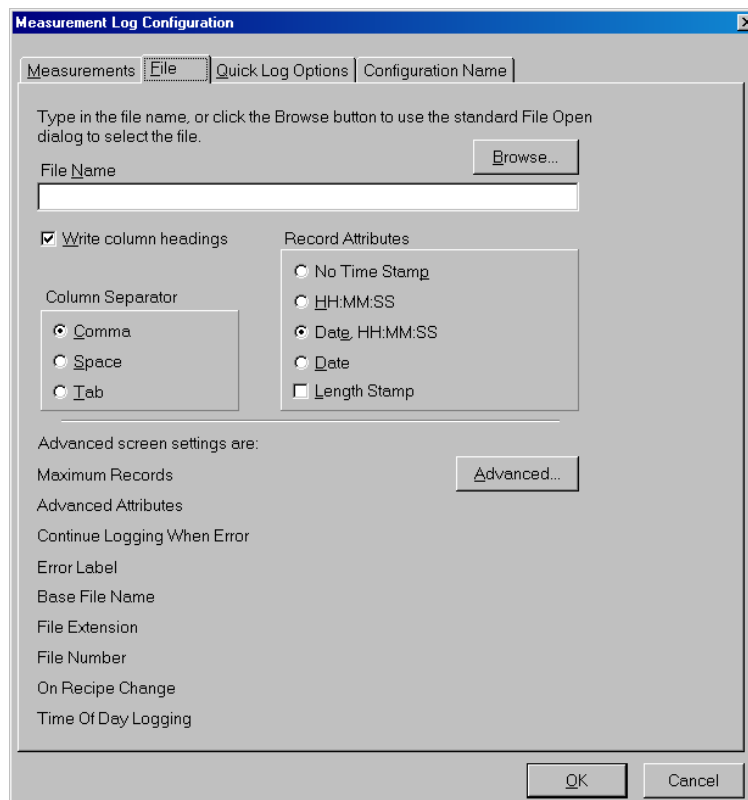
*The Logging Configuration window with one user-defined Log.*

Or, an alternate way:

Click on the **Data Logging!** menu in the Total Vu main window.

**Note:** Unlike other configurations, there is no wizard icon. To start a new Data Log, go to the **File** menu in the Logging Configuration window and select **New Measurement Log**.

The initial configuration screen shows four tabs: **Measurements**, **File**, **Quick Log Options**, and **Configuration Name**. Depending on choices made during setup, some tabs might change. If you choose **Auto File Naming**, the **Quick Log Options** tab will disappear, and if attributes are included for logging with measurements, the **Attribute Options** tab will appear.



*The Logging configuration screen, with the File tab selected.*

## 1 Measurements tab.

- 1.1 From the list of available fields, select one or more measurement(s) or attribute(s) for logging.

- 1.1.1 Click **Add**.

- 1.1.2 Or, if you wish to use all measurements and attributes, click the **Add All** button.

The list includes attributes and measurements—at least one attribute or measurement must be created before setting up Data Logging. Attributes and measurements that are created later can also be added to the log later.

You can modify the order of the list (which also changes the order in the log file) by selecting one or more items and clicking the **Up/Down** buttons.

- 1.2 If desired, check the boxes for:

- 1.2.1 **Only Log Out-of-Spec Measurements.**

If checked, records are logged only if they contain at least one measurement outside of its upper or lower specification limits.

- 1.2.2 **Log Rejected Measurements.**

If checked, records with a rejected unreasonable measurement are logged anyway.

- 1.2.3 **Log Measurement Spec Limits.**

If checked, the USL, nominal, and LSL for the measurement(s) will be included in the log file.

- 1.3 Set the **Logging Interval**.

The **Logging Interval** specifies when the values for the **Measurements to Log** are sampled and logged to the file. The **Logging Interval** can be set to **Measurement(s)**, **Second(s)**, **Feet** (with encoder option), **Log Record Action**, or digital inputs.

With **Log Record Action**, the system will log one record when the specified action is executed.

## 2 File tab.

- 2.1 If you are not using **Auto File Naming**, enter a path and file name for the log.

The **Browse** button can be used to find a valid path on the hard drive or networked drive. If no path is created, but a file name is entered, the file will be placed in the **Total**

Vu\DataLogging directory (typically found in C:\Program Files\LaserLinc\Total Vu\DataLogging).

**Auto File Naming** is the preferred method, in that it helps to eliminate operator errors and misnamed files. Instead of allowing an operator to enter a file name, the file name is assigned automatically from a set of variables. Auto File Naming is accessed from the **Advanced...** button, which is detailed in section 2.5.

## 2.2 If desired, check the box for **Write column headings**.

With this box checked, the first line of the file will be column headings. Column headings include the name(s) of the attributes and measurements that have been selected for the log.

## 2.3 Choose a **Column Separator** for the file.

The choices are Comma, Space, or Tab.

## 2.4 Choose which identifier to record: **No Time Stamp**; **HH:MM:SS**; **Date, HH:MM:SS**; **Date**; or **Length Stamp**.

## 2.5 For advanced settings, click the **Advanced...** button.

The **Advanced Options** screen shows four new tabs: **Advanced Options**, **Initialization**, **File Flush**, and **Misc**. There are two other tabs: **File Naming**, which appears only if the box for **Auto File Naming** is checked, and **Time of Day**, if the box for **Time of Day Logging** is checked.

### 2.5.1 **Advanced Options** tab.

When the **Next Auto File** is created, the current file is closed, system variables and attributes in the **Auto File Name** are replaced with their current values, the operator is prompted for **Operator Input** (if any), and a new file is opened.

#### 2.5.1.a If **Auto File Naming** is desired, check the box.

Example: Auto File Name =  
C:\Data\**<Recipe>** **<DD>**-**<MMM>**-**<YY>**, File Extension  
= .CSV

For a recipe named Tubular, on 05 (day), May (month), 07 (year), the next automatically-created file will be: C:\Data\Tubular 05-May-07.csv.

#### 2.5.1.b If **Time of Day Logging** is desired, check the box.

**Time of Day Logging** permits the automatic creation of new log files at the specified times of day.

## 2.5.2 File Naming tab.

The **File Naming** tab shows a drop-down list of variables, a blank for entering text, and a drop-down list of file extensions. **Automatic File Naming** combines the text and variables: operator-entered text is copied verbatim and the variables are replaced by their current value.

### 2.5.2.a Insert Variable—from the drop-down list:

- Select a variable.
- Click the **Insert Variable** button.

An abbreviation for the selected variable will appear between angle brackets in the box for **Auto File Name**.

### 2.5.2.b If you need other text for the **Auto File Name** besides the values of the variables, enter that text in the box.

### 2.5.2.c File Extension.

- Either: choose a file extension using the drop-down menu.
- Or: enter an extension.

For example, your software might need an extension of `.dat`; in which case you would enter that instead of the provided choices of `.txt` or `.csv`.

### 2.5.2.d Some screen options vary depending on the variable chosen in section 2.5.2.a.

- **Recipe Name:** Check the radio button for how you would like to handle a Load Recipe event (Choices: *Do NOT create a new file*, *Always create a new file*, or *Automatic*). With *Automatic*, there will only be a new file if the recipe changes.
- **File Number:** Enter the next value to use for the **File Number Variable**.
- **Operator Input:** Enter text in the operator-input field.

The table gives a brief description of the variables. **Note:** names of the attributes that you create for your own specific uses will appear in your own drop-down list in addition to the pre-defined variable; this table only shows those variables pre-defined in Total Vu Software.

PRE-DEFINED VARIABLES	
VARIABLE	MEANING
<Recipe Name>	The most recently loaded recipe.
<Measurement Name>	The name of the first measurement to be logged in the log file.
<File Number>	An auto-incrementing number to designate the count of log files; if selected, a box will appear allowing you to enter the initial file number. The number must be six digits, with 0s added as needed.
<Operator Input>	Any name other than the pre-defined ones.
<D>	Day of the month, 1–31.
<DD>	Two-digit day of the month, 01–31.
<DDD>	Three-digit day of the year, 001–366.
<M>	Month, 1–12.
<MM>	Two-digit month, 01–12.
<MMM>	Three-letter alphabetic month abbreviation.
<MMMM>	Month spelled out all the way.
<YY>	Last two digits of the year, 00–99.
<YYYY>	Four-digit year.
<H>	Hour of the day, 1–12.
<HH>	Two-digit hour of the day, 01–12.
<H24>	24-Hour time 0–23.
<HH24>	Two-digit 24-Hour time 0–23.
<AP>	A or P (for AM or PM).
<AMPM>	AM or PM.
<N>	Minutes 0–59.
<NN>	Two-digit minute of the day, 00–59.
<S>	Seconds 0–59.
<SS>	Two-digit Seconds 00–59.

### 2.5.3 Time of Day tab.

Some examples of Time of Day Logging:

12:00 AM—a new file will be created at the start of each day.

7:30 AM, 3:30 PM, and 11:30 PM—create a separate file for each shift.

The times shown in the list are the times of day at which a new log file will automatically be started. The new name for the file will follow the **Auto File Name** specified on the **Auto File Name** tab.

2.5.3.a To use this feature:

- Edit the time value by first selecting the hour, minute, and AM or PM.
- Then, adjust using the Up/Down arrows.
- Click the **Add Time** button.
- To delete a time, select the time you wish to delete and click the **Delete Time** button.

2.5.4 Initialization tab.

2.5.4.a Use the radio buttons to select the **Startup State** (Off, On, or Restore Last State).

With **Off**, the log file is always off at restart and must be started manually; with **On**, the log file is always on when the program is restarted; with **Restore Last State**, the condition when the program shut down will resume on restart: If the log was on when the program was closed, it will be on when the program restarts; if the log was off, it will be off when the program restarts.

2.5.5 File Flush tab.

The operating system buffers data before writing it to disk. The flush interval guarantees the data is written to disk at least as often as you specify.

2.5.3.a Enter the interval (in minutes) at which buffered data gets written to disk.

2.5.6 Misc tab.

2.5.6.a If desired, enter the **Maximum Records**.

If a number is entered for the **Maximum Records**, measurement logging will stop automatically when that number of records has been logged.

2.5.6.b If desired, check the box for **Overwrite On Start**.

When the **Start** button is pressed, the measurement log will be erased and restarted.

2.5.6.c If desired, check the box for **Continue Logging When Measurements(s) in Error**.

Logging will continue even if one or more measurements have an error.

The next item is grayed out if **Continue Logging** is not in use.



2.5.6.d Optional: Enter the value or text to log for measurements that have an error (Errors include: MISSING, TOO MANY, NO SCAN, DISABLED, OFF, etc.).

2.5.7 Click **OK** or press **Enter** to return to the main screen.

### 3 Quick Log Options tab.

**Note:** This tab is displayed only if you have not selected **Auto File Naming**.

3.1 Check the box for **Force Default Folder** to compel all file names to be in a particular folder.

3.1.1 Enter the path to the folder.

This feature ensures that an operator cannot create a data file in another folder on the computer or network.

3.2 Check the box for **Force Default Extension** to compel all file names to have the specified extension.

3.2.1 Either: select **.csv** or **.txt** from the drop-down menu.

3.2.2 Or: enter your own extension.

For example, your software might need an extension of **.dat**; in which case you would enter that instead of the provided choices of **.txt** or **.csv**.

### 4 Configuration Name tab.

4.1 Enter a **Configuration Name**.

**Note:** The configuration name is NOT the file name. The configuration name is the description that will be used to refer to this measurement log elsewhere in the program. With **Auto File Naming** selected, the file name will change, but the configuration name will not.

The configuration name can be up to 30 characters. Names must begin with a letter or a digit and cannot contain [ ] or | characters. It is not case sensitive. It must be unique among log file configurations. Example names include: Coil, 5 Strands, Line 1, and Product XYZ.

### 5 Attribute Options tab.

**Note:** This tab will appear only if one of the selection(s) in the **Measurement** tab included an attribute.

## 5.1 Check the boxes as desired for:

### 5.1.1 Log text Attributes in quotes.

If checked, attribute values are written to the file set off by quotation marks (such as: “operator”).

### 5.1.2 Require update from all logged Attributes.

If there are attributes selected for logging, no records will be logged until a new value has been accepted for each selected attribute.

Items 5.1.3 and 5.1.4 are displayed only if **Require update** is not checked.

### 5.1.3 Log previous value for un-updated attributes.

Instead of a blank (no text), the software will write the previous value for the attributes that have not been updated.

### 5.1.4 Log \_\_\_\_\_ for attributes that haven't been updated.

Enter a word or phrase to log for attributes that have not been updated. Whatever is entered here will be used, instead of a blank, for attributes that have not been updated.

## 6 Click OK or press Enter.

An icon for your new **Data Log** will appear in the **Logging Configuration** window.

However, if you chose **Operator Input** as one of your variables in the **File Naming** tab, after clicking **OK** a window called **New Data Capture File** will appear. You can either enter text in the box and click **OK**, or click **Cancel**. Entering dummy text is better than clicking **Cancel**, but if you click **Cancel**, a warning box will appear with buttons for **Yes** and **No** and the text: “The values on this form are needed to start a new **Data Logging** file. Are you sure you want to cancel?”

With **No**, you return to the **New Data Capture File**; with **Yes**, another warning will appear with a button for **OK** and the text: “The Auto File Name for **Data Logging** file ‘NameYouChose’ could not be created. The log has been disabled.”

If you click **OK**, the icon for your new **Data Log** will still appear in the **Logging Configuration** window, but you can only use the **Data Log** after it is enabled. If you open the icon you will see that the box under the label **Current File Name** is blank.

To enable a **Data Log** that has been disabled because the **Operator Input** was not entered, either:

- Right-click on the icon for the **Data Log** in the **Logging Configuration** window.

- Select Enable.

Or:

- Select the icon for the **Data Log**.
- Click on the **File** menu of the **Logging Configuration** window.
- Select Enable.

The **New Data Capture File** will appear again and you can enter text as needed. After entering text, if you open the icon for your Data Log, you will see a file name below the label **Current File Name**.

### Actions Specific for Data Logging

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for data logging.

- *Start Data Logging: Start Logging of all logs:* For logs that are not already capturing data, logging will start; for logs that are already logging, they will continue logging.
- *Stop Data Logging: Stop Logging of all logs:* For logs that are capturing data, logging will stop; for logs that are already not logging, they will remain stopped.
- *Start/Stop Data Logging: Start or Stop Logging of all logs:* If the last execution of the action stopped logging, the next will start logging; if the last execution started logging, the next will stop logging.
- *Start Data Logging of Selected Logs:* Starts logging of a selected list of logs. If any of the logs are not already logging, logging will start; for logs that are already logging, they will continue logging.
- *Stop Data Logging of Selected Logs:* Stops logging of a selected list of logs. If any of the logs are logging, logging will stop; for logs that are already not logging, they will remain stopped.
- *Start/Stop Data Logging of Selected Logs:* Starts or stops logging of a selected list of logs. If the last execution of the action stopped logging, the next will start logging; if the last execution started logging, the next will stop logging.
- *Start New File for Selected Logs:* Starts a new file for each of the selected logs. If the log uses auto file naming, the new file name will be made from the referenced variable names. If any of the logs are not already logging, logging will start.
- *Log a Record for Selected Logs:* Logs a new record using the most recent values of the measurements/attributes.
- *Erase and Restart Existing File for Selected Logs:* Empties the existing file for each of the selected logs. All data in the file will be erased. The file name will not change.

## Event Characterization

Total Vu Software has the ability to process and log to disk un-averaged single-scan measurement data. This kind of high-speed sampling can be useful in diagnosing problem areas in the production process. However, at the scan-rates of many laser-scan micrometers there is too much data generated during a run to save everything. Further, there would be too much data to analyze after the run to find the few portions of data that would be of interest. **Event Characterization** (or “Flaw Snapshot”) is designed to save *only* the high-speed data of interest during a run.

**Event Characterization** generates a separate data file for each event identified during the run. Event triggers include out-of-spec measurements and input from an external device.

### Event Characterization Operation

Total Vu Software will maintain a trace buffer of the selected log measurements, the size of which is specified by the **Before & After** parameter. Except for the period in which the buffer is filling up after a restart, the buffer contains the specified number of measurements.

When an event trigger occurs, either an out-of-spec measurement or a digital input trigger, the contents of the buffer are immediately written to an ASCII format text file in the designated event folder. If the **File Header** parameter is active, then the first line in the file will contain a comma-separated list of the measurements to log. If the **Date & Time** parameter is also active, then the date and time separated by a comma will be appended to the first line.

The file name will be `Event nnnnnn.csv` where the event number, left-padded with zeroes, replaces nnnnnn. New measurements will continue to be logged until the buffer has been refilled with measurements without an intervening event trigger, or until the number of measurements logged has reached the event cutoff parameter, or until the software is stopped.

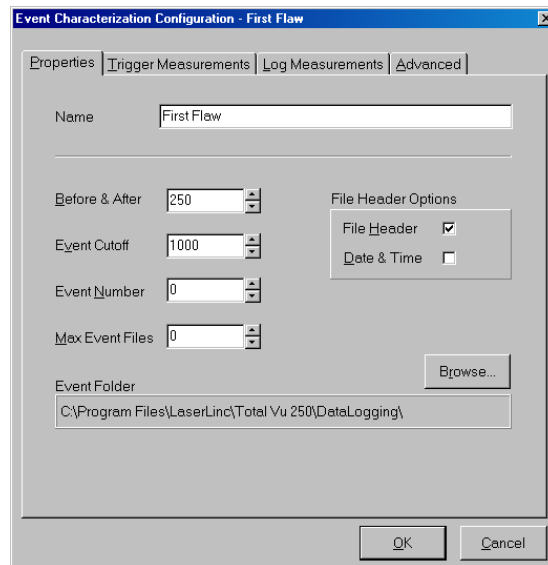
While the event is in progress the **EVENT** label on the **Status** panel will flash. (Note that the **EVENT** label will not appear at all if the **Event Characterization** option is not installed.)

When the event is completed, the **Event Number** parameter is automatically incremented to prepare for the next event. When the software is stopped, any event in progress is closed and the trace buffer is cleared to prevent old data from being included in the first event after a restart.

If the encoder option is installed, each line in the event file will begin with the length into the run, followed by each log measurement, all separated by commas. A line is not written to the file until all of the log measurements have been updated. If the log measurements do not all use the same scan averaging, then the log measurements will be stored at the update frequency of the slowest measurement, i.e. the measurement with the highest scans-to-average setting.

## Setting up the Event Characterization Definitions

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Event Characterization** icon to open the **Event Characterization Configuration** window.



*The Event Characterization configuration window.*

The Event Characterization configuration window shows four tabs: Properties, Trigger Measurements, Log Measurements, and Advanced.

### 1 Properties tab.

#### 1.1 Enter a name for the event that you are logging.

The names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique.

- 1.2 Use the up/down arrows to set a **Before & After** number.

**Before & After** allows you to set a number of measurements to log before and after an event occurs. Examining the data before and after the actual event makes identifying the cause of an event easier.

- 1.3 Use the up/down arrows to set the **Event Cutoff**.

This is the maximum number of measurements to log for any single event.

- 1.4 Use the up/down arrows to set the **Event Number**.

Each event is numbered, and the number becomes part of each event file name.

- 1.5 Use the up/down arrows to set the **Max Event Files**.

This places a limit on the number of event files the system will store.

- 1.6 **File Header Options.**

- 1.6.1 If you wish to generate a column header in each event file, check the box.

The column header lists the items logged on each line, separated by commas, such as: **Length,X Diameter,Y Diameter**.

- 1.6.2 If you wish to include the date and time at the end of the column header, check the box.

**Date & Time** is ignored if **File Header** is not checked.

- 1.7 Click the **Browse...** button to switch from the default event folder.

The default location for the event folder is dependent on where the software was installed (typically in the Data Logging folder under the install folder for the Total Vu Software).

The event folder should be saved on a hard drive local to the machine. Using a floppy drive, network drive, or other storage device might be too slow and result in lost data.

## 2 Trigger Measurements tab.

- 2.1 From the list of available measurements, select the one(s) you wish to use for triggering the **Event**.

If one of the selected measurements goes out of spec, either above the USL or below the LSL, then a new event will begin. If an event is already in progress, the event will be extended by resetting the number of measurements saved after the event. If none of the selected measurements have spec limits assigned to them, then the only way an event will

be generated is from an external device. On clicking the **OK** button, the software will report a list of selected trigger measurements that do not have spec limits assigned to them. A warning is also reported if no trigger measurements have been selected.

**Note:** if the **Digital I/O** option is installed, a digital input can trigger **Event Characterization**.

2.2 Click **Add**.

3 **Log Measurements** tab.

3.1 From the drop-down list, choose the scanner that will be making the measurements.

After the scanner is selected, a list of measurements will appear in the box **Available Log Measurements**.

3.2 From the list of available log measurements, select the one(s) you wish to log.

3.3 Click **Add**.

3.4 Use the **Up/Down** buttons to adjust the order in which you want the measurements to be logged.

4 **Advanced** tab.

The **Advanced** tab is for optimizing the rate at which the buffered list of log measurements is stored to disk on an event trigger. This parameter is provided because if the computer and hard disk are not fast enough, the software might not be able to write the buffered data to disk fast enough to avoid a loss of data.

The **Block Size** parameter specifies the number of buffered measurements to write to disk at one time. If the parameter is set to **0**, then the entire log measurement buffer is written to disk *immediately*. If the log measurement buffer is too large, data loss might occur when writing too many measurements at once. Data loss might also occur if the **Block Size** parameter is too small. In this case, for the computer to write only a few lines to disk at one time is inefficient.

The **Block Size** parameter needs to be adjusted only if **OVERRUN** errors are reported when an event trigger occurs. An appropriate value can only be determined empirically because there are an infinite number of possible parameter and computer combinations.

4.1 If needed, set the **Block Size**.

5 If you are finished with the setup process, click **OK** or press **Enter**.

An icon for your new **Event** will appear in the **Event Characterization** window.

## Configuring Digital Inputs

The **Digital Inputs (I/O)** windows provide information and configuration options related to the PCI CTR05 digital I/O card and other digital I/O devices. The **Digital Inputs** icon will only appear if the **Control** or **Digital I/O** option has been purchased with the software, and an external device (PCI card with a breakout box or USB I/O device) has been installed. If these items have been purchased with the system and the icon does not show up in the **Full Configure** window or if the status under the **General** tab reports “This device is not responding”, make sure the **Measurement & Computing** software program called **InstaCal** (supplied on the LaserLinc Total Vu installation CD) has been installed and run. When the InstaCal software is run for the first time, it will recognize the digital I/O device(s) and allow the Total Vu Software to use the device(s). If the InstaCal software has not been installed and run, Total Vu Software will be unable to recognize the digital I/O devices attached to the system.

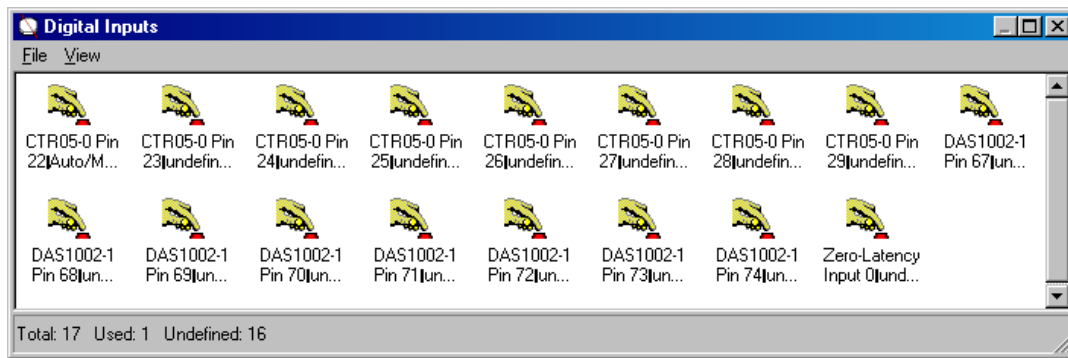
### Digital I/O and the CTR05 and USB Icons

These icons are not configurable but appear depending on the type of device that is attached to the system, after InstaCal detects the device. Opening the icon gives this message: “The resources owned by this device are fixed. The number of counters, analog, and digital I/O channels are fixed. To change the use of digital inputs, if any, open the **Digital Inputs** icon; to change the use of digital outputs, if any, open the **Alarms** icon.”

### Setting up a Digital Input

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Digital Inputs** icon to access the **Digital Inputs** configuration.





*The Digital Inputs configuration window.*

The **Digital Inputs** configuration window consists of four or more icons for setting up digital devices. If you only want to view either defined or undefined inputs, from the **View** menu of the **Digital Inputs** configuration window you can switch the setting. The icon’s label is dependent on installed devices—the label will either say “undefined” or include the name or type of device that has been installed.

- 1 Double-click an icon.

You will see a window with two tabs, **General** and **Properties**. The **General** tab displays configuration information and the **Properties** tab allows setup of various actions that a digital device (often a push button in the operator’s Total View Software main window or a separate switch wired to a device) can activate.

The default (and preferred) action is: **Execute User-Defined Action**, which is used to complete one or more actions. The actions must have already been created in the **Actions** configuration window.

The table below shows actions and a description of how the digital input affects them. These actions are legacy functions and it is best for users to define their own actions for use with digital inputs, combined with **Execute User-Defined Action**.

TABLE OF ACTIONS AND DESCRIPTIONS	
ACTION	DESCRIPTION
Start	The system will start scanning when the input activates. This is equivalent to pressing the <b>Start</b> button in the Total Vu Software main window.
Stop	The system will stop scanning when the input activates. This is equivalent to pressing the <b>Stop</b> button in the Total Vu Software main window.
Start/Stop	The system will start scanning or stop scanning depending on the polarity of the input and the switch mode.
Start Data Logging	The system will start data logging when the input activates. If data logging is already in progress, the input has no effect.

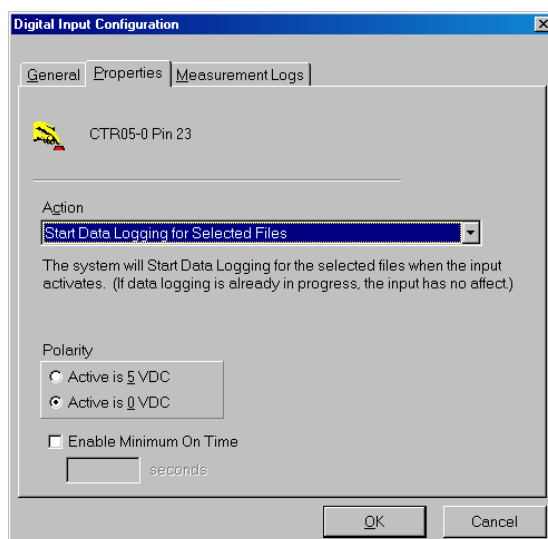
TABLE OF ACTIONS AND DESCRIPTIONS	
ACTION	DESCRIPTION
Stop Data Logging	The system will stop data logging when the input activates. If data logging is not in progress, the input has no effect.
Start/Stop Data Logging	The system will start data logging or stop data logging depending on the polarity of the input and the switch mode.
Start Data Logging of Selected Files	The system will start data logging for the selected files when the input activates. If data logging is already in progress, the input has no effect.
Stop Data Logging of Selected Files	The system will stop data logging for the selected files when the input activates. If data logging is not in progress, the input has no effect.
Start/Stop Data Logging of Selected Files	The system will start data logging or stop data logging for the selected files depending on the polarity of the input and the switch mode.
Start Next Log File	The system will close the current file and start the next for each of the selected measurement logs.
Log Record	The system will log the next complete record for each of the selected measurement logs. Important note: This action can only be configured from the data logging configuration screen.
Start SPC	The system will start SPC data collection when the input activates.
Stop SPC	The system will stop SPC data collection when the input activates.
Start/Stop SPC	The system will start SPC data collection or stop SPC data collection depending on the polarity of the input and the switch mode.
Print SPC Summary	The system will print the statistical summary report.
Sample All Discrete Measurements	The system will sample all discrete measurements when the input activates.
Sample Selected Discrete Measurements	The system will sample a set of discrete measurements that you select on the <b>Measurements</b> tab.
Reset Selected Measurements	The system will cause the selected measurements and associated statistics to be reset.
Trigger Serial Output of Measurement Value	The system will send a selected set of measurement values by the RS232 serial port when the input changes to the polarity of the input. <b>Note:</b> The configuration of this function must be set under the <b>Serial Output</b> configuration.
Write Log File to Serial Output	The system will open the selected measurement log file and send the measurements by the RS232 serial output.
Clear All Flaws	The system will clear all of the flaws that have been detected.
Report All Flaws	The system will report all of the flaws that have been detected. The operator must indicate whether to print the report or save it to disk.
End Part	Scanning of the current part will continue for a specified number of times, then stop.
Discard Scans	The system will discard a configurable number of scans before the digital input and a configurable number of scans following the input.
Auto Setup of Nominal/Setpoint	Set the nominal/setpoint for each of the selected measurement(s) to the current measurement value(s).
Auto Setup of Offset	Set the offset for each of the selected measurement(s) to make the current measurement equal to a specified value.
Load Recipe	The operator will be prompted to load a recipe.
Start/Stop Scanning of Selected Scanners	Toggle scanning on or off from the selected scanners. When scanning is off, all measurements from the scanner stop updating as do position displays and alarms.
Start Scanning of Selected Scanners	Turn scanning on for the selected scanners.

TABLE OF ACTIONS AND DESCRIPTIONS	
ACTION	DESCRIPTION
Stop Scanning of Selected Scanners	Turn scanning off for the selected scanners.
Enable All Alarms	All alarms in the system will be enabled (they will resume normal operation).
Disable All Alarms	All alarms in the system will be disabled (regardless of the system state, all alarms will remain off).
Enable/Disable Alarms	Enable or disable all alarms, depending on the polarity of the input and the switch mode.
Enable Selected Alarms	The system will enable the selected alarms if they are currently disabled.
Disable Selected Alarms	The system will disable the selected alarms if they are currently enabled.
Enable/Disable Selected Alarms	A selected set of alarms in the system will be enabled or disabled depending on the polarity of the input and the switch mode.
Clear Alarms	The system will clear all alarms.
Clear Selected Alarms	The system will clear the set of alarms selected on the <b>Alarms</b> tab.
Set Digital Output	Set the state of a digital output.
Reset Encoder	The system will set the distance to a preset value.
Start Max/Min Interval	<b>Note:</b> all max/min-related actions are only available with the <b>Max/Min Measurement</b> option. The system will start the max/min interval of the selected set of max/min measurements. This action can only be set up from the <b>Max/Min Measurement</b> configuration window in the <b>Measurements</b> configuration window.
End Max/Min Interval	The system will end the max/min interval of the selected set of max/min measurements. This action can only be set up from the <b>Max/Min Measurement</b> configuration window in the <b>Measurements</b> configuration window. ( <b>Max/Min</b> option.)
Start/End Max/Min Interval	For the selected set of max/min measurements, the system will start or end the max/min interval depending on the polarity of the input and the switch mode. ( <b>Max/Min</b> option.)
All Control Loops Manual	<b>Note:</b> all control-related actions are only available with the <b>Control</b> option. The system will put all control loops in manual mode.
All Control Loops Auto	The system will put all control loops in automatic mode. ( <b>Control</b> option.)
Manual Control Mode	The system will set the selected control loops to manual mode. ( <b>Control</b> option.)
Automatic Control Mode	The system will set the selected control loops to automatic mode. ( <b>Control</b> option.)
Auto/Manual Control	The system will switch the selected control loops between automatic and manual modes depending on the polarity of the input and the switch mode. ( <b>Control</b> option.)
Jog Up	The system will jog up the selected control loops (manual mode only). ( <b>Control</b> option.)
Jog Down	The system will jog down the selected control loops (manual mode only). ( <b>Control</b> option.)
Event Report	The system will write a new event with a user-defined message to the Process Tracker file.
Trigger Event Characterization	<b>Note:</b> all event characterization-related actions are only available with the <b>Event Characterization</b> option. The system will begin recording a high-speed log for the selected event, regardless of the status of the trigger measurements.
Enable Event Characterization	The system will begin evaluating the status of the <b>Event Characterization</b> trigger measurements. ( <b>Event Characterization</b> option.)

TABLE OF ACTIONS AND DESCRIPTIONS	
ACTION	DESCRIPTION
Disable Event Characterization	The system will stop evaluating the status of the <b>Event Characterization</b> trigger measurements, effectively preventing detection or activation of any new event files. ( <b>Event Characterization</b> option.)
Enable/Disable Event Characterization	The system will enable or disable the <b>Event Characterization</b> feature depending on the polarity of the input and the switch mode. ( <b>Event Characterization</b> option.)
Profile Next Part	A new part-trace will be started on the multi-part chart. <b>Note:</b> Must have a multi-part chart configured first. <b>Note:</b> only available with the <b>Taper Tube</b> option.

## 2 The Properties tab.

The **Properties** tab has a drop-down list for selecting an **Action**, a choice for the device's polarity, and a check box for enabling minimum on time. By default, "undefined" is selected when you first open the tab. With some **Actions** a second (and in some cases a third) tab will appear. Also, with some **Actions**, other parameter choices will appear in the **Properties** tab.



*The Digital Input Configuration window with an Action selected and an additional tab showing.*

- 2.1 From the action drop-down list, select the action you are assigning.
- 2.2 For **Polarity**, select the radio button for active when the input voltage changes to either +5 VDC (TTL high) or 0 VDC (TTL low).
- 2.3 If desired, check the box for **Enable Minimum On Time**.

Use **Minimum On Time** if a situation needs to be active for a certain amount of time before an event occurs. This can be compared to turning on a light switch but having a delay before the light goes on. Until the light switch remains in the active state (based on polar-

ity) for the specified time, the light would remain off. This is useful when the input signal is “noisy”. **Minimum On Time** allows the system to disregard spurious glitches.

2.3.1 Enter a minimum on time, in seconds.

2.4 For actions that have other parameter choices on the **Properties** tab: (*Start/Stop, Start/Stop Data Logging, Start/Stop Data Logging for Selected Files, Start/Stop SPC, Execute User-Defined Action, Start/Stop Scanning of Selected Scanners, Enable/Disable Alarms, Enable/Disable Selected Alarms, Auto/Manual Control, and Enable/Disable Event Characterization*).

After choosing any start/stop action from the drop-down menu, a new parameter for **Switch Mode** will appear.

2.4.1 Use the radio button to select the **Switch Mode**, either **Maintained** or **Momentary**.

With **Maintained**, the switch operates like a typical light switch (on in one position and off in the other). With **Momentary**, the switch toggles the function on and off alternately each time the push button (momentary switch) is pressed.

- Click OK or press Enter.

**OR**

- Select the next tab.

3 **Measurement Logs** tab (with actions: *Start Data Logging of Selected Files, Stop Data Logging of Selected Files, Start/Stop Data Logging of Selected Files, Start Next Log File, Log Record*).

3.1 From the list of available measurement logs, select one or more logs.

3.2 Click **Add**.

3.3 **Details** tab (with action: *Start Next Log File* only).

3.3.1 If desired, select the option: **Prompt for Operator Input Variables**.

If the logs are set up to use operator entry in the **Auto File Name**, you can choose whether the operator should be prompted to provide new value(s) for the operator input variables.

3.4 Click **OK** or press **Enter**.

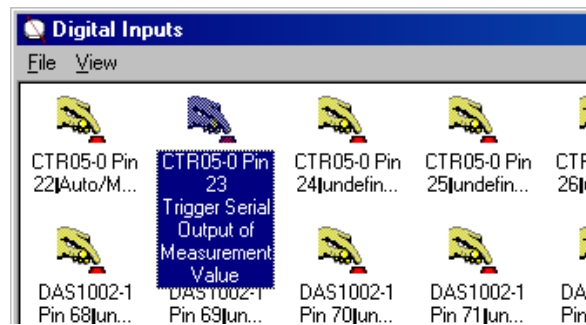
4 **Discrete Measurements** tab (with action: *Sample Selected Discrete Measurements*).

4.1 From the list of available discrete measurements, select one or more measurements.

- 4.2 Click Add.
- 4.3 Click OK or press Enter.
- 5 Measurements and Details tabs (with action: *Reset Selected Measurements*).
  - 5.1 Measurements tab.
    - 5.1.1 From the list of available discrete measurement, select one or more measurements.
    - 5.1.2 Click Add.
  - 5.2 Details tab.
    - 5.2.1 If desired, select: **Reset Statistics**.

If checked, the statistics for the selected measurements will also be reset.
  - 5.3 Click OK or press Enter.
- 6 Details tab (with actions: *Trigger Serial Output of Measurement Values, Write Log File to Serial Output, End Part, Discard Scans, Reset Encoder, Trigger Event Characterization*).
  - 6.1 **Note:** For *Trigger Serial Output of Measurement Values*, the configuration can only be set up from the serial input/output configuration. Selecting a digital input for outputting a record will configure the input. (Please refer to the chapter [Serial I/O](#) for more details).
    - 6.1.1 Open a COM Configuration window and configure for measurement output.
    - 6.1.2 In the Output Interval tab, select the digital input to which the device will be connected.
    - 6.1.2 Click OK.

In the Digital Inputs window there is now a digital input icon for the action.



*In this example, Pin 23 of the CTR05-0 Pin is configured for the action **Trigger Serial Output of Measurement Value**.*

6.1.3 Open the digital input icon for the appropriate digital input.

6.1.3.a Configure the **Properties** tab as needed.

**Note:** If you select a different action from the pull-down menu, you will not be able to go back to the **Trigger Serial Output of Measurement Values** action from this window. You will have to re-configure from the **COM Configuration** window.

6.2 With action: *End Part*.

6.3.1 In the box, enter the number of scans for the **End Part Delay**.

6.3 With action: *Discard Scans*.

6.3.1 In the boxes, enter **Discard Scans** values for **Before** and **After**.

**Note:** You can choose to leave one or the other blank, but not both.

6.4 With action: *Reset Encoder*.

6.4.1 Enter a value for the **Reset Distance** (in the unit of measure specified in your encoder setup).

The encoder input will be preset to this value when the **Reset Encoder** input is activated.

6.5 With action: *Trigger Event Characterization*.

6.6.1 From the drop-down list, select the **Event** that you wish to trigger.

6.6 Click **OK** or press **Enter**.

7 **Auto Setup** and **Measurements** tabs (with actions: *Auto Setup of Nominal/Setpoint*, *Auto Setup of Offset*).

7.1 **Auto Setup** tab.

7.1.1 Enter the **Auto Setup Time**, in seconds.

This is the number of seconds over which to average the measurement values.

7.1.2 Select the radio button for **Operator Acknowledgement**.

With **Never**, the operator does not need to acknowledge either success or errors that might have occurred; with **Errors Only**, the operator must acknowledge errors that have occurred; with **Always Required**, the operator must acknowledge the result of the auto setup procedure, regardless of success or failure.

7.1.3 *Auto Setup of Offset*-only:

7.1.3.a Select the radio button to adjust the measurement offset to make the current measurement value equal to the **Nominal** or equal to a pre-specified **Value**.

7.1.3.b For **Value**, enter the value in box.

7.2 **Measurements** tab.

7.2.1 From the list of available measurements, select one or more.

7.2.2 Click **Add**.

7.3 Click **OK** or press **Enter**.

8 **Actions** tab (with action: *Execute User-Defined Action*).

8.1 From the list of available actions, select one or more.

8.2 Click **Add**.

8.3 Click **OK** or press **Enter**.

9 **Scanners** tab (with actions: *Start/Stop Scanning of Selected Scanners*, *Start Scanning of Selected Scanners*, *Stop Scanning of Selected Scanners*).

9.1 From the list of available scanners, select one or more.

9.2 Click **Add**.



9.3 Click **OK** or press **Enter**.

10 **Alarms** tab (with actions: *Enable Selected Alarm, Disable Selected Alarms, Enable/Disable Selected Alarms, Clear Selected Alarms*).

10.1 From the list of available alarms, select one or more.

10.2 Click **Add**.

10.3 Click **OK** or press **Enter**.

11 **Set Digital Output** tab (with Action: *Set Digital Output*).

11.1 Select a digital I/O card from the list.

When you select a card, the pin numbers will appear in the column to the right, **Digital Output Pins**.

11.2 Choose a pin from the list of **Digital Output Pins**.

11.3 Select the Output State, either Force High (+5 VDC) or Force Low (0 VDC).

11.4 Enter a value, in milliseconds, for the **Minimum Pulse Width**.

If specified, the output state will be set according to the selection for the minimum period of milliseconds, and then the output state will be toggled back. The output will remain active for at least the specified number of milliseconds.

11.5 If you wish to make the **Digital Output** re-triggerable, select the box.

If checked, a pulse in progress will be extended if the input is activated again before the pulse completes; otherwise, changes to the input are ignored until the pulse completes.

11.6 If you wish to reset the device on clearing an alarm, check the box.

If checked, and the external alarm that is created for this function is included in a **Clear Alarms Action**, the output will be reset to the alarm's off state; if not checked, the **Clear Alarms** function will have no effect on output.

11.7 Click **OK** or press **Enter**.

12 **Control Loops** tab (with actions: *Manual Control Mode, Automatic Control Mode, Auto/Manual Control, Jog Up, Jog Down*).

12.1 From the list of control loops, select one or more.

12.2 Click Add.

12.3 Click OK or press Enter.

13 Event to Report tab (with action: *Event Report*).

13.1 Select the radio button for the **Event Description**.

Choices are: **Supplied by the Operator** (the operator will be prompted to describe the event), **Preset Event Description** (the description is provided in a separate parameter and the operator will not be prompted), and **Preset Event Description + Operator Input** (the description is provided in a separate parameter and the operator will be prompted).

13.2 From the drop-down list, select a measurement to correlate with the event.

13.3 Click OK or press Enter.

14 Multi-Part Charts tab (with action: *Profile Next Part*).

Note: Must have at least one multi-part chart configured.

14.1 From the list of multi-part charts, select one or more.

14.2 Click Add.

14.3 Click OK or press Enter.

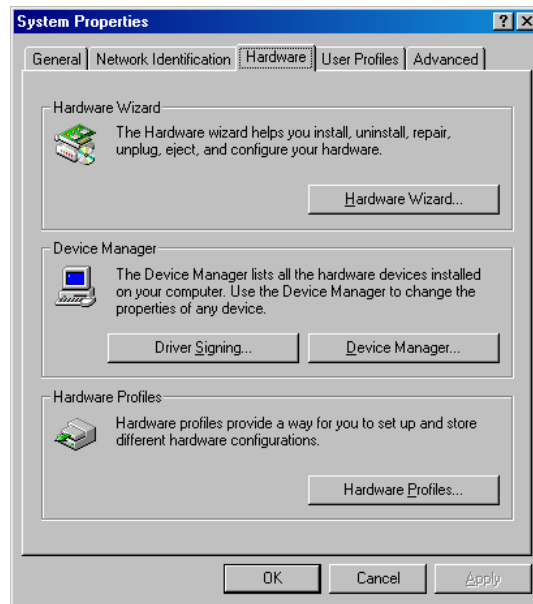
## Serial I/O

Total Vu Software can use a PC's serial port(s), also called RS232 or COM ports, to send or receive measurement values to or from another device. The system will automatically scan the PC hardware for available serial ports and provide an icon for each port found. The standard software package includes the capability to have one measurement that comes from a serial device. If the COM port will be set up to take in data from an external device, check with LaserLinc to confirm that the Total Vu Software can accept data from the particular device and for more specific instructions on how to configure the system to do so.

If you are using the port for input to Total Vu Software, LaserLinc will need to know the technical details of the communication from your device. The device might already be supported; if not, please supply the following: a manual for the device that includes details of the serial port configuration and the format of the data that is communicated. Sample data files from the device are also helpful. You can use Microsoft's HyperTerminal utility to capture data files. Please be sure to capture transmissions that include when the device is in error—this aids the process of distinguishing good data from errors. And last, sending the device to LaserLinc for live testing will ensure a successful integration.

## Windows Device Manager

**IMPORTANT:** Device settings—baud rate, data bits, parity, stop bits, and flow control—are extracted from the operating system's Device Manager (part of Microsoft Windows).



*The System Properties window—this screen shot is from Windows 2000; the window will vary with other versions of Windows.*

To access Device Manager:

- Press the Windows and Break keys.

A window will appear with multiple tabs. The exact appearance of the window will depend on the operating system. Your version might not be identical to the version shown here. Regardless, it will have a **Hardware** tab.

- Select the **Hardware** tab.

There are three sections for hardware parameters. Here, **Device Manager...** is in the middle section.

- Click the **Device Manager...** button.

A window will open that shows a tree of devices on your computer. There will be an icon and label for **Ports**.

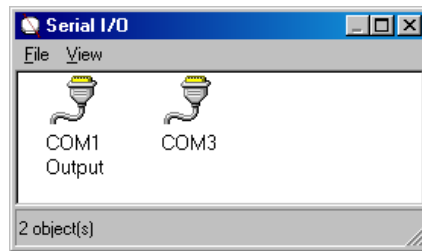
- If the symbol for **Ports** has a plus sign next to it, click the plus sign.
- Double-click the icon for the **Port** that you need to configure

Another window will appear, with multiple tabs.

- Configure as needed to match the serial device with which you will be interfacing.

## Setting up Serial I/O for One Measurement

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Serial I/O** icon to access the **Serial I/O** configuration.



*The Serial I/O window. There will be one COM for each port found; the number following “COM” is the port number.*

You can use any COM port. The standard Total Vu Software package permits one serial input measurement.

### 1 Double-click the COM1 icon.

A window will appear for selecting COM1 usage. The COM1 icon is for configuring the Total Vu Software default of one measurement from a serial device. You have only one choice here: Measurement Output.

#### 1.1 Select the device type (Measurement Output).

#### 1.2 Click OK.

A configuration window will open. The window has three tabs: Measurements, Output Format, and Output Interval.

### 2 Measurements tab.

#### 2.1 Select from the list of available measurements.

##### 2.1.1 Click Add.

#### 2.2 Or, if you wish to use all measurements, click the Add All button.

#### 2.3 If desired, use the Up/Down buttons to adjust the order in which the measurements will output.

- 2.4 If you want the average statistic for each measurement to be sent instead of the current measurement value, check the box for **Output Average Statistic**.

### 3 Output Format tab.

- 3.1 Select the character used to separate values in the list of measurements to output.

Choices are **Comma**, **Space**, **Tab**, or **Other** (which, if chosen, will need to be specified). Selecting **Other** allows entry of more than one character.

- 3.2 Select the **End Of Line** sequence.

### 4 Output Interval tab.

The **Output Interval** specifies when the values for the selected measurements are sampled and transmitted.

- 4.1 If you want to output only Out-of-Spec Measurements, select the box.

This means that nothing will be sent unless one or more of the values for the selected measurements is out-of-tolerance. If so, all of the selected measurements are output, not just those that are out-of-spec.

- 4.2 In the box for **Output Interval**:

- 4.2.1 Enter a value for how often you want to output a record.

- From the drop-down list, choose a unit of frequency (time, measurements(s), length) for your record.

**OR**

- From the drop-down list, select a digital input pin.

A record will be output whenever the digital device connected to the pin is triggered (Please see the chapter [Configuring Digital Inputs](#)).

- 4.3 In the box for **Error Text**, enter the value or text to be logged for any measurement that has an error (optional).

Possible measurement errors include: **Too Few**, **Too Many**, **No Scan**, **OLD**, **Missing**, etc.

If the **Error Text** box is left blank, what is logged will depend on what was selected in section 3.2 for **End of Line** sequence. If **Carriage Return** was selected, a blank line will be logged; with **Other** selected, and something entered in the box, for example “a:”, then that text will be logged.

#### 4.4 Use Timeout Error.

The **Timeout Error** function will force the sending of an output record if measurement output is not being sent through the normal course of events. If nothing has been sent for the specified time period, an output record/message will be sent. The record will use the **Error Text** in place of actual measurement values; if the **Error Text** is empty, the record will be composed of the required number of delimiters followed by the end-of-record sequence.

4.4.1 If desired, check the box for **Use Timeout Error**.

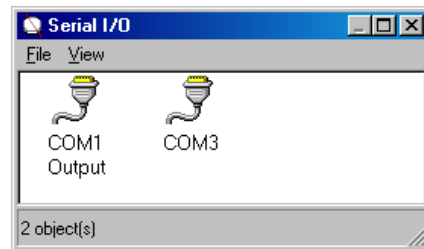
4.4.2 And, enter an amount in milliseconds.

#### 4.5 Click OK or press Enter.

You can access your settings at any time by double-clicking the **COM1** icon.

### Setting up Serial Input from a Specific Device

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Serial I/O** icon to access the **Serial I/O** configuration.



*The Serial I/O window; your own icon could be different, COM2, COM4, etc.*

Any COM port can be used for input or output. The resulting number of input measurements is what is restricted. For example, the Ultra Gage may have six input measurements, whereas the AccuScan LD1010 has two.

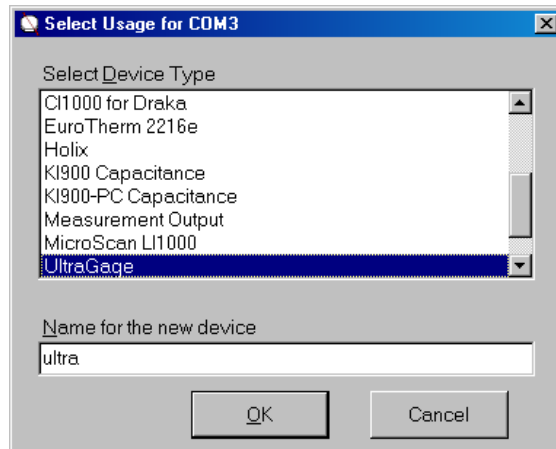
#### 1 Double-click the COM icon.

A window will appear that contains a list of devices types.

##### 1.1 If your device is in the list, select it.

- 1.2 Enter a name for the device in the box below.

Total Vu Software has a description of the device that includes the name(s) of the measurement(s) that come from the device. All of these measurements will be created when you click OK.

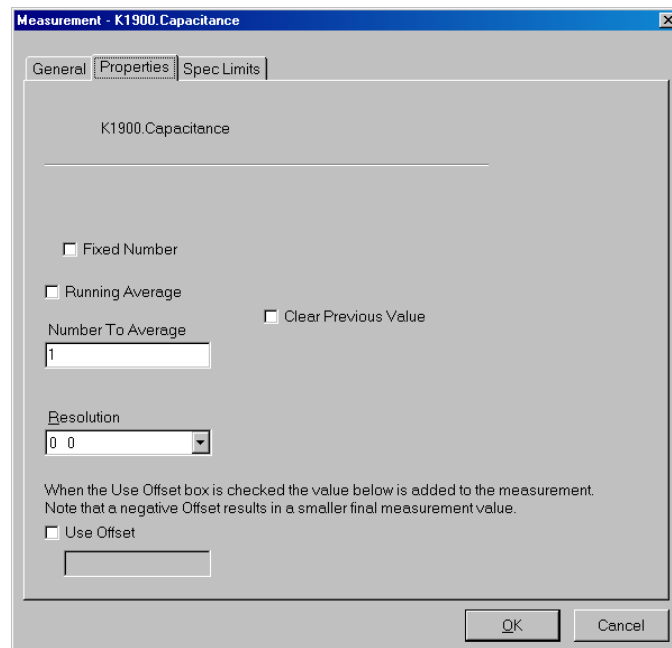


*The window showing the list of device types.*

- 1.2 Click OK or press Enter.
- 1.3 Close the **Serial I/O** window.
- 1.4 Open the **Measurements** window.

You will see icons for the new measurements. The new measurements will have names of the form: <device name>.<parameter name>.





*Measurement configuration window for device K1900 Capacitance.*

1.4.1 Open each measurement's icon to configure their details, including Resolution.

By default, there is no additional averaging and the measurement resolution is zero decimal places to the right of the decimal point.

1.4.2 When you are finished, click OK.

## Clearing a COM port

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Serial I/O** icon to access the **Serial I/O** configuration.

- 1 Select the **COM** port that you wish to clear.
- 2 Press the **Delete** button or go to **File\Clear Configuration**.

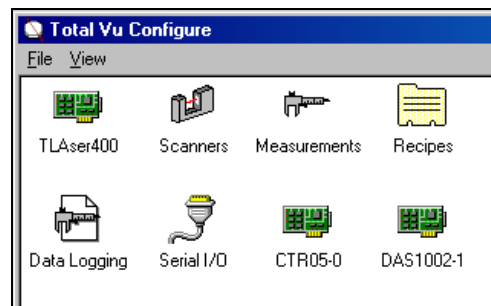
**Note:** the icon cannot be deleted; only the configuration will be erased.

## Analog I/O

Analog input and output (I/O) are options of the Total Vu Software and require installation of an analog output PC board. With analog output, you are able to send a measurement, using a voltage, to a device with an analog input. With analog input, a device such as a thermocouple can send a voltage for temperature.

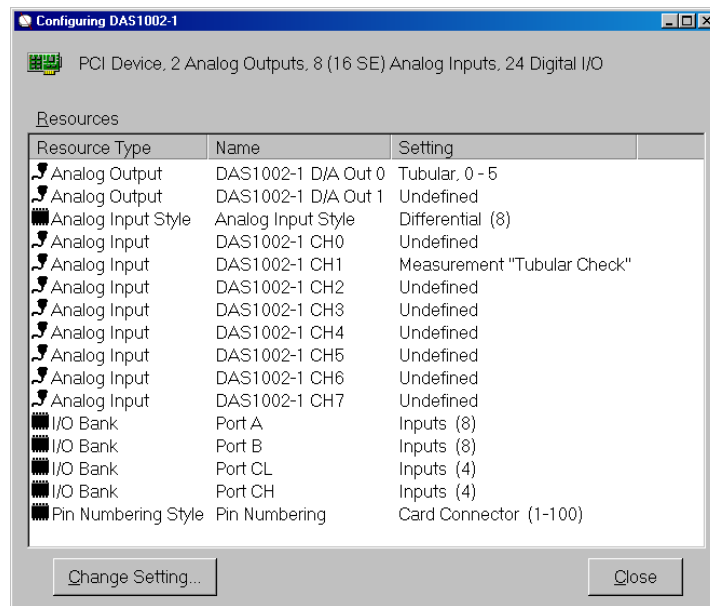
### Analog Configuring Window

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the icon for the analog device to access its configuration.



*Detail of Total Vu Software Full Configure window showing the icon for a DAS1002-1 analog card; other cards will have icons with different names;*

Double-clicking the card icon opens the configuration window. The window displays three columns: **Resource Type**, **Name**, and **Setting**. Under **Resource Type** there are resources for input, output, and other related settings. The number of inputs available depends on the setting for **Analog Input Style**, either **Single-Ended** or **Differential**. With **Single-Ended**, one wire is used to connect the analog device, generally giving twice as many inputs; with **Differential**, the number as inputs is device dependent. As shown in the following screen shot, with a setting for **Differential**, there are eight possible inputs. The setting you use depends on the needs of the actual device you are using.



*Analog configuration window showing output and input resources.*

## Configuring Analog Output

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the icon for the analog device to access its configuration.

- 1 Double-click the analog card's icon.

The configuration window that opens shows a list of resource types.

- 1.1 To configure an **Analog Output** resource, select one and click the **Change Setting...** button, press the **Enter** key, or double click on the item.

Another window opens that initially has three tabs: **General**, **Voltage Range**, and **Usage**. Choosing **Measurement** in the **Usage** tab adds the **Scaling** tab. The **General** tab displays device information and parameters, such as the voltage range.

2. **Voltage Range** tab.

- 2.1 Use the radio buttons to select between **Unipolar** and **Bipolar**.

With unipolar, the lowest output voltage range will be zero; with bipolar, the lowest output voltage will be the negative of the highest output voltage (e.g. a highest voltage of 5 VDC will carry the lowest voltage of -5 VDC).

## 2.2 From the drop-down list, select the **Voltage Range**.

The list of choices depends on the I/O device, and the resolution varies with voltage range choices of 5 or 10 volts.

## 3 Usage tab.

With a choice of **Unused**, there are no other parameters (**Unused** is simply the default setting before configuring).

### 3.1 Use the radio button to select the parameter for the type of output planned for this configuration.

#### 3.1.1 For **Measurement**:

3.1.1.a Select the measurement to follow.

#### 3.1.2 For **Closed Loop Control**:

3.1.2.a Select the control loop that will use this analog output.

3.1.3 With a choice of **Unused** or **Closed-Loop Control**, click **OK**; With **Measurement**, go to the **Scaling** tab.

## 4 Scaling tab.

The parameters in this tab vary with the choices of **Deviation from Nominal**, **Deviation from Constant**, and **Absolute**.

### 4.1 **Scaling Method**.

The system will automatically calculate the necessary scaling. Select how you want to specify the range of measurement values that the output voltage will represent.

#### 4.1.1 **Deviation from Nominal**.

The nominal of the measurement represents the midpoint of the voltage range; whenever the recipe is changed, the scaling will be updated automatically.

4.1.1.a **Relative Scaling**: In the **Measurement Range** box, enter the full range of measurement values that the output will represent.

For example, **Measurement Range** = 0.030; **Voltage Range** = 0 to 10 VDC  
**Nominal** – 0.015 will be 0 VDC and **Nominal** + 0.015 will be 10 VDC

#### 4.1.2 Deviation from Constant.

Specify the measurement value that the midpoint of the voltage range represents and also the total range of measurement values that the output represents.

4.1.2.a **Relative Scaling:** In the **Measurement Range** box, enter the full range of measurement values that the output represents.

For example, **Measurement Range** = 0.030; **Voltage Range** = 0 to 10 VDC  
**Constant** – 0.015 will be 0 VDC and **Constant** + 0.015 will be 10 VDC

4.1.2.b In the **Central Measurement Value** box, enter the measurement value that the VDC shown on screen represents. (The exact value will depend on the voltage range chosen in the **Voltage Range** tab.)

#### 4.1.3 Absolute.

Specify the highest and lowest measurement values that the output represents.

4.1.3.a **Absolute Scaling:** in the boxes for **Largest Measurement Value** and **Smallest Measurement Value**, enter the largest and smallest measurement values that the output voltage represents.

#### 4.2 Error Voltage.

4.2.1 If you want the output voltage to be forced to a preset voltage on a measurement error,

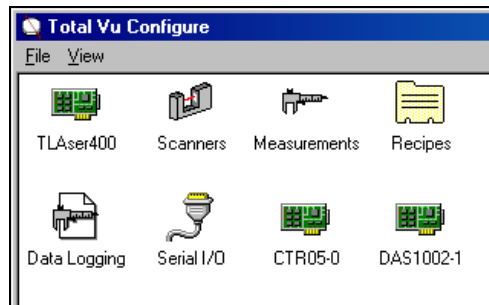
4.2.1.a Check the box for Use Error Voltage;

4.2.1.b And enter the voltage that represents an error.

4.3 Click OK or press Enter.

### Configuring Analog Input

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the icon for the analog device to access its configuration.

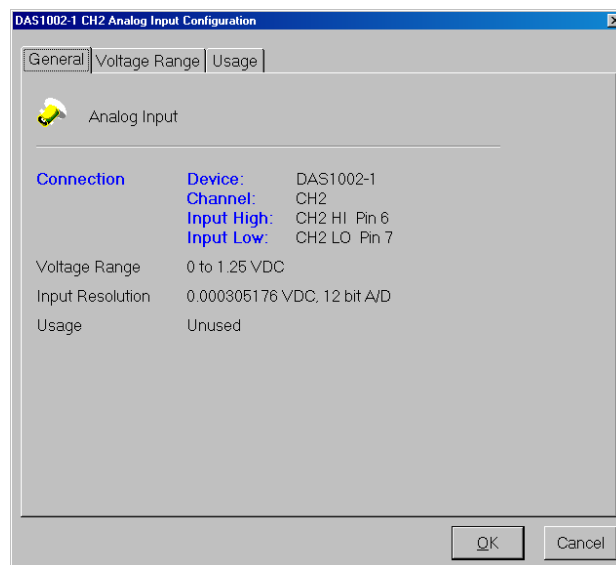


*Detail of Total Vu Software Full Configure window showing the icon for a DAS1002-1 analog card; other cards will have icons with different names;*

- 1 Double-click the analog card's icon.

The configuration window that opens shows a list of resource types.

- 1.1 To configure an **Analog Input** resource, select one and click the **Change Setting...** button, or press the **Enter** key, or double click on the item.



*General tab of the Analog Input Configuration window.*

Another window opens that initially has three tabs: **General**, **Voltage Range**, and **Usage**. Choosing **Measurement** in the **Usage** tab adds three other tabs: **Measurement**, **Scaling**, and **Name**. The **General** tab displays device information and parameters, such as the voltage range.

## 2. Voltage Range tab.

### 2.1 Use the radio buttons to select between **Unipolar** and **Bipolar** inputs.

With unipolar, the lowest input voltage range will be zero; with bipolar, the lowest input voltage will be the negative of the highest input voltage (e.g. a highest voltage of 5 VDC with carry the lowest voltage of -5 VDC).

### 2.2 From the drop-down list, select the **Voltage Range**.

The list of choices is dependent on the I/O device; the resolution varies with voltage range choices of 1.25, 2.5, 5, or 10 volts.

## 3 Usage tab.

### 3.1 Use the radio button to select the parameter for the type of input planned for this configuration. For **Unused**, the input is ignored.

3.1.1 For **Measurement**, the input voltage will be converted to a measurement. The measurement will be scaled according to the parameters on the **Scaling** tab.

3.1.2 For **Closed Loop Control**, the input voltage will be used to monitor the MOP setting when the control loop is in manual mode. It is important that the voltage range of the input match the voltage range of the analog output used by the associated control loop.

3.1.3 With a choice of **Unused** or **Closed-Loop Control**, click **OK**; With **Measurement**, go to the **Measurement** tab.

## 4 Measurement tab.

### 4.1 **Averaging Period**: Enter the period over which you will accumulate input samples.

Samples will be averaged before reporting the measurement value.

### 4.2 **Resolution**: Select the number of decimal places to display to the right of the decimal point.

### 4.3 **Offset**: When the **Use Offset** box is checked, the value is added to the measurement value before it is reported. A negative offset results in a smaller final measurement value.

4.3.1 If an offset is needed, check the **Use Offset** box.

4.3.2 Enter a value for the offset.

## 5 Scaling tab.

The parameters in this tab vary with the choices of **Deviation from Nominal**, **Deviation from Constant**, **Absolute from Reasonable Limits**, and **Absolute from Constants**.

### 5.1 Scaling Method.

The system will automatically calculate the necessary scaling. Select how you want to specify the range of measurement values that the input voltage will represent.

#### 5.1.1 Deviation from Nominal.

Specify the total range of measurement values that the input voltage represents. The midpoint of the voltage range will represent the nominal of the measurement; whenever the recipe is changed, the scaling will be updated automatically.

5.1.1.a **Relative Scaling:** In the **Measurement Range** box, enter the full range of measurement values that the input represents.

For example, **Measurement Range** = 0.030; **Voltage Range** = 0 to 10 VDC  
**Nominal** – 0.015 will be 0 VDC and **Nominal** + 0.015 will be 10 VDC.

In the box labeled **Central Measurement Value** there will be a **No Specs** message until the measurement is assigned to a recipe and that recipe is loaded.

#### 5.1.2 Deviation from Constant.

Specify the measurement value that the midpoint of the input voltage range represents and also the total range of measurement values that the input represents. The system will automatically determine the necessary scaling.

5.1.2.a **Relative Scaling:** In the **Measurement Range** box, enter the full range of measurement values that the input represents.

For example, **Measurement Range** = 0.030; **Voltage Range** = 0 to 10 VDC  
**Constant** – 0.015 will be 0 VDC and **Constant** + 0.015 will be 10 VDC

5.1.2.b In the **Central Measurement Value** box, enter the measurement value that the VDC shown on screen represents. (The exact value will depend on the voltage range chosen in the **Voltage Range** tab.)

#### 5.1.3 Absolute from Reasonable Limits.

The highest and lowest measurement values that the input represents are copied from the reasonable limits of the recipe that the measurement is assigned to. However, at this point in setup, the measurement has not yet been assigned to a recipe.



Under the **Absolute Scaling** parameter there will be a **No Specs** message until the measurement is assigned to a recipe and that recipe is loaded.

#### 5.1.3.a Absolute Scaling.

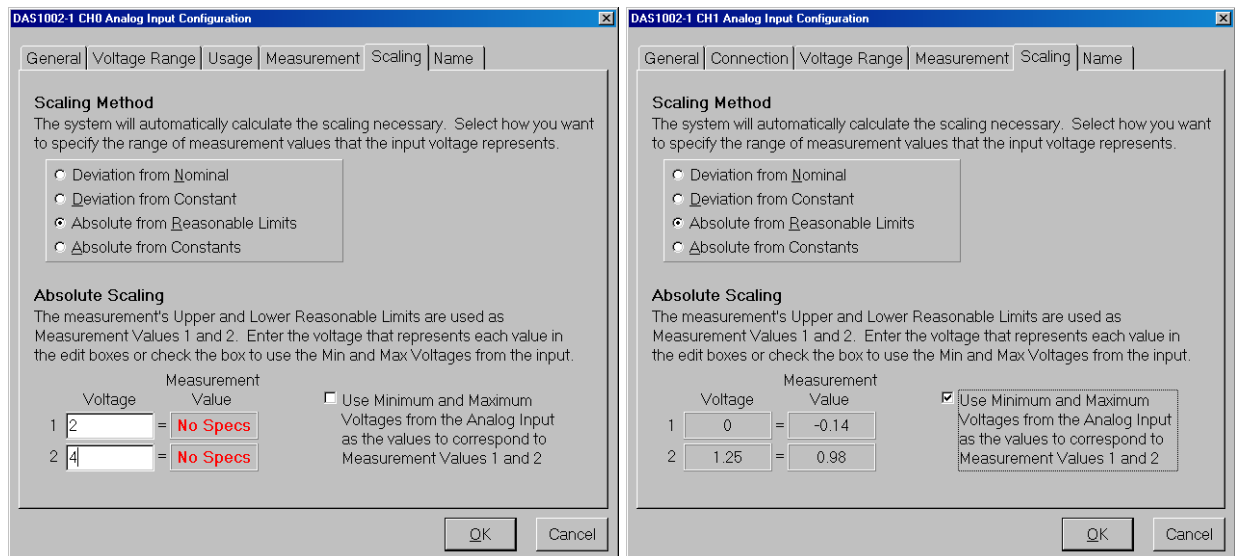
- In the edit boxes, enter the voltage that represents each value.
- **Or:**
- Check the box to use the minimum and maximum voltages from the analog input.

#### 5.1.4 Absolute from Constants.

Specify two measurement values and the input voltage that represents each value.

#### 5.1.4.a Absolute Scaling.

- In the boxes for **Measurement Value 1** and **Measurement Value 2**, enter measurement values for which the corresponding input voltage is known.



*Scaling tab. The version on the left shows the No Specs warning label for Measurement Values; the version on the right shows Measurement Values from a recipe's reasonable limits. In addition, the version on the right has the box for using minimum and maximum voltages from the analog input checked.*

## 6 Name tab.

6.1 **Measurement Name:** Enter the name for the new analog input-based measurement.

Names must begin with any letter, digit, or symbol other than these symbols: [ ] |. The name can be up to 30 characters and must be unique. It cannot match any of the names in the box.

## 6.2 Click OK or press Enter.

In the analog card's configuration window, under the **Resources** tab, the **Setting** column will now show the name of the new measurement to the right of the channel that was configured. Also, an icon for the new measurement will appear in the **Measurements** configuration window. You can modify the measurement either from the **Measurements** configuration window or from the **Analog I/O** window where it was configured.

- 7 Add the new analog input-based measurement to an existing recipe or create one for it. (Please see chapter on [recipes](#) for details)

## Encoders

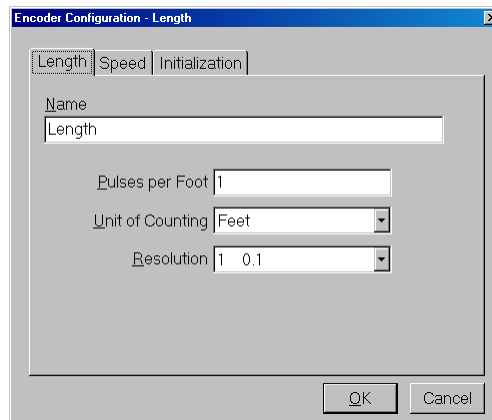
An **Encoder** is a separate, optional device for measuring the length of a product and/or the speed of the production line. A rotating wheel rests against the production line and produces pulses to indicate the movement of line or product. When the product is moving, the wheel rotates and the encoder sends pulses to the Total Vu system. With an encoder connected, Total Vu Software continually monitors the incoming pulses to determine line speed and total product length. Each measurement reading is then tagged with the product length where the measurement occurred. The measurement reading and product length pairs can then be used to compute pitch measurements, do same spot measurement, track control delays based on product movement, store product footage in Log files, and many other features. Besides the encoder itself, an encoder interface module must be installed on the TLAs400 Card.

After an encoder has been set up, all of the other Total Vu Software features that require an encoder are available. After defining speed and length measurements in an encoder, you can view them by adding them to a measurement window. Only one encoder can be used with a system at a time.

A newer type of encoder has been recently implemented, called **Quadrature**. With quadrature, you can measure (count) in both directions, forward and backward. The direction signal is separated 90 degrees in phase from the count/pulse signal. Quadrature is a separate package. Documentation for setting up a quadrature encoder will follow at the end of this chapter.

### Setting up an Encoder

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Encoder** icon to open the **Encoder Configuration** window.



*The Encoder configuration window.*

The Encoder Configuration window shows three tabs: Length, Speed, and Initialization.

## 1 Length tab.

1.1 Enter a name for the **Length** measurement.

1.2 Enter a number for **Pulses per Unit of Measurement**.

The unit in the **Pulses** parameter is dependent on the unit chosen in **Unit of Counting**. In the screen shot, **Foot** is shown as the unit for **Pulses** because **Feet** is the default choice for **Unit of Counting**. The number of pulses per unit of length depends on encoder specifications (pulses per revolution, gear ratios, etc.), if any, and possibly the circumference of the contact wheel.

1.3 From the drop-down lists, choose:

1.3.1 **Unit of Counting** (choices are mils, thousandths of an inch, feet, inches, yards, microns, millimeters, centimeters, or meters).

1.3.2 **Resolution** (the number of places after the decimal to be displayed in the length measurement).

## 2 Speed tab.

2.1 Enter the name for your speed measurement.

2.2 From the drop-down list, choose the **Unit of Time** (second, minute, or hour).

2.3 Use the up/down arrows to select the **Averaging Period** (in seconds). The system calculates an average speed over the specified time period.

2.4 From the drop-down list, choose the **Resolution** (the number of places after the decimal to be displayed in the speed measurement).

3 Initialization tab.

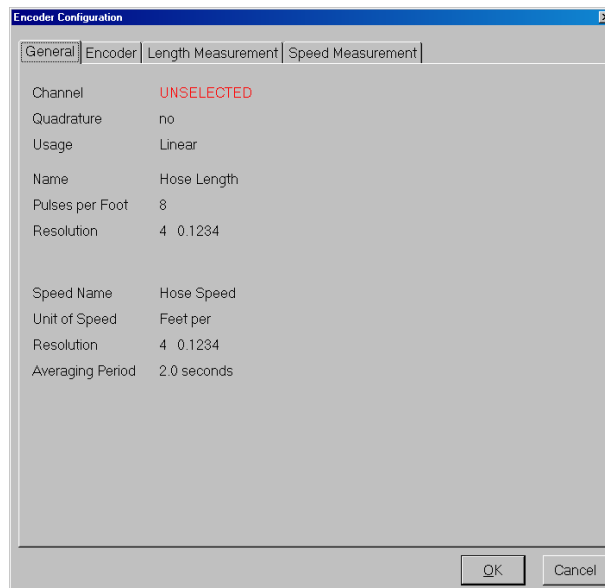
Choose the encoder state on startup of your system (**Off, On, or Restore Last State**).

With the choice of **Off**, the encoder will not count until execution of an action for **Resume Encoder**.

4 Click **OK** or press **Enter**.

### Setting up a Quadrature Encoder

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Encoder** icon to open the **Encoder Configuration** window.



*The Quadrature Encoder configuration window.*

The Quadrature Encoder Configuration window shows four tabs: **General**, **Encoder**, **Length Measurement**, and **Speed Measurement**.

## 1 General tab.

The **General** tab shows configuration settings.

## 2 Encoder tab.

### 2.1 Channels.

2.1.1 Select the channel of the TLAser400 Laser Micrometer Interface Card(s) to which the encoder is connected.

2.1.2 If the encoder is connected to multiple cards:

2.1.2.a Press the **Ctrl** key, and

2.1.2.b Click on the channel you wish to use.

### 2.2 Quadrature.

2.2.1 If the encoder has **Quadrature** outputs, check the box.

With a **Quadrature Encoder**, the system can count pulses forward and backward and you can choose the **Count Direction**.

### 2.3 Count Direction.

The direction depends on how the encoder is wired, and how it is mounted and geared. The wires from the encoder could have been reversed. If they *have* been reversed, using the software to reverse the direction is much easier than re-wiring the encoder.

2.3.1 If the encoder is counting in the opposite direction of how it was intended, choose the other count direction.

## 3 Length Measurement tab.

### 3.1 Length Measurement Name.

3.1.1 Enter the name for the length measurement.

The name must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique.

### 3.2 Units.

3.2.1 Use the drop-down menu to select the units that the encoder count represents.

### 3.3 Pulses per <Unit>.

**Note:** The **Unit** will vary depending on your selection of **Units**. If you select feet as your unit above, the parameter for section 3.3 will read as **Pulses per Foot**.

3.3.1 Enter the number of pulses that equal one of the chosen **Units** of movement.

#### 3.4 Resolution.

3.4.1 From the drop-down list, select the number of places to the right of the decimal point to display in the measurement value.

### 4 Speed Measurement tab.

#### 4.1 Speed Measurement Name.

4.1.1 Enter the name for the speed measurement.

The name must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique.

#### 4.2 Unit of Time.

4.2.1 Use the drop-down menu to select the unit of time in the speed measurement.

For example, for **Feet per Minute**, select **Minute** from the list.

#### 4.3 Averaging Period.

4.3.1 Use the up/down arrows to enter the number of seconds over which the speed of the encoder will be averaged.

#### 4.4 Speed Resolution.

4.4.1 From the drop-down list, select the number of places to the right of the decimal point to display in the measurement value.

### 5 Click OK or press Enter.

## Actions Specific for Encoders

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for encoders.

- *Pause Encoder*. Stops the encoder input from counting. The length value will remain unchanged until you execute a *Resume Encoder* action.)

- *Resume Encoder*: Restarts the encoder input counting. The length value will begin increasing again. If the encoder is already counting, this action will not do anything.
- *Resume/Pause Encoder*: Resumes or pauses the encoder input. If the last execution of the action paused the encoder, the next will restart the encoder; if the last execution restarted the encoder, the next will pause the encoder.
- *Reset Encoder*: Resets the encoder input. The length measurement value will be reset to user-specified value and the encoder state following the reset can be selected (paused, running, or left unchanged).



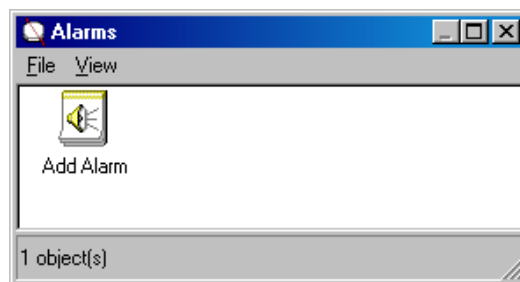
## Alarms

Alarms are typically used to communicate from the system to the outside world. They can, for example, turn on a warning light if a product goes out of spec., trigger an audible warning to alert an operator to a scanner problem, or activate a paint sprayer to mark a product that has a defect. The alarm could also be used to shut down a process that has become “out of control”, or to indicate to other equipment that the measurement system is ready for a new part. If any system in the world outside the measurement system requires notification of “events” in the measurement system, notification can be achieved with an alarm.

Total Vu Software’s Alarms configuration has recently been updated. Because some users have an older version, both versions are covered in this chapter. The new version is first and the older version follows.

### Configuring Alarms

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Alarms** icon to open the **Alarms** configuration window. In the window you will see an icon for **Add Alarm**.



*The Alarms window.*

## 1 Connection and Logic Mode (screen 1).

### 1.1 Check the box for: No output—Alarm On and/or Alarm Off actions only.

This option is used with other processes, such as data logging. For example, with an action for start/stop data logging, if the line speed drops, data logging stops, and starts again when the line speed returns to a normal production level.

When the box is checked, the rest of the screen grays out.

**Or:**

### 1.2 Select the I/O device and output to use for the alarm.

After you select a device, the available outputs for the device will appear in the outputs list.

#### 1.2.1 Select the output from the list.

### 1.3 For **Logic Mode**, use the radio button to select whether the output should be On or Off when any of the alarm conditions are true.

The choices are: **Output On when Conditions True** or **Output Off when Conditions True**.

### 1.4 Click **Next** or press **Enter** to move to the next screen.

## 2 Conditions (screen 2).

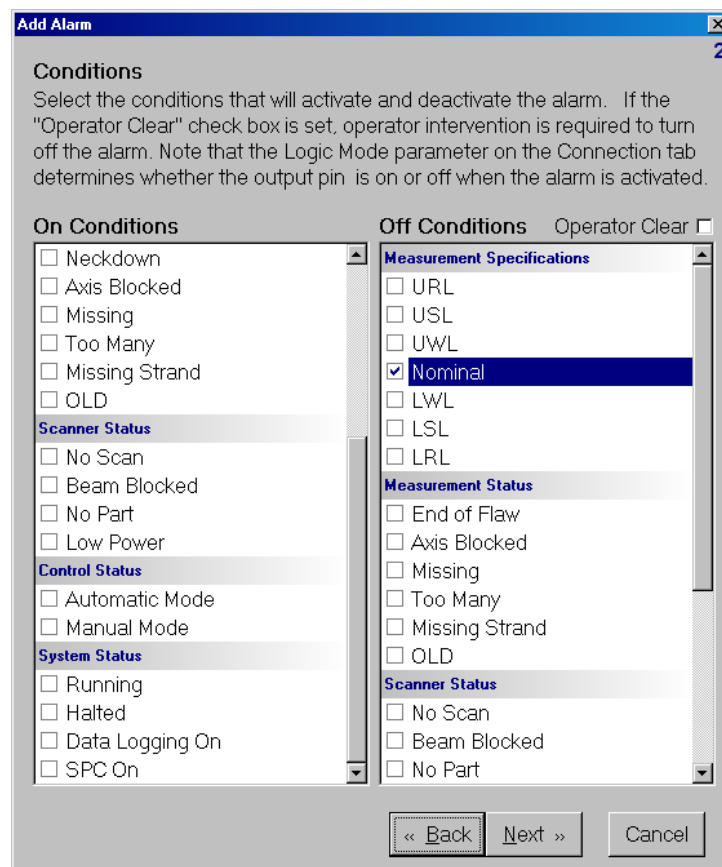
### 2.1 If desired, check the box for **Operator Clear**.

If the **Operator Clear** box is checked, operator intervention is required to deactivate the alarm. **Note:** The logic mode parameter in screen one determines whether the output pin is on or off when the alarm is activated.

### 2.2 Select the conditions that will activate and deactivate the alarm.

This category is separated into groups of **On Conditions** and **Off Conditions**. Note the on-screen messages for specific information about each condition.

ALARM ON AND OFF CONDITIONS	
Measurement Specifications	The check boxes in this group correspond to the tolerance status of the selected measurements.
Measurement Status	The check boxes in this group correspond to the status of the selected measurements.
Scanner Status	The check boxes in this group correspond to the most common status conditions of a laser scan micrometer.
Control Status	The check boxes in this group correspond to the most common status conditions for a control loop.
System Status	The check boxes in this group correspond to the status of system-wide conditions.



Screen 2: Conditions; On Conditions is scrolled down to show the rest of the list.

2.3 Click **Next** or press **Enter** to move to the next screen.

3 **Measurements** (screen 3).

3.1 Select the measurements that will be checked for the chosen conditions.

3.2 Click **Next** or press **Enter** to move to the next screen.

#### 4 Minimum On Condition Time, Alarm Delay, and Minimum Pulse Width (screen 6).

4.1 **Minimum On Condition Time:** If desired, check the box for **Use Minimum On Condition Time**.

If this parameter is checked, the **On Condition** must be sustained for the specified time before the alarm will activate.

4.1.1 Enter a value for minimum on condition time.

4.2 **Alarm Delay:** If a delay is desired, check the box.

If checked, the alarm output will be delayed by the specified amount. Use the delay if there is some physical action that must occur to the product being inspected. For example, marking the product with spray paint or sorting bad pieces. The delay would be the distance between the location of inspection and the location of the sprayer or sorter.

4.2.1 Enter an amount for the delay (in units of distance as determined in your encoder setup).

4.3 **Minimum Pulse Width:** If you wish the alarm to remain active for a minimum period, check the box.

If a delay has been entered, the duration of the alarm pulse will be expressed in the same units as the delay. If a delay is not specified, the duration is specified in milliseconds.

4.3.1 In the box, enter a value for the pulse duration.

The output will remain active for at least the specified period (expressed either as milliseconds or the distance unit specified in the alarm delay. **Note:** If you chose to force the operator to clear the alarm, this parameter has no effect.

4.3.2 Select the radio button for **Last** or **First On Condition** for the ending of the alarm delay.

With **Last:** Once active, the alarm will remain active for the specified minimum time. Each time an **On Condition** becomes true, the countdown of the **Minimum On Time** is restarted so the alarm remains on for the **Minimum On Time** after the last on condition becomes false.

With **First:** Once active, the alarm will remain active for the specified minimum time. After the **Minimum On Time** elapses, the alarm will turn off immediately unless at least one of the **On Conditions** is true.

4.4 Click **Next** or press **Enter** to move to the next screen.

## 5 Alarm On Action, Alarm Off Action, and Open File (screen 7).

Actions must first be created using the **Actions** configuration window (please see the [Actions](#) chapter).

### 5.1 Alarm On Action: If desired, select an action to execute when an alarm activates (when at least one of the On Conditions becomes true).

For example: If you want data logging to stop when an alarm activates, create the action *Stop Data Logging*.

**Note:** If the **Delay** feature is used, the action is executed after the delay expires.

### 5.2 Alarm Off Action: If desired, select an action to execute when an alarm de-activates.

Continuing from the previous example, you would create the action *Start Data Logging* so that logging will resume when the alarm de-activates, .

**Note:** If the **Minimum on Time** feature is used, the action is executed after the minimum on time expires.

### 5.2 Open File (optional): If you wish for a file to open or execute when the alarm activates, type in a file name in the box or click the **Browse...** button to find a file.

For example: if you select a .wav file, the sound will be played when the alarm activates. If the selected file is not an executable program, the file type must have an associated application to be opened. Please see **Windows Explorer Help** for details on file types.

### 5.3 Click **Next** or press **Enter** to move to the next screen.

## 6 Alarm Name (screen 8).

### 6.1 Enter a name for the new alarm.

The name must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

### 6.2 Click **Next** or press **Enter** to move to the next screen.

An icon for the new **Alarm** will appear in the **Alarms** window.

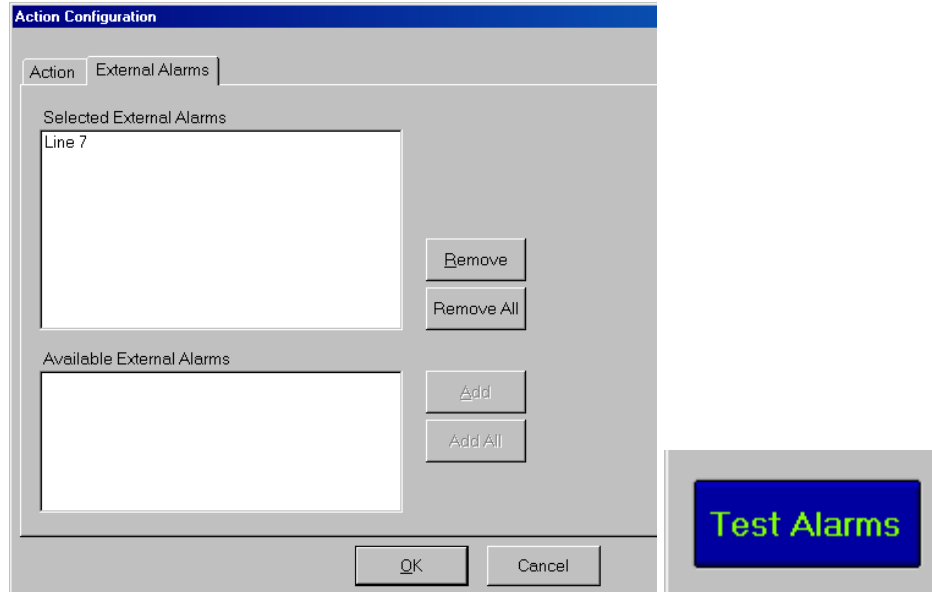
## Actions Specific for Alarms

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for alarms.

- *Alarms: Clear:* Clears selected alarms.
- *Alarms: On:* Forces selected alarms to activate.
- *Alarms: Off:* Forces selected alarms to deactivate.
- *Alarms: Test:* Toggles selected alarms between active and inactive to test hardware and wiring.
- *Alarms: Enable:* Enables selected alarms.
- *Alarms: Disable:* Disables selected alarms.
- *Alarms: Enable/Disable:* Toggles selected alarms between enable and disable.

### *Try This*

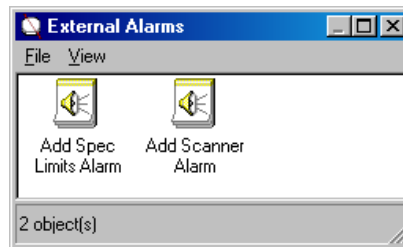
- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Actions** icon to open the **Actions** configuration window. In the window you will see an icon for **Add Action** and any previously-defined actions.
- Create the action for **Alarms: Test**.
- Open the **Display** icon and create a button for the **Action**.
- Click the button whenever you need to test the alarm.



*Left: Action Configuration window with Alarms: Test selected, showing the Alarms tab and an alarm selected; on the right, the Test Alarms button on the Total Vu Software desktop.*

## Creating A New Spec Limits Alarm (for older versions of Total Vu Software)

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **External Alarms** icon to open the **Alarm Configuration** window. In the window you will see an icon for **Add Spec Limits Alarm** and **Add Scanner Alarm**.



*The External Alarms window.*

Double-click the **Add Spec Limits Alarm** icon. This is a wizard, which will guide you through the setup process.

### 1 Digital I/O Pin Selection.

- 1.1 Select the output pin on the digital I/O card that will be used for the **External Alarm**.

The column on the left shows available digital I/O cards and the column on the right will show the available digital output pins that are available for that card. The pins have no pre-defined meaning. You can wire them to anything that needs an on/off signal. By selecting a pin for a particular alarm setup, the user is defining the function of that pin.

- 1.2 Select the radio button for **Polarity** (Active is 5 VDC or Active is 0 VDC).

5 VDC means that the output is high or the contact is closed when the alarm is in logical "on".

- 1.3 If you want the alarm output to stay active for a guaranteed minimum amount of time, enter a number for the **Minimum Pulse Width** (in milliseconds).

- 1.4 Click **Next** or press **Enter** to move to the next screen.

### 2 On/Off Conditions.

- 2.1 Specify the **Spec Limits conditions** that will control whether the alarm is on or off (for each group of conditions, check all the conditions that apply).

Two groups, labeled **On Conditions** and **Off Conditions**, are used for specifying the external alarm's on/off conditions. The settings for **On** and **Off** are mutually exclusive (selection of a spec limit in the **On** group will disable the spec limit level in the **Off** group, and vice versa).

If any of the **On Conditions** are true, the alarm will activate. If no **Off Conditions** are checked, the operator must clear the alarm manually.

2.2 Click **Next** or press **Enter** to move to the next screen.

### 3 Measurements.

3.1 From the list of available measurements, select the measurement(s) that will control the external alarm.

The values of these measurements will be checked against the spec limits.

3.1.1 Click **Add**.

3.2 Or, if you wish to use all measurements, click the **Add All** button.

3.3 Click **Next** or press **Enter** to move to the next screen.

### 4 Alarm Delay.

Use the delay if there is some physical action that must occur to the product being inspected. For example, marking the product with spray paint or sorting bad pieces. The delay is the distance between the location of inspection and the location of the sprayer or sorter.

4.1 If a delay is desired for the alarm:

4.1.1 Check the box for **Use Delay**.

4.1.2 Enter the amount of duration of the delay (in units of distance as determined in your encoder setup).

4.1.3 Enter the minimum pulse width.

4.1.4 Use the radio buttons to select when the minimum pulse is to begin.

4.2 Click **Next** or press **Enter** to move to the next screen.

### 5 External Alarm Name.

5.1 Enter a name for the new external alarm.



The new name must be non-blank and must not conflict with other defined external alarm names.

- 5.2 Click **Finish** or press **Enter**.

An icon for the new **External Alarm** will appear in the **Alarms** window.

### Creating A New Scanner Alarm (for older versions of Total Vu Software)

Double-click the **Add Scanner Alarm** icon. This is a wizard, which will guide you through the setup process.

#### 1 Digital I/O Pin Selection.

- 1.1 Select the output pin on the digital I/O card that will be used for the external alarm.

The column on the left shows available digital I/O Cards and the column on the right will show the available digital output pins that are available for that card.

- 1.2 Select the radio button for **Polarity** (Active is 5 VDC or Active is 0 VDC).

- 1.3 Enter a number for the **Minimum Pulse Width** (in milliseconds).

- 1.4 Click **Next** or press **Enter** to move to the next screen.

#### 2 Scanner Status On Conditions.

- 2.1 Select the scanner status condition(s) that will turn the alarm on.

- 2.2 Select whether the alarm should stay active until an operator acknowledges it.

If not checked, the alarm will deactivate when none of the **On Conditions** are true.

- 2.3 Click **Next** or press **Enter** to move to the next screen.

#### 3 Scanners.

- 3.1 From the list of **Available Scanners**, select the one(s) that will control the external alarm.

3.1.1 Click **Add**.

- 3.2 Or, if you wish to use all scanners, click the **Add All** button.

- 3.3 Click **Next** or press **Enter** to move to the next screen.

#### 4 Alarm Delay.

4.1 If a delay is desired for the alarm:

4.1.1 Check the box for **Use Delay**.

4.1.2 Enter the amount of duration of the delay (in feet).

4.1.3 Enter the minimum pulse width.

4.1.4 Use the radio buttons to select when the minimum pulse is to begin.

4.2 Click **Next** or press **Enter** to move to the next screen.

#### 5 External Alarm Name.

5.1 Enter a name for the new external alarm.

The new name must be non-blank and must not conflict with other defined external alarm names.

5.2 Click **Finish** or press **Enter**.

An icon for the new **Scanner Alarm** will appear in the **Alarms** window.

## Creating and Working with SPC Plans

Statistical Process Control (SPC) uses statistical techniques to measure and analyze variation in production processes. Using control charts and collecting few but frequent samples, you can detect changes in the production process that might affect product quality.

The full SPC package, which includes control limits, x-b and range charts, and histograms, is an optional extra; **Standard SPC** is included with the basic version of Total Vu Software. The full package allows user-defined sampling, but **Standard SPC** is fixed—it includes all measurement values for selected measurements.

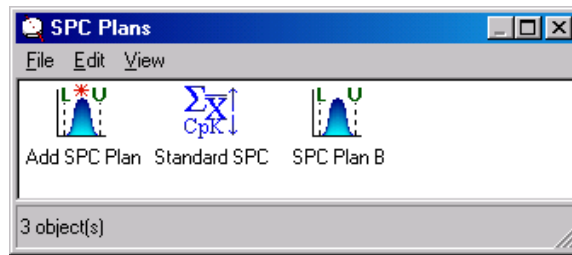
Whichever SPC you have, there is a basic sequence you can follow to get it running:

- Add the measurements to the SPC plan in **Standard SPC**, or set up a SPC plan with the full SPC package and add the measurements there.
- Create actions for **Start, Stop, Clear, and Report SPC**.
- Decide how to trigger these events (digital inputs, OPC communications, or buttons on the main screen), and create these triggers.
- If an operator is to view the information, create an **SPC Data** window.

The individual items in the basic sequence are explained in their respective chapters: [Actions](#), [Digital Inputs](#), and [Menu Configurations](#).

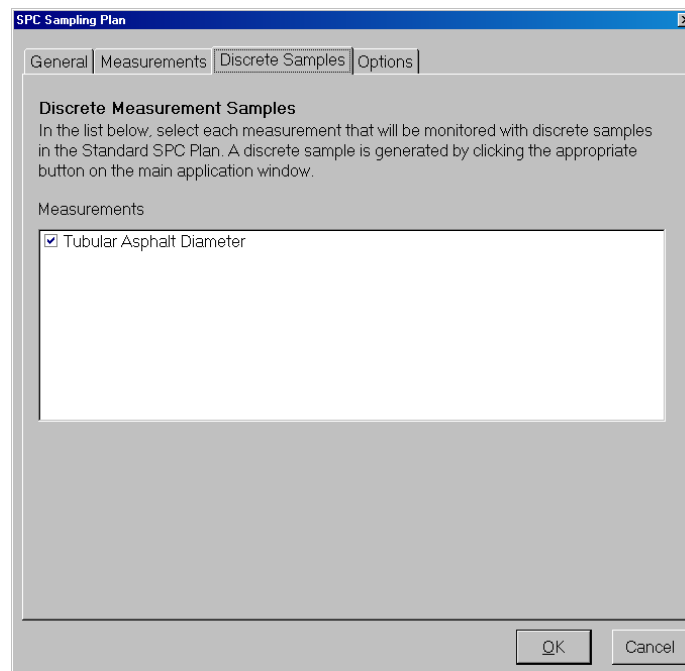
### Configuring Standard SPC

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **SPC Plans** icon to open the **SPC Plans** window. In the window you will see an icon for the **Standard SPC** wizard. If you have purchased full **SPC**, you will also see an icon for **Add SPC Plan**.



The SPC Plans window, showing the icons for Add SPC Plan, Standard SPC, and SPC Plan B (an existing user-defined SPC Plan).

Double-click the **Standard SPC** icon. The screen shows a row of tabs. The **General** tab displays configuration data, whereas the tabs for **Measurements**, **Discrete Samples**, and **Options** are for entering configuration data.



The Standard SPC configuration window, with the Discrete Samples tab selected.

## 1 Measurements tab.

### 1.1 Select the measurements for which you want to maintain statistics.

**Note:** You can define more than one plan if you want to collect statistics for other measurements using a different sampling plan.

#### 1.1.1 Click Add.

1.2 Or, if you wish to use all measurements, click the **Add All** button.

## 2 Discrete Samples tab.

2.1 From the list, select each measurement that will be monitored with discrete samples in the **Standard SPC** plan.

A discrete sample is generated by execution of an appropriate action. Actions can be executed from OPC, by pressing a user-defined button, or by assigning a digital input to them.

## 3 Options tab.

### 3.1 SPC Backup Interval and Minimum Line Speed.

Storing your data ensures that there will be no loss of critical data should an event such as a power outage interrupt the system.

If you have the **Zero-Latency Encoder** option, you can set up the system to disable **SPC Sampling** until the line reaches a minimum speed. If this feature is **NOT** enabled, when the line stops or slows radically, sampling will continue. This will weight samples in favor of the place where the line stops (because the system will continue to sample the same location again and again). For the most representative SPC data, sampling should be by length, and **Minimum Line Speed** should be selected.

1.3.1 Enter the frequency, in seconds, for storing your real-time SPC data to disk.

1.3.2 If you have an encoder and are using **Minimum Line Speed**,

1.3.2.a Check the box.

1.3.2.b Enter an amount for distance per unit of time.

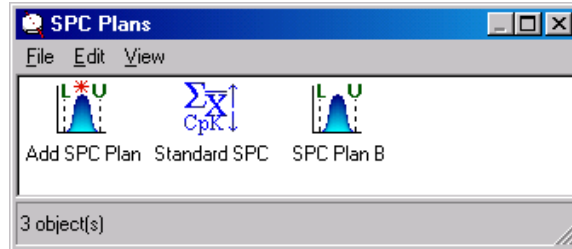
The distance and unit of time is determined in your encoder configuration.

## 4 Click **OK** or press **Enter**.

Because **Standard SPC** is a basic, simplified tool for collecting statistical data, your new settings do not produce a new icon the way other configurations would; instead, the **Standard SPC** icon is also the modification window for your settings. You can modify the **Standard SPC** window, but cannot copy or delete it.

### Creating A New SPC Plan with the Full SPC Option

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **SPC Plans** icon to open the **SPC Plans** window. In the window you will see an icon for the **Add SPC Plan** wizard.



*The SPC Plans window, showing the icons for Add SPC Plan, Standard SPC, and SPC Plan B (an existing user-defined SPC Plan).*

Double-click the **Add SPC Plan** icon. This is a wizard, which will guide you through the setup process.

Or, an alternate way: Go to the **File** menu of the **SPC Plans** configuration window and select **New**.

#### 1 Measurements (screen 1).

- 1.1 Select the measurements for which you plan to maintain statistics.

**Note:** If you want to collect statistics using different sampling parameters, you can define more than one plan. An example would be one plan for collecting statistics for an entire run and another for collecting statistics for each reel or spool.

##### 1.1.1 Click Add.

- 1.2 Or, if you wish to use all measurements, click the **Add All** button.
- 1.3 Click **Next** or press **Enter** to move to the next screen.

#### 2 Sample Interval, Subgroup Interval, and Subgroup Size (screen 2).

- 2.1 For **Sample Interval**, check the radio button for how often you want to include a measurement value in the statistical data (seconds, minutes, hours, or measurements, and, with the encoder option, distance).

You can define the interval based on a delay between two consecutive samples, as a frequency, or when an action is executed.

**Note:** On the difference between **Frequency** and **Delay**.

In general, a delay-based interval defines the time-, length-, or other event-count that must elapse between the **end** of a sample-collection and before the **start** of the next sample-collection. A frequency-based interval defines exactly the time-, length-, or other event-count that must elapse between the **start** of one sample-collection and the **start** of the next sample-collection.

With a frequency-based interval, if the frequency is faster than the rate at which the measurement updates, then the rules of the sampling plan will not be followed—the statistics can only update if there is new measurement data to sample. In this case, the effective sampling frequency will be the same as the update frequency of the measurement. This problem does not occur with a delay-based interval because the delay begins only after a sample is taken.

- 2.2 For **Subgroup Interval**, check the radio button to define how often you want to begin a statistical subgroup. You can define the interval based on a delay between two consecutive subgroups, as a frequency, or when an action is executed.
- 2.3 For **Subgroup Size**, use the up/down arrows to enter the number of samples (measurement values) to include in each subgroup.
- 2.4 Click **Next** or press **Enter** to move to the next screen.

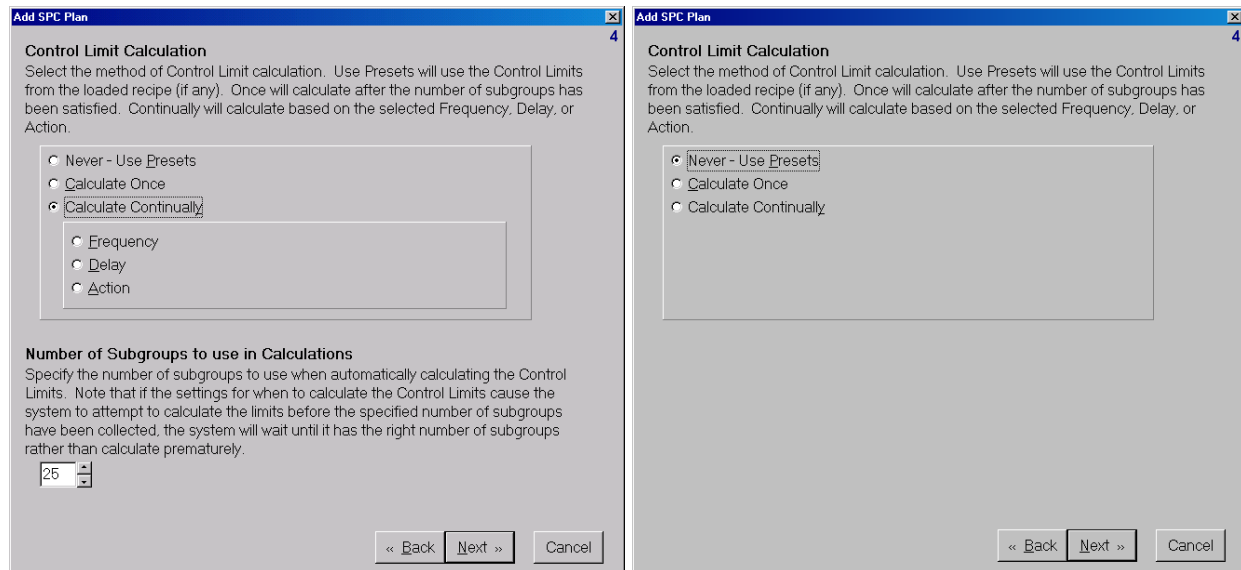
### 3 Control Limit Calculation (screen 4).

- **Never—Use Presets:** takes the control limits from the loaded recipe (if any).
- **Calculate Once:** will calculate after the number of subgroups has been completed (Note: the number of subgroups will be configured in section 3.2).
- **Calculate Continually:** will calculate based on the selected **Frequency**, **Delay**, or **Action**.

- 3.1 Select the radio button for the method of control limit calculation.

With **Calculate Once** and **Calculate Continually**, other choices appear, for **Frequency** (**Calculate Continually** only), **Delay**, or **Action**, and for the **Number of Subgroups to use in Calculations**.

- 3.1.1 If **Calculate Once** is desired, select whether you want to use **Delay** or **Action**.
- 3.1.2 If **Calculate Continually** is desired, select whether you want to use **Frequency**, **Delay**, or **Action**.



Screen 4, with *Calculate Continually* checked to show all options and, for comparison, with *Never—Use Presets* selected.

### 3.2 Number of Subgroups to use in Calculations.

Specify the number of subgroups to use when automatically calculating the control limits.

**Note:** If the settings for when to calculate the control limits cause the system to attempt to calculate the limits before collecting the specified number of subgroups, the system will wait until the right number of subgroups has accumulated rather than calculate prematurely.

3.2.1 Use the up/down arrows to select the number of subgroups.

3.4 Click **Next** or press **Enter** to move to the next screen.

## 4 SPC Backup Interval and Minimum Line Speed (screen 7).

Storing your data ensures that there will be no loss of critical data should an event such as a power outage interrupt the system.

If you have the **Zero-Latency Encoder** option, you can set up the system to disable **SPC Sampling** until the line reaches a minimum speed. If this feature is **NOT** enabled, when the line stops or slows radically, sampling will continue. This will weight samples in favor of the place where the line stops (because the system will continue to sample the same location again and again). For the most representative SPC data, sampling should be by length, and **Minimum Line Speed** should be selected.

4.1 Enter the frequency, in seconds, for storing your real-time SPC data to disk.



4.2 If you have an encoder and are using **Minimum Line Speed**,

4.2.1 Check the box, and

4.2.1 Enter an amount for distance per unit of time.

The distance and unit of time is determined in your encoder configuration.

4.3 Click **Next** or press **Enter** to move to the next screen.

5 **SPC Sampling Plan Name** (screen 9).

5.1 Enter the name for the new sampling plan.

The names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

5.2 Click **Finish** or press **Enter**.

An icon for the new **SPC Plan** will appear in the **SPC Plans** window.

### Actions Specific for SPC

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for SPC.

- *SPC Start Sample*: The next SPC sample will be started.
- *SPC Start Subgroup*: The next SPC subgroup will be started.
- *SPC Calculate Control Limits*: Control limits will be calculated.
- *SPC Start*: Statistics for the selected SPC plans will begin to update.
- *SPC Stop*: Statistics for the selected SPC plans will stop updating.
- *SPC Start/Stop*: If the last execution of the action stopped SPC, the next will start SPC; if the last execution started SPC, the next will stop SPC.
- *SPC Reset Plans*: Statistics for the selected SPC plans will be reset.
- *Generate SPC Summary Report*: Prints and/or saves to disk a SPC summary report for the selected measurements. You can set options for SPC statistics to be reset after generating the report, or turned on or off.

## Setting up Control Loops

A **controlled** system can monitor product during its manufacture and make adjustments to keep the product at its target value (setpoint). You can have one **control** per line or separate **controls** for different sections of the same line, depending on your needs. Control can only keep the overall, or average, product size, at the setpoint—it cannot keep every bit of the product at the setpoint. Every process has a certain amount of short-term variation that cannot be controlled. Averaging “smoothes over” this variation. Sufficient averaging keeps the system from trying to react too quickly to an oversize or undersize value. The more measurement values that are included in the average, the closer the resulting value is to the actual dimension of the product. The **Control Measurement** is usually an **XY Average** diameter from a dual-axis gauge or an **ABC Average** from a triple-axis gauge, and uses **Running Average**.

- If this average value increases or decreases and approaches the deadband limits, Total Vu Software can initiate gradual adjustments to keep the product within the production limits.
- If too small a number of measurements is averaged, adjustments might be made too fast, causing larger fluctuation in the product.
- If too large a number of measurements is averaged, changes in the product might go undetected and uncompensated for a long time, resulting in much more product variation.

When setting up control parameters for the system it is important to know:

- The operating characteristics of the system without automatic control.
- How much the process varies over short periods of time (from a few seconds to a minute or two).
- How each control parameter affects the process when automatic control is used.

## How the Control System Works

Specification labels for a measurement used as the input for a control loop take on special meaning. Nominal will become setpoint, upper warning tolerance (or limit) and lower warning tolerance (or limit) become upper deadband (UDB) and lower deadband (LDB).

The system compares the value of the control measurement to the specifications entered for that measurement. If the control measurement is equal to or less than the UDB and equal to or greater than the LDB, the system does nothing and waits for the next control measurement. If the measurement value is greater than the UDB, the system will initiate a modification to reduce the size of the product. Likewise, if the measurement value is lower than the LDB, the system will initiate a modification to increase the size of the product.

To determine the needed change, the system computes a control deviation. This is a calculation to find the difference between the setpoint and the actual product measurement. The control deviation is multiplied by the control gain to determine how much change is needed. The farther the actual control measurement is from the setpoint, the greater the change made will be.

When the process has been adjusted, the manufacturing operation needs time to react, and the product made with the modifications needs time to reach the point where the control measurement is taken. Additionally, the software needs time to update the control measurement. The control delay tells the system to wait for these events to occur so that it can “see” the effects of the change before determining whether another change is needed.

### Profit Maximizer

This feature is designed to make automatic determinations of when savings can be achieved by producing the product at a size larger or smaller than the nominal/setpoint value. For example, if the specifications on a strand of insulated wire are  $.045" \pm .001"$  (from  $.044"$  to  $.046"$ ) and the actual measurements are varying only a total of  $.0004"$  then it should be possible to target the diameter to a dimension of  $.0444"$  or  $.0445"$  and still produce something within the specifications. This will allow you to use less insulating material, and therefore, your profit will be maximized. The parameters for Profit Maximizer look more at the overall performance of the system than at the individual measurements while they are being recorded.

In some processes, profit is maximized by producing more product in the same amount of time. An example of this would be wire that is sold by weight. If the product specs are  $.045" \pm .001"$ , making the product at  $.0455"$  rather than  $.045"$  means coil weight increases more rapidly (more than 1.1 percent faster) for the same length of product.

### Shrinkage Compensation

Shrinkage compensation is used in applications where the hot dimension is controlled and the cold dimension must lie within preset specifications. The value of the hot measurement is not important—only the final product size matters. The shrinkage compensation feature will automatically adjust the hot setpoint to ensure that the final product size (cold measurement) meets specifications.

## The Control Measurement

Because averaging for control must continue over a longer period than for normal averaging, it is not a good idea to use the same measurement for control and for other purposes, such as data capture, flaw detection, SPC, display updates, or generating trend charts. It is better to set up a measurement for the control function (called the control measurement) that will not be used for any other purpose.

The control measurement should use a higher number of scans-to-average, enough to equal a few seconds of time. For example, if the scanner speed is 400 scans-per-second, use 1200 scans averaging for a three-second time interval. If the averaging period is too long, the control will be unresponsive and slow.

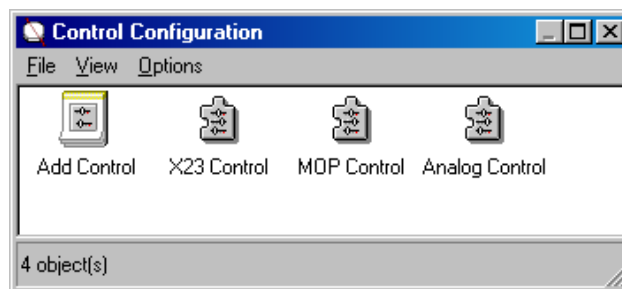
Use running average so that the control response is as fast as possible. With running average, when the scanner receives each new sample (scan), the control measurement is updated. The oldest scan is thrown away and the new one is averaged in. For example, if the averaging period is 2000 scans and the micrometer scan rate is 400 scans-per-second, then the control measurement averages over a period of five seconds ( $2000/400 = 5$ ).

Without running average, the control measurement updates once every five seconds. With the running average enabled for the measurement, it will update every 2.5 milliseconds ( $1/400$  of a second).

Other control terms and information are detailed at the end of this chapter.

## Creating A New Control Loop

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Control** icon to open the **Control Configuration** window. In the window you will see an icon for the **Add Control** wizard.



*The Control Configuration window, showing icons for Add Control and user-defined that have already been implemented Controls.*

Double-click the **Add Control** icon. This is a wizard, which will guide you through the setup process.

Or, an alternate way: Go to the **File** menu of the **Control Configuration** window and select **New**.

**Note:** You can set control for manual or automatic. The default setting in the software is for manual. To set automatic control and toggle back and forth, you will need to configure an action, alarm, or digital input. You can implement control with either a digital or an analog interface.

For analog control, you will first need to configure the device by the analog card interface. Please see the chapter **Analog I/O** for details.

## 1 Interface and Channel (screen 1).

### 1.1 Digital (Relay Output), LaserLinc MOP (Motorized Potentiometer), and Analog (DC Voltage).

**Digital** uses separate increase and decrease signals to modify the setting of the controlled device. The pulse width of the control system output is proportional to the deviation of the input measurement from its setpoint.

**Analog** uses a DC reference voltage (typically 0–10 VDC) to establish the setting of the controlled device. The voltage is proportional to the setting for the device. For example, 0 VDC means 0 RPM, 5 VDC = 125 RPM, and 10 VDC = 250 RPM.

Direct analog control is strongly discouraged for the following reason: when the Total Vu Software is not running, or if there is a PC failure, the values on analog outputs are undetermined. This can lead to indeterminate control, or even (rarely) damage to the equipment being controlled. We strongly recommend that customers desiring analog control implement this with a **Motorized Potentiometer (MOP)** (available from LaserLinc). With a MOP, the larger the needed change, the longer the MOP will turn, and the more the line speed will change.

The MOP offers analog control in a system that remains functional even when the controlling PC is not. An operator can start up a line under manual control. After the line is at or near spec, the operator can switch to automatic control. Additionally, an operator has the ability to make adjustments without reverting to manual control.

1.1.1 Select the type of interface for the device being controlled. The selections available depend on the hardware installed.

1.1.1.a For analog, you will first need to open the icon for the analog output hardware and configure it for a control loop.

## 1.2 Channel.

1.2.1 Select the hardware channel that will be used to connect to the controlled device.

The channels that the software offers will be those that previously have been installed and configured on the PC. (If you have not yet installed and configured anything, please see the Quick Start Guide.)

- **Digital Control** is usually implemented with a CTR-05 counter timer card. The output is from two distinct relays. Activation of one of the relays will cause the controlled device to increase speed/pressure/rpm/etc.; Activation of the other will cause the controlled device to decrease speed/pressure/rpm/etc.
- **Analog Control with a MOP** is implemented in the same manner as digital control, but a MOP is wired between the counter/timer card and the controlled device. The I/O card is cabled to the MOP. If there is more than one control loop, you can cable a second MOP from the first one. Only two MOPs can be driven from a single connection at the PC.
- **Analog Control (without the MOP)** is implemented with an analog output card (models vary). The output will be a Digital-to-Analog (D/A) converter. This is a two-wire interface (a ground and a signal wire). Refer to documentation for the particular installed card to determine pin numbers. Also, for analog control, the output must be selected for use as a control output elsewhere in the software.

### 1.3 Click **Next** or press **Enter** to move to the next screen.

The next screen depends on the choices made in screen one. A choice of digital or MOP leads to screen two.

A choice of analog leads to screen three. Some other screens differ as well.

**Note:** analog will be covered at the end of digital and MOP.

## 2 Direction and Pulse Width Resolution (screen 2).

Screen two depends on whether you chose digital or MOP in screen one. Numbering of 2a is used for digital and 2b for MOP.

### 2a.1 **Digital.** Use the radio buttons to select the output signal for initiating an increase of the controlled dimension and for initiating a decrease of the controlled dimension.

Two factors affect your choice:

- How the signals are wired.
- Whether the control measurement value is directly or inversely proportional to the setting of the controlled device. (With inversely proportional, an increase in line speed results in a smaller product size; with directly proportional, an increase in extruder RPM means an increase in product size.)

2a.2 Select the resolution of the output pulse width.

The absolute minimum output pulse is three times the selected resolution. For example, if the output resolution is 10 milliseconds (ms), then the minimum pulse width is 30 ms.

2a.3 Click **Next** or press **Enter** to move to the next screen.

2b.1 MOP. Use the radio buttons to select either:

2b.1.1 One of the three devices that the MOP is controlling (**Puller**, **Extruder**, or **Air Pressure**).

2b.1.2 How a clockwise turn affects the controlled measurement (increase or decrease).

2b.1.3 Select the resolution of the output pulse width.

The absolute minimum output pulse is three times the selected resolution. For example, if the output resolution is 10 milliseconds (ms), then the minimum pulse width is 30 ms.

2b.1.4 Click **Next** or press **Enter** to move to the next screen.

3 **Control Measurement and Control Measurement Averaging** (screen 4).

3.1 Select the measurement that the control function will monitor.

The control function will automatically adjust the setting of a process parameter to keep the measurement as close as possible to the nominal (setpoint) value assigned to the measurement.

3.2 Enter the number of measurement values to be averaged together to compute the control measurement value.

The units depend on the measurement selected in 3.1.

3.3 Click **Next** or press **Enter** to move to the next screen.

4 **Gain, Maximum Compensation, and Minimum Compensation** (screen 5).

4.1 Enter a number for the **Gain**.

**Gain** is the constant (multiplier) used to calculate the amount of control change needed to achieve a desired change in the controlled measurement. To compute the amount of correction needed, multiply gain times the deviation from the setpoint of the control measurement.

**Note:** an automatic compensation is attempted only when the control measurement value is outside of the deadband and control mode must be set to automatic.

$$\text{Output pulse width (in seconds)} = \text{Control Measurement Deviation} * \text{Gain}$$

Example: **Control Deviation = 0.004; Gain = 100; Pulse Width = 0.4 seconds.**

- 4.2 If you will be using **Maximum Compensation** (optional), enter the maximum pulse width for any single automatic compensation.

If **Gain \* Control Measurement Deviation** exceeds this value, the actual compensation time will be equal to this value.

**Note:** This applies only in automatic mode.

- 4.3 If you will be using **Minimum Compensation** (optional), enter the minimum pulse width for any single automatic compensation.

If **Gain \* Control Measurement Deviation** is less than this value, the actual compensation time will be equal to this value.

**Note:** This applies only in automatic mode.

- 4.4 Click **Next** or press **Enter** to move to the next screen.

## 5 Control Delay (screen 7).

- 5.1 Enter the minimum delay needed, following a compensation before the control function will consider making another compensation.

A delay is needed to allow the process to settle, and to allow time for the amount of product that has been made after the control compensation to reach spot where the product is measured.

The delay can be specified in seconds or (with the encoder option), distance.

- 5.2 Click **Next** or press **Enter** to move to the next screen.



## 6 Shrinkage Compensation (screen 9).

You can use **Shrinkage Compensation** in an application where the hot dimension is controlled and the cold dimension must lie within preset specifications. In this configuration, the actual value of the hot measurement is not important—only the final product size matters. The shrinkage compensation feature will automatically adjust the hot setpoint to ensure that the final product size (cold measurement) meets specifications.

### 6.1 If you will be using **Shrinkage Compensation**, check the box.

After the box is checked, the grayed-out setting options for **Cold Measurement** and **Cold Process History** will be enabled.

### 6.2 **Cold Measurement**: select the measurement that monitors the cold product.

The system will automatically adjust the setpoint of the control (hot) measurement to keep the cold measurement at the nominal specification. If you use Profit Maximizer too, Profit Maximizer optimizes the cold measurement value, not the hot.

### 6.3 **Cold Process History**: specify the interval of time or distance over which the process will be evaluated.

If the cold measurement statistics over this interval indicate that the process is moving away from the nominal dimension, then the setpoint for the control measurement will be adjusted automatically.

### 6.4 Click **Next** or press **Enter** to move to the next screen.

## 7 Profit Maximizer (screen 10).

**Control Loop Configuration** 10

Profit Maximizer monitors the product range and compares it to the product specifications. If the process performs well enough, the system will automatically adjust the process to run at the most cost effective dimension while maintaining quality.

**Use Profit Maximizer**

- Optimize to the High side of the specification**
- Optimize to the Low side of the specification

**Process Measurement**  
Select the measurement that the system will monitor to determine whether the process can be optimized.

Tubular Asphalt Diameter

**Process History**  
Specify the interval over which the process will be evaluated. If the Process Measurement statistics over this interval indicate that the process can be optimized, the Setpoint for the Control Measurement will be adjusted automatically.

- Seconds** 35
- Distance
- Measurements (or Parts)

**Sigma Multiplier**  
This value multiplied by the Standard Deviation of the Process Measurement determines the worst expected dimension that will be produced by the process. If the result is within product specifications then the process will be optimized; if not, the process will be adjusted to minimize scrap.

3.2

<< Back Next >> Cancel

*The Profit Maximizer screen of the Control Loop Configuration wizard.*

**Profit Maximizer** monitors the product range and compares the product to its specifications. If the process does well enough, the system will automatically adjust the process to run at the most cost-effective dimension while maintaining product quality.

7.1 If you will be using **Profit Maximizer**, check the box.

After the box is checked, the grayed-out setting options for optimization choices, **Process Measurement**, **Process History**, and **Sigma Multiplier** will appear.

7.1.1 Select the radio button for optimizing to the high or low side of the specification.

7.2 **Process Measurement**: select the measurement that the system will monitor to determine whether it can optimize the process.

7.3 **Process History**: Specify the interval over which the process will be evaluated.

If the **Process Measurement** statistics over this interval indicate that the process can be optimized, the setpoint for the control measurement will be adjusted automatically.

7.4 **Sigma Multiplier**: Use the up/down arrows or enter the value.

This value multiplied by the standard deviation of the **Process Measurement** determines the worst-expected dimension that the process will produce. If the result is within product specifications (i.e. the process can keep the product within the specification range), then the process will be optimized; if not, then the process will be adjusted to minimize scrap.

7.5 Click **Next** or press **Enter** to move to the next screen.

## 8 **Status Labels and Backlash** (screen 12).

**Status Labels** differ slightly between digital and MOP; numbering of (a) is used for digital and (b) for MOP.

8.1.a Select how the **Status Labels** will read based on the control output change.

One choice works for either setting: For example, setting **Counter 4** for **Increase** will automatically set **Counter 5** for **Decrease**.

8.1.b Select how the **Status Labels** will read based on the control output change.

One choice works for either setting—if a clockwise (CW) turn causes a decrease, then a counter clockwise (CCW) turn will cause an increase.

8.2 If you need to use **Backlash**, check the box.

**Backlash** compensation is added when a control direction change is detected. This feature is pertinent only to applications where the device being controlled physically changed directions. For example, Up-to-Down, Right-to-Left.

8.2.1 Enter the number of seconds.

8.3 Click **Next** or press **Enter** to move to the next screen.

## 9 **Name of Control Loop** (screen 13).

9.1 Enter the name for the new loop.

The names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

9.2 Click **Finish** or press **Enter**.

An icon for the new **Control Loop** will appear in the **Control Configuration** window.

**Analog Control Loop (Continues from screen one).****2 Voltage Mode, Initial Voltage, Reset Control Voltage, and Voltage Trimming (screen 3).****2.1 Select the Voltage Mode.**

Voltage Mode defines how compensations affect the analog output voltage.

- Summing: **Output Voltage = Previous Voltage + (Deviation \* Gain).**
- Relative: **Output Voltage = Initial Voltage + (Deviation \* Gain).**

**2.2 Initial Voltage (applies only with choice of Relative in section 2.1).**

If the voltage mode is relative, this parameter specifies the initial voltage for the control function. If the **Reset Control Voltage** feature is enabled, the system will set the output to this value when the control function is switched from **Manual Mode** to **Automatic Mode**.

**2.3 Check the box to enable Reset Control Voltage.**

Enabling the **Reset Control Voltage** feature causes the system to default to the initial control voltage when the control function is switched from manual to automatic.

**2.4 Voltage Trimming.**

Enabling the trim mode restricts the automatic control feature from making machine changes beyond a specified range. The range is established as a percentage of the entire voltage range of the output channel. When the operator turns on **Automatic Control**, the system stores the initial voltage and prevents automatic compensation from setting the control voltage beyond the calculated range.

**2.4.1 Check the box for Use Trim Mode.****2.4.2 Use the up/down arrows or enter a number for the percent of Trim Range.****2.5 Click Next or press Enter to move to the next screen.****3 Control Measurement and Control Measurement Averaging (screen 4).****3.1 Select the measurement that the control function monitor.**

The control function will automatically adjust the setting of a process parameter to keep the measurement as close as possible to the nominal (setpoint) value assigned to the measurement.

**3.2 Enter the number of measurement value to average together to compute the control measurement value.**

The units depend on the measurement selected in section 3.1.

3.3 Click **Next** or press **Enter** to move to the next screen.

4 **Gain, Invert, and Maximum Compensation** (screen 6).

4.1 Enter a number for the **Gain**.

The gain is multiplied by the deviation from the setpoint of the control measurement to compute the amount of correction to make to the process.

**Note:** An automatic compensation is attempted only when the control measurement value is outside of the deadband and control mode must be automatic.

$$\text{Voltage Change} = \text{Control Measurement Deviation} * \text{Gain}$$

Example: **Control Deviation = 0.004; Gain = 100; Voltage Change = 0.4 VDC.**

4.2 If voltage is inversely proportional to size, check the **Invert** box.

With voltage inversely proportional, a greater output voltage results in a smaller product size.

4.3 If you will be using **Maximum Compensation** (optional), enter the maximum voltage change for any single automatic compensation.

If **Gain \* Control Measurement Deviation** exceeds this voltage, the actual compensation will be equal to the voltage.

**Note:** This applies only in **Automatic Mode**.

4.4 Click **Next** or press **Enter** to move to the next screen.

5 **Control Delay** (screen 7).

5.1 Enter the minimum delay needed, following a compensation before the control function will consider making another compensation.

A delay is needed to allow the process to settle, and to allow the time for the amount of product that has been made after the control compensation to reach the measurement location.

The delay can be specified in seconds or (with the encoder option), distance.

5.2 Click **Next** or press **Enter** to move to the next screen.

## 6 Shrinkage Compensation (screen 9).

You can use **Shrinkage Compensation** in an application where the hot dimension is controlled and the cold dimension must lie within preset specifications. In this configuration, the actual value of the hot measurement is not important—only the final product size matters. The shrinkage compensation feature will automatically adjust the hot setpoint to ensure that the final product size (cold measurement) meets specifications.

### 6.1 If you will be using **Shrinkage Compensation**, check the box.

After the box is checked, the grayed-out setting options for **Cold Measurement** and **Cold Process History** will appear.

### 6.2 **Cold Measurement**: select the measurement that monitors the cold product.

The system will automatically adjust the setpoint of the control (hot) measurement to keep the cold measurement at the nominal specification. If you use **Profit Maximizer** too, **Profit Maximizer** optimizes the cold measurement value, not the hot.

### 6.3 **Cold Process History**: specify the interval of time or distance over which the process will be evaluated.

If the cold measurement statistics over this interval indicate that the process is moving away from the nominal dimension, then the setpoint for the control measurement will be adjusted automatically.

### 6.4 Click **Next** or press **Enter** to move to the next screen.

## 7 Profit Maximizer (screen 10).

**Profit Maximizer** monitors the product range and compares the product to its specifications. If the process does well enough, the system will automatically adjust the process to run at the most cost effective dimension while maintaining quality.

### 7.1 If you will be using **Profit Maximizer**, check the box.

After the box is checked, the grayed-out setting options for optimization choices, **Process Measurement**, **Process History**, and **Sigma Multiplier** will appear.

#### 7.1.1 Select the radio button for optimizing to the high or low side of the specification.

### 7.2 **Process Measurement**: select the measurement that the system will monitor to determine whether it can optimize the process.

### 7.3 **Process History**: Specify the interval over which the process will be evaluated.

If the **Process Measurement** statistics over this interval indicate that the process can be optimized, the setpoint for the control measurement will be adjusted automatically.

7.4 **Sigma Multiplier:** Use the up/down arrows or enter the value.

This value multiplied by the standard deviation of the process measurement determines the worst expected dimension that the process will produce. If the result is within product specifications (i.e. the process can keep the product within the specification range), then the process will be optimized; if not, then the process will be adjusted to minimize scrap.

7.5 Click **Next** or press **Enter** to move to the next screen.

## 8 **Status Labels and Backlash** (screen 12)

8.1 Select how the **Status Labels** will read based on the control output change.

One choice works for either setting: For example, setting **Counter 4** for **Increase** will automatically set **Counter 5** for **Decrease**.

8.2 If **Backlash** is needed, check the box.

8.2.1 Enter the number of volts.

**Backlash** compensation is added when a control direction change is detected. This feature is pertinent only to applications where the device being controlled physically changed directions. For example, Up-to-Down, Right-to-Left.

8.3 Click **Next** or press **Enter** to move to the next screen.

## 9 **Name of Control Loop** (screen 13).

9.1 Enter the name for the new loop.

The names must begin with a letter or a digit. [ ] and | are illegal. The name can be up to 30 characters and it must be unique. It cannot match any of the names listed in the box.

9.2 Click **Finish** or press **Enter**.

An icon for the new **Analog Control Loop** will appear in the **Control Configuration** window.

## **Control Status Window**

You can create a **Control Status Window** to monitor the status of the control function. The window has a label to show whether control is **Manual** or **Automatic**. While control is occurring, the label

flashes and shows either increase or decrease; another label indicates whether or not Profit Maximizer is in use.

- With Total Vu open, go to the **Window** drop-down menu.
- Select **New Window...** You will see a screen with various radio buttons.
- Select the radio button for **Control Status**, then click **Next...** or press **Enter**.

## 1 Selected-Available Control Loops, Window Layout, and Window Caption.

### 1.1 Select one or more of the Available Control Loops.

#### 1.1.1 Click Add.

### 1.2 Window Layout.

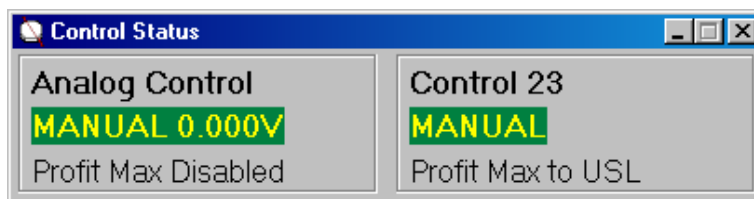
#### 1.2.1 Specify the number of Rows and Columns used to display the selected control loops.

### 1.3 Window Caption.

#### 1.3.1 Enter the caption text for the Control Status Window.

### 1.4 Click OK or press Enter.

The new **Control Status Window** will appear on your desktop. The window might be hidden by the Total Vu Software program window.



*Control Status window with two Controls.*

DEFINITIONS FOR CONTROL STATUS WINDOW INDICATORS	
INDICATOR	DESCRIPTION
<b>MANUAL</b>	Control loop is in <b>Manual</b> mode. The system will not make automatic corrections. Jog functions, if enabled, will work.
<b>AUTO</b>	Control loop is in <b>Automatic</b> mode. The system will make an automatic correction the next time the control deviation is outside of the deadband but within the reject limits (if they are enabled). The jog functions are disabled in this mode.



DEFINITIONS FOR CONTROL STATUS WINDOW INDICATORS	
INDICATOR	DESCRIPTION
<b>INCREASE</b>	Control loop is in <b>Automatic</b> mode and is in the middle of making an automatic correction. The background color flashes between white and red.
<b>DECREASE</b>	Control loop is in <b>Automatic</b> mode and is in the middle of making an automatic correction. The background color flashes between white and red.
<b>DELAY</b>	Control loop is in <b>Automatic</b> mode and is waiting for the control delay to expire. While delaying, no further corrections are made.
<b>NO SPECS</b>	Configuration error message. Without control specifications, the control function cannot operate in <b>Automatic</b> mode. Activate a spec recipe that has specs for the control measurement.
<b>NO DEADBAND</b>	Configuration error message. Without control specifications, the control function cannot operate in <b>Automatic</b> mode. Activate a spec recipe that has specs for the control measurement.

### Assigning Deadbands and Control Limits to Control Measurements

After a separate measurement has been configured for the control function, establishing a separate set of specifications in each recipe that will be used for control is also necessary. For the control function to work, deadbands (the equivalent of warning limits) must be enabled for the control measurement. The **Use Reasonable Tolerances** option will ensure that if something goes wrong and the product size exceeds the reasonable tolerances, control actions will stop. If **Use Reasonable Tolerances** is not engaged, the control function could potentially push the process so far out of control that machine failure or product breakage could result.

- 1 If a recipe is already set up, and if the deadband uses the same values as the warning limits:
  - 1.1 Add the control measurement to the list of selected measurements in the recipe.
 

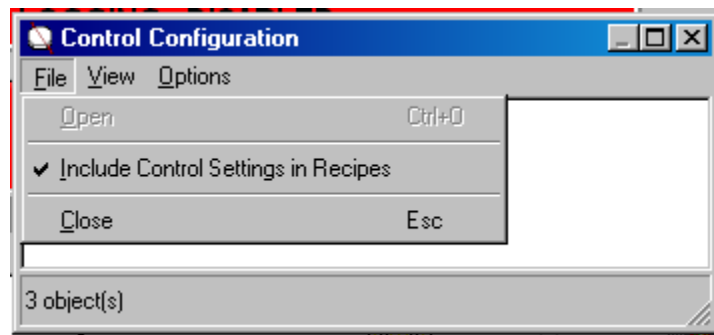
When this is done, the label warning limits becomes deadband limits.
- 2 If a recipe is already set up, and if the deadband uses values different than those used as warning limits:
  - 2.1 Click on the **Add Specification** button in the **Recipe Management** window.
  - 2.2 Select the **Control Measurement** in the list of available measurements.
  - 2.3 Enter the **Setpoint**, **Deadband**, and **Reasonable Limits** in the respective fields.
  - 2.4 Click **OK**.

The control specifications have now been added to this recipe.

- 3 If no recipe has been configured, follow the instructions in the chapter on [recipes](#).

Be sure to add the control measurement to the list of selected measurements when configuring the control specifications.

- 4 There is an option available from the **File** menu of the **Control Configuration** window for **Include Control Settings in Recipes**.



*File menu with Include Control Settings in Recipes selected.*

- 4.1 If you wish to include control settings in recipes, select the option.

## Actions Specific for Control

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for control.

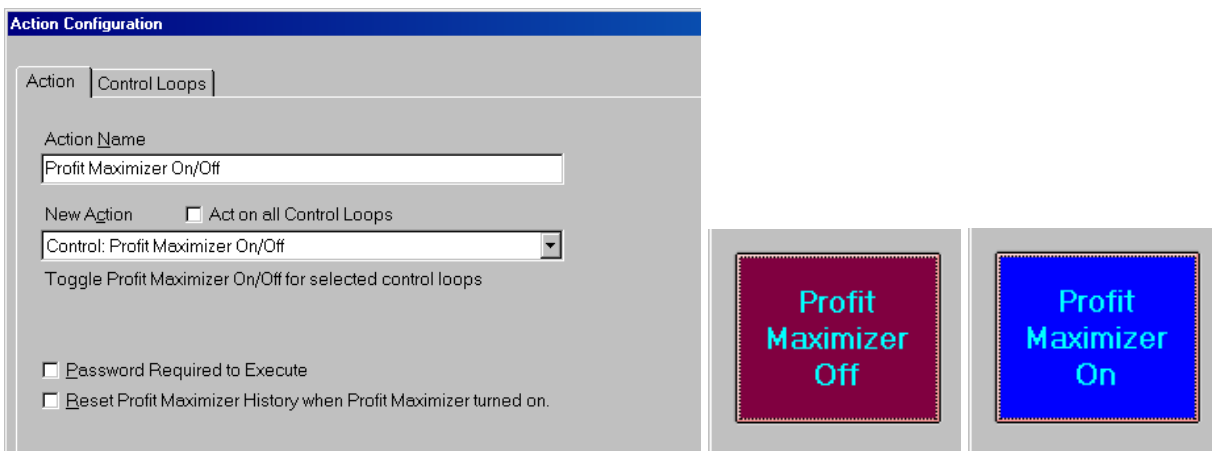
- *Control: Automatic Mode:* Sets selected control loops to automatic mode.
- *Control: Manual Mode:* Sets selected control loops to manual mode.
- *Control: Automatic/Manual Mode:* Toggles selected control loops between automatic and manual mode.
- *Control: Jog:* Adjusts the selected control loop up or down depending on the whether the deviation is above or below nominal.
- *Control: Shrinkage Compensation Reset:* Resets the shrinkage compensation for selected control loops.
- *Control: Shrinkage Compensation On:* Turns shrinkage compensation on for selected control loops.
- *Control: Shrinkage Compensation Off:* Turns shrinkage compensation off for selected control loops.
- *Control: Shrinkage Compensation On/Off:* Toggles shrinkage compensation between on and off for selected control loops.

- *Control: Profit Maximizer Reset*: Resets profit maximization for selected control loops.
- *Control: Profit Maximizer On*: Turns profit maximization on for selected control loops.
- *Control: Profit Maximizer Off*: Turns profit maximization off for selected control loops.
- *Control: Profit Maximizer On/Off*: Toggles profit maximization between on and off for selected control loops.
- *Control: Set Error*: Asserts both increase and decrease counters for selected control loops.
- *Control: Clear Error*: Turns off both increase and decrease counters for selected control loops.

### Creating a Button to Turn Profit Maximizer On or Off

#### *Try This*

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Actions** icon to open the **Actions** configuration window. In the window you will see an icon for **Add Action** and any previously-defined actions.
- Create the action for **Control: Profit Maximizer On/Off**.
- Open the **Display** icon and create a button for the Action.
- Click the button whenever you need to activate or de-activate profit maximizer.



*Left: Action Configuration window with Control: Profit Maximizer On/Off selected; note options for enabling password. On the right, a button for Profit Maximizer On/Off on the Total Vu Software desktop. The button has been configured to have different text and color for on or off.*

## Control Terms and Information

**Deadband:** The region within which the control system will assert no control changes. This is the zone between the yellow lines on a trend chart. In a non-control system, these yellow lines indicate the warning limits. In a control system, this is the deadband. In any system without a deadband, the control system will “thrash,” making a control change at every opportunity, because it is generally impossible for a process not to vary, and because measurement resolution is generally of a sufficient number of digits to prevent the system from hitting the setpoint exactly.

**Control delay:** The delay (time or distance), after a control change has been made, during which no new control change will be made. If a gauge is 15 meters downstream from an extruder head, when a change is made, even if the change is perfect and immediate, the product will have to move 15 meters before the gauge will “see” the new dimension. Failure to use a sufficient control delay will result in over-control. A second, generally equivalent control change will be made before the corrected product reaches the gauge. This will result in an oscillation of the product diameter around the setpoint. A control delay that is too long will prevent the system from responding in a timely fashion to diameter changes and will usually yield sub-optimal final product. Time-based control delay is usually inferior to distance-based delay, because time delay does not respond to changing line speed.

**Gain:** In a control system, the constant (multiplier) used to calculate the amount of control change, or compensation, that is needed to achieve a desired change in the value of the controlled measurement. The actual compensation can be a change in an analog output voltage, or the duration that a control signal is asserted. The general formula would be:

$$\text{control change} = \text{desired change} \times \text{gain.}$$

- If the control is done with an analog voltage, and the measurement is in inches, the units of gain would be: volts/inch.
- If the control is done with a digital signal, and the measurement is in millimeters, the units of gain would be: seconds/mm.
- In a system measuring in inches, and where control is done by digital signal duration, if the deviation from nominal is +0.001 inches (and this exceeds the deadband), and the gain is 10 seconds/inch, the required control change is 0.001 inches \* 10 seconds/inch or 0.01 seconds.
- In the case of digital compensation, there are separate output signals for wiring control up and control down. The value is a scalar, and the output signal used determines direction.
- In the case of analog compensation, the calculated value is a vector (its value specifies magnitude and its sign (+/-) specifies direction. In a system measuring in millimeters, and where control is done by analog value, if the deviation from nominal is +0.01mm (and this exceeds the deadband), and the gain is 10V/mm, the control change is -0.01mm \* 10V/mm or -0.1V.

**Profit Maximizer:** Control feature included with Total Vu Software that allows the system to optimize toward the top or bottom end of the specifications range. Most users optimize for the bottom of the specifications range.

- In situations where the material for a product is purchased by weight or volume, and the product is sold by length, you can achieve savings by producing the smallest product that conforms to the specifications (thereby saving material).
- In the rare situation in which the product is sold by weight, you can achieve savings by producing the largest product that conforms to the specifications (thereby reducing production time).
- In either case, the user specifies how long (in time, measurements, or distance) the product should be monitored to establish its standard deviation. The user also specifies the number of standard deviations to stay away from the targeted spec limit (upper or lower). The control software will then move the nominal toward the targeted specifications until it reaches the specified number of standard deviations from the limit.

**Process History:** How much data to average to determine the “process center line” and amount of variation. As with control, if you do not look at enough data before making a change, you can make the wrong decision. It is better to err on the conservative side by specifying a longer history.

**Sigma Multiplier:** The setting for this parameter involves an understanding of statistics.

Six standard deviations approximate the range of the process (i.e. process average  $\pm 3$  standard deviations). Six standard deviations will include 99.97% of all measurement samples:

$$\text{Process Average} - (\text{Sigma Multiplier} * \text{Standard Deviation}) \\ = \text{smallest expected product that will be made}$$

With **Profit Maximizer** enabled, the system will adjust the setpoint automatically so that the smallest expected product that will be made will be equal to the lower specification limit for the product. Setting the **Sigma Multiplier** to higher than three will ensure that better than 99.97% of product will be within the design specifications.

## Potential Problems When Using Control

There are a number of things you must watch out for when running control in automatic mode. The problems listed here can cause the product to vary too much. There are two types of potential problems discussed. The first are serious problems. These potential problems are important because they can cause the final product to vary much more than if you had not used the automatic control feature at all. Less serious problems are discussed next. These problems are less serious because they will not make the product worse than if you had not used control at all.

### Serious Problems

- *Deadband Limits are not large enough.* The system will constantly adjust. This can introduce unnecessary variation in the product size and can destabilize the process. Removing all variation is NEVER possible.
- *Not enough Control Measurement Averaging.* Some processes have inherent short-term variation that cannot be eliminated. It is necessary to set the averaging to a sufficiently large value so that these variations are “averaged out”. Otherwise, the system will make control adjustments to move the targeted measurement back to nominal when the product would have naturally returned to nominal on its own. A control system CANNOT remove variation that is shorter than the control delay.
- *Control Gain is too large.* The system makes too great an adjustment. If the product size is only slightly above the upper deadband, the system makes such a large change to the speed that the product size ends up *below* the lower deadband. This is another potential cause of overshoot.
- *Control Delay is not long enough.* Remember that the control measurement is the average of many values—if the average still includes old values from before the previous speed change, and the system makes another change to the speed based on some of the old data, then the system will overshoot and product size will change too much. Control delay should be, as a minimum, the time or distance from the place where the product is MADE to the place where the product is measured PLUS the time for one full measurement (again, time or distance). Failure to meet this minimum WILL result in some degree of overshoot!

### Less Serious Problems

- *Deadband Limits are too large.* The system will not make many adjustments to the speed, and therefore the product size can drift above or below the setpoint and stay there. If you see that the product size remains on the same side of the setpoint for an extended period, then the deadband limits are probably too large. Additionally, when there is a large distance or time between the place where the product is made and the place where the product is measured, it is possible that by the time the measured product leaves the deadband, the product at the source is ALREADY out of spec.
- *Control Measurement Averaging is too high.* The system will not make many adjustments; when the system does make an adjustment, it will do so much later than it could or should have.
- *Control Gain is too small.* The system will have to make several control changes in the same direction before the product size reaches the setpoint. Under normal conditions it generally should not take more than two or three consecutive control changes (increases or decreases) for the product size to reach the setpoint. If four, five, or more consecutive changes are needed to bring the product back to size, then the gain is too small. If the gain is too small, it is even possible that the system will not be able to compensate

for a natural product trend, resulting in a product that moves farther and farther from nominal.

- *Control Delay is too long.* The system will take longer than it should or could to bring the product size back to the setpoint. After a control change was enacted, and the product that was made after the change has reached the measurement point, significant delay will hinder the system's ability to keep the product in spec.

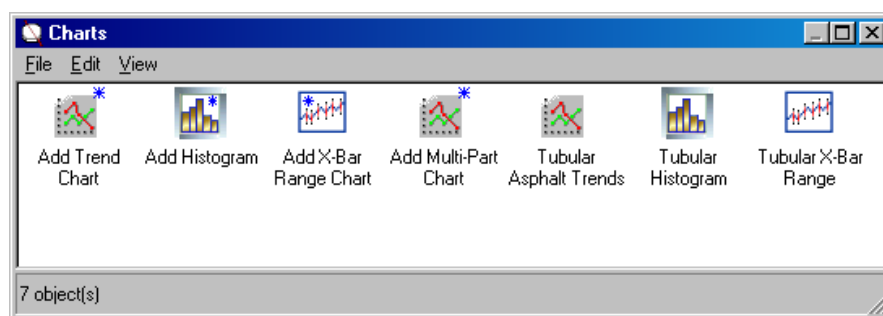
## Creating and Working with Charts

### Trend Charts

Trend charts are simple graphs to show measurement values over time or distance, or by sequence number. A trend chart gives the operator a graphical window to display what is happening in the production process. One or more trend charts can be configured and displayed. They can contain different measurements and/or different time scales.

### Creating a New Trend Chart

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Charts** icon to open the **Charts** window. In the window you will see, depending on your package, icons for **Add Trend Chart**, **Add Histogram**, **Add X-Bar Range Chart** ( $\bar{x}/R$ ), and **Add Multi-Part Chart** wizards, plus any existing charts.



*The Charts window, showing the Add Chart wizards and several user-defined charts.*

Double-click the **Add Trend Chart** icon. This is a wizard, which will guide you through the setup process.



Or, an alternate way:

- With Total Vu Software open, go to the **Window** drop-down menu.
- Select **New Window...** You will see a screen with various radio buttons.
- Select the radio button for **Trend Chart**
- Click **Next...** or press **Enter**.

The screen shows a window at the top for entering the **Title**, and below that a row of tabs for entering configuration data. The tabs are: **Measurements**, **Legend**, **Axes**, **Miscellaneous**, **Attributes**, and **Refresh**.

### 1 Enter a title for your trend chart.

Titles should reflect the product being measured, or the point on a line that is being monitored, such as “PVC Wall”, “Nylon Wall”, and “Bare”. You can enter the title any time during setup (the box is visible no matter which tab is selected).

### 2 Measurements tab.

2.1 Select the measurements you need from the list of available measurements. You can select up to eight measurements to graph simultaneously.

### 3 Legend tab.

3.1 If you want to have a **Legend** for the chart, select the box for **Show Legend**.

The **Legend** appears at the bottom of the chart and has column headings for: **Measurement**, **Graph?**, and **Color**. You can modify the **Legend** in this screen or in the actual chart. Modifications can also be made during run-time, when the trend chart is displayed on the computer’s monitor.

3.2 Select the measurement, if any, whose specifications you want to plot on the chart.

The other measurements will be graphed also, but the y-axis scale and the displayed nominal, warning/deadband, and specification limit will be based on the measurement selected here.

3.3 You can change the graph status (yes or no) and color of each measurement as needed.

3.3.1 Double-click on the cell under the **Graph?** column of the measurement for which you want to change the status. The status toggles between **Yes** and **No** (the default is **Yes**). If the selection is switched to **No**, data for the selected measurement will not be displayed on this trend chart.

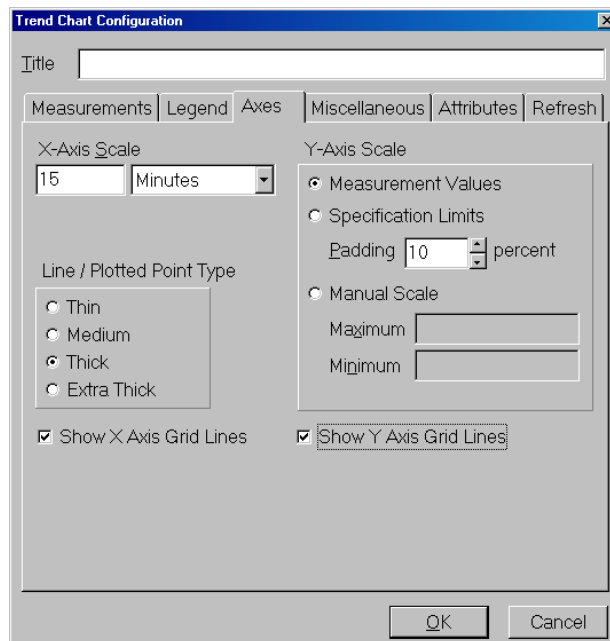
3.3.2 To change the color:

3.3.2.a Double-click in the **Color** column for whichever measurement you wish to change.

3.3.2.b Select the color you wish to be used for the selected measurement.

#### 4 Axes tab.

The **Axes** tab is divided into several groupings of parameters to provide visual aids specific to a several processes.



*The Axes tab.*

4.1 **X-Axis Scale:** Enter a number in the box and use the drop-down arrow to choose seconds, minutes, hours, parts, or length.

**Note:** **Length** is available only if the encoder option is enabled and the units of measure will match what is chosen in the encoder configuration. Possible values are:  $1 \leq \text{value} \leq 480$ .

4.2 **Line and Plotted Point Type:** Select the radio button for how thick you want your plots to appear on the screen. The default is **Thick** but for most situations, except viewing from a distance, **Medium** or **Thin** is preferable.

4.3 **Show X-Axis Grid Lines:** Check the box if you want vertical grid lines at equally spaced intervals to show for your x-axis (time, length, or part count).

4.4 **Y-Axis Scale:** Select from three ways of scaling your Y-axis.

4.4.1 **Measurement Values:** With **Measurement Values** checked, the screen is continuously re-scaling itself to keep the plotted line in view. Using measurement values is best if you are unsure where the numbers will fall—everything will show up in the chart. Unless the product is near the specification limits, the spec limits will not be displayed.

4.4.2 **Specification Limits:** With **Specification Limits** checked, the specification limits appear to the right of the graph, and the plotted specification and warning/deadband limits, as well as nominal, are contained within a predetermined zone. Numbers outside the zone will be off the chart.

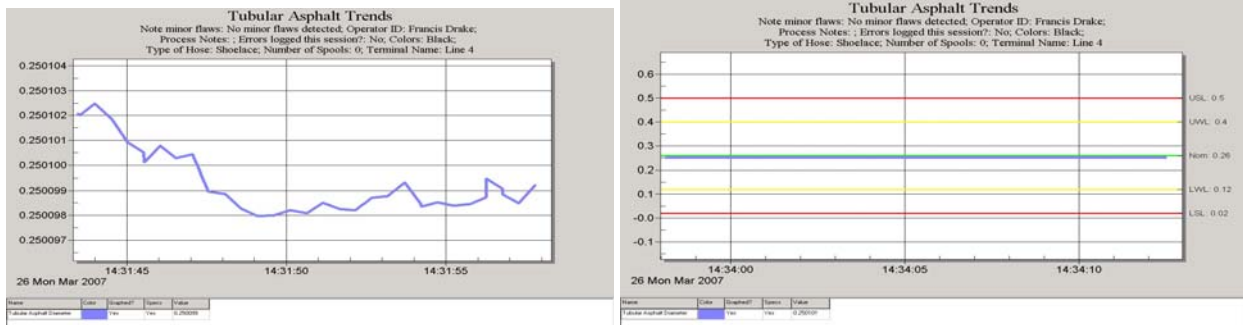
4.4.3.a Set the percent of **Padding**.

This applies to both measurement values and specification limits. With more padding, fluctuations into the upper and lower ranges will still show. With padding at zero, upper and lower spec limits will be placed at the top and bottom of the chart, so nothing beyond those numbers will show. With padding set to 100, the space above and below the specification limits will each be equal in size to the space between the upper and lower specification limits. For a process that is under control and running well, 25 percent is an appropriate value for the padding.

4.4.2 **Manual Scale:** **Manual Scale** is most appropriate when running a product that has no defined limits, or when one or more measurement(s) is running far out of spec.

The user specifies the chart's upper and lower limits. As with specification limits, the scale is fixed. To keep values from being off the chart when different measurements on the same chart have values that differ widely, you can set up the scale to encompass all measured values. But to have a reasonable resolution (no flat lines), the scale will either need to be adjusted for each product or have a wide maximum and minimum. In this case, using separate trend charts for the different ranges would probably be the most useful method.

4.5 **Show Y-Axis Grid Lines:** Check the box if you want horizontal grid lines at equally spaced measurement intervals to show for your y-axis.



Both charts show the same pin being measured; on the left, the y-axis scale is set to **Measurement Values** and the right is set to **Specification Limits**.

## 5 Miscellaneous tab.

The **Miscellaneous** tab has checkboxes for information that you might want to plot on the chart and also for some cosmetic choices. The choices are: **Plot Spec Nominal**, **Plot Warning Limits/Deadband**, **Plot Upper/Lower Limits**, **Plot Reasonable Limits**, **Connect the dots**, **Show Title**, **Plot Flaws**, and **Show Control Changes**.

If the **Connect the dots** option is not enabled, data will be displayed as points on the graph. If the option is enabled, each data point will be connected to the prior point by a line. The default for this option is **Off**, but for most applications, **On** is the preferred state. In situations where data is intermittent, and the x-axis is set to time, the chart will display long straight lines between adjacent (but temporally distant) points. In these situations, turning this option **Off** or setting the x-axis scale to **Parts** is best method.

5.1 Select your preferences for configuring the chart's appearance.

5.2 **Chart Refresh on Startup:** There are three choices here: **Off**, **On**, or **Restore Last State**. With **Off**, the chart will not start graphing until an action is executed; **On** means that the chart will be ready to graph data at all times; with **Restore Last State**, the chart will open with data from the previous production run. One reason to use the **Off** setting is if you do not want data to appear until the operator has the process running smoothly. **On** is the most common selection.

5.2.1 Select either **Off**, **On**, or **Restore Last State**.

## 6 Attributes tab.

You can set an option to display the current value of attributes in the chart's header, below the title.

6.1 From the list of available attributes, select the attributes that you wish to display.

6.1.1 Click **Add**.

6.2 Or, if you wish to use all of them, click the **Add All** button.

## 7 Refresh tab.

7.1 Set the **Chart Refresh Rate**. Charts will be updated every specified number of seconds.

**Note:** This is a global setting that will apply to all charts (trend, histogram,  $\bar{x}/R$ ); the setting appears in the setup wizards for other charts, but it is not a separate setting: for example, changing the setting in histogram will change it in trend charts too.

If any of the displayed charts are for short-term use to evaluate the state of the process, one second is a good choice for this field. If the charts are for evaluating the process over a long period, an appropriate choice would be ten seconds.

8 Click **OK** or press **Enter**. An icon for your new **Trend Chart** will appear in the **Charts** window.

Or, if you created the chart using the alternate method from the **Window** menu, the open chart will appear on the desktop (although the chart might be obscured by the **Total Vu Software** window).

## Modifying Trend Charts

1 Open the **Charts** window.

- Double-click the icon for a user-defined trend chart (not the **Add Trend Chart** wizard).

**Or**

- When the chart itself is open, whether it is gathering and displaying production data or sitting idle, right-click on the chart.

You will see the same window with tabs that you saw in the setup wizard, and from here you can make modifications.

## Saving a Trend Chart as a Graphic

1 If the chart has never been saved, when a chart is open:

1.1 Go to the **File** menu.

1.2 Select **Set File Name...**

A dialog box will open, from which you can choose the file name, file type, and where to save the file.

1.3 Select file name, type, and where you wish to store the file.

1.4 Click **Save**.

This does not save the actual file: it saves your settings for naming the file, where you want the file to be saved, and in which file format.

2 After you have set the file name, you can save the file.

2.1 Go to the **File** menu.

2.2 Select **Save** or press **Ctrl + S**.

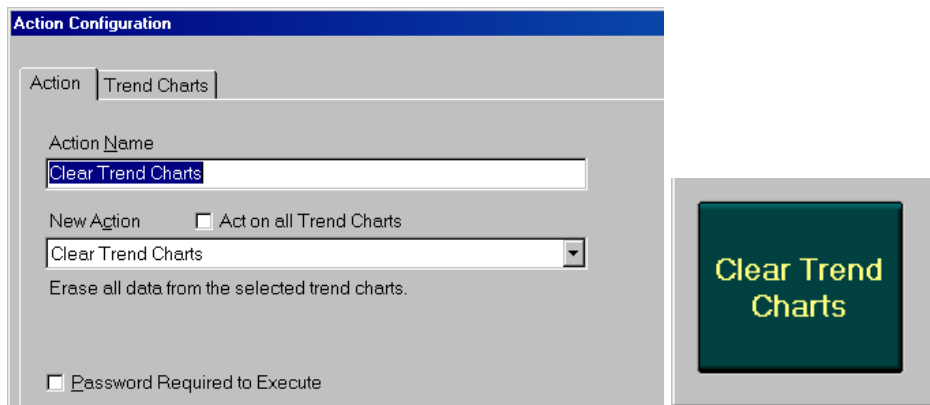
### Actions Specific for Charts

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for charts.

- *Start Graphing on Trend Charts:* The selected trend charts will begin updating.
- *Stop Graphing on Trend Charts:* The selected trend charts will stop updating.
- *Start/Stop Graphing on Trend Charts:* If the last execution of this action stopped the trend charts from updating, the selected charts will begin updating again; if the last execution started updating of the selected charts, the charts will stop updating.
- *Clear Trend Charts:* Erase all data from the selected trend charts.

#### *Try This*

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Actions** icon to open the **Actions** configuration window. In the window you will see an icon for **Add Action** and any previously-defined actions.
- Create the action for **Clear Trend Charts**.
- Open the **Display** icon and create a button for the **Action**.
- Click the button whenever you need to clear the chart.



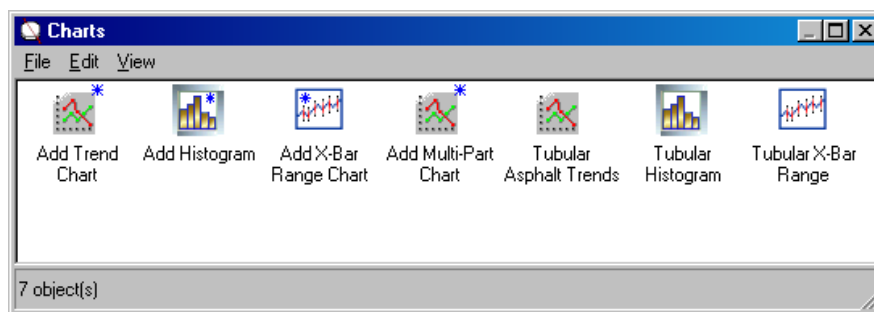
Left: Action tab of the Action Configuration window with Clear Trend Charts selected; a trend chart (or charts) will need to be selected on the Trend Charts tab. On the right, the button for Clear Trend Charts button on the Total Vu Software desktop.

## Histograms

A Histogram is a graphical display of tabulated frequencies; it is the graphical version of a table showing what proportion of cases fall into each of several categories. The categories are usually specified as non-overlapping intervals of some variable. The categories (bars) must be adjacent. Histograms provide a visual representation of the distribution of your entire data set. Unlike a trend chart, a histogram configuration needs to be selected in advance of a run.

## Creating a New Histogram

- Open the Total Vu Software.
- Go to the Configure drop-down menu.
- Select Full Configuration. You will see a screen with various icons.
- Double-click the Charts icon to open the Charts window. In the window you will see, depending on your package, icons for Add Trend Chart, Add Histogram, Add X-Bar Range Chart, and Add Multi-Part Chart wizards, plus any existing charts.



The Charts screen, showing the Add Chart wizards, and charts that have been created previously.

Double-click the **Add Histogram** icon. This is a wizard, which will guide you through the setup process.

Or, an alternate way:

- With Total Vu Software open, go to the **Window** drop-down menu.
- Select **New Window...** You will see a screen with various radio buttons.
- Select the radio button for **Histogram**.
- Click **Next...** or press **Enter**.

The screen shows a window at the top for entering the **Title**, and below that a row of tabs for entering configuration data. The tabs are: **Measurements**, **X-Axis**, **Miscellaneous**, **Attributes**, and **Refresh**.

### 1 Enter a title for your histogram.

Titles should reflect the product being measured, or the point on a line that is being monitored, such as “PVC Wall”, “Nylon Wall”, and “Bare”. You can enter the title any time during setup (the box is visible no matter which tab is selected).

### 2 Measurements tab.

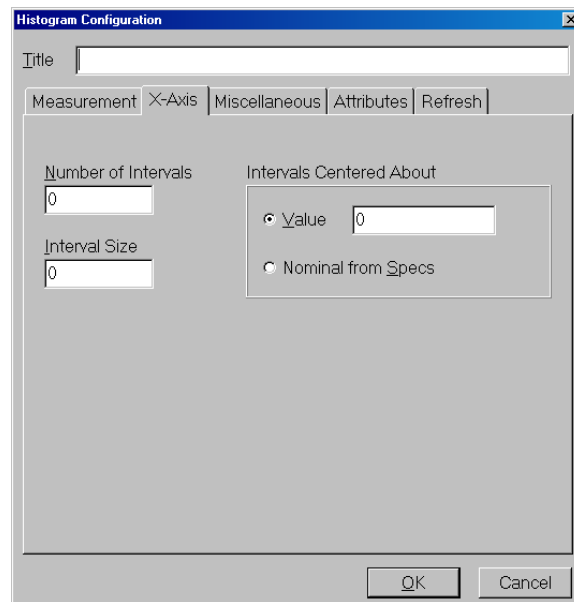
Unlike the trend chart, for the histogram only one measurement can be selected.

2.1 Select the measurement you need from the list of available SPC plans.

### 3 X-Axis tab.

The **X-Axis** tab is divided into several groupings of parameters to provide visual aids for the chart.





*The X-Axis tab*

- 3.1 **Number of Intervals:** Enter the number of bars you want to be represented on the histogram.

An odd number will make determining the center easier (there will always be the same number of units to left and right of the graph). Possible values are:  $2 \leq \text{value} \leq 20$ .

- 3.2 **Interval Size:** Enter the range of values that each interval represents.

Possible values are:  $\text{value} > 0$ .

- 3.3 **Intervals Centered About:**

3.3.1 Either, enter a value.

3.3.2 Or, check the radio button for **Nominal from Specs**.

If an **Intervals Centered About** value is entered, the histogram will be centered around the value. This is similar to **Manual Scale** in trend charts. With **Nominal from Specs**, the histogram's x-axis will be reconfigured automatically when recipes are changed. This is similar to **Manual Scale** and **Scale to Specifications** in trend charts.

- 4 **Miscellaneous tab.**

The **Miscellaneous** tab has checkboxes for parameters that you might want to plot on the chart. The choices are: **Show Specification Limits**, **Show Title**, **Show Normal Curve**, **Show Mean**, **Show +/- Sigma**, and **Print Filled Bars**.

- 4.1 Select the choices you wish for configuring the appearance of your chart.
- 4.2 **Chart Refresh on Startup:** There are three choices here: **Off**, **On**, or **Restore Last State**. With **Off**, the chart will not display data until an action is executed; **On** means that the chart will be ready to graph data at all times; with **Restore Last State**, the chart will open with data from the previous production run. One reason to use the **Off** setting is if you do not want data to appear until the operator has the process running smoothly.

- 4.2.1 Select either **Off**, **On**, or **Restore Last State**.

## 5 Attributes tab.

You can set an option to display the current value of attributes in the chart's header, below the title.

- 5.1 From the list of available attributes, select the attributes that you wish to display.

- 5.1.1 Click **Add**.

- 5.2 Or, if you wish to use all of them, click the **Add All** button.

## 6 Refresh tab.

- 6.1 Set the **Chart Refresh Rate**.

Charts will be updated every specified number of seconds. **Note:** this is a global setting that applies to all charts. Setting the refresh rate for histograms is not likely to be of value, but using a large value will cause trend charts to update slowly. This value should usually be set in a way that will be most appropriate for trend charts. Histograms will operate well regardless of how this value is set (within reason).

- 7 Click **OK** or press **Enter**.

An icon for your new **Histogram** will appear in the **Charts** window.

Or, if you created the chart using the alternate method from the **Window** menu, the open chart will appear on the desktop (although the chart might be obscured by the **Total Vu Software** window).

## Modifying Histograms

- 1 Open the **Charts** window.

- Double-click the icon for a user-defined **Histogram** (not the **Add Histogram** wizard).

**Or**

- When the chart itself is open, whether it is gathering and displaying production data or sitting idle, right-click on the chart.

You will see the same window with tabs that you saw in the setup wizard, and from here you can make modifications.

**Saving a Histogram as a Graphic**

1 If the chart has never been saved:

1.1 When a chart is open, go to the **File** menu.

1.2 Select **Set File Name...**

A dialog box will open, from which you can choose the file name, file type, and where to save the file.

1.3 Select file name, type, and where you wish to store the file.

1.4 Click **Save**.

This does not save the actual file: it saves your settings for naming the file, where you want the file to be saved, and in which file format.

2 After you have set the file name, you can save the file.

2.1 Go to the **File** menu.

2.2 Select **Save** or press **Ctrl + S**.

**Actions Specific for Histograms**

Although covered in detail in the [Actions](#) chapter, it is useful to note several actions that are specific for histograms.

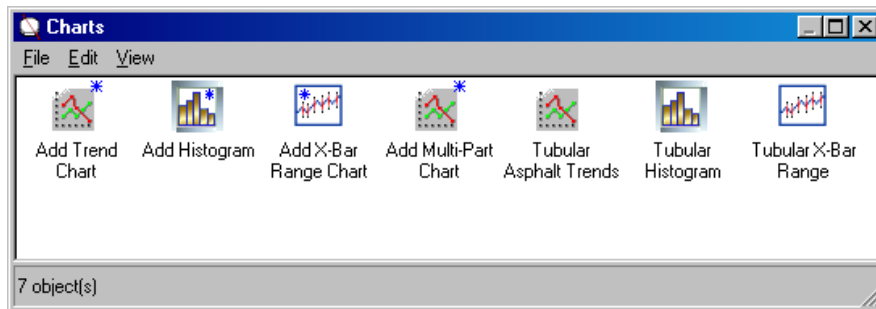
- *Print Histogram*: Prints the histogram to the default printer.
- *Clear Histogram*: Clears the histogram.

## X-Bar and Range Charts ( $\bar{x}/R$ )

The SPC plan defines how to collect measurements in subgroups. The X-Bar and Range Chart is a graphical way of viewing the subgroup statistics. In Total Vu Software's form of the chart, the data is given as average, maximum, and minimum. Average is plotted as a dot, maximum value is the top of the bar, and minimum is the bottom of the bar. The bar represents the absolute range of values included in the subgroup. In a standard x-bar and range chart (actually two charts), the average data is plotted on one chart and the range data is plotted on a second chart. Typically they are shown with one stacked above the other. The range value is plotted as the difference between the maximum and minimum value—it can be thought of as a relative value. The range chart shows the relative difference between smallest and largest within a group and nothing about where the absolute measurement values fell.

## Creating an X-Bar and Range Chart

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Charts** icon to open the **Charts** window. In the window you will see, depending on your package, icons for **Add Trend Chart**, **Add Histogram**, **Add X-Bar Range Chart**, and **Add Multi-Part Chart** wizards, plus any existing charts.



*The Charts screen, showing the Add Chart wizards, and charts that have been created previously.*

Double-click the **Add X-Bar Range Chart** icon. This is a wizard, which will guide you through the setup process.

Or, an alternate way:

- With Total Vu Software open, go to the **Window** drop-down menu.
- Select **New Window...** You will see a screen with various radio buttons.
- Select the radio button for **X-Bar Range Chart**.
- Click **Next...** or press **Enter**.

The screen shows a window at the top for entering the title, and below that a row of tabs for entering configuration data. The tabs are: **Measurement**, **Axes**, **Miscellaneous**, and **Attributes**.

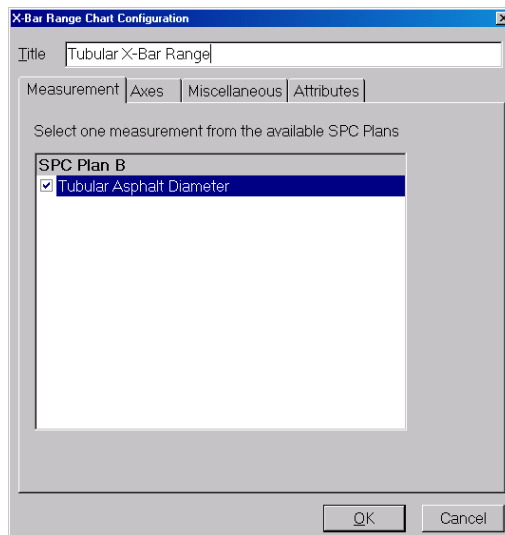
- 1 Enter a title for your x-bar range chart.

Titles should reflect the product being measured, or the point on a line that is being monitored, such as “PVC Wall”, “Nylon Wall”, and “Bare”. You can enter the title any time during setup (the box is visible no matter which tab is selected).

- 2 **Measurements** tab.

- 2.1 Select one measurement from the available SPC plans.

If there are no available plans, you will need to set up an SPC plan before continuing.



*Measurement tab, showing SPC Plan B checked.*

- 3 **Axes** tab.

The **Axes** tab is divided into several groupings of parameters to provide visual aids for the chart.

- 3.1 **X-Axis Scale**: Enter the number of subgroups.

Possible values are:  $1 \leq \text{value} \leq 200$ .

3.2 **Scrollable Region:** Enter the number of subgroups.

Possible values are:  $20 \leq \text{value} \leq 1000$ .

3.3 **Line and Plotted Point Type:** Select the radio button for line thickness.

3.4 **Show X-Axis Grid Lines:** Check the box if you want vertical grid lines to show on the X-axis.

3.5 **Y-Axis Scale:** Auto Scale and Manual Scale.

3.5.1 If **Auto Scale** is desired, select the radio button.

The scale is based on maximum and minimum values of sampled measurements (not all measurements).

3.5.2.a Set the **Padding** percentage.

With more padding, fluctuations into the upper and lower ranges will still show. With padding at zero, upper and lower spec limits will be placed at the top and bottom of the chart, so nothing beyond those numbers will show.

3.5.3 For **Manual Scale**, select its radio button.

With this setting, the scale is fixed. To keep values from being off the chart, you can set the scale to encompass all measured values. But to have a reasonable resolution the scale will either need to be adjusted for each product or have wide maximum and minimum.

3.5.4.a Enter the values for both **Maximum** and **Minimum**.

3.6 **Show Y-Axis Grid Lines:** Check the box if you want horizontal grid lines to show on the Y-axis.

4 **Miscellaneous tab.**

The **Miscellaneous** tab has checkboxes for parameters that you might want to plot on the chart and also for some cosmetic choices. The choices are: **Plot Control Limits**, **Show Range Control Limits**, **Print Filled Bars**, **Connect the dots**, and **Show Title**.

4.1 Select the choices you wish for configuring the appearance of your chart.

4.2 **Chart Refresh on Startup:** There are three choices here: **Off**, **On**, or **Restore Last State**. With **Off**, the chart will not start graphing until a specific action (created for this purpose) is executed; **On** means that the chart will be ready to graph data at all times; with **Restore Last**

**State**, the chart will update if it was enabled when the software was closed, and it will not update if it was disabled at the time the software closed. One reason to use the **Off** setting is if you do not want data to appear until the operator has the process running smoothly.

4.2.1 Select either **Off**, **On**, or **Restore Last State**.

## 5 Attributes tab.

You can set an option to show the current value of attributes in the chart's header, below the title.

5.1 From the list of available attributes, select the attributes that you wish to display.

5.1.1 Click **Add**.

5.2 Or, if you wish to use all of them, click the **Add All** button.

## 6 Click **OK** or press **Enter**.

An icon for your new **X-Bar and Range Chart** will appear in the **Charts** window.

Or, if you created the chart using the alternate method from the **Window** menu, the open chart will appear on the desktop (although the chart might be obscured by the **Total Vu Software** window).

## Modifying X-Bar Range Charts

### 1 Open the **Charts** window.

- Double-click the icon for a user-defined x-bar and range chart (not the **Add X-Bar Range Chart** wizard).

**Or**

- When the chart itself is open, whether it is gathering and displaying production data or sitting idle, right-click on the chart.

You will see the same window with tabs that you saw in the setup wizard, and from here you can make modifications.

## Saving an X-Bar Range Chart as a Graphic

### 1 If the chart has never been saved:

1.1 When a chart is open, go to the **File** menu.

1.2 Select **Set File Name...**

A dialog box will open, from which you can choose the file name, file type, and where to save the file.

1.3 Select file name, type, and where you wish to store the file.

1.4 Click **Save**.

This does not save the actual file: it saves your settings for naming the file, where you want the file to be saved, and in which file format.

2 After you have set the file name, you can save the file.

2.1 Go to the **File** menu.

2.2 Select **Save** or press **Ctrl + S**.

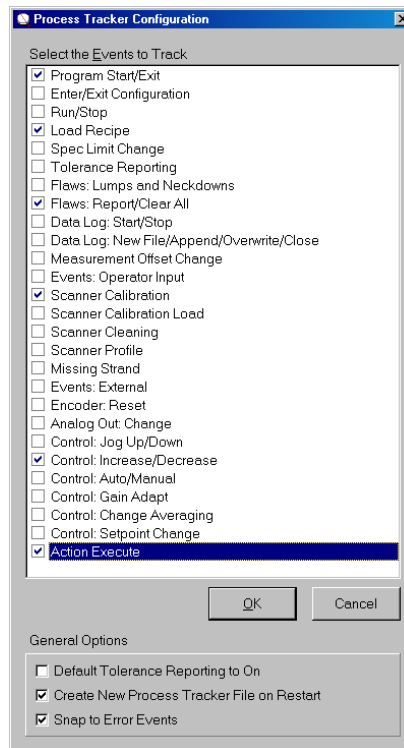


## Process Tracker

The **Process Tracker** option allows users to keep a file that contains records of when selected actions and events occurred. For example, **Program Start/Exit** or **Load Recipe**. Total Vu Software stores the Process Tracker file(s) in the Data Logging folder (The default path is C:\Program Files\LaserLinc\TotalVu\Data logging\Process Tracker.csv

### Setting up the Process Tracker Feature

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **Process Tracker** icon to open the **Process Tracker Configuration** window.



*The Process Tracker configuration window with some options checked.*

1 Check the boxes next to each event to be logged.

1.2 If desired, check the boxes for:

- **Default Tolerance Reporting to On**
- **Create new Process Tracker File on Restart**

Creates a new Process Tracker file each time Total Vu is started. If not checked, the program appends to a single Process Tracker .csv file.

- **Snap to Error Events**

If this is checked, and the Process Tracker window is visible on the display, it will keep the most recent event in the viewable area of the window.

1.5 Click OK or press Enter.

## OPC

OPC is a shortened usage for **Object Linking and Embedding (OLE) for Process Control**. OPC is an open standard designed to provide a bridge between industrial automation devices and Windows applications. OPC servers use Microsoft's OLE technology (also known as the Component Object Model, or COM) to communicate with clients. An OPC server is a data source; an OPC client is a user of data provided by an OPC server.

In OPC, items of information—called tags—are exchanged. A tag has several properties, including type, value and status. The Total Vu OPC Server has a number of tags that are exposed for OPC clients to access. Some tags can only be read, some can only be written, and some can be both read and written. Categories of tags include those for the system, scanners, measurements, recipes, actions, and alarms. In later sections, these tags are listed and described in more detail.

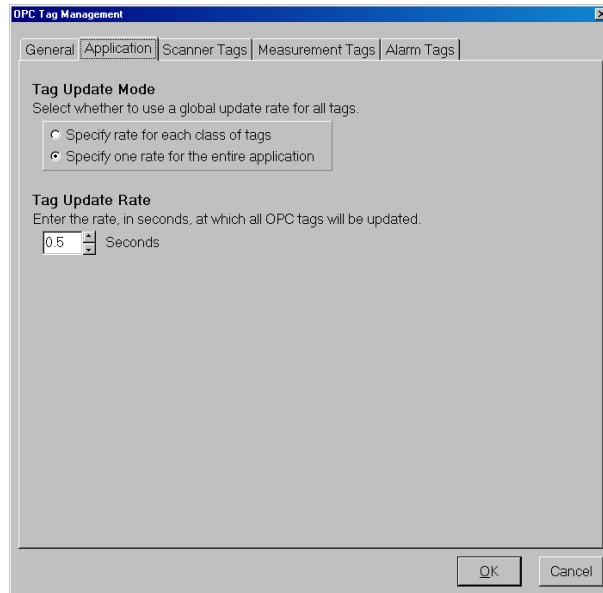
If you are using an OPC-compliant application or a remote device such as a Programmable Logic Controller (PLC) that has an OPC gateway running locally on the same PC as the Total Vu Software (or elsewhere on the network), that application or remote device can monitor status and data using the OPC protocol. Multiple applications and/or remote devices can access the Total Vu OPC Server. These other OPC clients may also write new settings, such as to the exposed tags to change measurement specifications, or to execute an action. Some examples are given below:

TotalVu.ServerTime	VT_Date	Read
Measurement.<MeasName>.Value	VT_R8	Read
Action.<ActionName>.Execute	VT_Bool	Read/Write

The OPC Foundation website: <http://www.opcfoundation.org/> is a useful source of additional information. Instructions for integrating OPC with various Windows settings is detailed in [Appendix C](#).

### Configuring OPC from Total Vu Software

- Open the Total Vu Software
- Go to the **Configure** drop-down menu
- Select **Full Configuration**. You will see a screen with various control panel icons.
- Double-click the **OPC** icon to access the **OPC Tag Management** panel.



*OPC Tag Management panel with the Application tab selected.*

The OPC Tag Management window has five tabs: **General**, **Application**, **Scanner Tags**, **Measurement Tags**, and **Alarm Tags**. As with other configurations, the **General** tab is only for viewing setup information. The **General** tab will not show the updated configurations until the window is re-opened after setup.

## 1 Application tab.

### 1.1 Tag Update Mode: Select whether to use a global rate for all tags.

Choices are: **Specify rate for each class of tags** and **Specify one rate for the entire application**. With a choice of a rate for the application, another parameter choice appears for **Tag Update Rate**.

### 1.2 Tag Update Rate: Use the up/down arrows to enter the rate, in seconds, at which all OPC tags will be updated.

## 2 Scanner Tags tab.

### 2.1 From the list of available scanners, select the scanner(s) to make accessible via OPC.

#### 2.1.1 Click the **Add** button.

### 2.2 Or, if all scanners are intended for OPC, click **Add All**.

## 3 Measurement Tags tab.

### 2.1 From the list of available measurements, select the one(s) to make accessible via OPC.

2.1.1 Click the **Add** button.

2.2 Or, if all measurements are intended for OPC, click **Add All**.

4 **Alarm Tags** tab.

2.1 From the list of available alarms, select the one(s) to make accessible via OPC.

2.1.1 Click the **Add** button.

2.2 Or, if all alarms are intended for OPC, click **Add All**.

5 Click **OK** or press **Enter**.

**OPC Tags**

The **OPC Tag Management** window assigns OPC tags to the selected scanners, measurements, and alarms. Other tags are created automatically.

*Total Vu Software OPC Server Properties*

ProgID: LaserLinc.TotalVu.1  
 AppID: {4C733CE0-D6BB-11DA-8314-002078153AE2}  
 CLSID: {4C733CE0-D6BB-11DA-8314-002078153AE2}  
 AppName: TotalVuServer  
 VendorName: LaserLinc, Inc.

All I/O is asynchronous

*Measurement Tag Names*

A set of tags is available for each measurement selected in the OPC configuration window in the Total Vu Software. In the list of tags, '<MeasName>' represents the case-sensitive name given to the measurement in the Total Vu Software. The data type for the tag is shown in the next column, followed by the access method.

Measurement.<MeasName>.Value	VT_R8	Read
Measurement.<MeasName>.URL	VT_R8	Read/Write
Measurement.<MeasName>.USL	VT_R8	Read/Write
Measurement.<MeasName>.UWL	VT_R8	Read/Write
Measurement.<MeasName>.Nominal	VT_R8	Read/Write
Measurement.<MeasName>.LWL	VT_R8	Read/Write
Measurement.<MeasName>.LSL	VT_R8	Read/Write
Measurement.<MeasName>.LRL	VT_R8	Read/Write
Measurement.<MeasName>.Status	VT_UI2	Read

Measurement.<MeasName>.ToleranceStatus	VT_UI2	Read
Measurement.<MeasName>.Offset	VT_R8	Read/Write

*For the ‘.Status’ tag, the possible values are:*

0	OK
1	Disabled
2	Missing
3	Too Few Events
4	Too Many Events
7	Pending
8	Old
9	Off
10	Scan Paused
11	Missing Axis
12	No Scan
13	No Part
14	Beam Blocked
16	Uncalibrated

*For the ‘.ToleranceStatus’ tag, the possible values are:*

0	Value is within the warning limits
1	Value is above upper reasonable limit
2	Value is above upper spec limit
3	Value is above upper warning limit
4	Value is below lower warning limit
5	Value is below lower spec limit
6	Value is below lower reasonable limit
7	Value not yet updated

#### *Assigning Spec Limits to Measurements*

Clients may assign new spec limit values at any time by writing the values to the appropriate read/write spec limit measurement tags defined above (‘.URL’, ‘.USL’, ‘.UWL’, ‘.Nominal’, ‘.LWL’, ‘.LSL’, ‘.LRL’). In order for the spec limits to take effect, the measurement(s) must be part of a loaded recipe. If multiple measurements share the same set of spec limits in the recipe, assigning a new spec limit value to one measurement will update all measurements that share the same spec limits.

#### *Scanner Tag Names*

A scanner status tag is available for each scanner selected in the OPC configuration window in the Total Vu Software. ‘<ScannerName>’ represents the case-sensitive name given to the scanner in the Total Vu Software.

Scanner.<ScannerName>.Status	VT_UI2	Read
------------------------------	--------	------

*The status bit masks are as follows:*

0x01	Scanner Off
0x02	No Scan
0x04	Beam Blocked
0x08	Index Error
0x10	Uncalibrated

*Server Time Tag Name*

The server time tag serves as a ‘heartbeat’ and is updated with the system time every second.

TotalVu.ServerTime	VT_Date	Read
--------------------	---------	------

*Action Tag Names*

A set of tags is available for each Action defined in the Total Vu Software. In the tags listed below, ‘<ActionName>’ represents the case-sensitive name given to the Action in the Total Vu Software.

Action.<ActionName>.Execute	VT_Bool	Read/Write
Action.<ActionName>.LastExecuteTime	VT_Date	Read

Clients can execute an action by writing the value True (1) to the ‘Execute’ tag. The ‘LastExecuteTime’ tag is updated with the time that the action last executed successfully.

*SPC Tag Names*

A set of tags is available for each set of statistics defined in the Total Vu Software. In the tags listed below, ‘<PlanName>’ represents the case-sensitive name given to the SPC Plan in the Total Vu Software, and ‘<MeasName>’ represents the case-sensitive name given to the measurement in the Total Vu Software.

SPC.<PlanName>.<MeasName>.Average	VT_R8	Read
SPC.<PlanName>.<MeasName>.StdDev	VT_R8	Read
SPC.<PlanName>.<MeasName>.Cp	VT_R8	Read
SPC.<PlanName>.<MeasName>.CpK	VT_R8	Read
SPC.<PlanName>.<MeasName>.Minimum	VT_R8	Read
SPC.<PlanName>.<MeasName>.Maximum	VT_R8	Read
SPC.<PlanName>.<MeasName>.Pp	VT_R8	Read
SPC.<PlanName>.<MeasName>.PpK	VT_R8	Read

*Recipe Tag Names*

The Recipe tags enable recipe management by clients.

Recipe.Load	VT_Bstr	Read/Write
-------------	---------	------------

Recipe.Unload	VT_Bstr	Read/Write
Recipe.Active	VT_Bstr	Read

Clients can load a recipe by writing the case-sensitive recipe name to the 'Load' tag. Clients can unload a recipe by writing the case-sensitive recipe name to the 'Unload' tag. Writing an empty string (") to either the 'Load' or 'Unload' tag will cause Total Vu Software to unload all active recipes. The 'Active' tag indicates the currently loaded recipes in Total Vu Software. If multiple recipes are loaded, the 'Active' tag lists the recipe names delimited with '|'.



## Appendix A: Table of Status Labels and Conditions

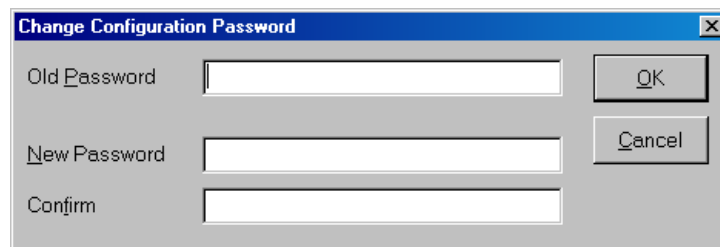
STATUS LABELS AND CONDITIONS	
STATUS LABEL	STATUS CONDITION
FULL	The TLAs400 Interface Card on-board buffer for scan events is full. During normal operation, the TLAs400 Card generates an interrupt when the on-board buffer reaches a configurable level—the PCI card generates an interrupt at a configurable level. The FULL condition indicates that an interrupt was not serviced in sufficient time and scan events might have been lost.
OK	The TLAs400 Card is operating properly and interrupts are being serviced in sufficient time.
EMPTY	The TLAs400 Card on-board buffer is empty—no scan events are being generated.
INIT ERROR	The TLAs400 Card was not properly initialized during system startup.
PROGRAMMED	The TLAs400 Card was programmed successfully during system startup.
OVERRUN	Scan events were being generated when the TLAs400 Card on-board buffer was full and, consequently, some scans have been lost.
NO OVERRUN	Based on received scan events, the software detected an overrun condition that was not reported by the hardware.
BAD EVENT	A received scan event did not contain the appropriate amount of data (the amount that the software expected).
NO SCAN	No events are being generated on the channel for the selected scanner.
MISSING AXIS	A dual-axis, dual reference scanner is configured (resets on both axes); however, the software is detecting only one reference.
LOW POWER	The power output of the scanner laser is lower than expected. This signal is available only for scanners that supply this status indicator.
OUTPUT FULL	The software buffer for completed scans was full and, consequently, some scans have been lost
ALARMS DISABLED	One or more alarms are currently disabled.
EVENT	This label appears only if the Event Characterization option is installed. It indicates the event number that is in progress or just completed. If an event is in progress, the label will flash.

## Appendix B: Security

### The Password Icon

If you wish to prevent others from accessing the Total Vu Full Configure window, you can enable password protection.

- Open the Total Vu Software.
- Go to the **Configure** drop-down menu.
- Select **Full Configuration**. You will see a screen with various icons.
- Double-click the **Password** icon to open the **Change Configuration Password** window.

The image shows a dialog box titled "Change Configuration Password". It has a blue title bar with a close button (X) in the top right corner. The dialog contains three text input fields: "Old Password", "New Password", and "Confirm". To the right of the "Old Password" field is an "OK" button, and to the right of the "New Password" field is a "Cancel" button. The "Confirm" field does not have a corresponding button.

*Change Configuration Password window.*

The default password must be entered in the **Password** edit box. The password can only be changed to a new one if the correct default password is entered. Please contact your salesperson or LaserLine for the default password (for the security of your system, publishing the password here is NOT preferable).

The new password must be at least 5 characters in length. A password is case-sensitive. Passwords must be entered twice, in the boxes for **New Password** and **Confirm**. The password characters are displayed as asterisks. Entering the new password twice helps to ensure that it is not mistyped. To remove password protection, leave the **New Password** and **Confirm** boxes blank.

Additional security settings are available in the **Display Configuration** window, as described in the **Display** chapter. The [Options](#) tab shows a list of checkboxes locking out access to certain features from the main display.

## Appendix C: Windows/OPC Compatability Settings

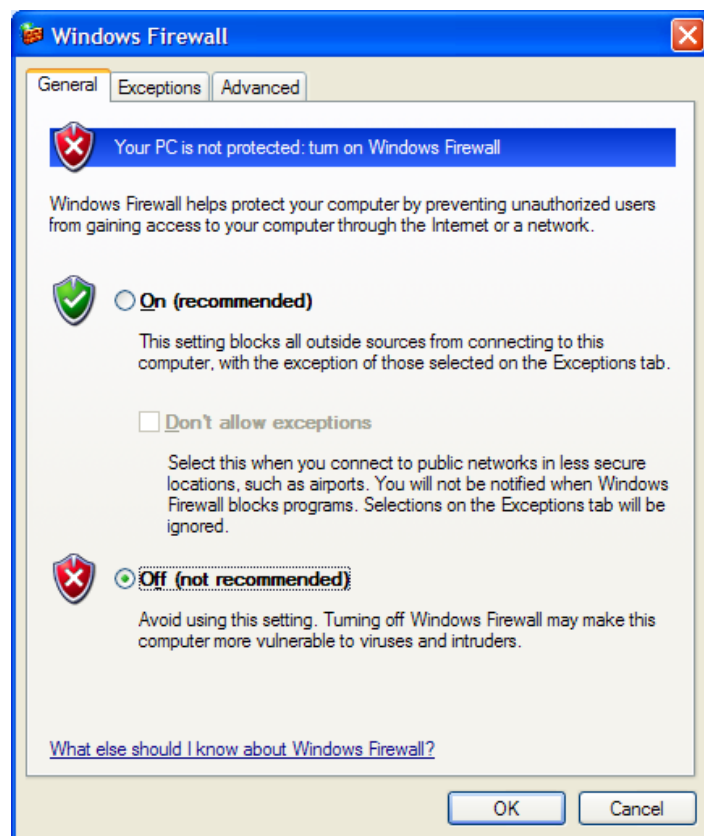
This section provides detailed DCOM configuration information for setting up one or more machines for using Total Vu Software as an OPC Server. The DCOM settings primarily address issues with enhanced security in Windows XP Service Pack 2. Some settings may be overkill for other Windows versions, but LaserLinc has empirical evidence that these settings work.

### Anti-Virus Software

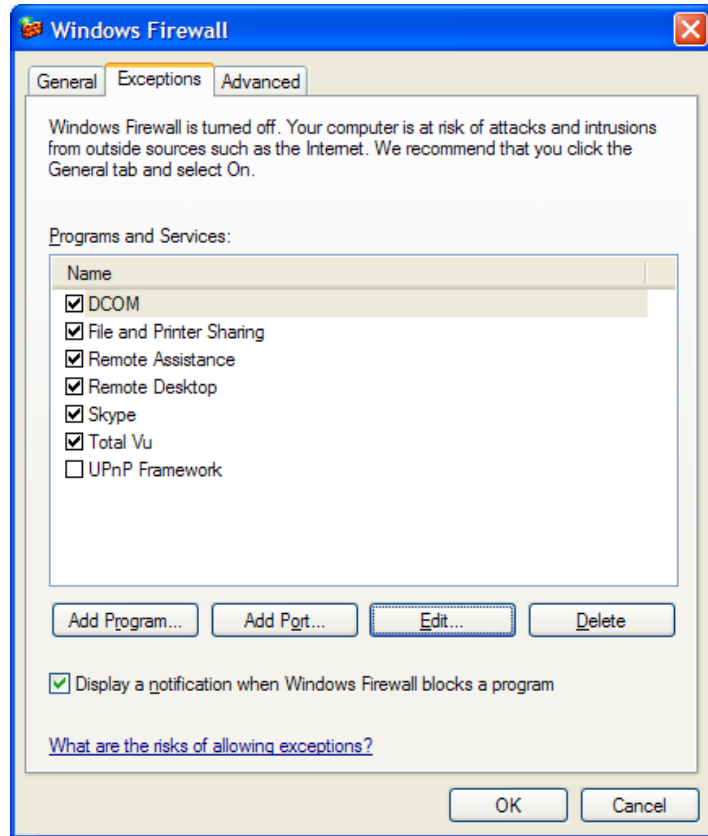
DCOM and anti-virus software do not get along! The interim solution is to disable all anti-virus software. We will be investigating exception settings that allow Total Vu/DCOM communications while maintaining a secure system.

To disable Windows Firewall:

- 1 Go to Start\Control Panel
- 1.2 Double-click on Windows Firewall.
- 1.3 Set to Off, as shown.



- 1.4 Select the Exceptions tab.
- 1.5 At a minimum, specify the DCOM Port (135), and add the Total Vu Software program.



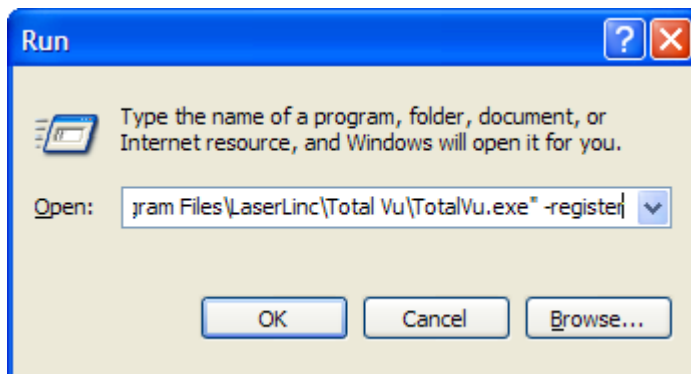
### Other Anti-Virus Software

Other anti-virus software (Norton Anti-Virus, etc.) must be disabled as well. See the appropriate software vendor's documentation.

### Total Vu Software Server Registration

To register Total Vu Software as an OPC Server:

- 1 Go to Start \Run...,
  - 1.2 Click **Browse** to locate TotalVu.exe.
  - 1.3 Add the parameter “-register”.
  - 1.4 Click OK.



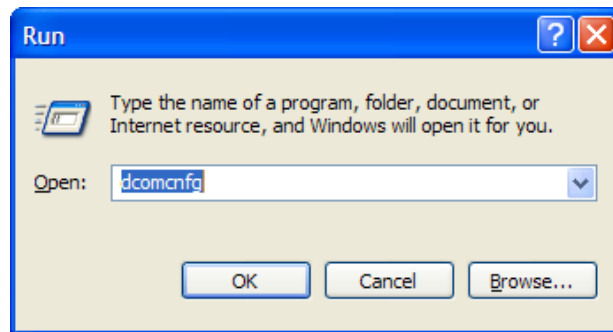
Once registered, Total Vu will display the following message:



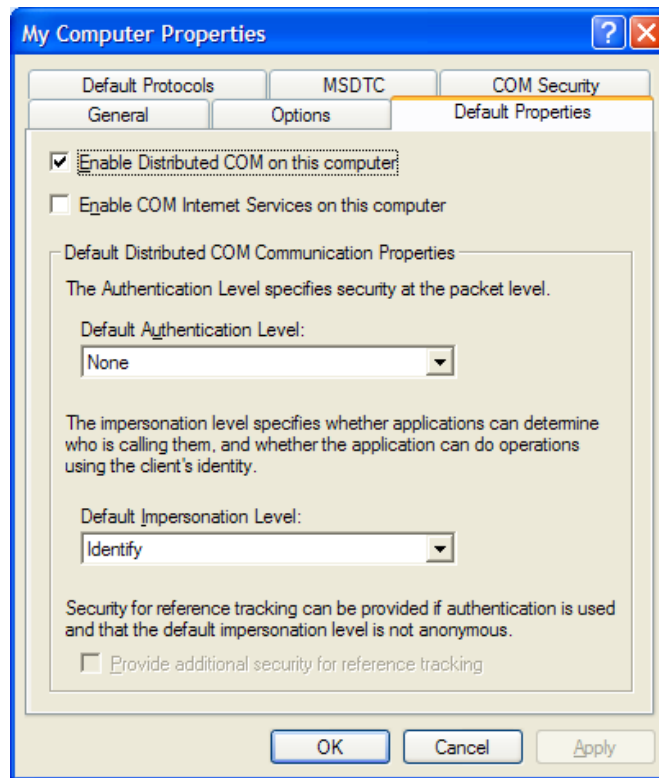
## DCOM Settings

OPC uses ActiveX COM and DCOM for communication. To configure DCOM:

- 1 Go to Start \Run...,
  - 1.2 Enter: dcomcnfg.
  - 1.3 Click OK.



2. Go to Console Root \Component Services \Computers \My Computer.
  - 2.1 Right-click on My Computer.
  - 2.2 Select Properties.
  - 2.3 Select the Default Properties Tab.
  - 2.4 Check the box for Enable Distributed COM.
  - 2.5 Set the Default Authentication Level to None.
  - 2.6 Set the Default Impersonation Level to Identify.



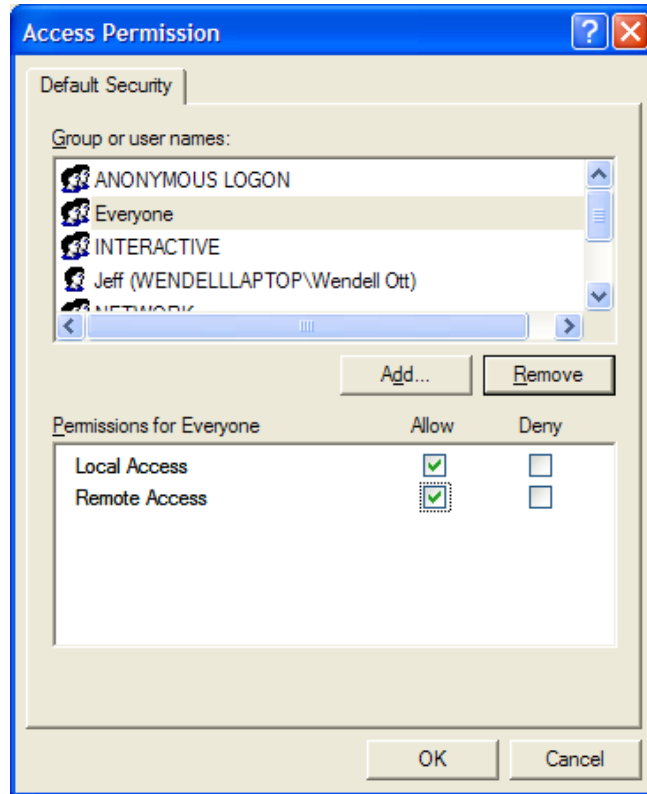
3 Select the COM Security tab.

3.1 On the COM Security tab, click the buttons for Edit Limits... and Edit Default...

3.2 In the windows for Access Permissions and Launch and Activation Permissions, check all the Allow check boxes for the following groups or user names:

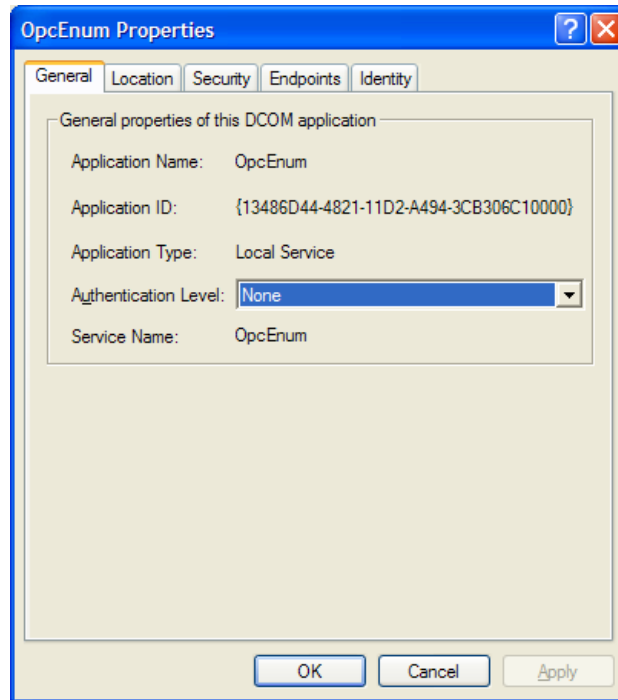
- ANONYMOUS LOGON.
- Everyone.
- INTERACTIVE.
- NETWORK
- SYSTEM.
- And an Administrator account.

3.3 If the Group or User Name is not in the list, add it using the Add... button.

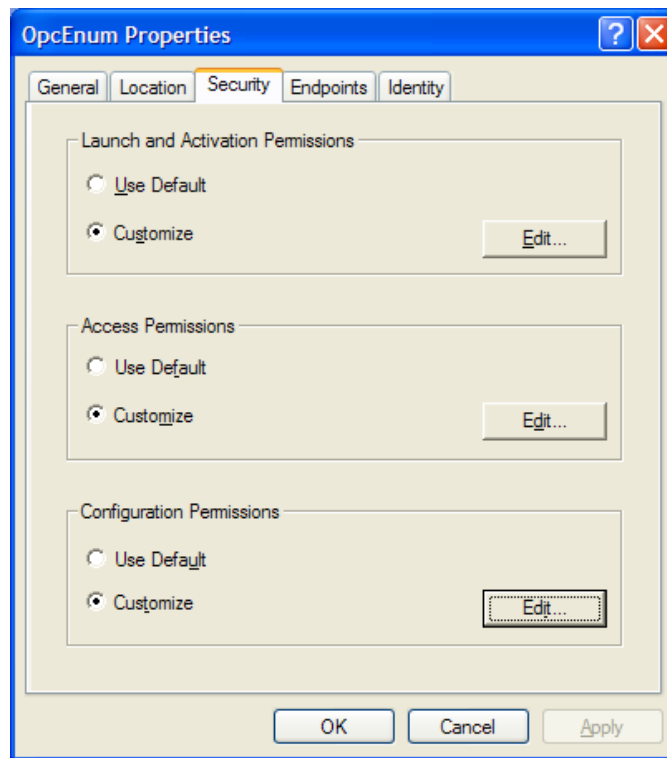


**OpcEnum Properties**

- 1 Run dcomcnfg.
  - 1.1 Select Component Services\Computers\My Computer\DCOM Config.
    - 1.1.1 Right-click on OpcEnum.
    - 1.1.2 Select Properties.
- 2 Select the General tab.
  - 1.2 Set Authentication Level to None.



- 3 Select the Security tab.
  - 3.1 For Launch and Activation Permissions, Access Permissions, and Configuration Permissions, select Customize.
    - 3.2 Click the Edit... button. The Change Configuration Permission window will open.

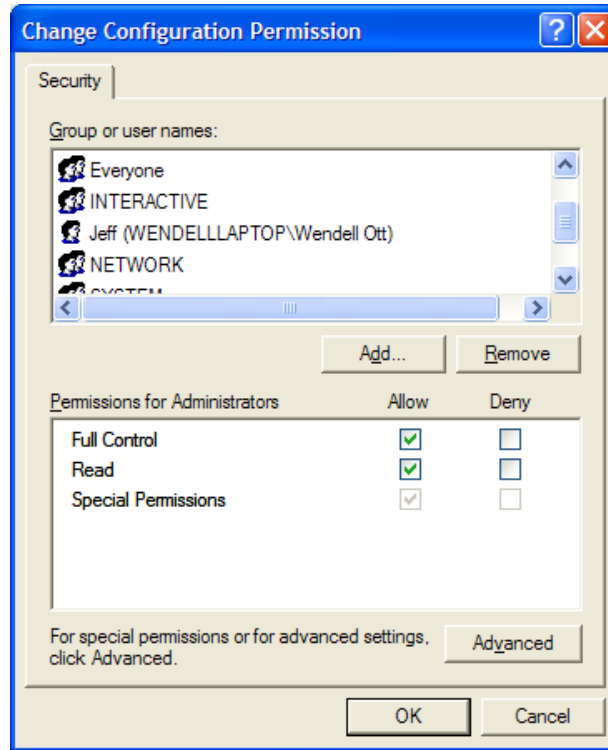


4 Modifying the Change Configuration Permission window.

4.1 Check all the Allow check boxes for the following Groups or User Names:

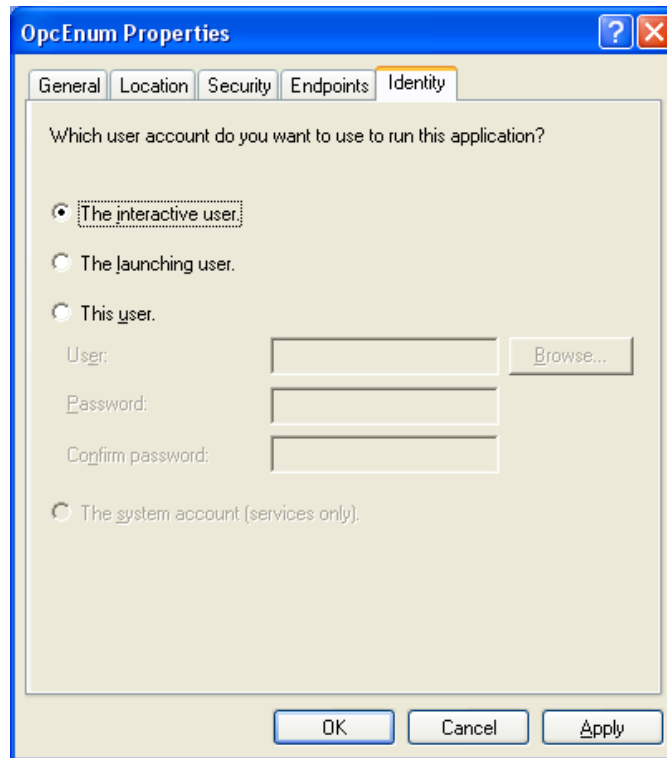
- ANONYMOUS LOGON.
- Everyone.
- INTERACTIVE.
- NETWORK.
- SYSTEM.
- And an Administrator account.

4.2 If the Group or User Name is not in the list, add it using the Add... button.



5 Select the Identity tab.

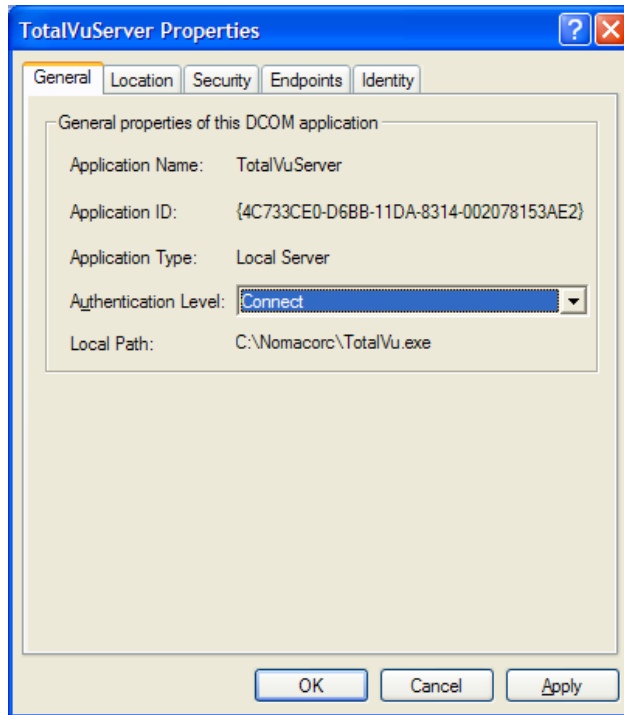
5.1 Select The interactive user.



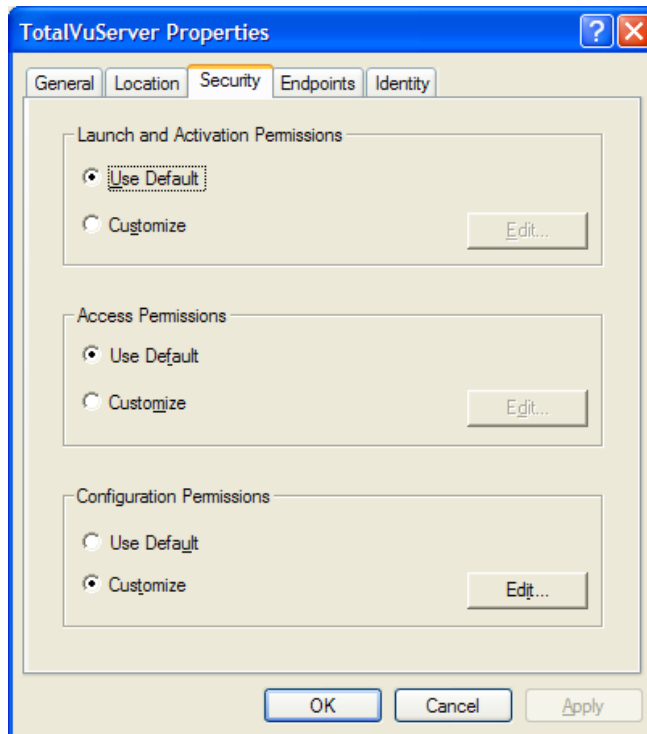


**TotalVuServer Properties**

- 1 Right-click on TotalVuServer
  - 1.1 Select Properties.
  - 1.2 Go to the General tab.
    - 1.2.1 Set Authentication Level to “Connect”



- 2 Select the Security tab.
  - 2.1 For Launch and Activation Permissions and Access Permissions, select Use Default.
  - 2.2 For Configuration Permissions, select Customize.
    - 2.2.1 Click the Edit... button. The Change Configuration Permission window will open.

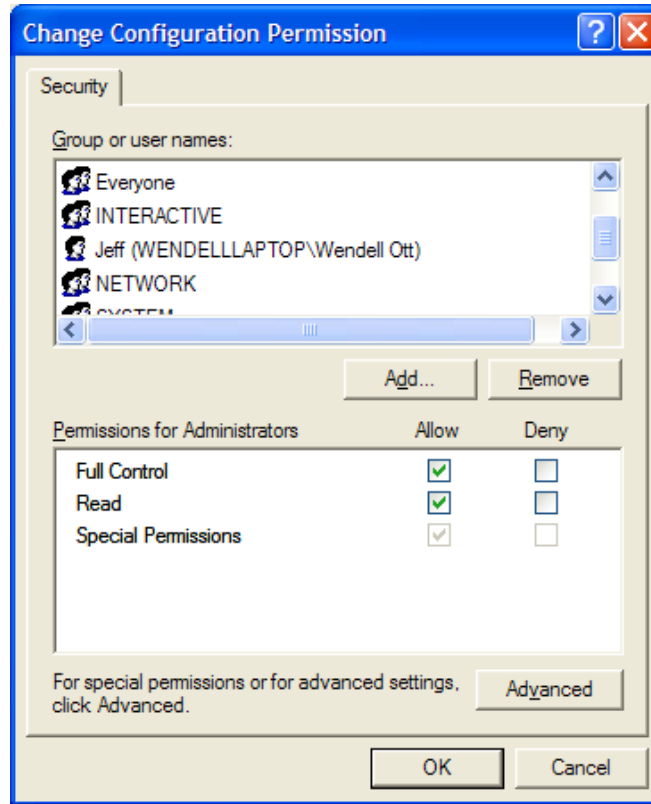


### 3 Modifying the Change Configuration Permission window.

#### 3.1 Check all the Allow check boxes for the following Groups or User Names:

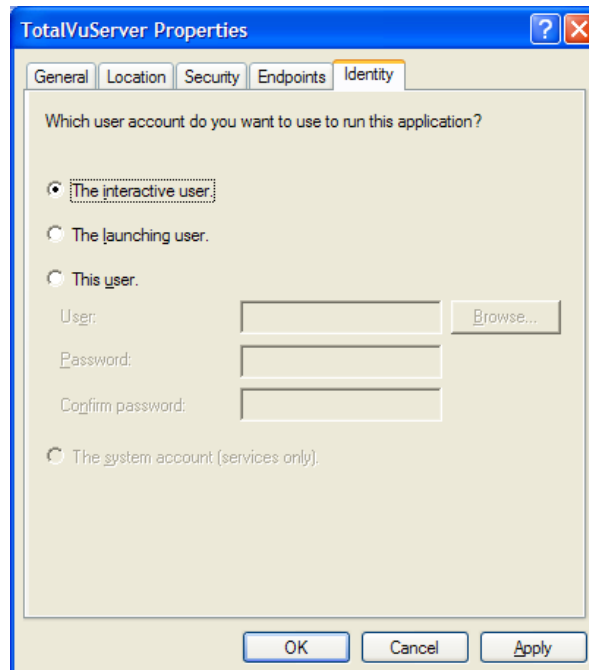
- ANONYMOUS LOGON.
- Everyone
- INTERACTIVE.
- NETWORK
- SYSTEM.
- And an Administrator account.

#### 3.2 If the Group or User Name is not in the list, add it using the Add... button.



### 4 Select the Identity tab.

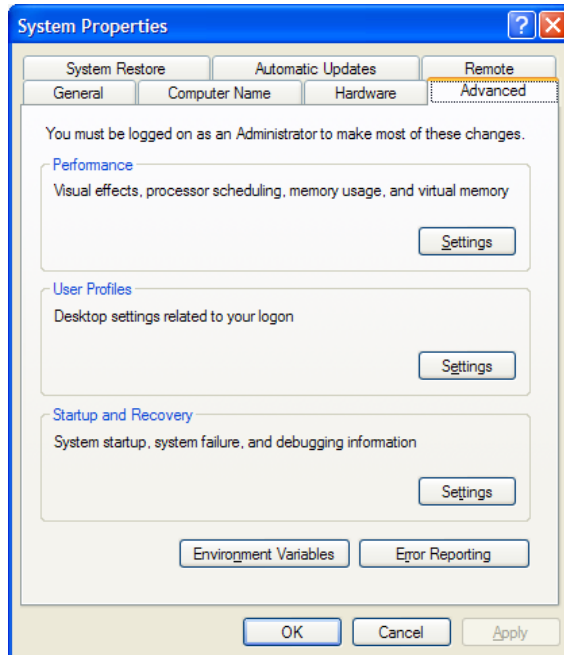
#### 4.1 Select The interactive user.



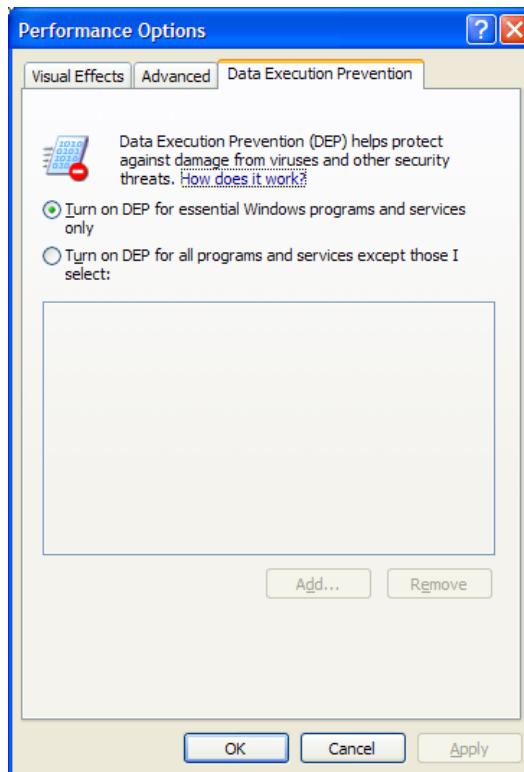
## Data Execution Prevention

Data Execution Prevention (DEP) is a set of hardware and software technologies that perform additional checks on memory to help prevent malicious code from running on a system. In Microsoft Windows XP, DEP must be disabled for OPC to function properly.

- 1 Go to Start.
- 2 Right-click on My Computer.
- 3 Select Properties.
  - 3.1 Select the Advanced tab
    - 3.1.1 In the Performance panel, click Settings button.  
The Performance Options window will open.



- 4 In the Performance Options window, select the Data Execution Prevention tab
  - 4.1 Select the radio button for Turn on DEP for essential Windows programs and services only.



## Reboot

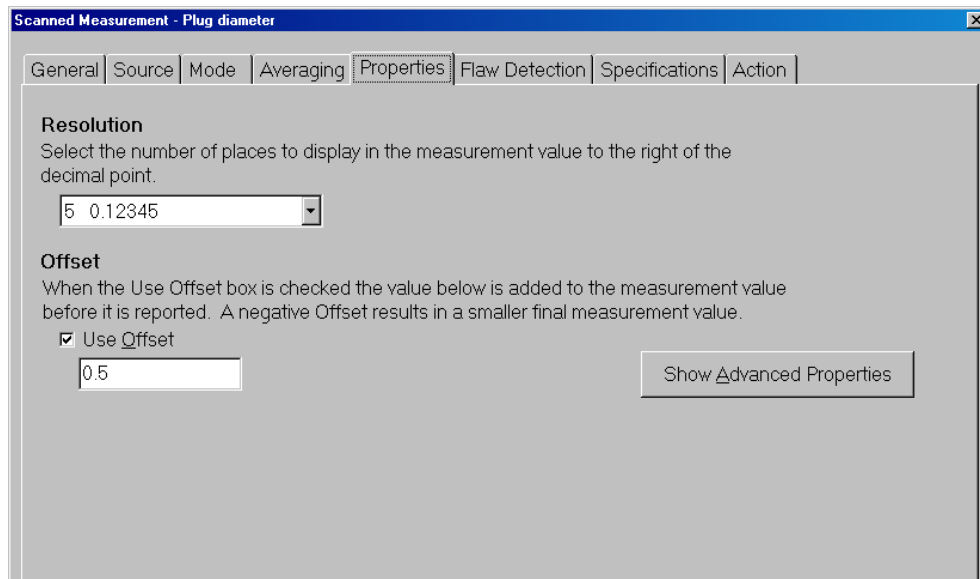
Reboot the machine to install the new DCOM settings. Once rebooted, OPC should function properly. In the event of problems, Matrikon offers several free tools from their web-site for diagnosing OPC/DCOM problems: [www.matrikonopc.com](http://www.matrikonopc.com).

## Appendix D: Troubleshooting & Quick Fixes

How do I [calibrate the scanner](#)? (the section on scanner calibration, page 17.)

How do I modify the resolution of the measurements?

- Open the **Measurements** configuration panel
- Double-click on the icon for the measurement that you need to modify the resolution of.
- Go to the **Properties** tab (shown below).



How do I modify a trend chart?

- Go to the section: [Modifying Trend Charts](#) (page 229).

How do I lock operators out of the setup functions?

- Go to the section: [Making Modifications in the Options, Miscellaneous, and Tab Order Tabs](#) in the Display chapter (bottom of page 111).

My measurements are gone, how do I get them back? (Somebody closed the **Measurements Display** window...)

- If the window was closed and not minimized, you will need to re-create it. Follow the instructions [here](#) (the section on the **Measurement Display** window, bottom of page 124).