Sterling ProMeasure Systems

MEASUREMENT
CONTROL
GAGING

Pro Manual
Operator Guide

Contact Information

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Typographical Conventions

Before you start using this guide, it is important to understand the terms and typographical conventions used in the documentation.

For more information on specialized terms used in the documentation, see the Glossary at the end of this document.

The following kinds of formatting in the text identify special information.

Formatting convention	Type of Information
Triangular Bullet(Ø)	Step-by-step procedures. You can follow these instructions to complete a specific task.
Special Bold	Items you must select, such as menu options, command buttons, or items in a list.
Emphasis	Use to emphasize the importance of a point or for variable expressions such as parameters.
CAPITALS	Names of keys on the keyboard. for example, SHIFT, CTRL, or ALT.
KEY	Key combinations for which the user must press and hold down one key and then press another, for example, CTRL+P, or ALT+F4.
+KEY	

Introduction to GageXpress Pro

The GageXpress Pro 3.0 program provides a complete user interface to your system for inspecting parts, calibration, and viewing resultant measurement data. It can be used with manually operated equipment, semi-automatic, and automatic inspection applications. This versatility provides a common interface to all of your inspection systems regardless of the design.

The GageXpress Profile program is used to configure the GageXpress Pro 3.0 program to interface with your precision inspection systems. The GageXpress Profile program makes creating inspection sequences for virtually any equipment a simple and straight forward process. If you understand a little bit about measurement techniques then you have the qualifications required to program the GageXpress Pro 3.0 system using the GageXpress Profile program.
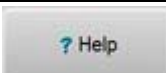
▲ ▼

Getting Started

Obviously, we'll assume that a GageXpress Pro 3.0 setup has already been created using the GageXpress Profile program. If not, please refer to the GageXpress Profile documentation to learn how to create an application fitting your needs.

The GageXpress Pro 3.0 user interface has been designed to provide access to all screens required to operate gage equipment with a minimum of steps.

The main GageXpress Pro 3.0 screen is divided into three areas. A status bar is shown at the top of the screen showing general information about the currently selected screen. This generally includes which screen is selected and which part has been selected to work with. The center area is used to display information for the selected screen. The screen display below is the Gaging screen seen when GageXpress Pro 3.0 is first started. The function bar is at the bottom of the screen. These functions provide access to all GageXpress Pro 3.0 program options.
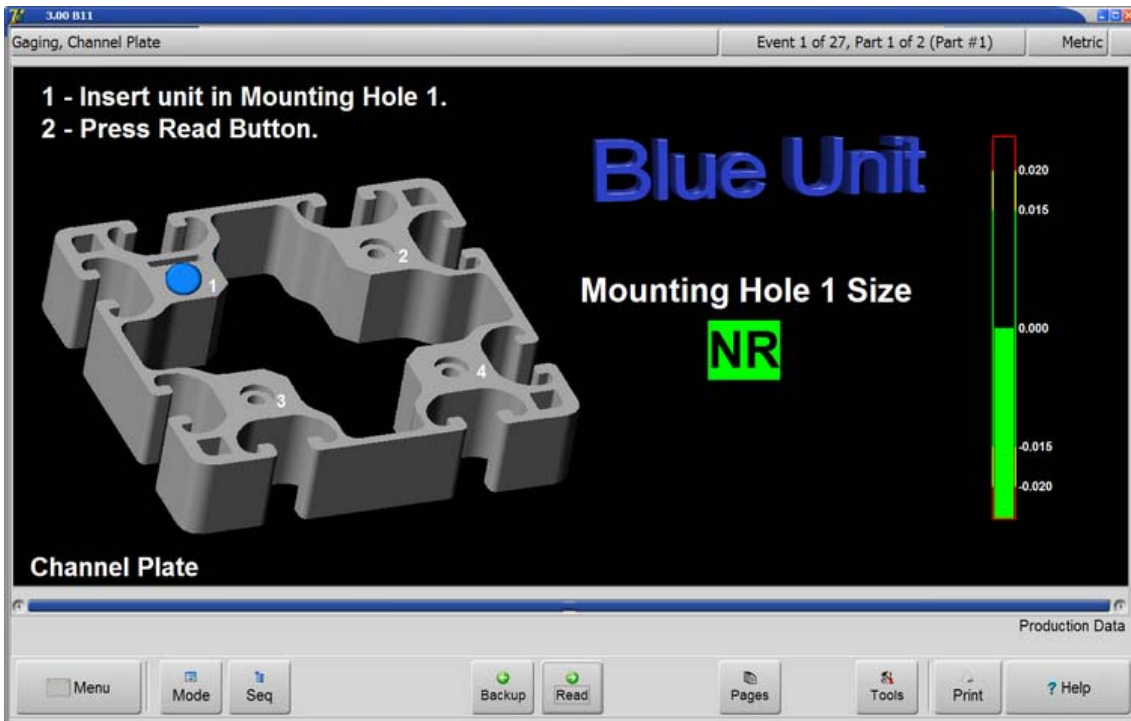
The buttons at the bottom of the screen provide access to the main areas of the GageXpress Pro 3.0 program. The following buttons are available on all screens:

	Function Bar
Menu	Displays main GageXpress Pro 3.0 menu.
Print	Print current screen or report.
Help	The Help button displays the online help documentation. You probably clicked that button to view this information.

First Startup

If this is the first time the sestup has been used, the transducers will have to be positioned in the gage using the GageXpress Pro 3.0 Setup screen. This is described in detail in the setup section of this manual. After completing the transducer setup steps, the gage(s) may have to be calibrated. Not all configurations require this step but most do. Click the Mastering button on the main menu to perform this task. Once in the mastering screen, the configuration will typically provide on screen instructions for each step. The GageXpress Pro 3.0 mastering screens are defined later in this manual.
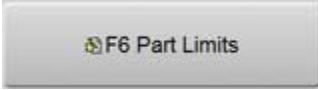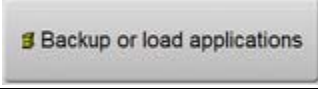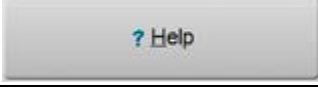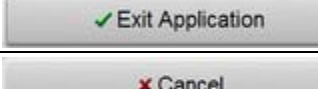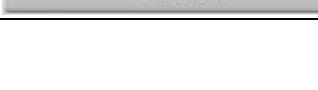
These are the only two steps that need to be performed before using your GageXpress Pro 3.0 system to inspect parts!

Main Menu

The main menu provides access to all areas of GageXpress Pro 3.0 and can be displayed by pressing the Menu button located at the lower left corner of all screens.

GageXpress Pro 3.0 Main Menu

	Menu Functions
⊞ Select display options	Displays menu for display options including unit of measure, engineering units, and language.
⋬ F1 Gaging	Displays gaging screen.
⊻ F2 Mastering	Displays mastering screen.
⊻ F3 Setup Transducers	Displays transducer setup screen.
⊞ F4 Charts and Reports	Displays SPC charts and reports screen.
☐ F5 Part Data	Displays part data screen for viewing, printing, and exporting part data.

F6 Part Limits	Displays part limit screen for editing specification and approach limits.
F7 GR&R	Displays gage repeatability and reproducibility screen.
Security	Displays screen for editing passwords and protected program areas.
Backup or load applications	Displays menu for backing up or installing applications.
Application Documents	Displays Application Documents screen allowing display of any Microsoft registered file type.
Event Log	Displays system event log.
? Help	The Help button displays the online help documentation. You probably clicked that button to view this information.
✓ Exit Application	Exits GageXpress Pro
✗ Cancel	Exits main menu without making a selection.

Application Documents

The GageXpress Pro 3.0 Application Documents option provides the operator with access to secondary reference information directly from GageXpress Pro. This feature can be used to provide operators with access to maintenance instructions, mission statements, design information, quality control plans, or anything else that might be of value. Document types are not limited and include DOC, PDF, DWG, XLS, PPT, TXT, and others. As long as the appropriate file reader is installed on the system, GageXpress Pro 3.0 will open and display the file. That is, if you can double click the file in Windows Explorer to open it, then GageXpress Pro 3.0 can provide access to the file using the Application documents option. Application documents must be entered for use using GageXpress Profile. GageXpress Pro 3.0 only displays the files.
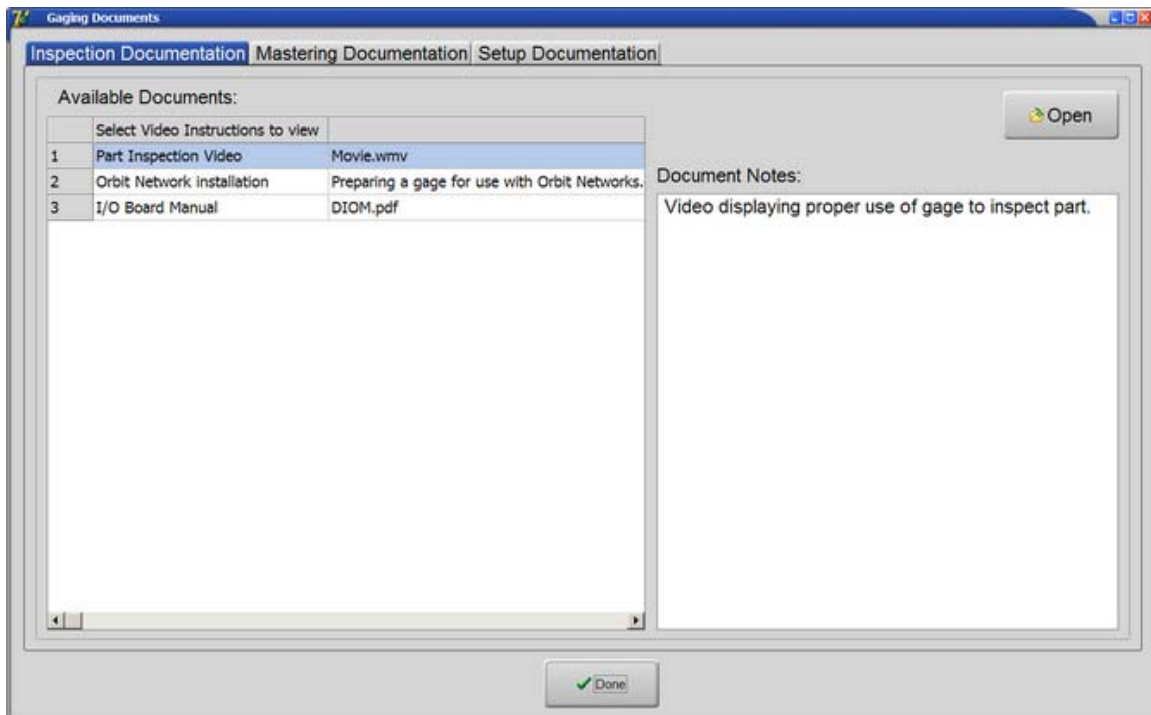
Display Options

Display options apply to the entire GageXpress Pro 3.0 system. These options primarily affect data display. Data can be displayed as deviation from nominal or as an engineering unit which includes the nominal value (nominal + value). You can also select whether data is displayed in english or metric units. Selections are stored so that the next time GageXpress Pro 3.0 is powered on, your preferences are loaded with it. GageXpress Pro 3.0 has special handling for small screens. Enabling small screen support will make all grids on the system display data in a larger format to make them easier to read. Column labels will also be displayed larger.
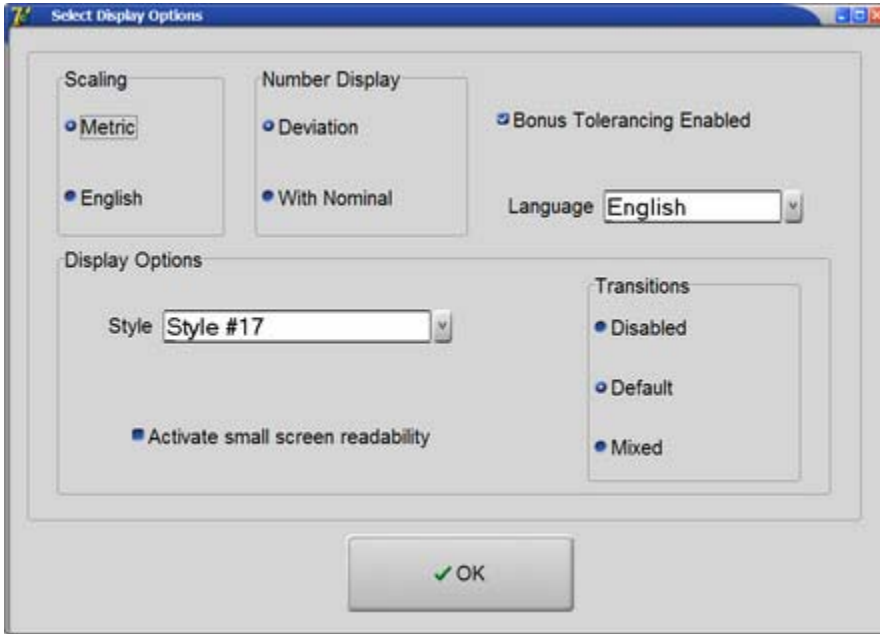
	Display Options
Metric	Measurement values will be displayed in metric (mm).
English	Measurement values will be displayed in english(inches).
Deviation	Measurement values will be displayed as deviation from nominal.
Engineering	Measurement values will be displayed with nominal value included.
Bonus Tolerancing Enabled	Provides ability to enable/disable bonus tolerancing. Only measurements that have been configured with bonus tolerances are affected.
Language	Select desired display language.
Transitions	Provides visual effect options for screen changes.
Activate small screen readability.	Enabling small screen support does two things: 1) All grids display only 10 rows so that each row is larger and easier to read on small screens. 2) Column limit label font are increased to improve readability.

Changing display units:

1. Click "Select Display Options" on the main menu.

2. Click   or   as desired.

3. Click   .
4. Done! Data fields will now be displayed based on your selections.

Changing display to Deviation from Nominal or Engineering units:

1. Click "Select Display Options" on the main menu.

2. Click   or   as desired.

3. Click   .
4. Done! Data fields will now be displayed based on your selections.

Changing display language:

1. Click "Select Display Options" on the main menu.
2. Select desired language from the drop down list.
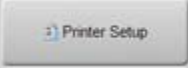
3. Click   .
4. Done! Data fields will now be displayed based on your selections.

Print Preview

The print preview screen is used throughout GageXpress Pro 3.0 to preview printed output. The printer to be used and selected page ranges can be selected.
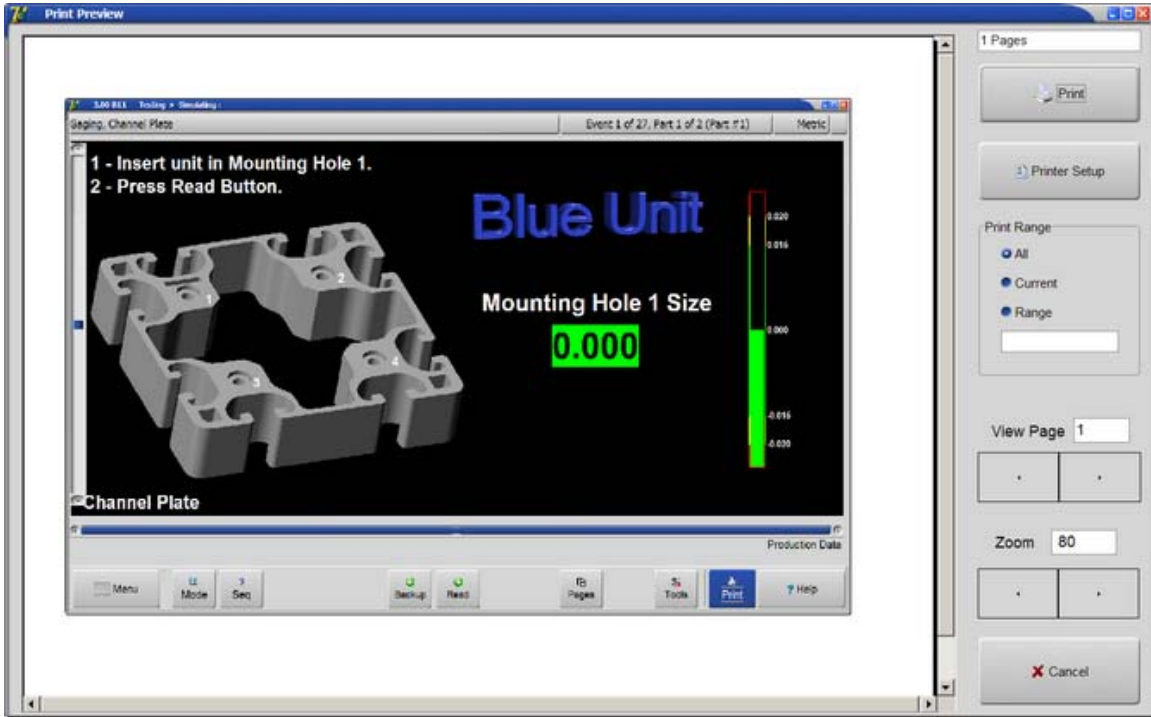
	Print Preview Selections
	Prints report.
	Displays printer setup screen to select printer to use.
	Selects range of pages to print.

Backup or Loading Applications

This screen provides functions for backing up or installing GageXpress Pro 3.0 applications.

Use this window to:

- Backup (Zip) the current application
- Load (UnZip) an application
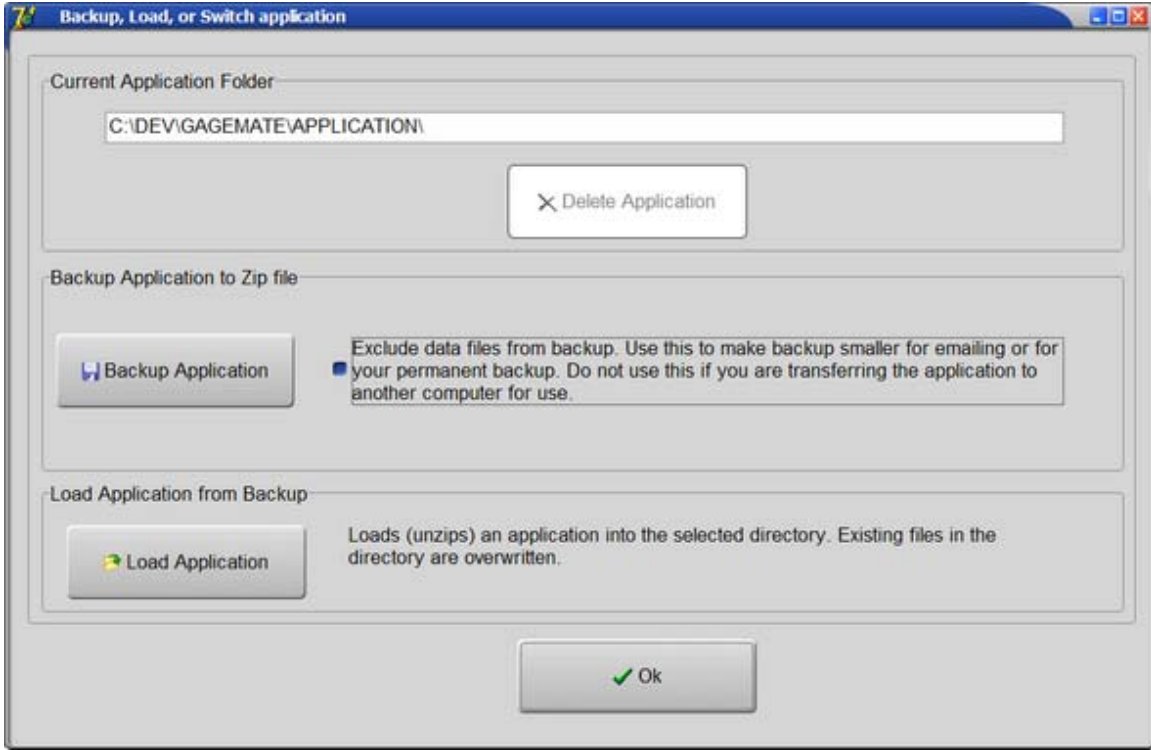
	Button Definitions
Backup Application	Use to backup the current application. See Backup Application.
Load Application	Use to install a new or updated application. See Install Application.

In This Section

Backup Application

The Backup Application button provides an easy way for you to back up your application. Simply click this button and enter a file name and GageXpress Pro 3.0 will create a backup of your application for you to keep in a safe location. You should do this any time changes are made to the application. Make sure to store the backup in a safe location so that it can be used to restore the system if something should happen to the computer. Do NOT use the Exclude Image Files option when you create a backup for safe keeping. Only use this option if you have a large application and must email the backup to technical support for assistance. This reduces the size of the file to be sent by not including the images in the backup.

The "Exclude Data Files" option is used to create a backup without any of the data. If you are zipping the application to email to tech support personnel, there is a good chance that the data files will not be needed. Tech support will be able to tell you if they need these files or not.
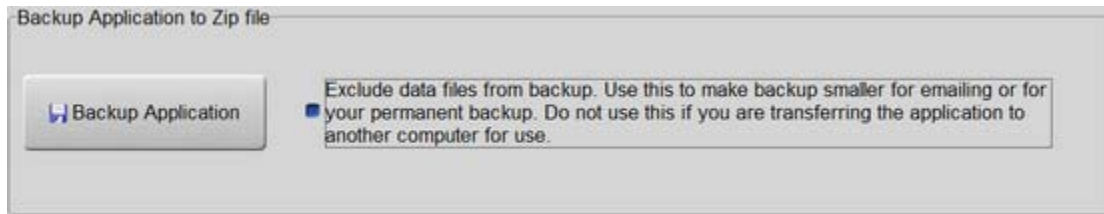
Backing up your system:

1. Click "Backup or Load Applications" on the main menu.
2. Select **Exclude Data Files** option as desired.
3. Click the Backup Application button.
4. Enter the file name to use for creating the backup. GageXpress Pro 3.0 will use the computer name and the current date/time as a default file name. The file extension must be .ZIP!
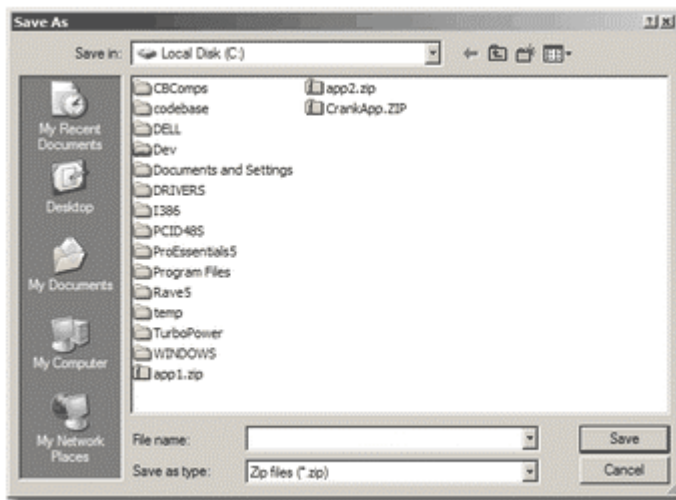
5. Store the back up file in a safe location for later use.

Load Application

The Load Application button provides an easy way to install new applications on the computer. The file to be unzipped should be a GageXpress Pro 3.0 zip backup file created with either GageXpress Pro 3.0 or GageXpress Profile. This is a two step process consisting of selecting the file to be installed and then specifying where it should be installed to. The destination directory is the name of the application directory.

Installing a new application or updating the existing application:

1. Click "Backup or Load Applications" on the main menu.
2. Click the Install button.
3. Select the zip file to be installed.
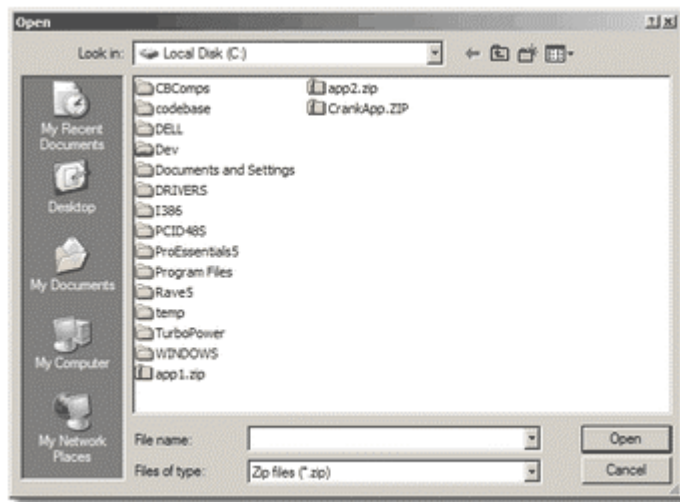
4. Select the destination directory.
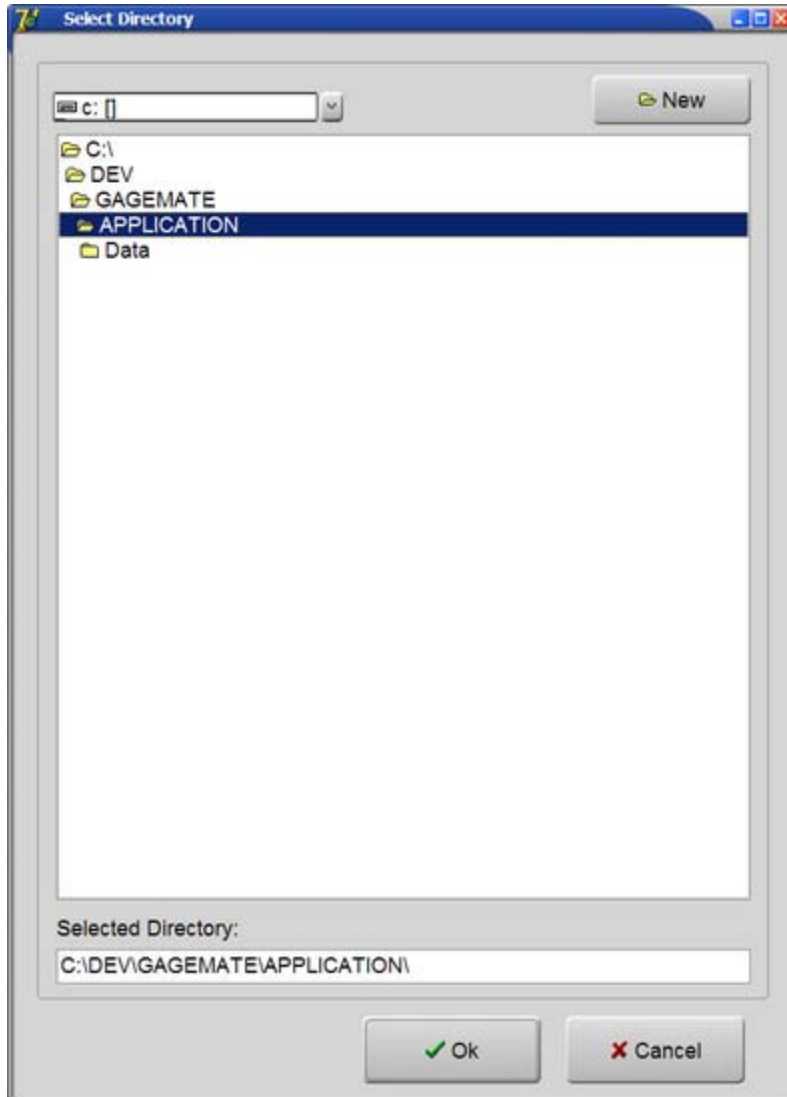
5. Click the **Ok** button.

When you exit the Backup or Load Application screen, you will be notified that the application will be closed and must be restarted for the changes to go into effect.

Master Screen

The mastering screen is used to master calibration fields used for Parts in a Gage or Machine. Each Part can have its own master sequence or multiple parts might share mastering.

Use this screen to

- Master calibration fields used by the selected Part
- Enter certification values for calibration fields
- View calibration log
- Evaluate calibration performance over time
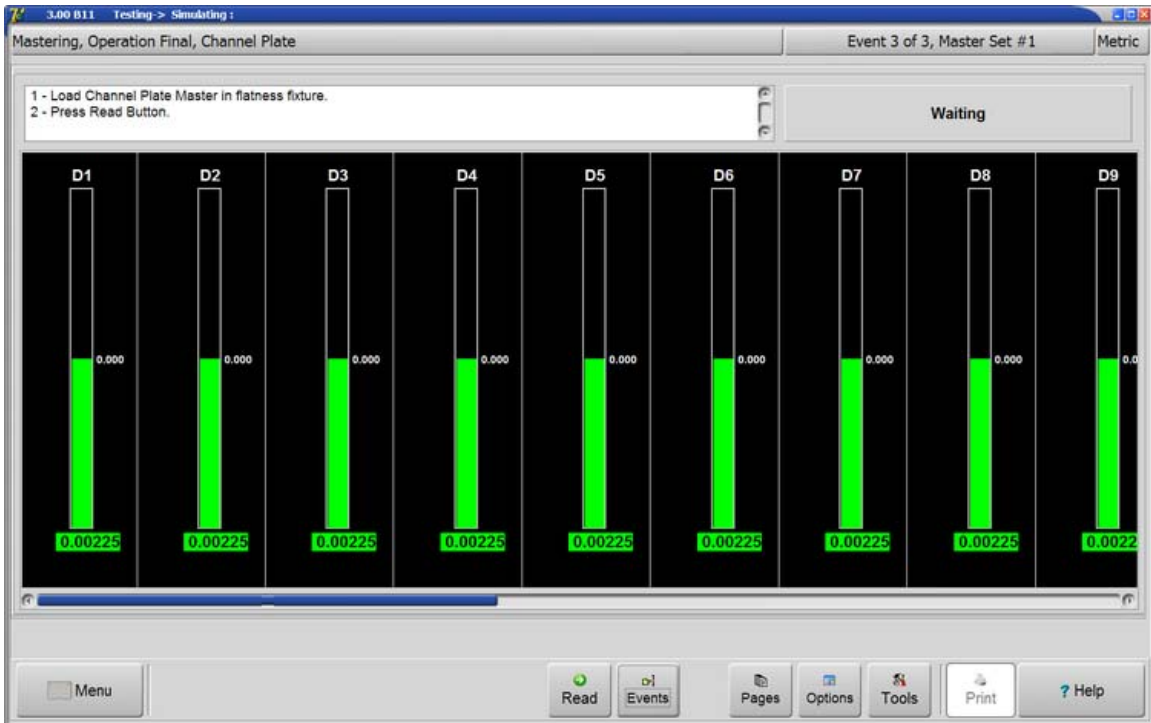
	Mastering Screen Button Panel
Read	Processes current event. The event may perform a combination of minimum, maximum, and mean mastering for the calibration fields on this event.
Events	Displays event selection menu.
Pages	Displays page selection menu.
Options	Displays option menu allowing selection of teaching, and sequence reset.

 Tools	Displays mastering tools screen and provides access to the calibration values and log.

Options Menu
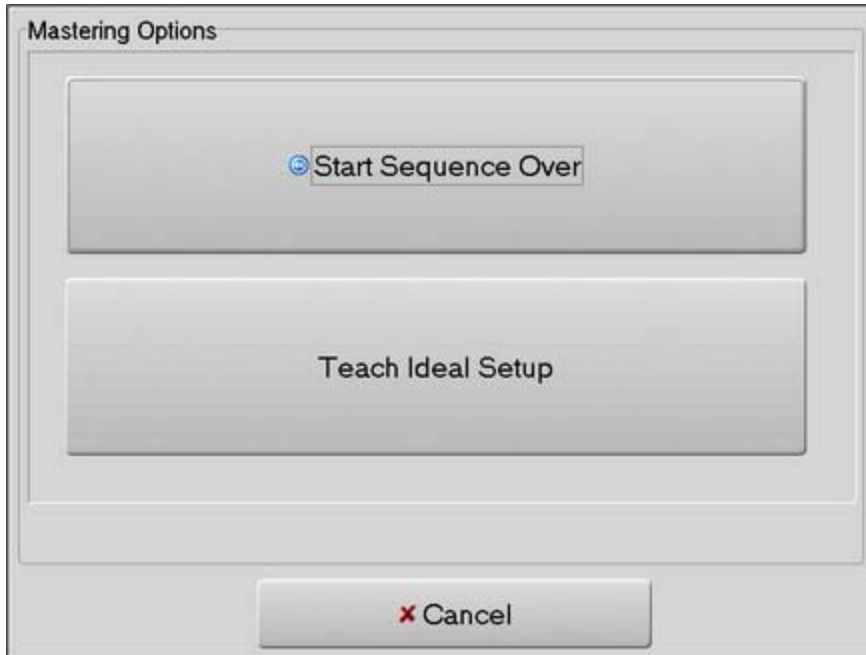
Start Sequence Over

Clicking the Start Sequence Over button re-initializes the master sequence. This is the same effect as exiting the mastering screen and then re-entering it. This may be necessary to clear faults that occur during the sequence. After the cause for the faults has been corrected, the sequence is reset and then can be attempted again.

Teaching

Each time GageXpress Pro 3.0 calibrates a calibration field, it verifies that the new gain and offset values are in an allowable range. It does this by comparing the values to established reference values that GageXpress Pro 3.0 has been taught. The initial setup of a gage is critical to insure that the reference values are valid.

Requirements for mastering to complete:

- inputs must be operating within their linear range
- calibration field gains must be within the allowable range of their ideal (taught) values
- calibration field positions must be within the allowable range of their ideal (taught) values.

How to teach GageXpress Pro 3.0 a new setup

When teaching, GageXpress Pro 3.0 will NOT compare the calculated gains to the previous taught gain. The only faults that will be generated are linear travel faults or zero movement faults. It is your responsibility to insure that the current setup is correct!

1. Click Calibration on the main menu.
2. Select Teach from the event drop down selection box.

3. Enter password if prompted.
4. Perform usual calibration sequence. GageXpress Pro 3.0 will store the calculated gain and offset as the ideal setup values for this calibration sequence.
5. Done!

Mastering Tools/Parameters

The Calibration Tools screen provides access to parameters for the Readings mastered in the selected calibration sequence and the results of previous mastering operations for the sequence. This is done via two tabs available at the top of the screen.

The Mastering Tools screen provides access to the calibration values for each calibration field. It also shows the last time each calibration field was successfully mastered and provides the ability to force operators to periodically master GageXpress Pro 3.0 This is done by setting the master frequency value to something other than 0. When a value is entered in this field, GageXpress Pro 3.0 will force calibration every time the number of parts equal to the value are inspected. If the "Time based calibration frequency" check box is checked, the value will be time based. For example, if 100 is entered, the operator will be forced to master after 100 parts have been gaged. If "Time based master frequency" is checked, the operator will be forced to calibrate after 100 minutes passes.

How to require calibration:

1. Click "Mastering" button on the main menu.
2. Click Tools button.
3. Click the **Mastering Parameters** tab. The following will be displayed
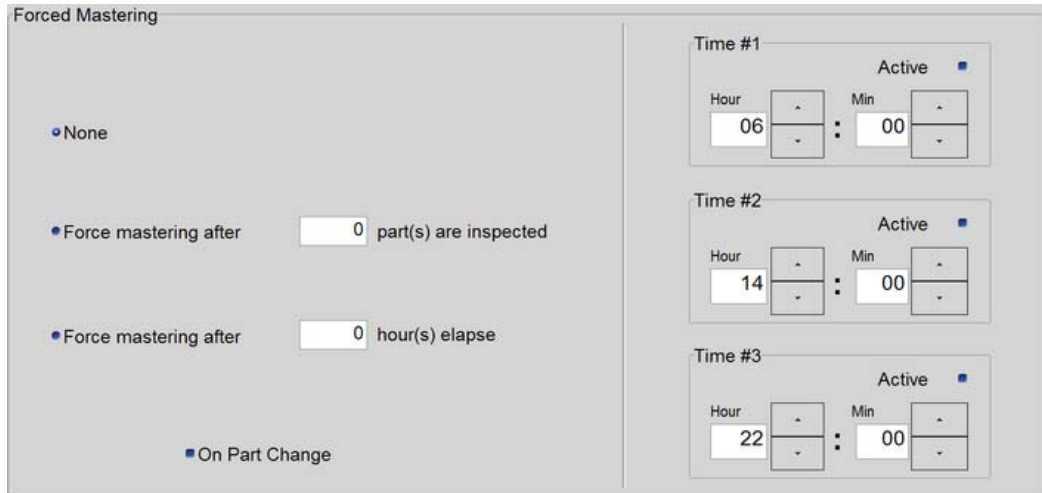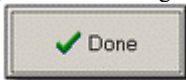
4. Select either part based or time based calibration frequency.
5. Enter the desired number of parts or number of hours in the frequency field.
6. Done!

How to enter new master certification values:

1. Click "Master Transducers" button on the main menu.
2. Click Tools button.
3. The table displayed on the Master Tools screen shows all calibration fields in this Master Sequence. It also shows the minimum, maximum, and mean master values currently used for each calibration field. Click on the field you wish to change and type the new value.
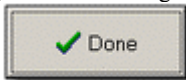
4. Click the _____ button.
5. Enter password if prompted.
6. Done!

Calibration Tools/Log

The Mastering Log tab shows a log detailing the results of past mastering operations. Charts are shown for the selected calibration field showing the variation in gain and offset values for the calibration field. The Mastering Log button shows the time and dates each calibration operation took place.

Use this screen to

- View consistency of mastering gain and offset parameters
- View time stamped mastering log including when the system was taught
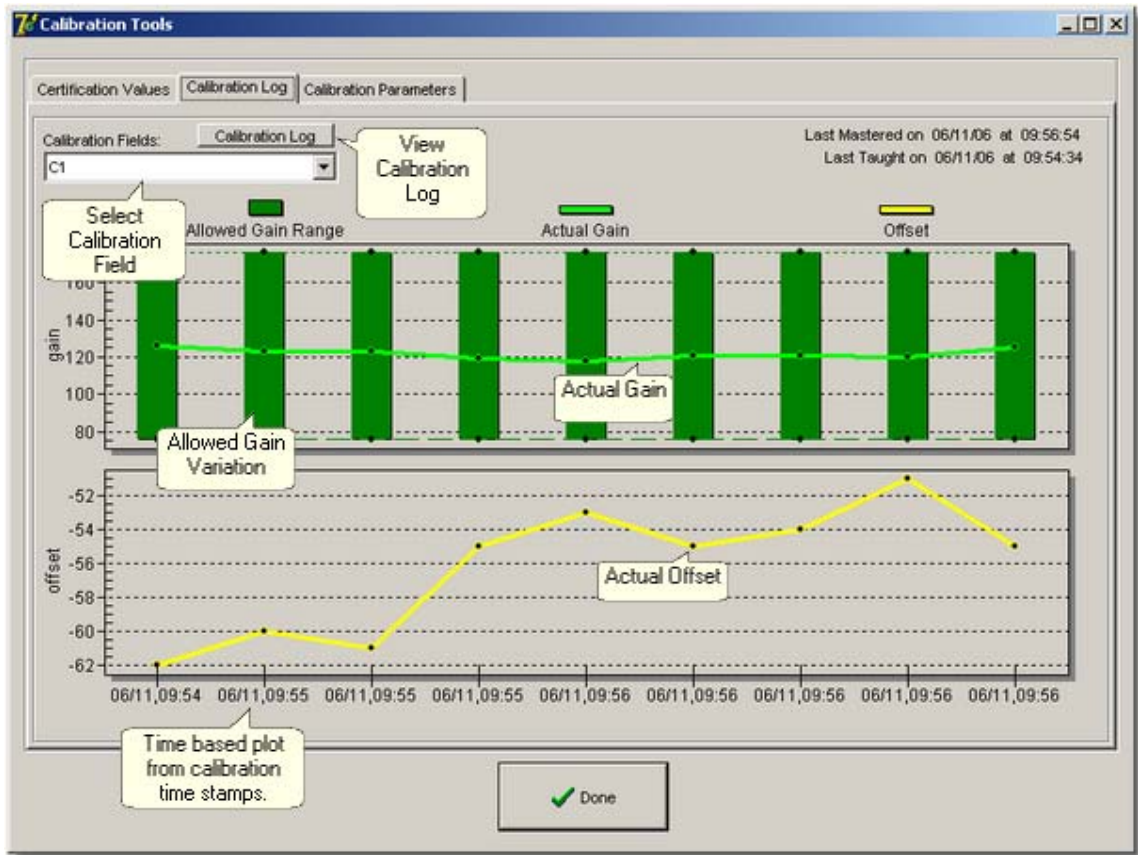
Each time a calibration field is mastered, new gain and offset values are calculated and stored in GageXpress Pro. These values are plotted on the chart shown above. The gain chart shows a bright green line plotted inside (hopefully) a dark green band. The band represents the allowed gain values based on the gain the system was taught during the last teach operation. The more stable the system is, the flatter the line will be. The ideal situation is that the gain line be a horizontal line. This indicates that the gain is a constant value and very little variation is taking place between mastering operations. If Solartron or Marposs Digital Probes are used, the gain line will usually be flat since they are normally only mean mastered and the gain is inherent to the probe itself.

The offset values are plotted on a line chart to show the offset variation between mastering operations. The only restriction on offset is that the transducer remains in its linear range during the mastering operation. However, the chart can be used to evaluate the health of the system. Once again, the ideal situation is that the offset remain essentially flat. You should see the offset line vary somewhat randomly over time. If the offset value starts to trend in either an upward

or downward direction, then something is influencing the system. The most likely causes are loose probes, contaminated air lines, and contaminated gage surfaces.

How to view system calibration stability

1. Click "Mastering" button on the main menu.
2. Click Tools button.
3. Click the **Mastering Log** tab.
4. Select desired calibration field from the drop down list. Evaluate displayed charts.
5. Done!

How to view the calibration history log

1. Click "Mastering" button on the main menu.
2. Click Tools button.
3. Click the **Mastering Log** tab.
4. Click Log button.
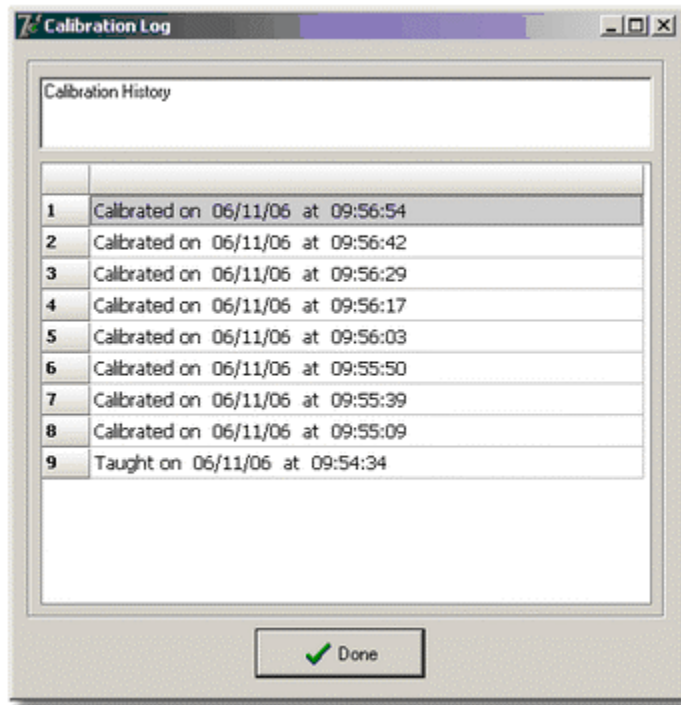
5. Done!

Setup Screen

The Setup screen is used to position or adjust each Input to make sure that it is being used in its proper operating range. Each Input is linked to a specified device type which has an inherent physical operating range. The gage and masters must be designed to operate within this range for the overall system to perform accurately or different transducers must be selected. The Setup screen is used to physically adjust the input transducer so that it is functioning in its designed operating range.

Use this screen to:

- Verify transducers are working
- Adjust transducers to be used in their designed operating range
- Assign Solartron Orbit addresses
- Assign Marposs DigiCrown addresses
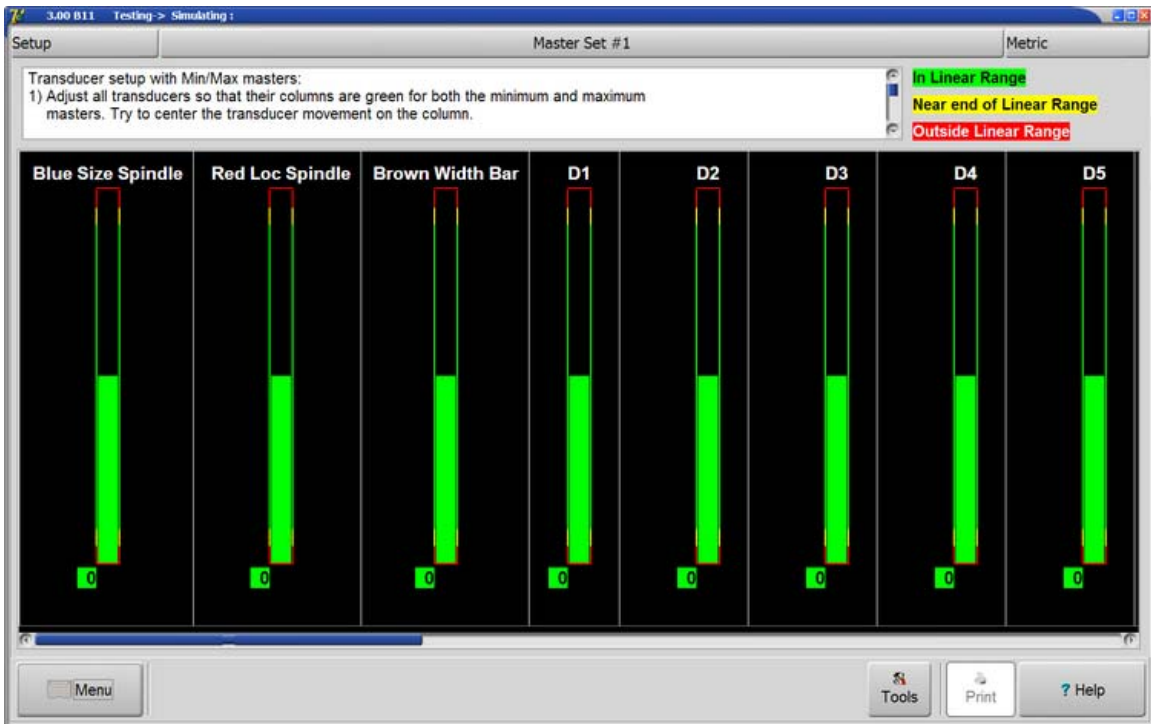
The column displays the entire operating range of the transducer. The transducer must be adjusted so that its value remains in the green area over the entire range of operation for the gage. The minimum and maximum masters generally encompass this range. If the transducer is mean mastered, you usually want to adjust it so that it reads near 0 on the mean master. Deviations from this will be displayed in the setup instructions at the top of the screen. If the transducer is min/max mastered, you usually want to adjust it so that it reads equally about 0 when the minimum and maximum masters are placed in the gage. For instance, a transducer might be adjusted so that it reads -1505 counts when the minimum master is in the fixture and 1482 counts when the maximum master is in the fixture. This insures that the gage is using the central portion of the transducers operating range.

	Setup Screen Button Panel
Tools	Displays Setup Tools screen providing access to Solartron Orbit Network setup, Marposs DigiCrown setup, and transducer balance groups.

Solartron Orbit Configuration

The Solartron Orbit Network setup screen is used to set the address of each Orbit module. The proper address for each module must be entered in GageXpress Pro 3.0 before the module can be used to inspect parts. This screen also provides a live test mode allowing you to test each module before use.
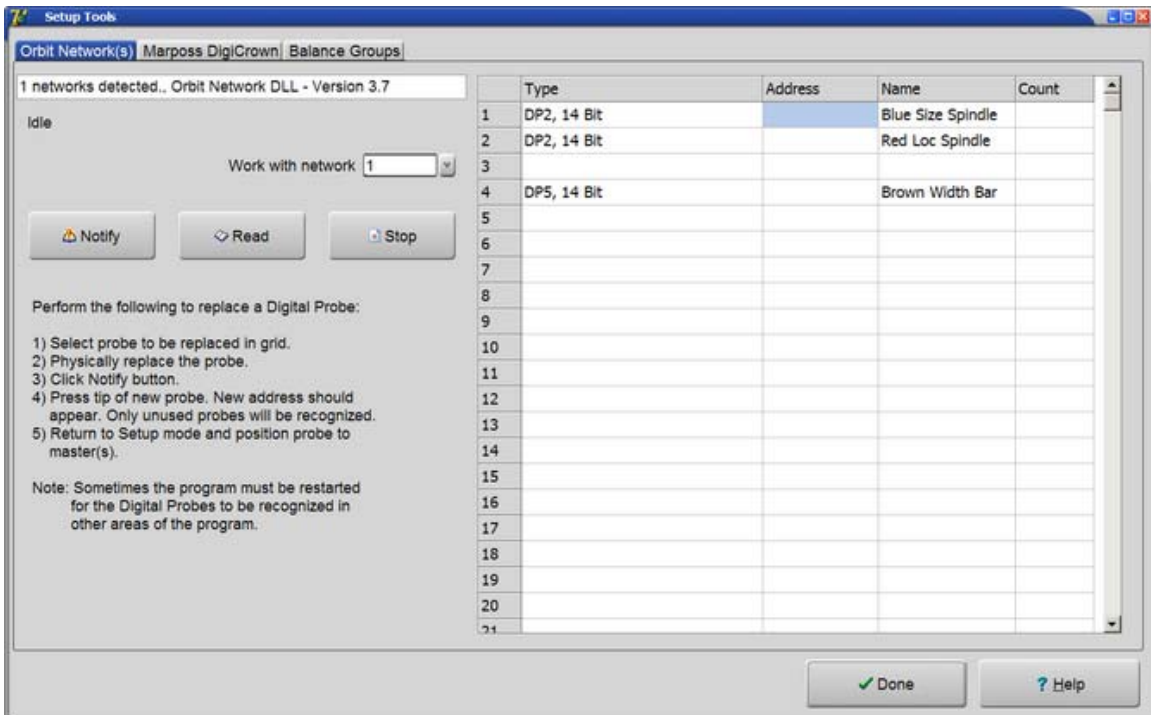
Orbit addresses are most commonly entered in GageXpress Pro 3.0 by using the Orbit Notify feature. The Notify feature allows the address to be automatically detected by obtaining the address of the module transducer currently moving. The module addresses for DIOM modules must be manually entered in the hardware configuration area of GageXpress Profile.

How to use Notify to obtain Orbit addresses

1. Click "Setup Transducers" button on the main menu.
2. Click Tools button.
3. Click the address cell you wish to obtain.
4. Click the Notify button. The following message will be displayed.
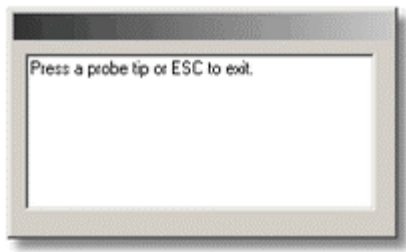
5. Physically press and release the Orbit transducer you want to enter. The address will be read and entered. You may have to move the transducer multiple times. Addresses for DIOM modules must be entered manually in GageXpress Profile.

Balance Groups

Some inspection tasks require that the transducers be precisely matched. The process of matching transducers is called balancing. GageXpress Pro 3.0 provides tools for balancing one or more transducers to a master input.
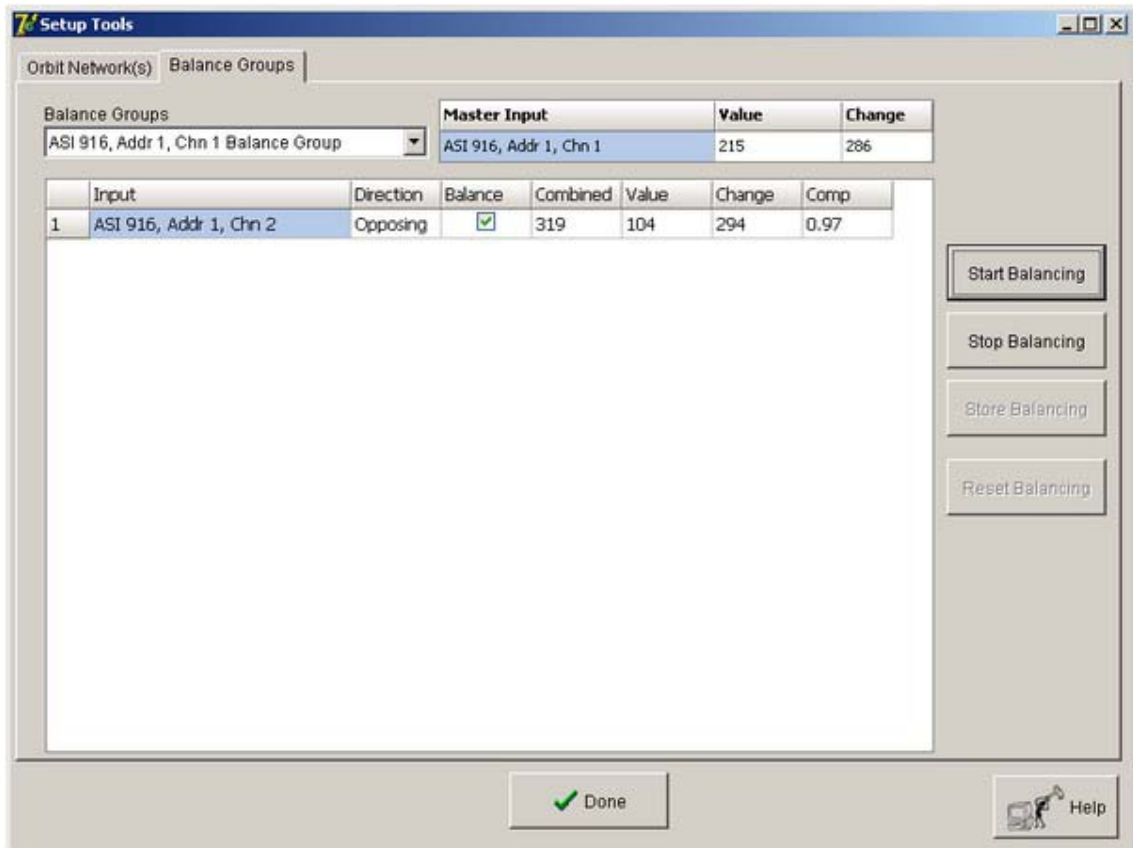
The balancing process is started by clicking the Start Balancing button.

Gage Screen

The Gage screen is used to inspect parts. The screens displayed here are setup specific. Most of the time, a setup will be created using screens with custom graphics, text, and data fields which match the gage and part being used. This ability is one of the features that makes GageXpress Pro 3.0 such an easy to use system for operators. The instructions and graphics shown on these pages make the gages easy to use even for new operators.
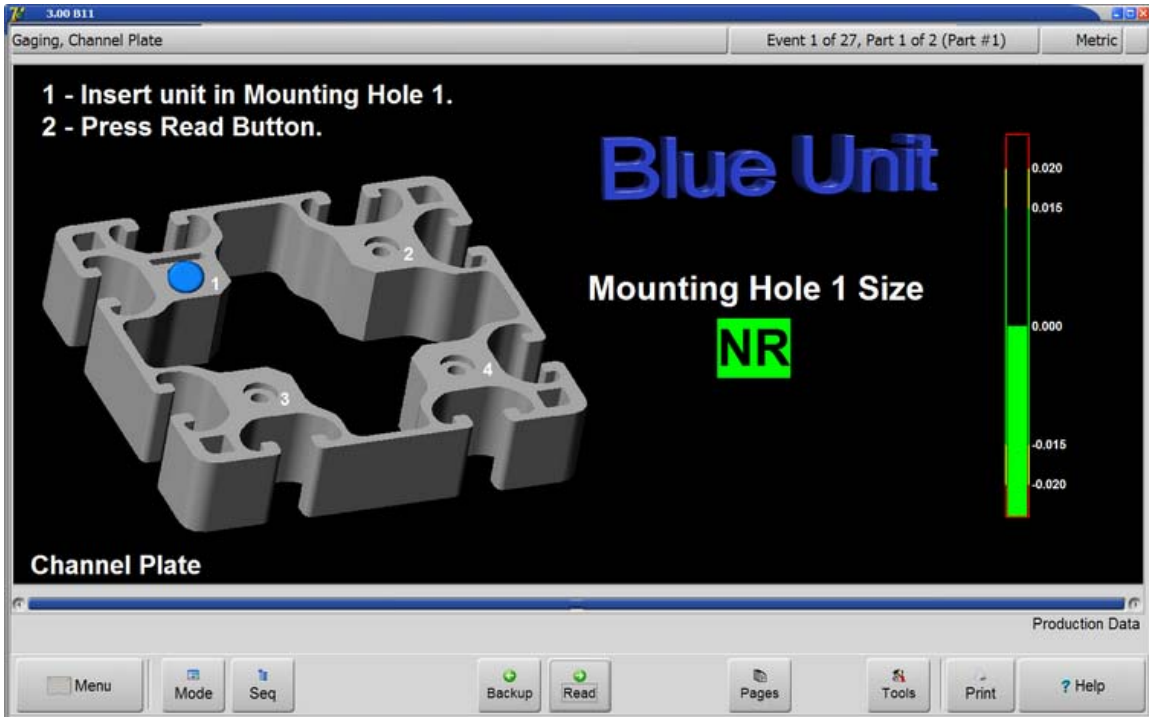
Data Field Condition	Description
value shown on Green background	The value represents an acceptable check.
value shown on Yellow background	The value exceeds an approach limit and is approaching a specification limit.
value shown on Red background	The value exceeds a specification limit. The part is a REJECT!
value shown on White background	The value represents a measurement, reading, or input. These fields to not have accept/reject limits and therefore do not display on red/yellow/green backgrounds.
NMV	No movement has been observed on one or more Inputs used for the displayed measurement. The input movement requirement can be enabled or disabled on the Gaging Tools/Testing and Faults Options screen.
LT	One or more Inputs used for the displayed measurement are currently reading outside their linear range. The linear travel requirement can be enabled or disabled on the Gaging Tools/Testing and Faults Options screen. This requirement should not normally be disabled when using the equipment to inspect parts.
NR	No reading can be taken from one or more Inputs used for the displayed measurement. This error is device specific but normally occurs if the input does not respond to read requests. An example would be a Solartron Orbit module for which the address has not been set.
NoVal	The measurement being displayed has not been measured yet. Therefore No Value is

		available for display.
Mode		Displays mode selection screen.
Seq		Displays inspection sequence selection screen.
Backup		Backs up one event.
Read		Reads all measurements being taken on the current event and moves to the next event.
Pages		Displays page selection screen.
Tools		Displays gaging tools window. See Gaging Tools.

Measurement Faults

GageXpress Pro 3.0 monitors inputs for a number of fault conditions. The existence of one or more faults can affect measurement results. The following describes the various fault conditions and how they affect system operation. The occurrence of faults on manual applications doesn't normally cause concern since an operator is present who can readily identify the problem. On automatic applications however, there is no operator observing the part inspection and fault conditions can negatively affect system operation if proper precautions are not taken to have GageXpress Pro 3.0 notify the PLC of the faults. In any case, it is important to understand the various fault conditions that can occur and how they are detected.

Term	Definition

No Value	Measurement not completed.
	
	Reasons:
	
	  1. Intentionally skipped. (ie measurement not gaged)
	  2. Input Movement fault. (NMV)
	  3. Input Linear Travel Fault (LT)
	  4. Input No Reading Fault (NR)
	
	Affects:
	
	  1. No Value measurements are not evaluated when updating counters. Therefore they are ignored as far as the accept/reject outputs are concerned.
	  2. No Value measurements are ignored on all chart screens.
	
	Parts without any valid measurements are not stored.

Movement Fault	No movement has been observed on one or more Inputs used for the displayed measurement. The input movement requirement can be enabled or disabled on the Gaging Tools/Testing and Faults Options screen.
	
	How detected:
	
	  1. Manual: Inputs are read when a new part inspection sequence is started or when first entering the mastering screen.
	  2. Automatics: Input is read when the Machine Cycled signal is received from the PLC. The gage station should be empty at this time and the input free state is therefore read.
	
	Inputs are read when the part is gaged. A difference between this value and the value read at Machine Cycle or start of gage sequence should be seen. Movement of ½% of the input linear travel is required.

Linear Travel Fault	One or more Inputs used for the displayed measurement are currently reading outside their linear range. The linear travel requirement can be enabled or disabled on the Gaging Tools/Testing and Faults Options screen. This requirement should not normally be disabled when using the equipment to inspect parts.

No Reading Fault	No reading can be taken from one or more Inputs used for the displayed measurement. This error is device specific but normally occurs if the input does not respond to read requests. An example would be a Solartron Orbit module for which the address has not been set. This is a hardware fault and cannot be disabled.

It is important to make use of the GageXpress Pro 3.0 Fault output on automatic machines. Its use will help you design a measurement system capable of reacting appropriately when fault conditions occur.

The Machine Fault output is used to inform the PLC of a measurement fault. It is turned on whenever:

- An input Movement Fault is detected
- An input Linear Travel Fault is detected
- An input No Reading Fault is detected
- A part type is not identified (if multiple part programs are present)
- A Take Data signal is received for an empty gage station

When a Fault is detected:

- The Fault output is turned on.
- A message is displayed on the screen identifying the fault and the inputs involved.
- The Fault output is turned off when the screen message is cleared.
- Part gaging is aborted. The part accept/reject outputs are not given.
- Machine cycling will not continue until the message is cleared.

Gaging Tools

The gaging tools screen provides access to a number of features useful while inspecting parts. The screen contains three tabs providing options for

- Part Correlation
- Testing and Fault detection
- Part Storage

All three areas affect how a measurement is taken or what happens with the data when it is stored.
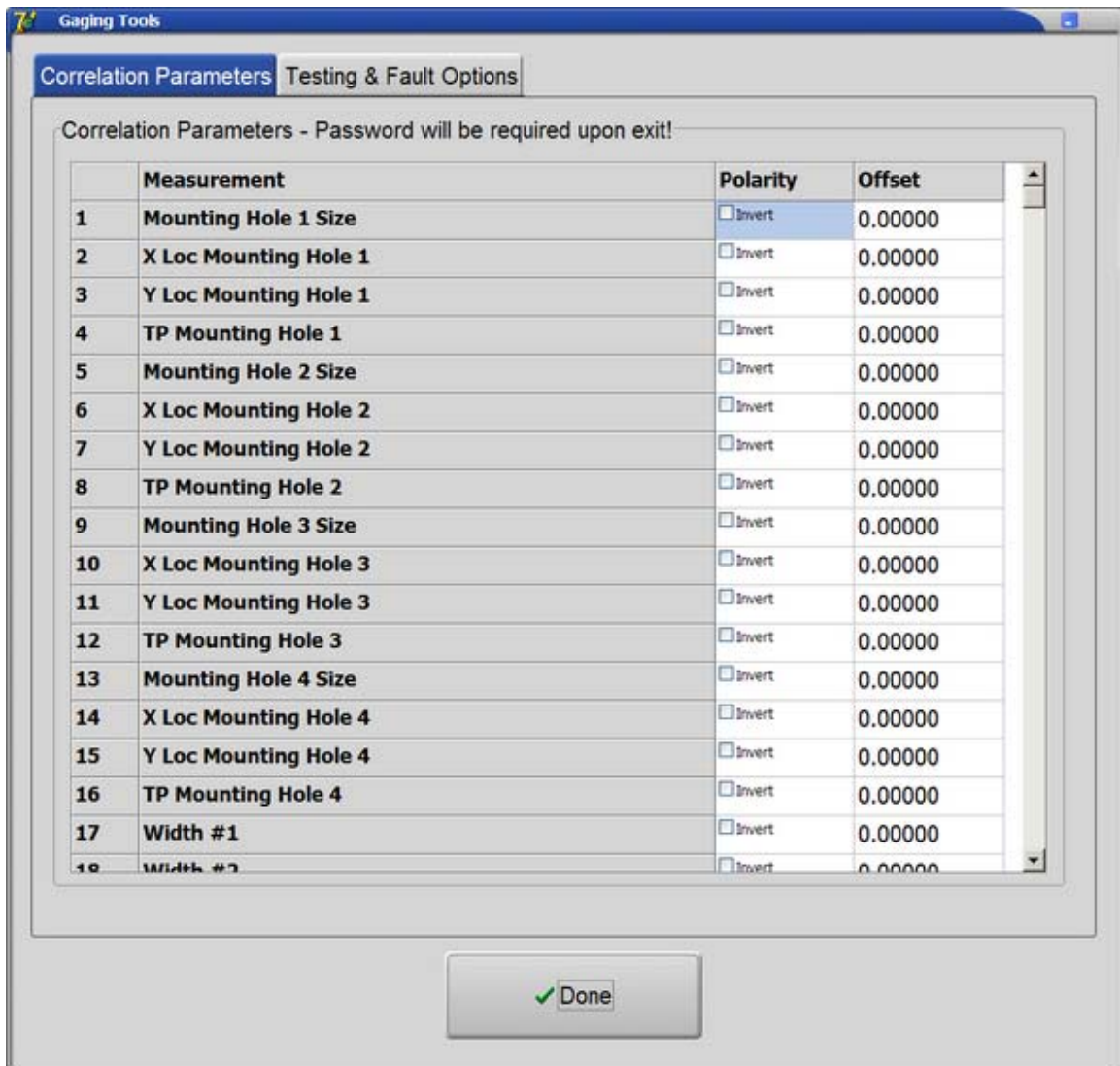
Correlation Parameters

Correlation parameters can be entered to help achieve correlation between gages connected to GageXpress Pro 3.0 and other inspection equipment. Each measurement can have an offset entered for it or have its polarity changed.

Measurement offsets are used to help make the measurement system correlate with other systems. This is generally used to account for known differences between the gage and a known standard. As long as the difference is constant, there is no harm in using a fixed offset to make the part data from the two systems correlate.

The polarity of a measurement is inverted (multiplied by -1) in circumstances where a datum changes or in some rate instances to account for how a transducer is used to make a measurement. A common application where this is required is when inspecting the location of a bore from two sides of a part. The datum will be to the right when you face the bore on side #1 and to your left when you face side #2. The polarity for one of the locations must be inverted so that a smaller value always indicates that the hole is getting closer to the datum. A common mistake is for users to change the polarity of a measurement when they actually want to change the polarity of an input. Changing input polarities is done in GageXpress Profile on the hardware screen that matches the input type.

Gaging Tools

Correlation Parameters | Testing & Fault Options

Correlation Parameters - Password will be required upon exit!

	Measurement	Polarity	Offset
1	Mounting Hole 1 Size	☐ Invert	0.00000
2	X Loc Mounting Hole 1	☐ Invert	0.00000
3	Y Loc Mounting Hole 1	☐ Invert	0.00000
4	TP Mounting Hole 1	☐ Invert	0.00000
5	Mounting Hole 2 Size	☐ Invert	0.00000
6	X Loc Mounting Hole 2	☐ Invert	0.00000
7	Y Loc Mounting Hole 2	☐ Invert	0.00000
8	TP Mounting Hole 2	☐ Invert	0.00000
9	Mounting Hole 3 Size	☐ Invert	0.00000
10	X Loc Mounting Hole 3	☐ Invert	0.00000
11	Y Loc Mounting Hole 3	☐ Invert	0.00000
12	TP Mounting Hole 3	☐ Invert	0.00000
13	Mounting Hole 4 Size	☐ Invert	0.00000
14	X Loc Mounting Hole 4	☐ Invert	0.00000
15	Y Loc Mounting Hole 4	☐ Invert	0.00000
16	TP Mounting Hole 4	☐ Invert	0.00000
17	Width #1	☐ Invert	0.00000
18	Width #2	☐ Invert	0.00000

✓ Done

How to enter an offset for a measurement:

1. Click Gaging on the main menu.
2. Click **Tools**.
3. Click the Offset column for the measurement you wish to enter an offset for.
4. Type in the offset value. This value will be added to the current measurement value.
5. Click [✔ Done] .
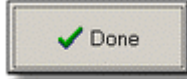
How to change the polarity for a measurement:

1. Click Gaging on the main menu.
2. Click **Tools**.
3. Check or clear the check box in the polarity column for the measurement you wish to change the polarity for. A check multiplies the current measurement value by -1. Clearing the check box leaves the measurement value alone.
4. Click [✔ Done] .
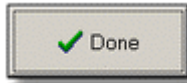
Testing and Fault Options

The Gage Tools Testing and Fault Options tab displays the current measurements with faults and the reason for the fault. The transducer fault options can also be enabled or disabled here. There are also options useful for testing applications without having the actual hardware available.
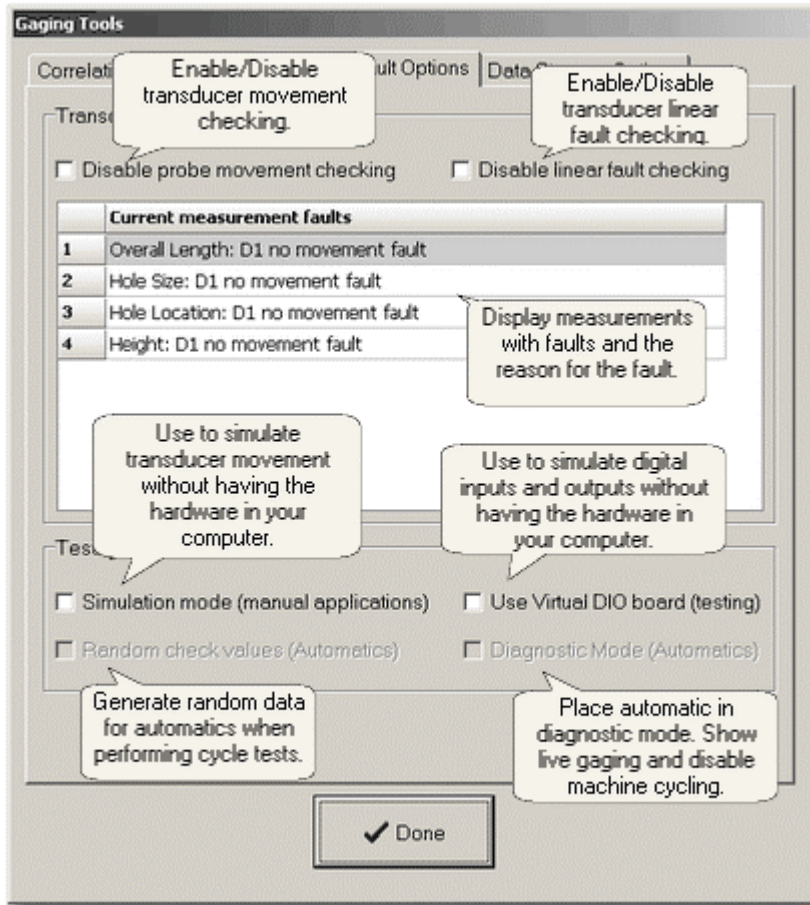
☑ Disable probe movement checking
This option disables the requirement that transducers show a change before they are used to take a measurement. Normally, GageXpress Pro 3.0 requires that a transducer show movement before it can be used. This allows detection of broken transducers and also prevents operators from loading a part and continually regaging it. Probe movement is also required before calibration takes place. If a check is placed in this field, the requirements just discussed are eliminated. This may be useful for testing purposes.
☑ Disable linear fault checking
GageXpress Pro 3.0 requires that transducers be operating in their linear range before being used to take a measurement. This requirement can be disabled by placing a check in the "Disable linear fault checking" field. This should never be done except during brief periods for testing purposes. Under almost every circumstance you would want GageXpress Pro 3.0 to verify this transducer values before using them in a measurement.

Current measurement faults
1	M1: D1 no movement fault

This area shows all measurements that currently have faults associated with them and the transducers responsible for the fault(s).

☑ Simulation mode (manual applications)

This option is used to test manual GageXpress Pro 3.0 applications before installing them on the final computer hardware. Activating this displays a slider on the left hand side of the gage screen that can be used to change transducer values and therefore simulate taking measurements. Columns and data fields will respond to the movement of the slider.

☑ Use Virtual DIO board (testing)

This option is used to test GageXpress Pro 3.0 applications that use digital I/O to interface with other devices. GageXpress Pro 3.0 can use internal computer memory to simulate the presence of a DIO card. This is referred to as a Virtual DIO board since it does not really exist. A GageXpress Pro 3.0 companion product is available for use in testing your GageXpress Pro 3.0 application in this manner.

☑ Random check values (Automatics)

This option is used to test the operation of GageXpress Pro 3.0 automatic applications. It allows random measurement data to be generated as the machine is cycled. This can be useful for sequence testing purposes before the actual gaging mechanics are available. Note that you cannot verify measurement calculations using this option as the measurement math is not executed. All measurement values are the result of a random number generator.

☑ Diagnostic Mode (Automatics)

Diagnostic mode is used to troubleshoot gaging mechanics on automatic machines. Activating this mode causes GageXpress Pro 3.0 to display the part measurements on the screen and continually scan the measurement math. This allows you to place test parts in the machine station or manually activate the transducers and see the resulting effect. GageXpress Pro 3.0 drops out of run mode when diagnostic mode is activated and will not respond to PLC machine cycle or start gage requests. This is a safety measure to help prevent the machine from moving when someone may be working with the gage mechanics.

Automatic Gage Testing Options

The "Generate random check values" option causes the GageXpress Pro 3.0 to generate random data for each check each time the machine is cycled and a start gage is received. This allows testing of the GageXpress Pro 3.0 machine sequencing without being connected to a machine and cycling parts.

The "Generate random check values" option must only be used for testing purposes. GageXpress Pro 3.0 DOES NOT inspect parts if this option is active. All stored data is randomly generated.

The second option is used to emulate a programmable logic controller (PLC) internally. When checked, this option reconfigures the DIO so that it can be used to emulate the interface to a PLC without the PLC (or DIO hardware) being present. GageXpress Pro 3.0 provides a test utility located in the GageXpress Pro\System directory that can be used to manually emulate a PLC other digital input source. The program name is gmMtu.exe.
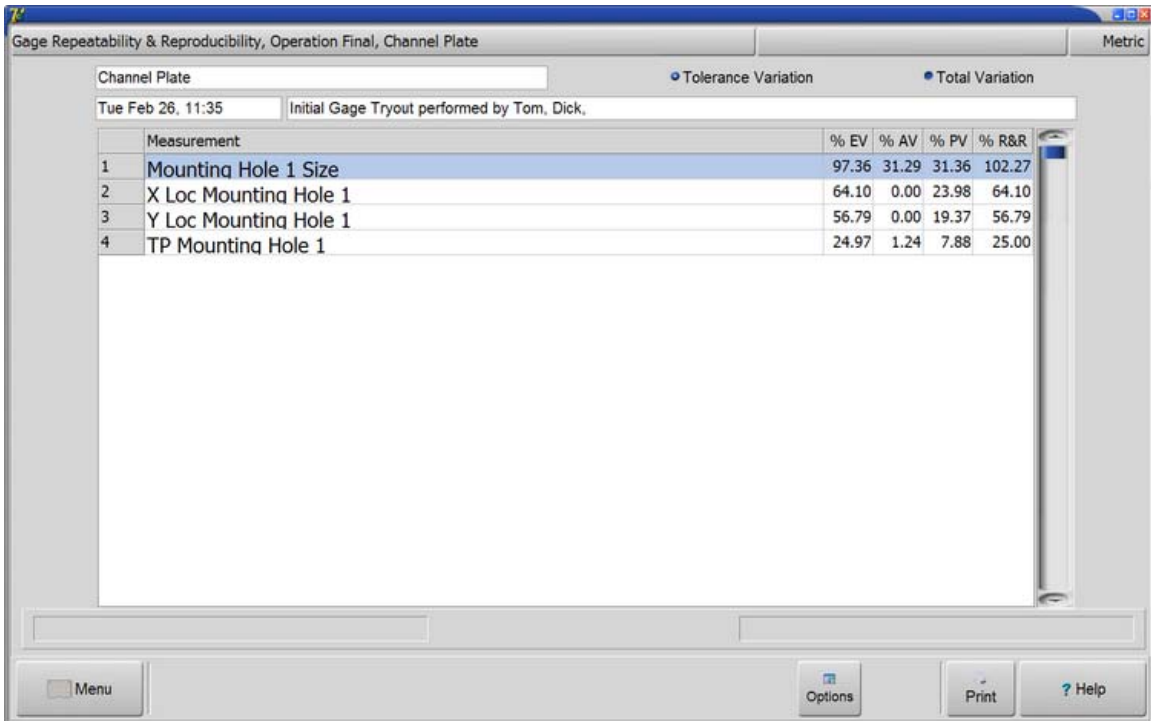
Gage Repeatability & Reproducibility (GR&R)

Gage performance can be measured using the Gage Repeatability & Reproducibility (GR&R) features in GageXpress Pro. GageXpress Pro 3.0 supports the AIAG Third Edition average and range method of evaluating gage performance making it easy to evaluate gage performance. Each GR&R study performed is saved so that a history of the gage's performance over time is created.
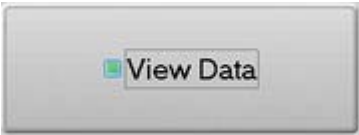
Use this screen to:

- Evaluate the gage system for repeatability
- Compare repeatability results over time

Gage Repeatability & Reproducibility, Operation Final, Channel Plate						Metric
Channel Plate		○ Tolerance Variation		● Total Variation		
Tue Feb 26, 11:35	Initial Gage Tryout performed by Tom, Dick,					
Measurement		% EV	% AV	% PV	% R&R	
1 Mounting Hole 1 Size		97.36	31.29	31.36	102.27	
2 X Loc Mounting Hole 1		64.10	0.00	23.98	64.10	
3 Y Loc Mounting Hole 1		56.79	0.00	19.37	56.79	
4 TP Mounting Hole 1		24.97	1.24	7.88	25.00	

Menu   Options   Print   ? Help

	GR&R Screen Button Panel
Options	Select various GR&R options.
GageXpress Pro 3.0 GR&R Option Menu	

GR&R Options	Description
	Displays data screen for selected measurement.
	Displays GR&R selection screen. Old studies can be selected for viewing or a new study started.
	Displays GR&R export screen.
	Deletes current GR&R study. The current study is the study currently viewed on the screen.

The GR&R summary screen shows GR&R results for all measurements inspected during the study. The percentages are calculated against the measurement tolerances by default. The Total Variation text can be clicked to have the percentages recalculated based on the range found in the GR&R parts.

Data for each measurement can be viewed by double clicking the measurement or selecting it and pressing the enter key.

How to delete a GR&R study

1. Click Perform or view GR&R on main menu. The last GR&R that was performed will be displayed.
2. Click the Options button.

3. If you want to delete the current study, then click the Delete button. Otherwise click the GR&R Studies button.
4. Click the Existing GR&R Studies tab.
5. Select the study you wish to delete and then click the Delete button.
6. Click **Yes** when prompted with the delete warning.
7. Done!

How to recalculate GR&R results with a new measurement tolerance

1. Change tolerances for desired measurements. See Edit Parameters.
2. Click "GR&R" on main menu.
3. The GR&R summary screen will be displayed with calculations based on the new measurement tolerances.
4. Done!

New GR&R

The parameters for a GR&R study are selected using the screen shown below. This screen is displayed when the GR&R Studies button is clicked on the GR&R options menu or when Gage Capability is selected on the gage Mode screen.

Use this screen to:

- Select # of operators to use for GR&R study
- Select # of trials to use for GR&R study
- Select # of parts to use for GR&R study
- Enter operator names
- Select GR&R study sequence
- Enter GR&R study comment

GageXpress Pro 3.0 performs average and range GR&R studies as defined in the AIAG Measurement Systems Analysis Third Edition. The number of operators can be set to 1, 2, or 3 and the number of trials can be set to 2 or 3. Number of parts can be set from 3 to 10. Operator names are optional. An optional comment can also be entered for use identifying GR&R later.

If the selected combination of operator, trial, and part is less than 30 parts, the parameter headers are displayed in red to warn that the number of parts inspected is statistically questionable.

The GR&R sequence can be selected from one of three options. These can best be described with an example. Each of the available part sequences will be shown for a 2 operator, 2 trial, 3 part GR&R.

Operator/Trial/Part

nth Part gaged	Current Operator	Current Trial	Current Part
1	1	1	1
2	1	1	2
3	1	1	3
4	1	2	1
5	1	2	2
6	1	2	3
7	2	1	1
8	2	1	2
9	2	1	3
10	2	2	1
11	2	2	2
12	2	2	3

Trial/Operator/Part

nth Part gaged	Current Operator	Current Trial	Current Part
1	1	1	1
2	1	1	2
3	1	1	3
4	2	1	1
5	2	1	2
6	2	1	3
7	1	2	1
8	1	2	2
9	1	2	3
10	2	2	1
11	2	2	2
12	2	2	3

Part/Operator/Trial

nth Part gaged	Current Operator	Current Trial	Current Part
1	1	1	1
2	1	2	1
3	2	1	1
4	2	2	1
5	1	1	2
6	1	2	2
7	2	1	2
8	2	2	2
9	1	1	3

10	1	2	3
11	2	1	3
12	2	2	3

How to perform a new GR&R

1. Click "GR&R" on main menu.
2. Click the Options button.
3. Click GR&R Studies button.
4. Select desired # of operators, # of trials, and # of parts.
5. Enter operator names if desired.
6. Enter comment for GR&R study.
7. Select desired sequence.
8. Click Ok. The gaging screen will appear with the expected operator, trial, and part shown at the top. Gage the required number of parts to complete the GR&R.
9. After all parts have been gaged, the GR&R summary screen will automatically appear with the GR&R results.
10. Done!

GR&R Data

The GR&R Data screen is displayed when a measurement is either double clicked or selected and then the enter key is pressed. This screen shows the individual part data for the GR&R.

Use this screen to:

- View GR&R data on screen
- Print GR&R report for individual measurements
- Regage a part in the GR&R study

The GR&R Data screen displays data for one measurement and one operator. The displayed measurement and operator can be selected using the drop down lists. The Print button prints a GR&R data sheet for the selected measurement . The **Regage** button allows you to re-gage the part selected in the data grid. When a part is re-gaged in a GR&R, all measurement data for the selected part is replaced ... not just the measurement you are currently viewing.

How to regage a GR&R part

1. Click "GR&R" on main menu.
2. Double click a measurement in the GR&R summary grid. Usually the measurement which has the highest GR&R % is used.
3. Select the Operator who gaged the part you need to replace using the drop down list.
4. Select the part to be replaced in the data grid.
5. Click the **Regage** button.

6. The GR&R gaging screen will be displayed. Perform the gaging sequence normally. After the part has been gaged, the GR&R summary screen will appear with the new results.
7. Done!

GR&R History

All GR&R studies performed by GageXpress Pro 3.0 are time stamped and saved. The History window provides access to previously performed GR&R studies for the currently selected part. The GR&R studies are presented in the grid sorted by time/date with the most recent study listed first. The GR&R comment is listed for reference.

Use this screen to:

- Select a past GR&R to review and/or print
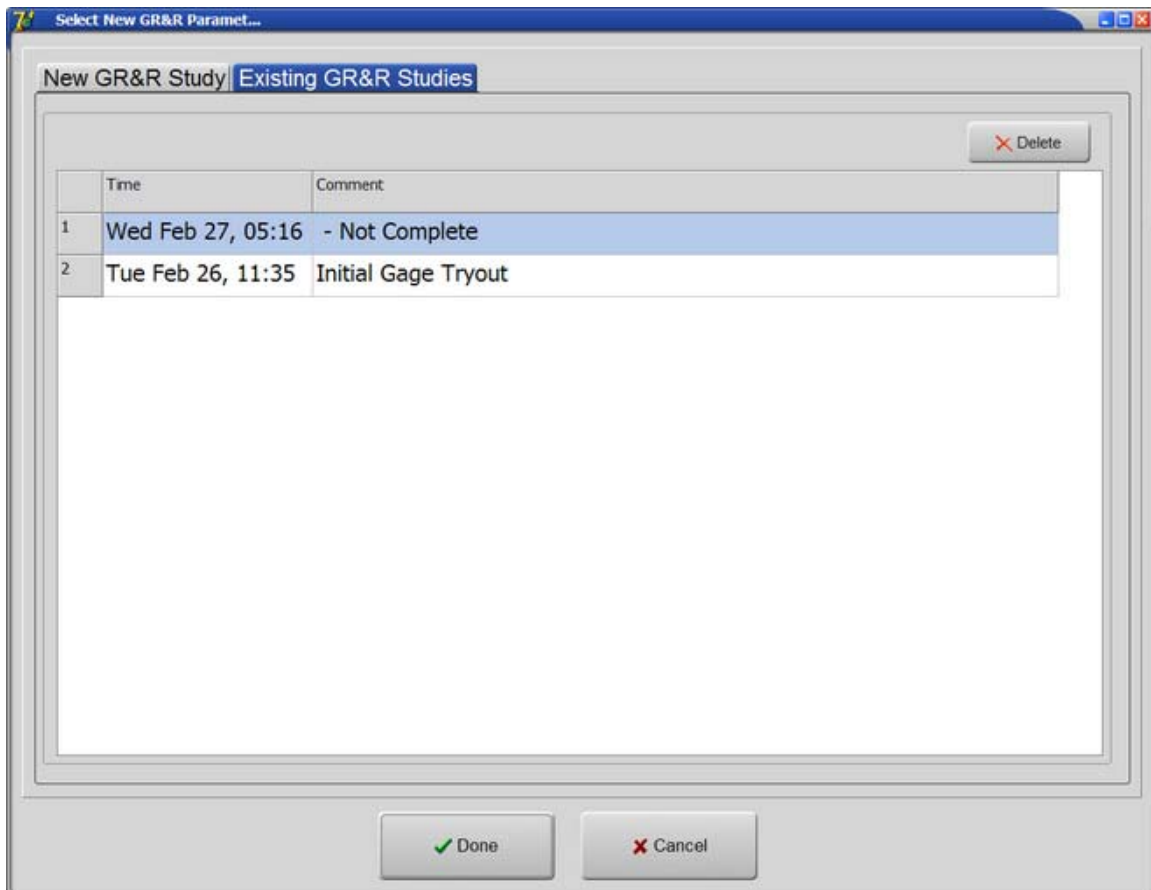
How to select an old GR&R study for viewing

1. Click "GR&R" on main menu.
2. Click the Options button.
3. Click GR&R Studies button.
4. Click the Existing GR&R Studies tab.
5. Select the desired GR&R from the list of studies.
6. Click Done button. The GR&R summary screen is displayed with the selected GR&R study. You can now review it, print it, and even re-gage parts in the study.
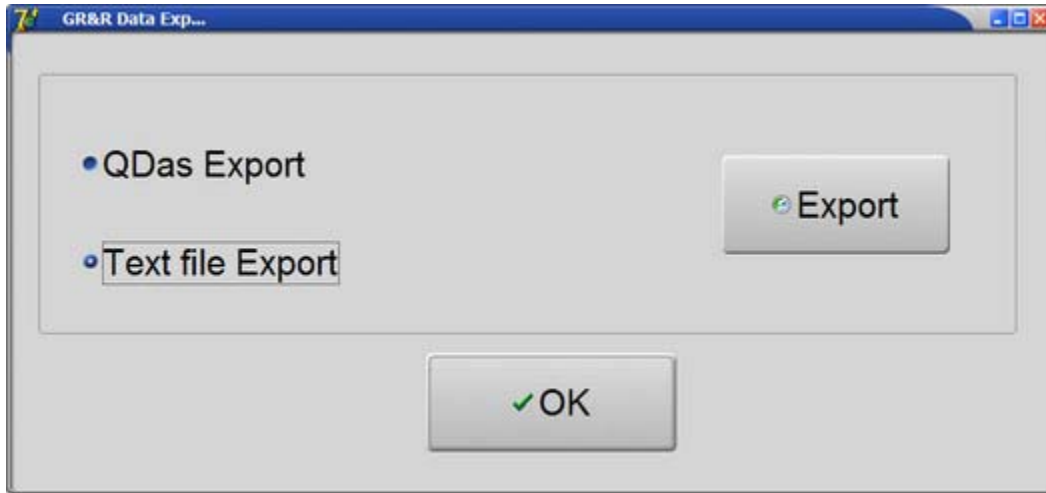7. Done!

GR&R Data Export

The GR&R Data Export window is used to export GR&R data to a text file for use in other programs.
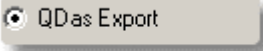
Use this screen to:

- Export the GR&R to a Q-Das compatible text file
- Export the data to a row/column based format

Data is exported using the Display Parameters currently in effect.

How to perform a Q-Das Export

1. Click "GR&R" on main menu.
2. Click the Options button.
3. Click the Export button.
4. Click ⊙ QDas Export   .
5. Click 🔵 Export   .
6. Enter data file name for export. The file name should have a DFQ extension to maintain QDas compatibility.

7. Done! Data is exported in the QDas K-field format for a Type 2 GR&R study.

How to export data to a text file

1. Click "GR&R" on main menu.
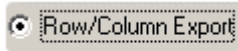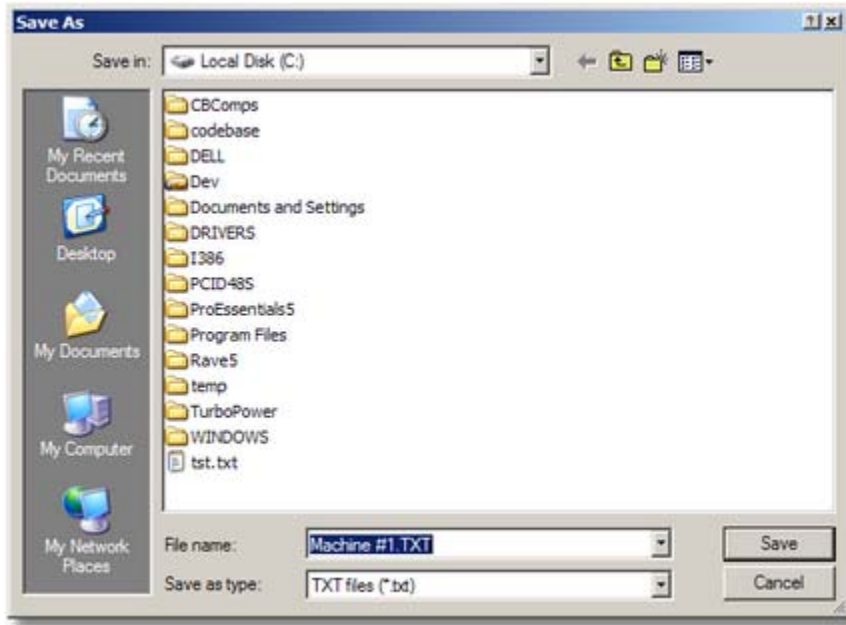2. Click the Options button.
3. Click the Export button.

4. Click   .

5. Click   .
6. Enter data file name for export. The file name extension should normally be TXT but you can use something else if desired.

7. Done! Data is exported in a row/column format with check header information at the top of the file.

Charts and Reports - Screens

GageXpress Pro 3.0 provides basic SPC charts and reports for use on the plant floor. Available screens include:

- Statistical Summary
- Histogram
- Xbar-R
- Xbar-s
- Individual and Moving Range
- Run

GageXpress Pro's focus is inspection and is not intended to be a sophisticated SPC analysis program. The basics required for process control are included along with options for moving GageXpress Pro 3.0 data to other more sophisticated SPC analysis programs. Refer to data exporting options for more information.
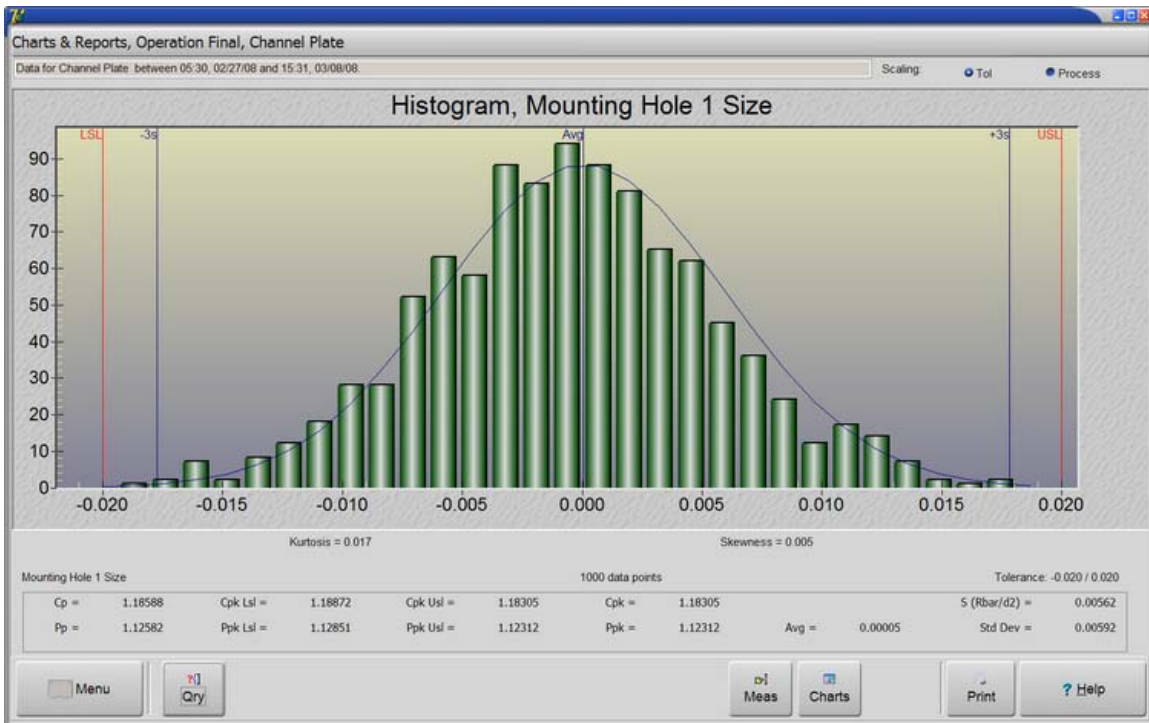
	SPC Reports Button Panel
Qry	Displays data query screen for data selection.
Meas	Select measurement to view. Pressing and holding the CTRL key and then pressing the up or down arrow keys will step through the measurements in ascending/descending order.
Charts	Select chart to view. Pressing and holding the CTRL key and then pressing the right/left arrow keys will step through each of the charts for the currently selected measurement.
GageXpress Pro 3.0 Chart Options Menu	
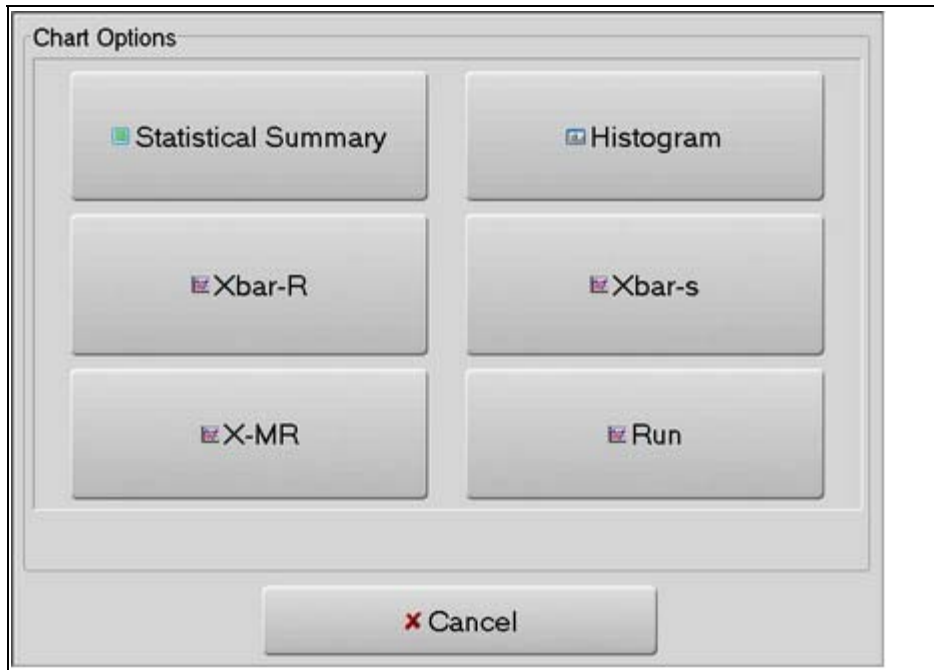
Chart Options	Description
	Displays summary report screen for all measurements.
	Displays Histogram chart for current measurement.
	Displays Xbar-R chart for current measurement.
	Displays Xbar-s chart for current measurement.
	Displays Individual and Moving Range chart for current measurement.
	Displays run chart for current measurement.

Histogram

The histogram is a graphic representation of the data distribution. The scale range is divided into a number of equal size cells and the data is then sorted to determine how many measurements fall in each cell. Bars are then created for each cell showing the number of measurements the cell contains. Since most manufacturing processes create a normal distribution, a normal curve is plotted on the histogram chart for reference. Processes creating other distribution types should be evaluated with an advanced SPC program.
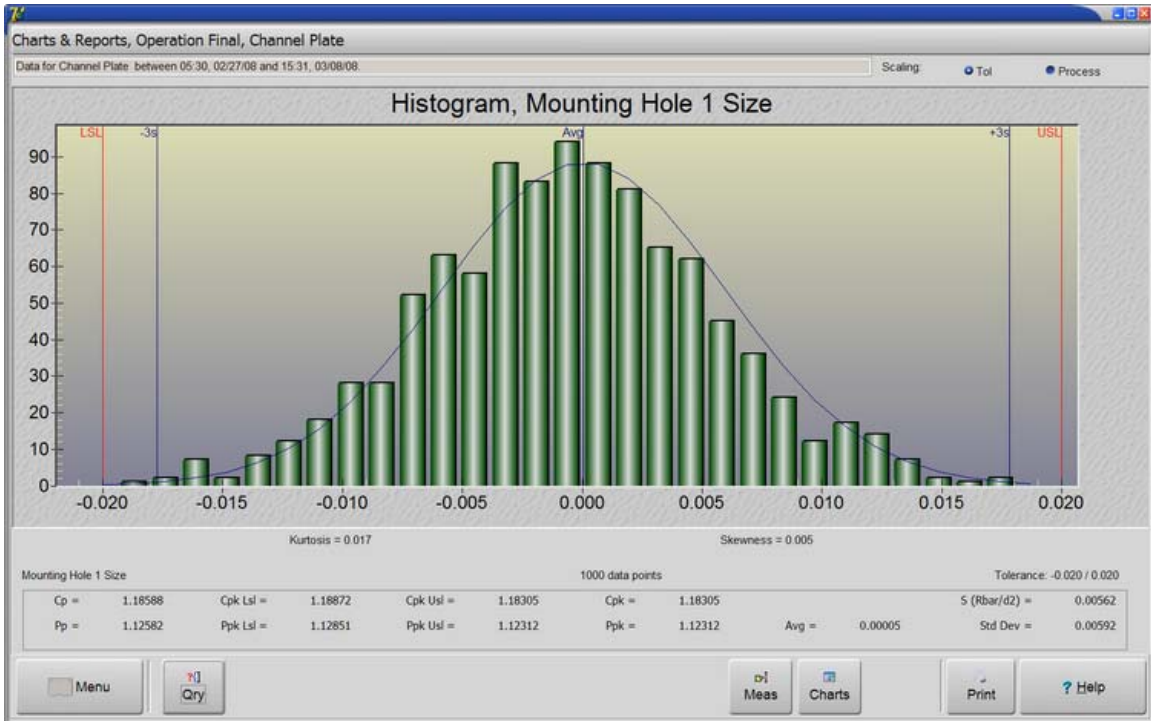
The only option available on the histogram screen is selection of the scale. The histogram can be scaled to the measurement's specification limits by clicking the Tol radio button in the upper right corner or can be scaled to the process by clicking the Process radio button. Scaling to the process will scale the histogram to the minimum and maximum data values found in the data set. Once selected, the scaling method will be applied to each measurement viewed on the histogram. The selection will also be saved when exiting the program and be applied the next time GageXpress Pro 3.0 is started.

Control Charts

Control charts are used to determine the process's center and operating range. The range portion of the chart is used to determine if a process is in control and the average portion of the chart is used to look for special causes of variation.
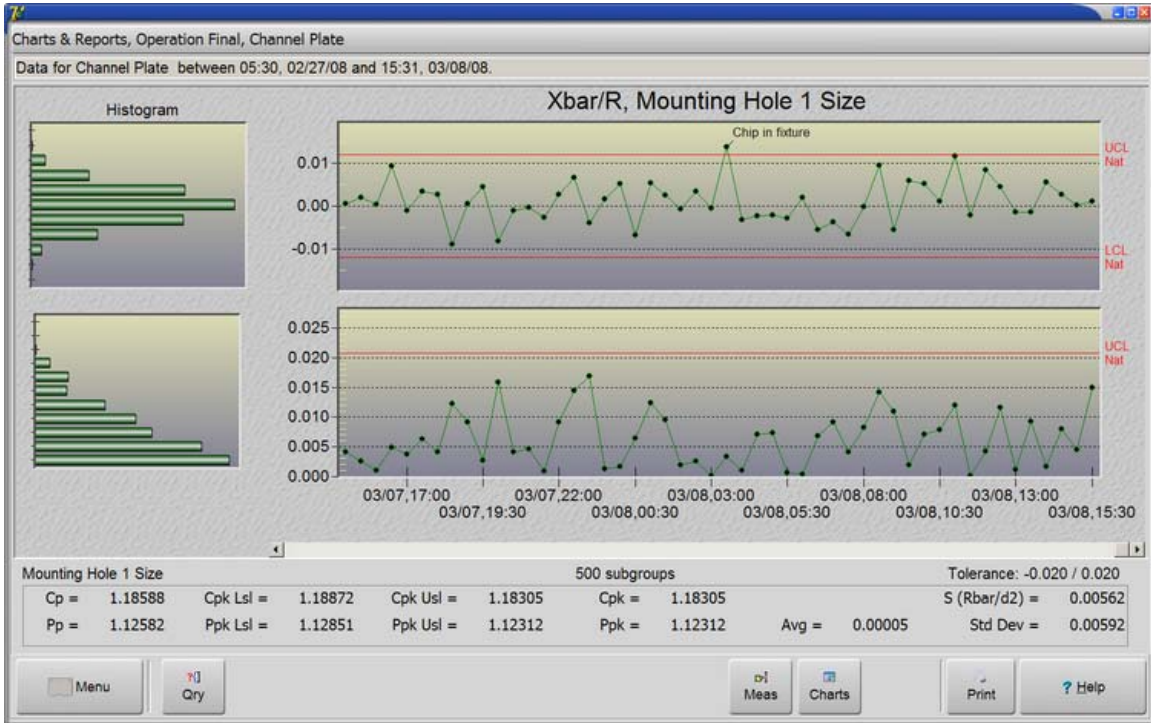
The data for each plotted point on a control chart can be viewed by moving the mouse cursor over the point to be viewed and then clicking. The mouse cursor will change from an arrow to a hand when it recognizes a point. The point values are shown in the upper right corner of the chart. If the point is clicked, the measurement values used to calculate the point are shown.
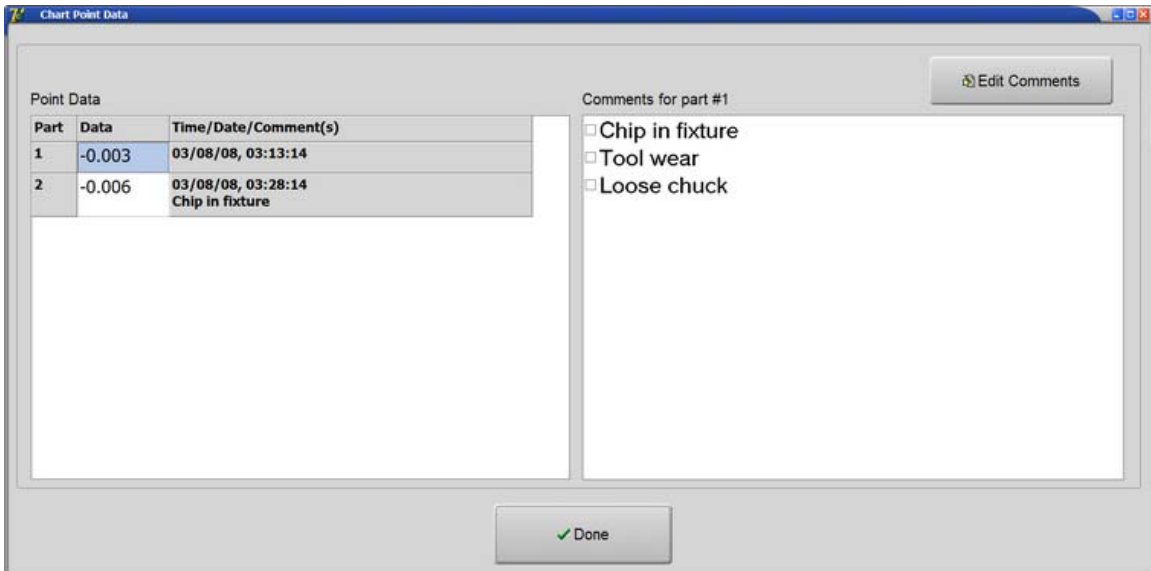
The chart point data screen can be used to view the measurement data used to calculate the point and to attach assignable causes to the part data. The data is shown on the left and the available causes are shown on the right. Comments can be attached or removed by selecting the desired part on the left and then selecting the appropriate comments on the right. More than one comment can be attached to a part. Comments attached to parts will be shown on all control charts including the run chart.

Creating Assignable Causes

The list of assignable causes is created or modified by clicking the Edit Comments button on the chart point data screen. This screen allows assignable causes to be created and deleted. If an assignable cause is deleted, it will no longer be available to attach to part data. However, parts previously tagged with the comment will still show it.
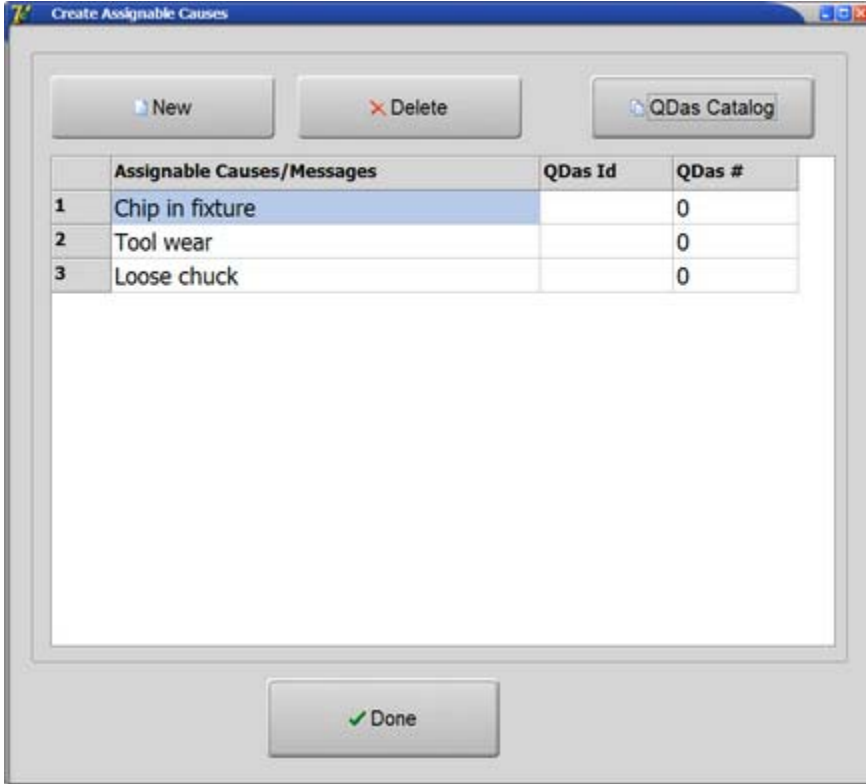
The QDas ID and QDas # fields correlate directly to QDas catalogs and are used to tie the comments into a QDas database. Please refer to the QDas documentation for additional information.

Statistical Summary

This screen provides a summary of the capability for all measurements belonging to the selected inspection system. Further analysis of the measurements can then be made on the histogram and control chart screens.

Charts & Reports, Operation Final, Channel Plate

Channel Plate   Summary Report

	Measurement	Tolerance	Ppk	Pp	Cpk	Cp
1	Mounting Hole 1 Size	-0.020 - 0.020	1.12	1.13	1.18	1.19
2	X Loc Mounting Hole 1	-0.020 - 0.020	1.12	1.12	1.11	1.11
3	Y Loc Mounting Hole 1	-0.020 - 0.020	1.13	1.14	1.18	1.18
4	TP Mounting Hole 1	0.000 - 0.100	1.35	0.90	1.36	0.90
5	Mounting Hole 2 Size	-0.020 - 0.020	1.14	1.15	1.15	1.16
6	X Loc Mounting Hole 2	-0.020 - 0.020	1.13	1.13	1.12	1.12
7	Y Loc Mounting Hole 2	-0.020 - 0.020	1.10	1.10	1.06	1.07
8	TP Mounting Hole 2	0.000 - 0.100	1.41	0.93	1.54	1.01
9	Mounting Hole 3 Size	-0.020 - 0.020	1.13	1.13	1.12	1.13
10	X Loc Mounting Hole 3	-0.020 - 0.020	1.08	1.09	1.11	1.11
11	Y Loc Mounting Hole 3	-0.020 - 0.020	1.09	1.11	1.10	1.12
12	TP Mounting Hole 3	0.000 - 0.100	1.50	0.99	1.52	1.00
13	Mounting Hole 4 Size	-0.020 - 0.020	1.10	1.11	1.08	1.09
14	X Loc Mounting Hole 4	-0.020 - 0.020	1.09	1.10	1.06	1.07
15	Y Loc Mounting Hole 4	-0.020 - 0.020	1.09	1.09	1.07	1.07
16	TP Mounting Hole 4	0.000 - 0.100	1.40	0.92	1.46	0.96
17	Width #1	-0.020 - 0.020	1.05	1.07	1.04	1.06
18	Width #2	-0.020 - 0.020	1.08	1.08	1.07	1.08
19	Width #3	-0.020 - 0.020	1.13	1.13	1.12	1.13
20	Width #4	-0.020 - 0.020	1.15	1.16	1.15	1.16
21	Width #5	-0.020 - 0.020	1.10	1.11	1.12	1.13

Menu   Qry   Meas   Charts   Print   ? Help

Part Limits Screen

The Part Limits screen displays limits for all measurements belonging to the selected part. The limits are displayed in a grid which allows the limits to be changed. All limits are usually password protected.

Use this screen to:

- Change part specification limits (LSL and USL)
- Change part approach limits (LAL and UAL)
- Change part nominal values
- Change display precision for part measurements
- Change control chart fixed control limits (LCL and UCL for each control chart type)

Part Limits, Operation Final, Channel Plate   Metric

Specification Limits

Description	LSL	USL	LAL	UAL	Nominal	Res
Mounting Hole 1 Size	-0.02000	0.02000	-0.01500	0.01500	18.00000	3
TP Mounting Hole 1	0.00000	0.10000	0.00000	0.08000	0.00000	3
Mounting Hole 2 Size	-0.02000	0.02000	-0.01500	0.01500	18.00000	3
TP Mounting Hole 2	0.00000	0.10000	0.00000	0.08000	0.00000	3
Mounting Hole 3 Size	-0.02000	0.02000	-0.01500	0.01500	18.00000	3
TP Mounting Hole 3	0.00000	0.10000	0.00000	0.08000	0.00000	3
Mounting Hole 4 Size	-0.02000	0.02000	-0.01500	0.01500	18.00000	3
TP Mounting Hole 4	0.00000	0.10000	0.00000	0.08000	0.00000	3
Width #1	-0.02000	0.02000	-0.01500	0.01500	235.40000	3
Width #2	-0.02000	0.02000	-0.01500	0.01500	235.40000	3
Width #3	-0.02000	0.02000	-0.01500	0.01500	235.40000	3
Width #4	-0.02000	0.02000	-0.01500	0.01500	235.40000	3
Width #5	-0.02000	0.02000	-0.01500	0.01500	235.40000	3
Width #6	-0.02000	0.02000	-0.01500	0.01500	235.40000	3
Flatness -J-	-0.02000	0.02000	-0.01500	0.01500	0.00000	3

Menu   Options   Print   ? Help

The following must be taken into consideration when editing specification limits:

1. LSL and USL values can be anything you like but they must be entered as a deviation from the nominal value.
2. LAL and UAL values must be "inside" the LSL and USL values. LAL must be larger than LSL and UAL must be smaller than USL.
3. Care should be taken when changing nominal values as they may also require calibration value changes.
4. Valid values for the precision are 0-5. Changing this value only affects the screen display. It has no effect on the accuracy of the inspection system or stored data.

Right clicking an approach limit field displays a pop up menu providing options for GageXpress Pro 3.0 to set the approach limit to a percentage of the specification limit. Right clicking the column header will calculate limits for the entire column.

Part Limit Options

Options for the part limits screen include selection of the limits you wish to edit. Four screens of limits are available for editing. Specification limits, Xbar-R, Xbar-s, and X-MR control limits can be edited.
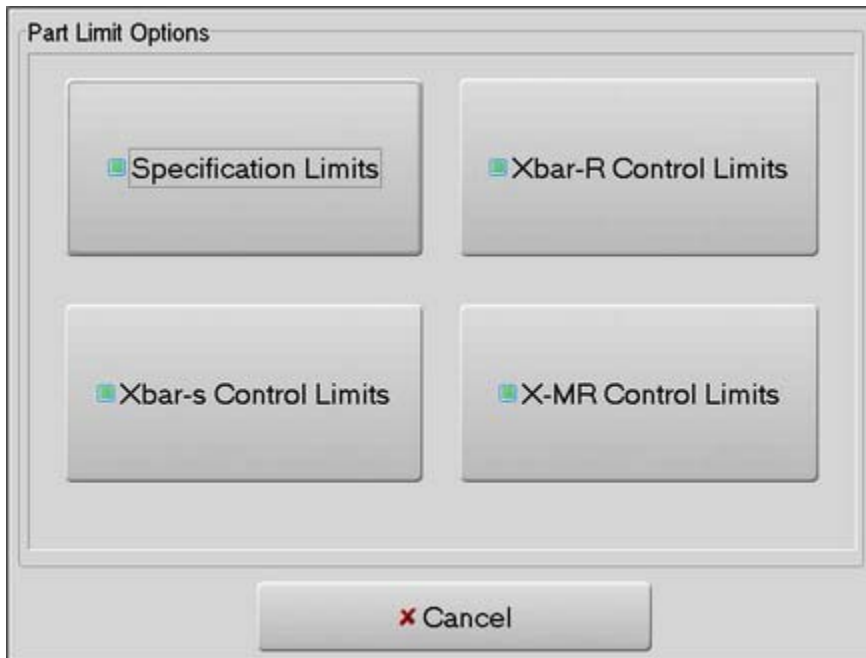
Changing the nominal value must be done with extreme care as it may affect the accuracy of the system. All calibration values in GageXpress Pro 3.0 are entered as deviations from nominal. Therefore, changing this value may also require changing the mastering values of the calibration fields used to calculate the measurement.

How to change measurement parameters

1. Click "Part Limits" on the main menu.
2. Click the grid cell for the measurement and column you wish to change.
3. Type in the new value.
4. The changes will be stored when you exit this screen. If the items are password protected, you will be prompted for the password.
5. Done!

Part Data Screen

The Part Data screen displays measurement data values for individual parts. The screen is displayed after a part is gaged to show the results for the part measurements. It can also be accessed by clicking "Part Data" on the main menu. The current data query set is available for display one part at a time.

Use this screen to:

- View measurement data for individual parts
- Export data to a text file
- Reset data files for the a part
- Set subgroup sizes for a part
- Set subgroup sample frequency for a part
- Print part data results

If "No Value" is displayed for a measurement, then a valid value for that measurement was not read when the part was gaged. This generally occurs for one of the following reasons:

1. The measurement belonged to an inspection event which was not selected as part of the gage sequence.
2. The measurement depends on a transducer which exceeded its linear range at the time the measurement was read.
3. The measurement depends on a transducer which did not move during the inspection sequence.

	Part Summary Screen Button Panel
?☐ Qry	Displays data query window. See Data Query.

		Displays gaging tools window. See Part Summary Tools.
Tools		
Options		Displays the part data options menu.

Part Data Options

	Regage Part		Delete Part
	Delete Data Set		Delete All
	Bonus Tolerance Report		

Cancel
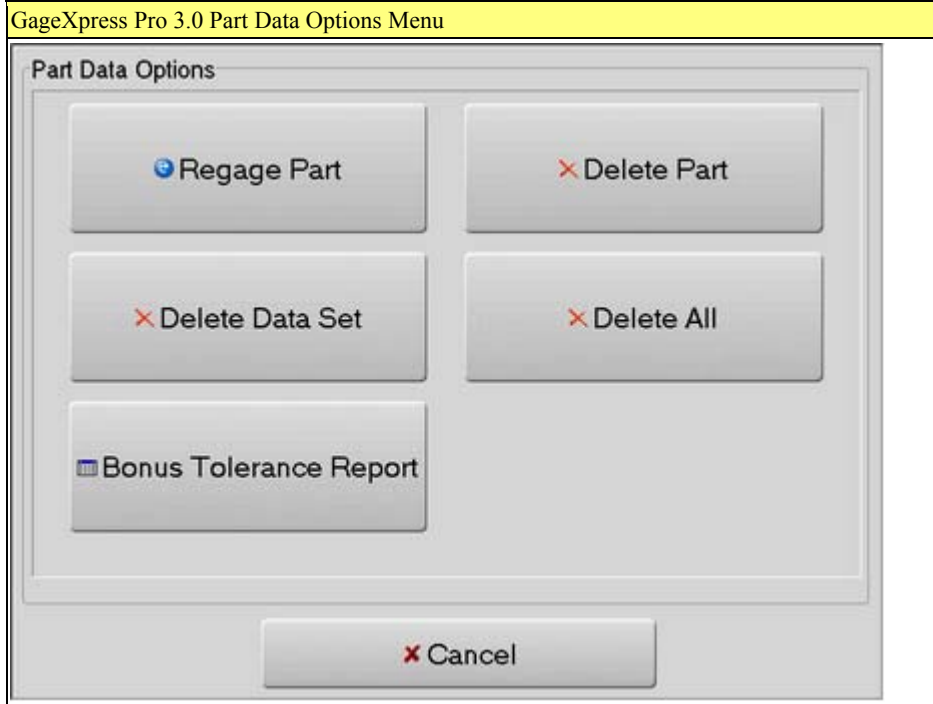
Part Data Options	Description
Regage Part	Re-gages the currently selected part. The original data will be replaced with the data for the new part.
Delete Part	Deletes the current part.
Delete Data Set	Deletes the current data set. This is the data belonging to the data set matching the query start and end times.
Delete All	Deletes all data for the part.
Bonus Tolerance Report	Displays Bonus Tolerance Report. Only applies if measurements are configured to use bonus tolerancing.

Data Query

The Data Query screen is used to select a range of data from the part data database. All data is selected by entering a time and date range. This screen is used to select a time/date range for the data and data filters.

The Last 7 Days button and the All button automatically set the selected time/date range to either the last 7 days worth of data or all stored data respectively.

Once a data set is selected, it will remain the selected data set until you change it. All screens using data will use the selected data set.

Part Summary Tools

The Part Summary tools window provides tools for modifying properties of the Data Sources of the current part.

Use this window to:

- Set the subgroup size of each SPC source
- Set sample frequency for each SPC source
- Archive data
- Export data
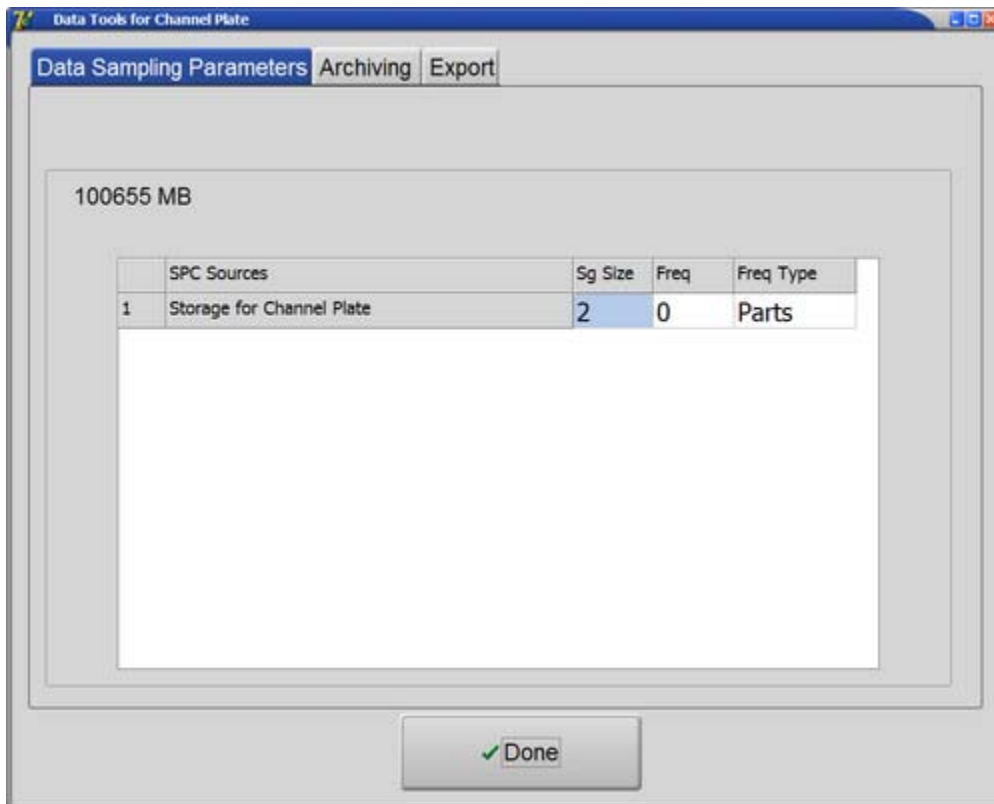
The grid in this window displays all SPC sources for the currently selected part and the properties available for editing on each SPC source. All of these properties may be password protected.

How to change the subgroup size of a Part:

1. Click "Part Data" on the main menu.
2. Click Tools.
3. Click the field in the Sg column and SPC source row you wish to change the subgroup size for.
4. Type the desired subgroup size. Valid sizes are 2-20.
5. Done!

How do I setup a sample frequency:

1. Click "Part Data" on the main menu.

2. Click Tools.
3. Click the field in the Freq column SPC source row you wish to change the sample frequency for.
4. Either check or clear the check box in the Time/Parts column for the SPC source you wish to edit. If you place a check in the box, the frequency will be time based (minutes) otherwise it will be part based.
5. Type in the new desired sample frequency. A 0 disables data sampling and will result in every gaged part being stored. If you enter 10, then one subgroup will be stored every time 10 parts are gaged.
6. Done!

Archiving

The Archive Options define how GageXpress Pro 3.0 handles old data. For now that means deletion but eventually options will be available for archiving the data to alternate disk drives in a variety of formats.
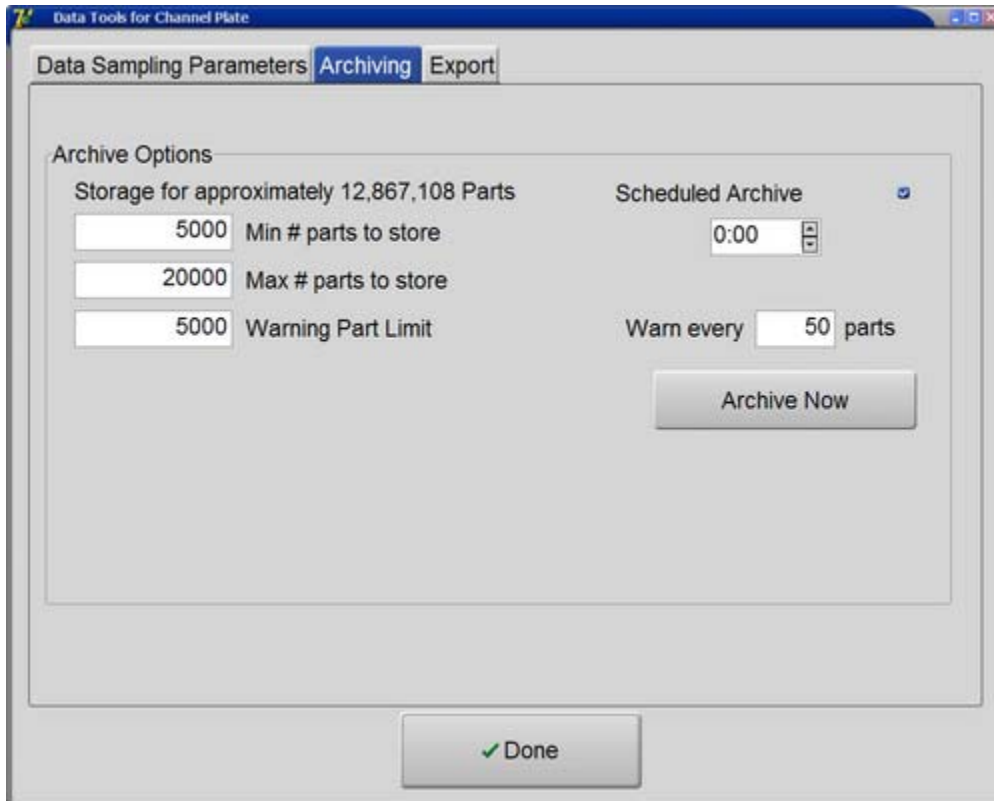
Archive Options

The parameters controlling this are straight forward and are as follows:

- Min # parts to store

    This is the number of parts that will be kept in the data file after archiving. This insures that a known number of parts will always be available for review. This minimum applies to each Data Source ... not the system as a whole.

- Max # of parts to store

    This is the maximum number of parts GageXpress Pro 3.0 will store for a Data Target before performing archiving. When this limit is reached, archiving will automatically occur at the next archive time if auto-archiving is enabled.

- Warning part limit

    GageXpress Pro 3.0 will display a warning when the estimated amount of storage on the systems hard disk falls below this value. Space must be made available at this time or GageXpress Pro's operation will stop.

- Warn every n parts

    This determines the frequency which will be used to present warnings once the "Warning part limit" value has been exceeded.

- Auto Archive

    This check box enables/disables automatic archiving of old data. The time box allows you to specify when the archiving will take place each day. If you clear this check box, archiving will be disabled and data will be stored until the hard drive is full.

The Archive Now button can be used to force archiving at any time. All Data Sources that have data above the "Min # of parts to store" value will be archived.

▲ ▼

Data Export

The Data Export tab is used to export part data to files for use in other programs.

Use this window to:

- Export data to a Q-Das compatible text file
- Export data to a row/column based format
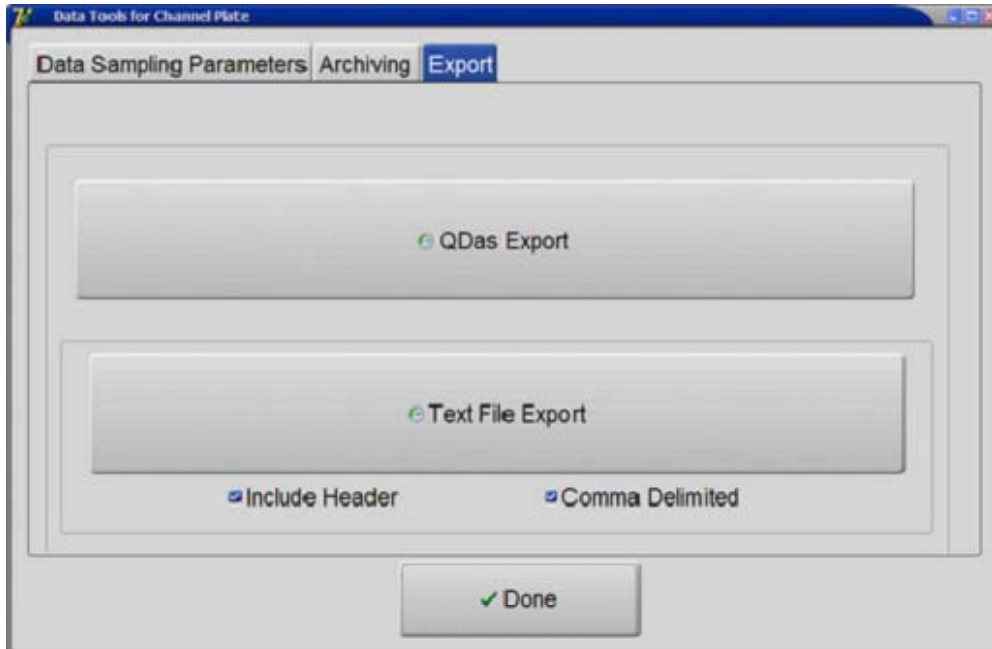
How to perform a Q-Das Export

1. This is an optional item and may not be available if a license has not been purchased.
2. Click "Part Data" on the main menu.
3. Set metric/english and deviation/engineering display options as desired.
4. Click Tools.
5. Click the Export tab.
6. Click the QDas Export button.
7. Enter data file name for export. The file name should have a DFQ extension to maintain QDas compatibility.
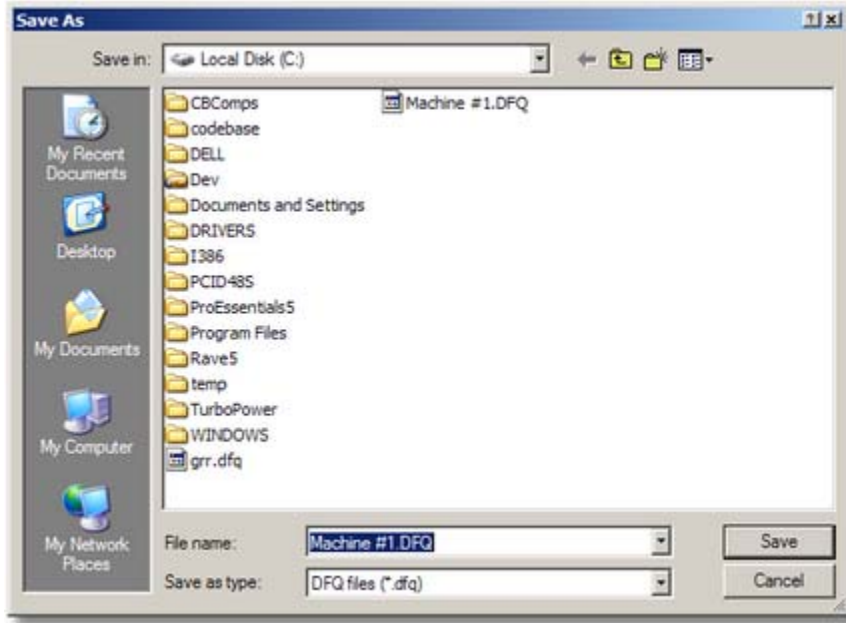
8. Done! Data is exported in the QDas K-field format.

How to export data to a text file

1. Click "Part Data" on the main menu.
2. Set metric/english and deviation/engineering display options as desired.
3. Click Tools.
4. Click the Export tab.
5. Click the Row/Column Export button.
6. Enter data file name for export. The file name extension should normally be TXT but you can use something else if desired.
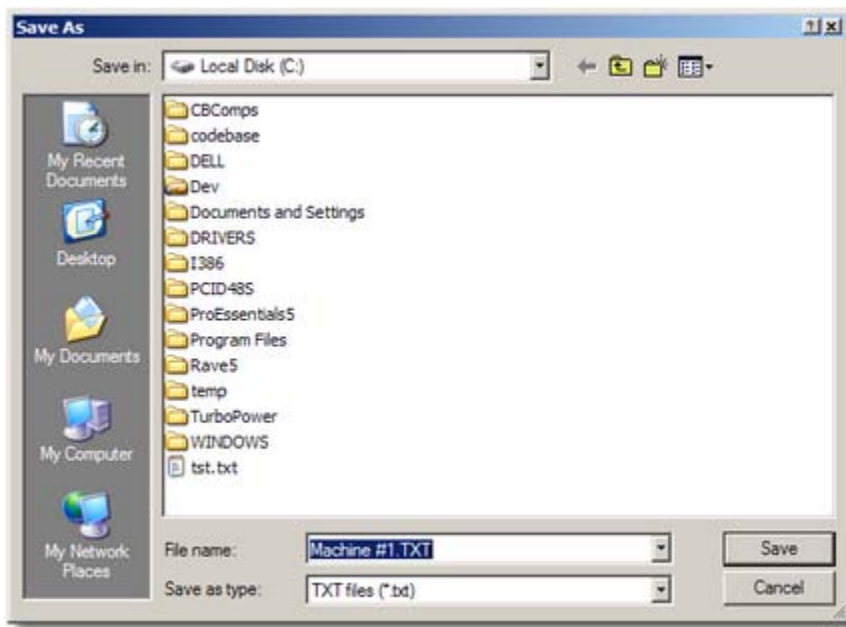
7. Done! Data is exported in a row/column format with check header information at the top of the file.

```
Part Name   = Half Shaft Crank
Part Number =
Units = Metric
Data Target = Data from Machine #1
Data Range  = Data between 17:24, 04/27/05 and 17:24, 05/04/05.
Check             Nominal        USL         LSL      Description
1                 0.00000     -0.20000     0.20000    Pin Size #1
2                 0.00000     -0.20000     0.20000    Pin Size #2

Data is deviation from nominal.
Time                            C1           C2
17:24,  04/27/05,            0.03071,    -0.06029,
17:39,  04/27/05,           -0.02395,     0.04416,
17:54,  04/27/05,           -0.04438,     0.05979,
18:09,  04/27/05,           -0.00173,     0.05912,
18:24,  04/27/05,           -0.01267,     0.06398,
18:39,  04/27/05,            0.00661,     0.02113,
18:54,  04/27/05,           -0.00447,     0.05263,
19:09,  04/27/05,            0.02792,     0.11747,
19:24,  04/27/05,           -0.02276,     0.04747,
19:39,  04/27/05,            0.01075,    -0.06121,
19:54,  04/27/05,           -0.00993,     0.00167,
20:09,  04/27/05,           -0.04610,    -0.01954,
20:24,  04/27/05,            0.03038,    -0.02696,
20:39,  04/27/05,            0.05365,     0.01549,
20:54,  04/27/05,            0.04572,     0.01482,
21:09,  04/27/05,           -0.00099,    -0.11664,
21:24,  04/27/05,           -0.04143,     0.06136,
21:39,  04/27/05,            0.02600,    -0.08033,
21:54,  04/27/05,           -0.03385,    -0.01356,
22:09,  04/27/05,           -0.06273,    -0.01692,
22:24,  04/27/05,            0.02174,     0.04105,
22:39,  04/27/05,           -0.05757,    -0.07696,
22:54,  04/27/05,            0.00309,    -0.03970,
23:09,  04/27/05,            0.07001,    -0.02931,
23:24,  04/27/05,            0.03023,    -0.01795,
23:39,  04/27/05,            0.15785,     0.02661,
23:54,  04/27/05,            0.01291,    -0.00413,
00:09,  04/28/05,           -0.03505,    -0.07...
00:24,  04/28/05,           -0.05631,
00:39,  04/28/05,            0.01086,
                             0.00362,
                            -0.05992,
```

Security

The system security screen provides the means to adjust which areas of GageXpress Pro 3.0 are password protected. GageXpress Pro 3.0 uses a combination of user groups with passwords to implement security. Each user group has a unique password (by default they are set the same) that controls access to selected security items.
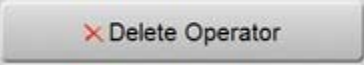
Six user groups are created by default. You can add or delete user groups depending on your needs. The Admin group is an exception and cannot be deleted. The Admin group also ALWAYS has access to everything in the system and the Admin password should be protected if you wish to implement security.

The default ship state also provides the Process Engineer group with access to everything.

Default User	Default Password
Admin	4321
Operator	1234
Production Supervisor	1234
Process Engineer	4321
Quality Technician	1234
Gage Technician	1234
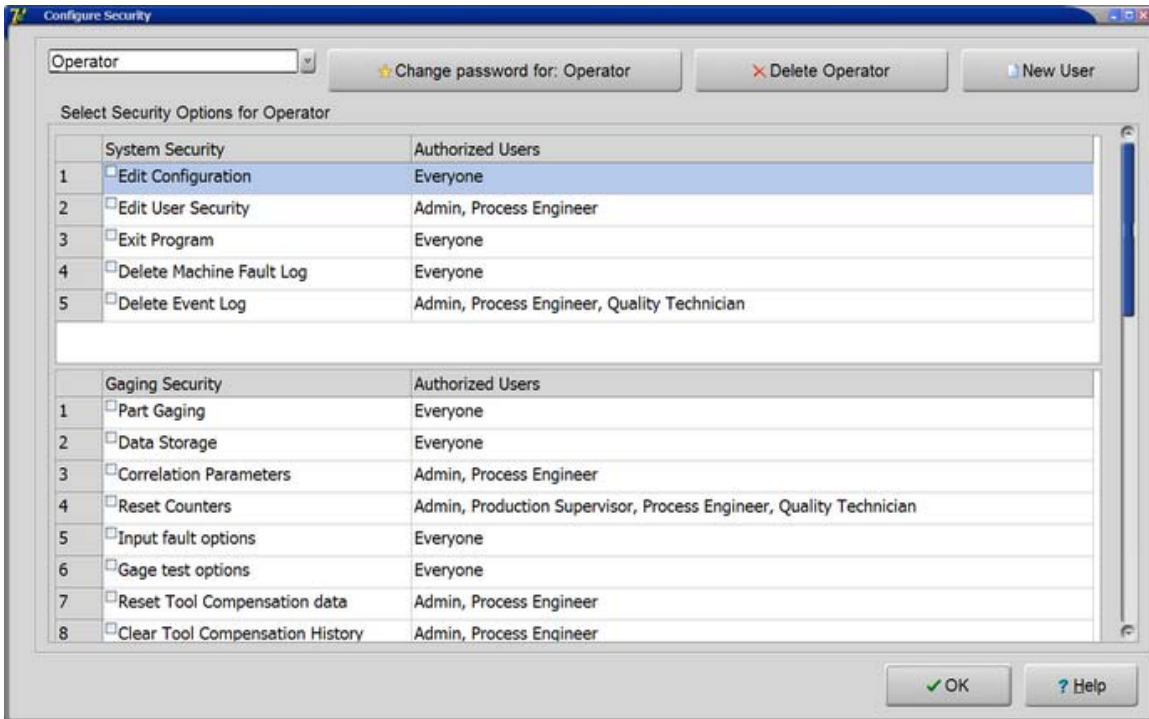
Security Screen	Description
Operator	Select the user group you want to assign access rights to.
Change password for: Operator	Change current user group's password.

		Delete current user group. The Admin group cannot be deleted.	
		Create a new user group.	

To set security for an item, select the user group you wish to grant access to and then check each item you want that group to have access to. Once an item has been protected, only people who know that group's password can gain access to the item. Multiple groups can be granted access to the same item. In this case, people knowing the password for any group with access will be allowed access to the item. If an item has not been password protected by any group, then that item will be available to everyone.

The Authorized Users column displays all users that have been granted access to each item. It will say Everyone if the item has not been assigned any password protection. Otherwise, it will list each group that has been designated for the item. The Admin group will always be listed.

Security items are organized into (5) groups organizing the various protection options. Each group has items that can be protected that are specific to the group.

Security Group	Item	Description
System		Protects options that affect the entire system.
	Configuration	Protects entry into GageXpress Profile. Once GageXpress Profile is running, nothing is password protected in it.
	Edit Security	Protects entry into the Security screen. Anyone with access to this screen can override all security options.
	Delete Machine Fault Log	Automatic gage systems log all PLC interface faults. This option determines who can clear the log.
	Delete Event Log	This option determines who can clear the event log.
	Exit Program	Protects program exit.
Gaging		Options to protect on the gaging screens.
	Part Gaging	Protects gage screen entry.
	Data Storage	Protects ability to turn data storage on or off.
	Correlation Items	Protects measurement offset and invert options used for gage correlation.
	Reset counters	Protects ability to reset part counters.
	Input Fault Options	Protects ability to turn on/off the input movement and input linear range fault checking used in gaging and mastering.
	Gage test options	Protects ability to turn on/off options for gage testing including simulation mode, virtual DIO, random data storage, and diagnostic mode.
	Reset Tool Compensation Data	Determines who can clear the current tool compensation running averages.
	Clear Tool Compensation History	Determines who can clear the history of all comp's sent to the machine.
Mastering/Setup		Options to protect on the mastering and setup screens.
	Mastering	Protects master screen entry.
	Master Parameters	Protects ability to edit master certification values
	Master Frequency	Protects ability to edit master frequency

		requirements
	Teach/Balance	Protects ability to teach a master setup or balance LVDTs.
	Orbit Network Ids	Protects ability to change Orbit Network Ids.
Quality Control		Options protecting data required for quality control.
	Edit Specification Limits	Protects ability to edit part accept/reject limits
	Data Deletion	Protects ability to delete stored data
	SPC Source Parameters	Protects changing of SPC source parameters including subgroup size and store frequency.
	Assign assignable causes	Protects ability to assign assignable causes to stored data.
	Edit assignable causes	Protects ability to edit or add to the list of assignable causes
	Edit Control Limits	Protect ability to edit control chart fixed limits.
	Create Studies	Determines who can create new studies.
	Delete Studies	Determines who can delete studies.
	Save Agile Sequence	Determines who can save inspection sequences.
	Edit Agile Sequence Prompts	Determines who can change prompting for an agile inspection sequence to be performed.
	Edit Agile Sequence Name	Determines who can change the name of an agile sequence.
GR&R		Options to protect on the GR&R screens.
	Regage GR&R parts	Protects ability to re-gage parts in a GR&R
	Delete GR&R's	Protects ability to delete old GR&Rs.

Creating Users

How to create new users

1. Click the "Security" button on the main menu and enter a valid edit security password. The Security screen will be displayed.
2. Click the "New User" button. The new user screen will be displayed

3. Enter the name for the new user.
4. Enter new user's password.
5. Done! Click Ok to return to the Security screen and assign access rights for the user.

Deleting Users

How to delete a user

1. Click the "Security" button on the main menu and enter a valid edit security password. The Security screen will be displayed.
2. Select the user to be deleted from the drop down pick list.
3. Click the "Delete <user name>" button.
4. Click yes when asked to verify deletion.
5. Done!

Changing User Passwords

How to change a user's password

1. Click the "Security" button on the main menu and enter a valid edit security password. The Security screen will be displayed.
2. Select the user that requires a password change from the drop down pick list.
3. Click the "Change <user name> Password" button. The change password screen will be displayed.

4. Enter the current password for the user and the new password.
5. Done. Click Ok.

Protecting Program Areas

How to protect program areas

1. Click the "Security" button on the main menu and enter a valid edit security password. The Security screen will be displayed.
2. Select the user that you want to change access for from the drop down pick list.
3. Check or Uncheck items as desired. Selecting an item will make that item password protected by the current user's password. The authorized users column updates to show which user passwords protect each item.
4. Done!

Glossary of Terms

Measurement based measurement

A measurement created from the combination of one or more other measurements.

Input based measurement

A measurement created from the combination of one or more calibration fields.

Feature

Features are used to segregate groups of gage events that can be selected or left out of gage sequences.

Feature Group

Feature Groups are used to group Features together.

Gage

Gages are used in manual configurations to take measurements on a Part. They are not used in automatic configurations.

Inspection Event

A Inspection Event is one press of the foot switch or click of the Read button on the gage screen. All measurements are made on inspection events. Inspection Events belong to Gages on manual configurations and Stations on automatic configurations.

Input

An Input is a single physical transducer connection to the GageXpress Pro 3.0 . Inputs aren't generally scaled. The most common input types are LVDTs, digital probes, and air/electronic converters.

LAL

Lower Approach Limit: This value provides a warning that a measurement value is approaching the LSL. Measurement values that are smaller than LAL but larger than LSL, are shown on a yellow background on gage screens and in the part summary.

LSL

Lower Specification Limit: This value represents the smallest value a measurement can have and still be considered an acceptable part. If a measurement value is smaller than LSL, its values will be shown on a red background on gage screens and in the part summary.

Machine

A GageXpress Pro 3.0 Machine represents an actual physical machine that the GageXpress Pro 3.0 is connected to for performing inspection tasks. Obviously, Machines are only used on automatic configurations.

Measurement

Measurements are a combination of one or more Calibration Fields that when combined represent an inspection feature on the part.

Station

A station on a machine that holds a part. Gaging on automatic machines always takes place in a Station although not all Stations will perform gaging. One Station must be created for each physical station in the machine.

Part

A GageXpress Pro 3.0 Part represents the actual part being inspected. A GageXpress Pro 3.0 Part is created for each part type to be inspected. For manual configurations, Parts are the first object under the Workstation ... all gages, checks, and other objects belong to the Part. For automatic configurations, the Part belongs to a Machine and the Machine is the first object under the Workstation.

Calibration Field

Calibration Fields are scaled Inputs. A Calibration Field may be a direct Input assignment or a mathematical combination of Inputs. All scaled values in GageXpress Pro 3.0 come from Calibration Fields.

UAL

Upper Approach Limit: This value provides a warning that a measurement value is approaching the USL. Measurement values which are larger than UAL but smaller than USL, are shown on a yellow background on gage screens and in the part summary.

USL

Upper Specification Limit: This value represents the largest value a measurement can have and still be considered an acceptable part. If a measurement value is larger than USL, its values will be shown on a red background on gage screens and in the part summary.

Computer

The GageXpress Pro 3.0 Computer is the computer which houses the signal conditioning hardware connected to the gage transducers in the gage.