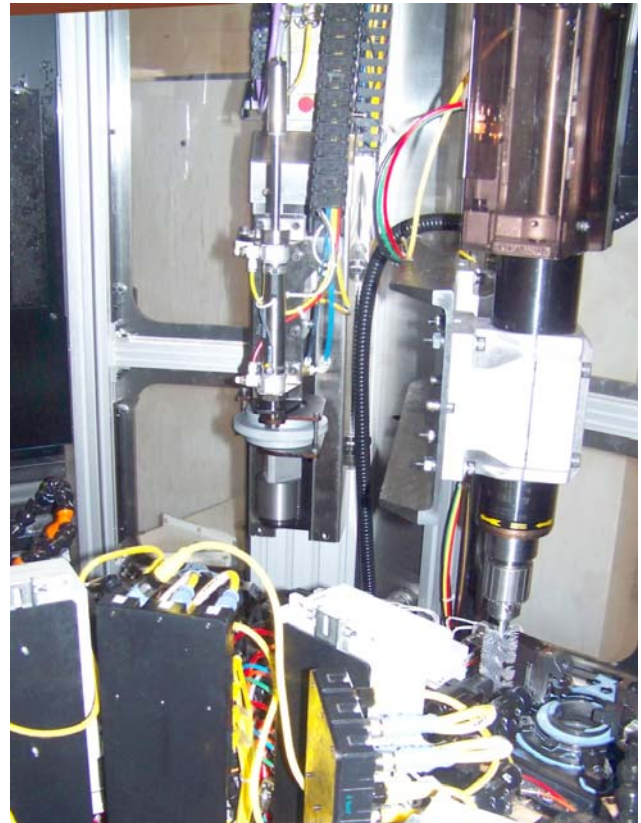




Instructions for Setting Up The Etamic CMZ32 Air Gaging System



for
SUNNEN[®] VERTICAL HONING SYSTEMS

Models: SV1000, SV1005, SV1010, & SV1015

"SUNNEN AND THE SUNNEN LOGO ARE REGISTERED TRADEMARKS OF SUNNEN PRODUCTS COMPANY."

Setting up the Etamic CMZ32 Air Gage System

GENERAL INFORMATION

The Sunnen® equipment has been designed and engineered for a wide variety of parts within the capacity and limitation of the equipment. With proper care and maintenance this equipment will give years of service.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY AND THOROUGHLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THIS EQUIPMENT.

IMPORTANT: Read any supplemental instructions BEFORE installing this equipment. These supplemental instructions give you important information to assist you with the planning and installation of your Sunnen equipment.

Sunnen Technical Service Department is available to provide telephone assistance for installation, programming, & troubleshooting of your Sunnen equipment. All support is available during normal business hours, 8:00 AM to 4:30 PM Central Time. Emergency breakdown support is available on a 24 hour / 7 day basis.

Review all literature provided with your Sunnen equipment. This literature provides valuable information for proper installation, operation, and maintenance of your equipment. Troubleshooting information can also be found within the Instructions. If you cannot find what you need, call for technical support.

Where applicable, programming information for your Sunnen equipment is also included. Most answers can be found in the literature packaged with your equipment.

Help us help you. When ordering parts, requesting information, or technical assistance about your equipment, please have the following information available:

- o Have ALL MANUALS on hand. The Customer Services Representative or Technician will refer to it.
- o Have Model Number and Serial Number printed on your equipment Specification Nameplate.
- o Where Applicable: Have Drive model and all nameplate data. Motor type, brand, and all nameplate data.

For Troubleshooting, additional information may be required:

- o Power distribution information (type - delta, wye, power factor correction; other major switching devices used, voltage fluctuations)
- o Installation Wiring (separation of power & control wire; wire type/class used, distance between drive and motor, grounding).
- o Use of any optional devices/equipment between the Drive & motor (output chokes, etc.).

For fast service on your orders call:

- o Sunnen Automotive Customer Service toll free at: 1-800-772-2878
- o Sunnen Industrial Customer Service toll free at: 1-800-325-3670
- o Customers outside the USA, contact your local authorized Sunnen Distributor.
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ESD PREVENTION REVIEW

Let's review the basics of a sound static control system and its effective implementation. First, in the three step plan:

- 1 Always ground yourself when handling sensitive components or assemblies.
- 2 Always use a conductive or shielded container during storage or transportation. These materials create a Faraday cage which will isolate the contents from static charges.
- 3 Open ESD safe containers only at a static safe work station.

At the static safe work station, follow these procedures before beginning any work:

- A. Put on your wrist strap or foot grounding devices.
- B. Check all grounding cords to make sure they are properly connected to ground, ensuring the effective dissipation of static charges
- C. Make sure that your work surface is clean and clear of unnecessary materials, particularly common plastics.
- D. Anti-static bubble wrap has been included for use at the machine when an ESD safe workstation is not available.

You are now properly grounded and ready to begin work. Following these few simple rules and using a little common sense will go a long way toward helping you and your company in the battle against the hazards of static electricity. When you are working with ESD sensitive devices, make sure you:

**GROUND
ISOLATE
NEUTRALIZE**

Setting up the Etamic CMZ32 Air Gage System

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Sunnen[®] Products Company and its subsidiaries (SPC) warrant that all new SPC honing machines, gaging equipment, tooling, and related equipment will be free of defects in material and/or workmanship for a period of one year from the date of original shipment from SPC.

Upon prompt notification of a defect during the one-year period, SPC will repair, replace, or refund the purchase price, with respect to parts that prove to be defective (as defined above). Any equipment or tooling which is found to be defective from improper use will be returned at the customer's cost or repaired (if possible) at customer's request. Customer shall be charged current rates for all such repair.

Prior to returning any SPC product, an authorization (RMA#) and shipping instructions must be obtained from the Customer Service Department or items sent to SPC will be returned to the customer.

Warranty Limitations and Exclusions. This Warranty does not apply to the following:

- o Normal maintenance items subject to wear and tear: (belts, fuses, filters, etc).
- o Damages resulting from but not limited to: › Shipment to the customer (for items delivered to customer or customer's agent F.O.B., Shipping Point) › Incorrect installation including improper lifting, dropping and/or placement › Incorrect electric power (beyond +/- 10% of rated voltage) including intermittent or random voltage spikes or drops › Incorrect air supply volume and/or pressure and/or contaminated air supply › Electromagnetic or radio frequency interference from surrounding equipment (EMI, RFI) › Storm, lightning, flood or fire damage › Failure to perform regular maintenance as outlined in SPC manuals › Improper machine setup or operation causing a crash to occur › Misapplication of the equipment › Use of non-SPC machines, tooling, abrasive, fixturing, coolant, repair parts, or filtration › Incorrect software installation and/or misuse › Non-authorized customer installed electronics and/or software › Customer modifications to SPC software

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Setting up the Etamic CMZ32 Air Gage System

NOTE:

- These instructions are to be used when using CMZ32 version 4.6.0 Build date: 5/31/07
- Only a qualified Operator should attempt to backup & restore setup files.
- Pictures of various screens in this manual are taken from version 1.2.3.0.
There may be some variation from the actual screens shown on the SV machine.

!!! WARNING !!!

Failure to follow these steps correctly may damage the machine.

**ALL SETUP FILES, GAGE PROJECT FILES, AND PARAMTER SETTING MUST BE CONFIGURED
CORRECTLY!**

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE MACHINE!

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NOTE:

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I. Managing Project Files

A project file, much like the setup files used on the SV machine, must be generated before the CMZ32 can be used. To do this the user must go to the Project Window in the System menu to setup a project folder & project file(s).

i. System Menu

Press the <1> SYSTEM key to get into the CMZ32 System Menu.

NOTE: All communication between the CMZ32 and the SV software will be halted while the user is in the System Menu. A warning message will appear on the screen warning you that communication with all I/O will stop. Press the "YES" button to continue.

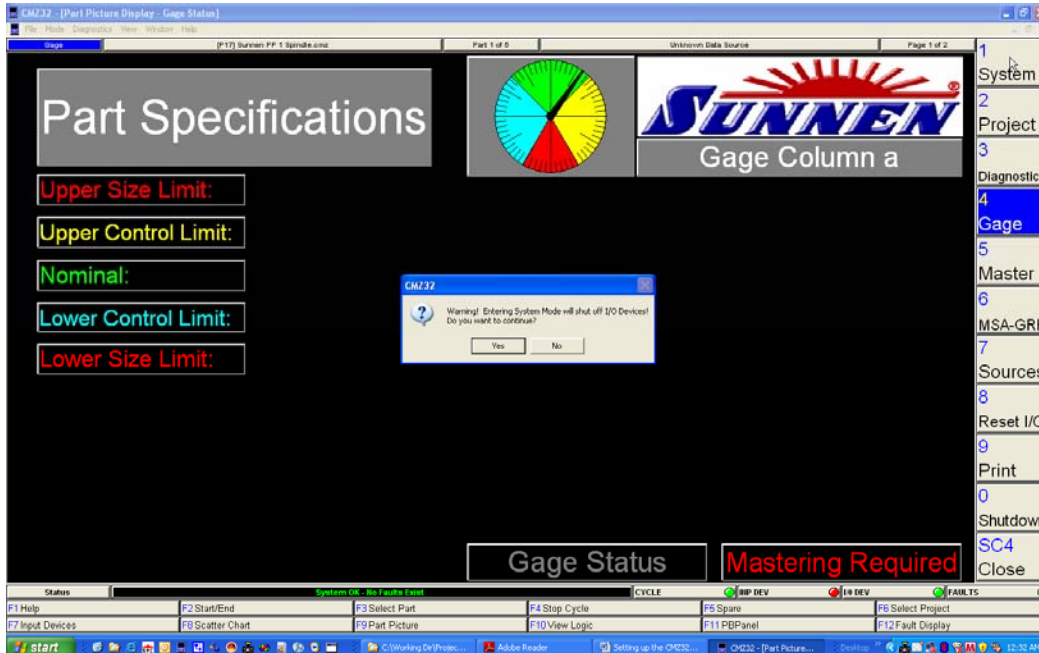


Figure I-1: Warning message when switching from Gage Menu to System Menu

From the System Menu screen, press the <F3> PROJECT FILES key to enter the Project Window.

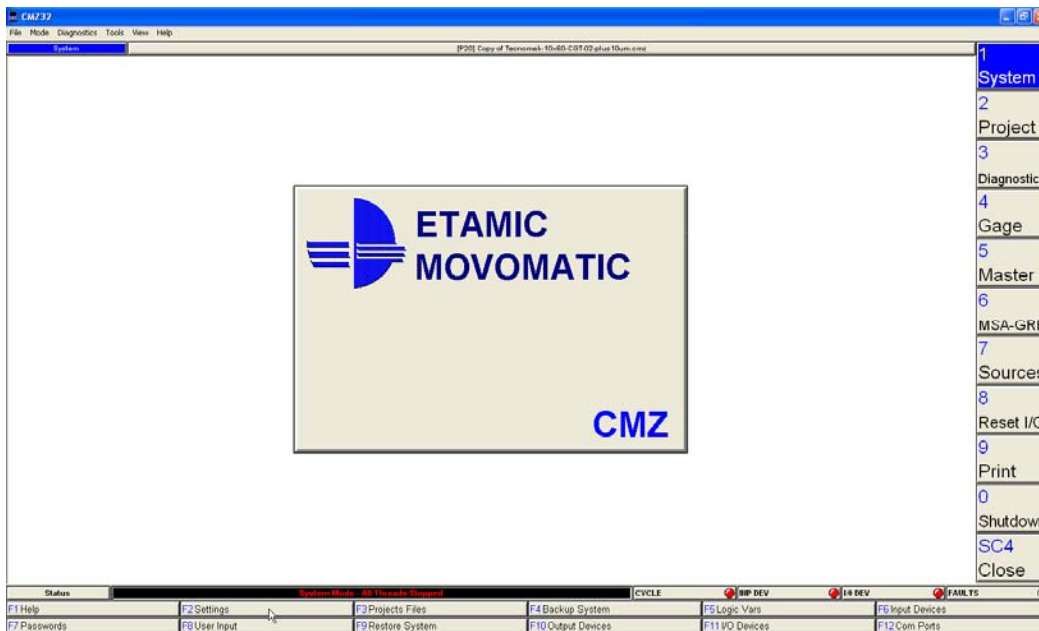


Figure I-2: System Menu

Setting up the Etamic CMZ32 Air Gage System

1. **Project Window**

Use the <F3> PROJECT FILES key from the System Menu to get to the Projects Window (refer to **Figure I-3** below). From here the user can manage the CMZ32 setup files such as recovering a previously saved CMZ32 setup using the 'Restore' button or to save the existing CMZ32 setup using the 'Back Up' button.

Refer to the keywords 'Project Files' in the CMZ32 User guide for more information.

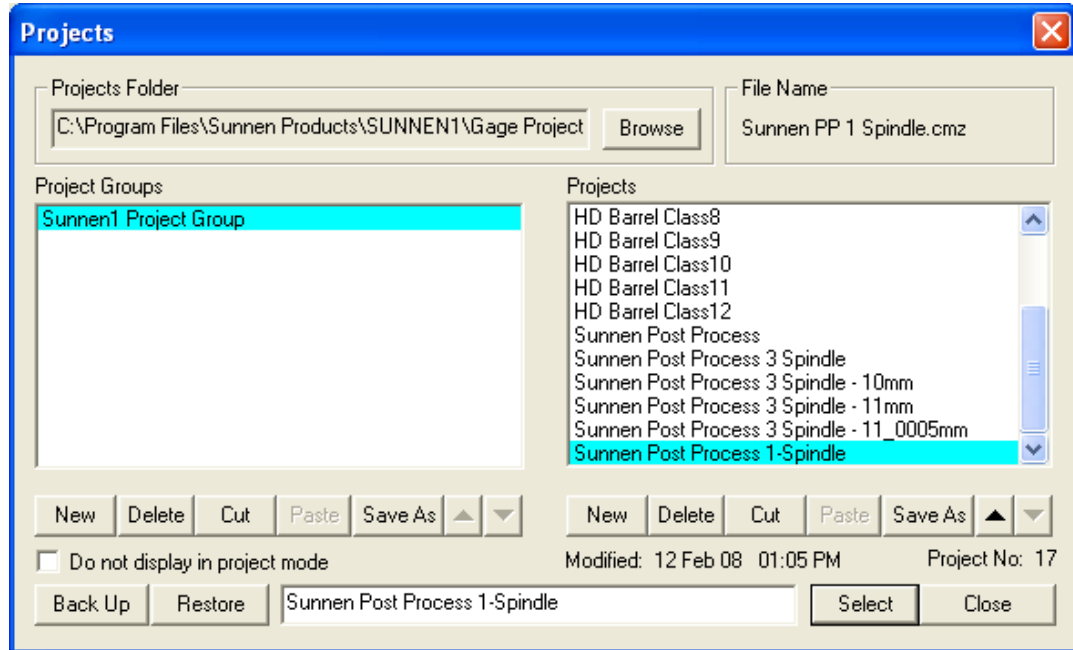


Figure I-3: Project Window

1st Step:

Use the 'Browse' button to point to the current project folder.

Make sure that the 'Project Folders' window is pointing to the correct folder on the hard drive.

All CMZ32 project files are saved to the following folder:

C:\Program Files\Sunnenn Products\SUNNEN1\Gage Projects

This is the text that you should see in the 'Project Folder' window (refer to figure above).

2nd Step:

Select a Project Group from the 'Project Groups' window.

Normally there will only be one project to select from. The default project is:

'Sunnenn1 Project Group'

3rd Step:

Select a Project file.

This can be done in one of three ways.

- (1) An existing project can be selected from the list of projects shown in the 'Projects' window.
- (2) A new project can be created using the 'Save As' or 'New' buttons.
- (3) A project file can be restored from an existing backup file.

Setting up the Etamic CMZ32 Air Gage System

a) Select an Existing Project

An existing project can be selected by highlighting a project name listed in the 'Projects' window. Sometimes there are more projects than can be displayed in the 'Projects' window. Use the Scroll key or the Up & Down Arrow buttons located in the lower-right corner of the 'Projects' window to see all the projects. The example below shows the 'Sunnen Post Process 3 Spindle – 10mm' project file selected. Note that the name of the actual project file is shown in the 'File Name' window.

NOTE:

- (1) To change the project name: Click on the text in the 'Project Name Edit Box', located at the bottom-center of the 'Projects' window.
- (2) Not all of the characters of the file name are displayed in the window. If you click on the file name, as shown below, an edit box will appear enabling you to edit the full file name. Normally the file name is the same as the project name.
- (3) The date and time of the last changes done to the project along with the project number is displayed below the list of projects names.

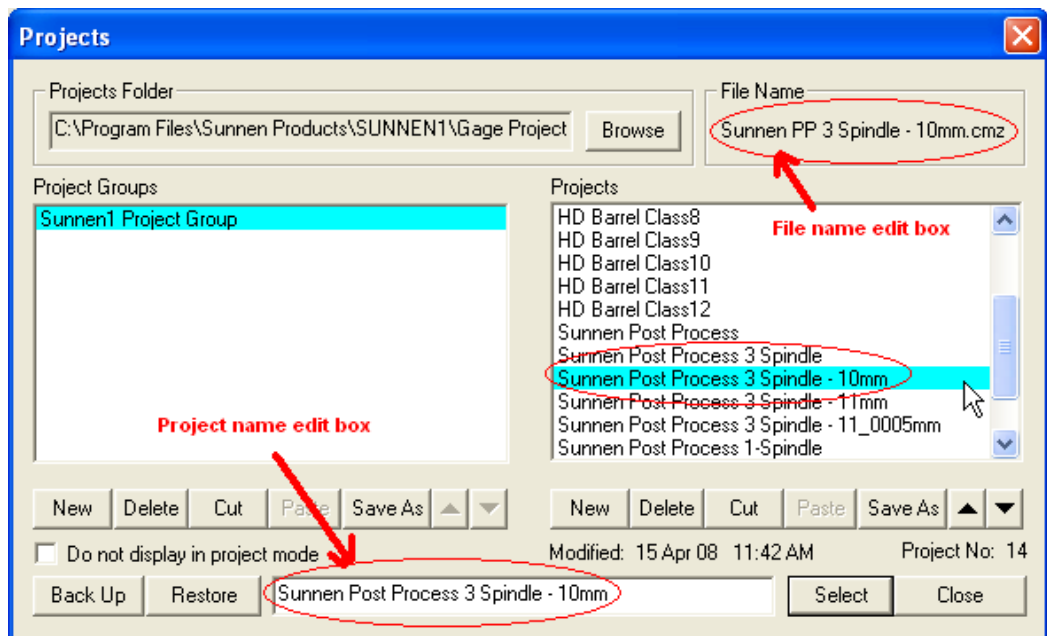


Figure I-4: Selecting an existing project

Press the 'Select' button to activate the project file highlighted in the 'Projects' window. The file selected will be displayed in the top horizontal tool bar in the System Menu.

Figure I-5 below shows how the CMZ32 tool bar displays that project file (#14) 'Sunnen Post Process 3 Spindle – 10mm' file, is selected.

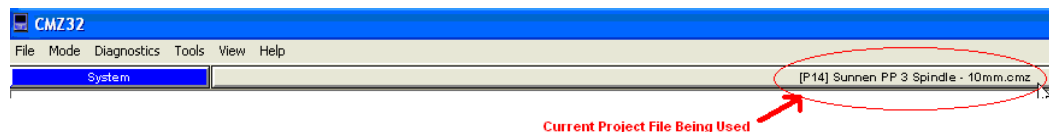


Figure I-5: Displaying the current project loaded in the CMZ

Setting up the Etamic CMZ32 Air Gage System

b) *New Project*

A new project can be generated using either the 'New' or 'Save As' buttons.

(4) 'Save As' Button

The 'Save As' button is used to copy an existing project. The new project can then be renamed using the File & Project Name Edit boxes as explained in (a) 'Selecting an Existing Project' above. The default name of the new project file is the same as the old project name but copied with the text 'Copy of' appended to the front of the old project name.

For example:

Say an operator needed to create a project file for an 11mm part. The only project file he presently has is for a 10mm part. The only difference between the two parts is the bore diameter. Everything else, like tolerance and control limits, are the same.

He could create a whole new project file using the 'New' button however this would require a lot of work going through all of the parameters in the CMZ32 screens. An easier and much faster method would be to copy the 10mm project to another file name and then edit the nominal size parameter in the new project.

To do this the operator would first highlight the 10mm project name. In this example the project name is:

'Sunnen Post Process 3 Spindle - 10mm'

The user would then press the 'Save As' button after highlighting the project name. A new project, "Copy of Sunnen Post Process 3 Spindle - 10mm", is created and listed in the 'Projects' window as shown in the figure below. The user can then use the project Name Edit Box (as explained above) to rename the default project name to whatever they wish it to be.

NOTE:

The actual file name of the new project is also defaulted with the same text as that used for the project name. It is strongly suggested that the user use the File Name Edit Box to rename the file name of the project to match that of the project name (as explained above in 'Select an Existing project').

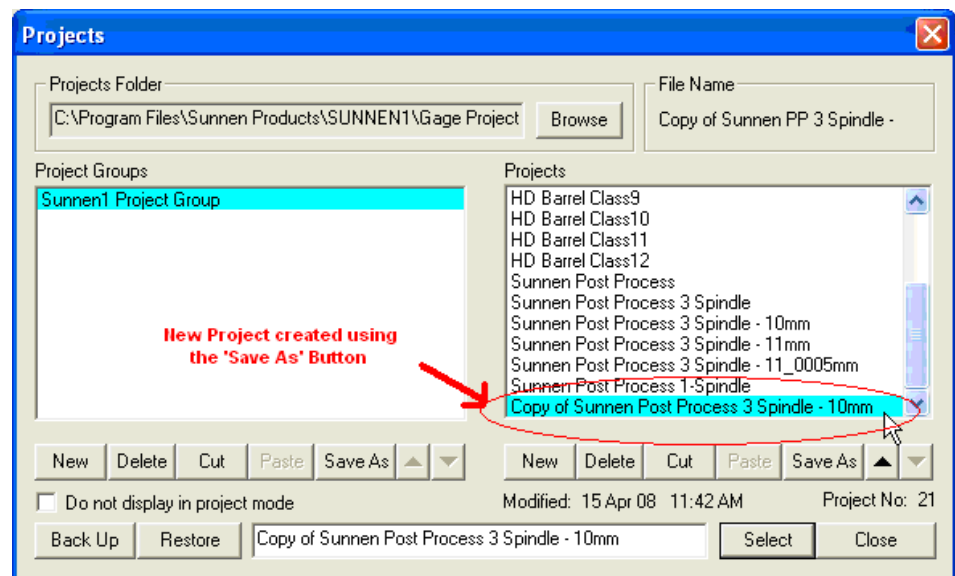


Figure I-6: New project using the "Save As" feature

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(5) 'New' Button

Use the 'New' button to create a completely new project. An edit box will appear on the screen displaying the default project name as shown in **Figure I-7** below. You can use this default name or create you own by typing in a project name.

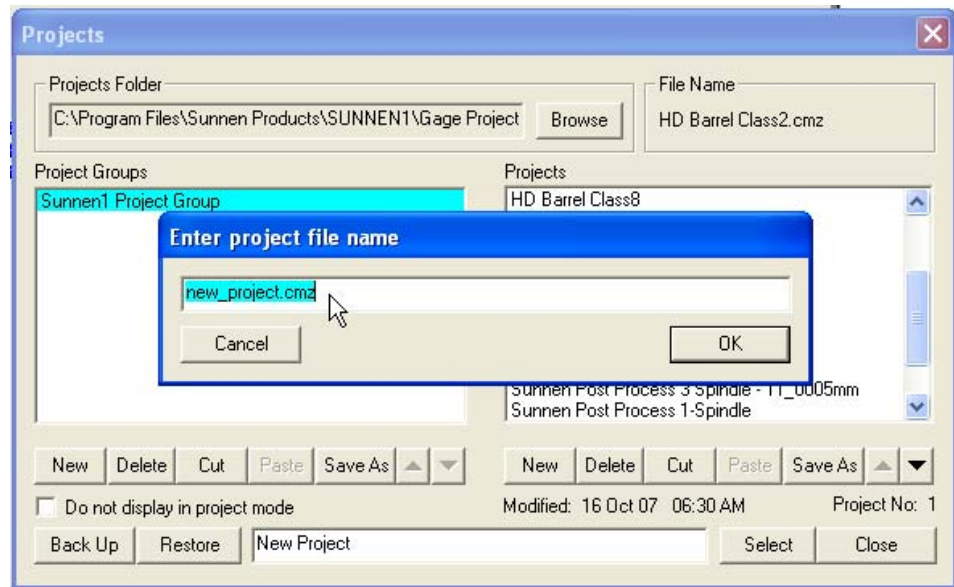


Figure I-7: New project file name

Press the 'OK' button after completing the project file name.

The CMZ32 will generate a completely new project file. The name given to the file will be displayed in the 'Projects' window. Refer to **Figure I-8** below. The new project name is "New Project" and the new file name for this project is:

New_project.cmz

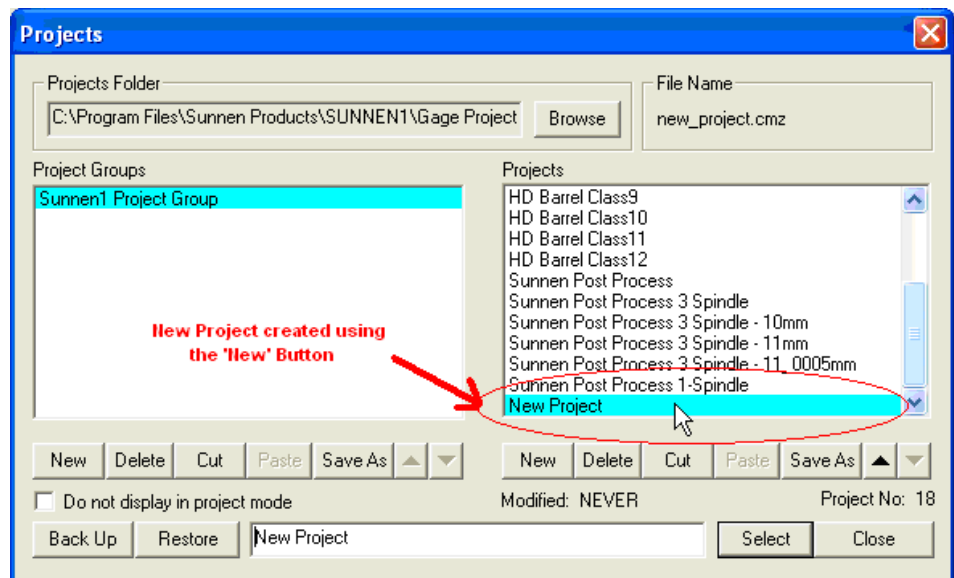


Figure I-8: New project created

NOTE:

This method of generating a new project file will cause the CMZ32 to clear or default many of its parameters requiring the user to review the settings of all the CMZ parameters. Such that, it is recommended that this method only be used when it is really necessary.

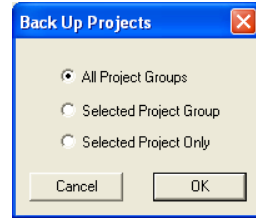
Setting up the Etamic CMZ32 Air Gage System

c) **Backup & Restore a Project**

A project folder can be saved and later retrieved using the 'Backup' and 'Restore' buttons.

(6) 'Backup' Button

The following window is displayed when the 'Backup' button is pressed. This allows individual, group, or all existing project groups to be saved and archived.



'All Project Groups' –

Archives all projects in all groups.

'Selected Project Group' –

Archives a specific selected project group.

'Selected Project only' –

Archives a specific selected project.

Figure I-9: Backup types

NOTE: By default the first option, 'All Project Groups' is selected.
It is highly recommended that this be the option of choice!

A browser window will appear after pressing the 'OK' button.
Scroll down until you get to the gage backup folder:

C:\Program Files\Sunnen Products\SUNNEN1\Gage Backup

The default file name of the gage backup archive is the same as the name of the current project folder (refer to "1st Step" in section Project Window above). In the examples we have been using throughout this document our project folder has been 'Gage Projects' such that the default file name of the backup archive is:

'Gage Projects.zip'

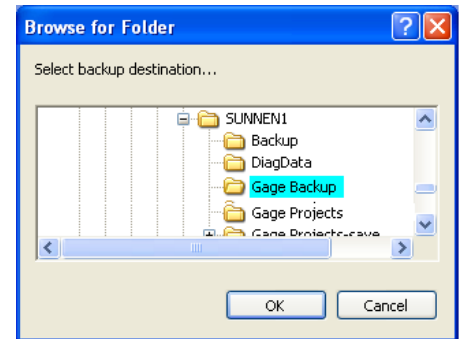


Figure I-10: Backup browser

The user will get a warning message if a file already exists with this same name:

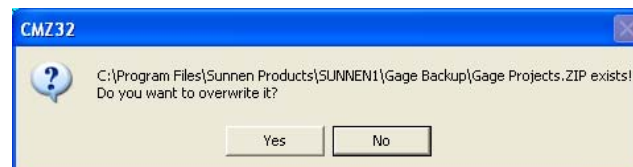


Figure I-11: Overwrite Warning message

Press the 'YES' button to proceed and archive using the same file name.

NOTE:

You must rename the existing file if you wish not to over write the current archive.

The following message appears if the system successfully archived the project:

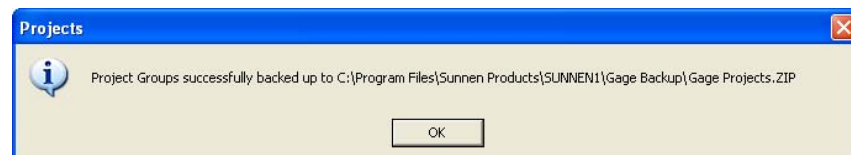


Figure I-12: Backup complete message

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'Restore' Button

A project can be retrieved using the 'Restore' button.

A browser window will appear after pressing the 'Restore' button.

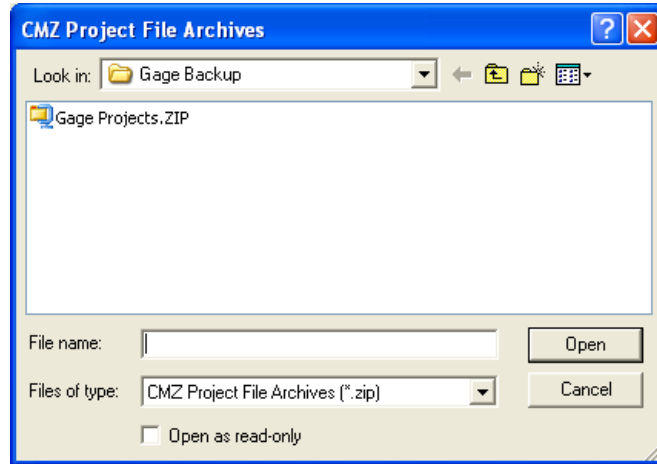


Figure I-13: Restore browser

Scroll down until you get to the gage backup folder:

C:\Program Files\Sunnen Products\SUNNEN1\Gage Backup

NOTE:

The default file name of the gage backup archive is the same as the name of the current project folder (refer to "1st Step" in section Project Window above and also the section above referring to the 'Backup' button). In the examples we have been using throughout this document our project folder has been 'Gage Projects' such that the default file name of the backup archive is:

'Gage Projects.zip'

Select the backup file from the 'Gage Backup' folder and then press the 'Open' button. The following window will appear on the screen asking what part of the archive to open.

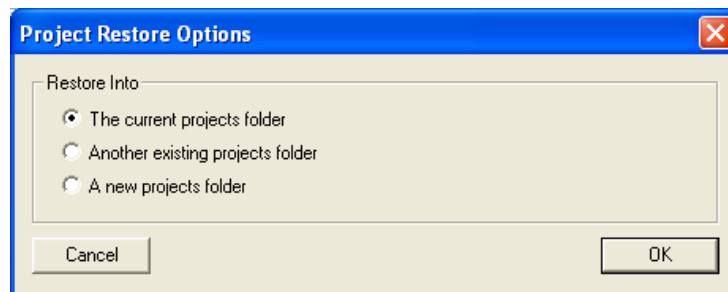


Figure I-14: Restore options

'The current project folder' - Selecting this option will restore the archive to the currently selected projects folder.

'Another existing projects folder' - This option is used to select a different existing project folder to restore the archive into.

'A new projects folder' - This option is used to create a new project folder to restore the archive into it.

NOTE:

By default the first option, 'The current projects folder' should be selected.

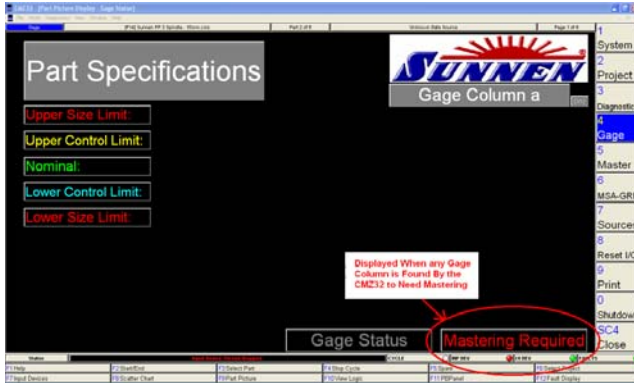
It is highly recommended that this be the option of choice!

Setting up the Etamic CMZ32 Air Gage System

II. Mastering

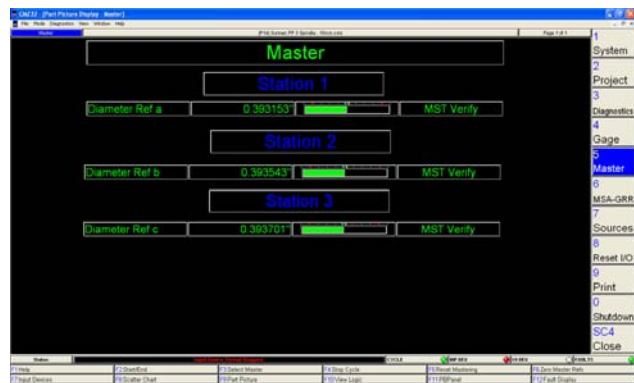
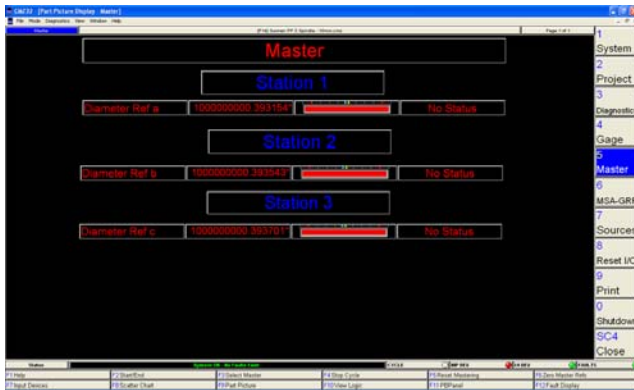
i. Master Window

Press the <5> MASTER key to get into the CMZ32 Master Menu.
Use the <F2> Start/End function key to master ALL attached gage systems.



NOTE:

This Function will only work if the Sunnen1 application is not running or if the Sunnen1 application is in a specific state in its Gage Diagnostic menu as explained in the 'Sunnen SV Gage operating Display Screens' manual.



After mastering, the CMZ32 reports the status of the process for each gage column. The status is shown in the horizontal status bar for each gage column. The first column in the status bar correspond to the gage (a-d), the second column displays the reading the CMZ32 took during mastering. The third column is a bar graph representing the transducer signal at the time the mastering was done, and the last column is the actual status. The status can either be:

- "No Status" - Problems with the gage column caused the mastering to fail.
- "Failed" - Mastering failed.
- "MST Verified" - Mastering was checked and found OK (gage column was not re-mastered).
- "Mastered" - Mastering passed

NOTE:

The <F6> 'Zero Master Refs' button may need to be pressed if a gage column fails to master. This WILL occur any time the "SAVE" button is pressed while in the Measurement Configuration screen (in the 'Project Menu').

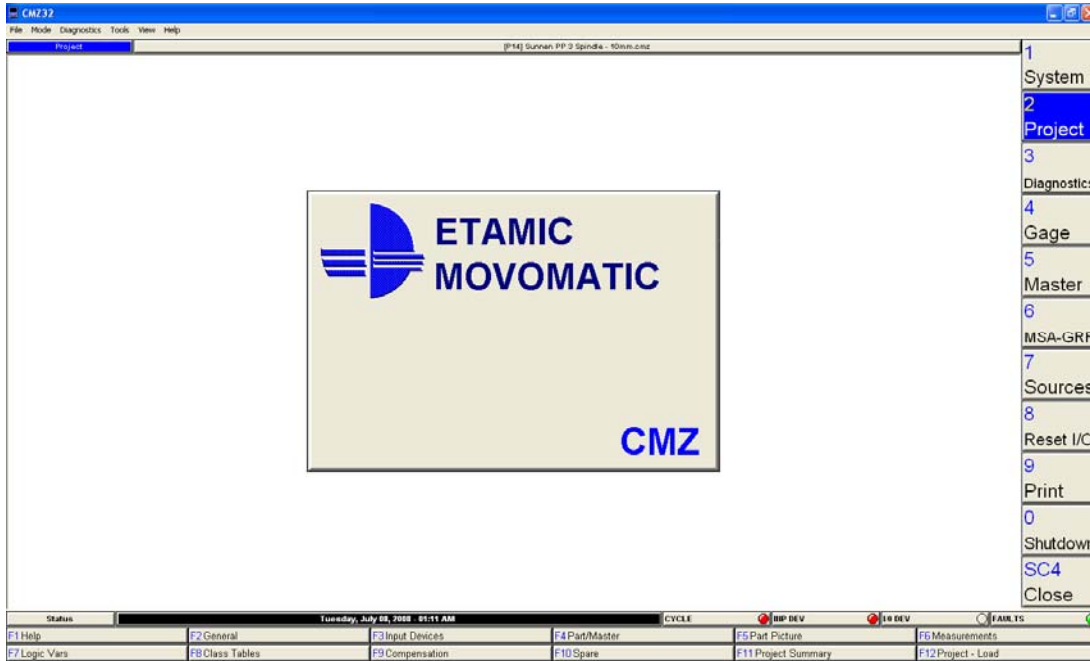
Setting up the Etamic CMZ32 Air Gage System

III. Auto Re-Mastering

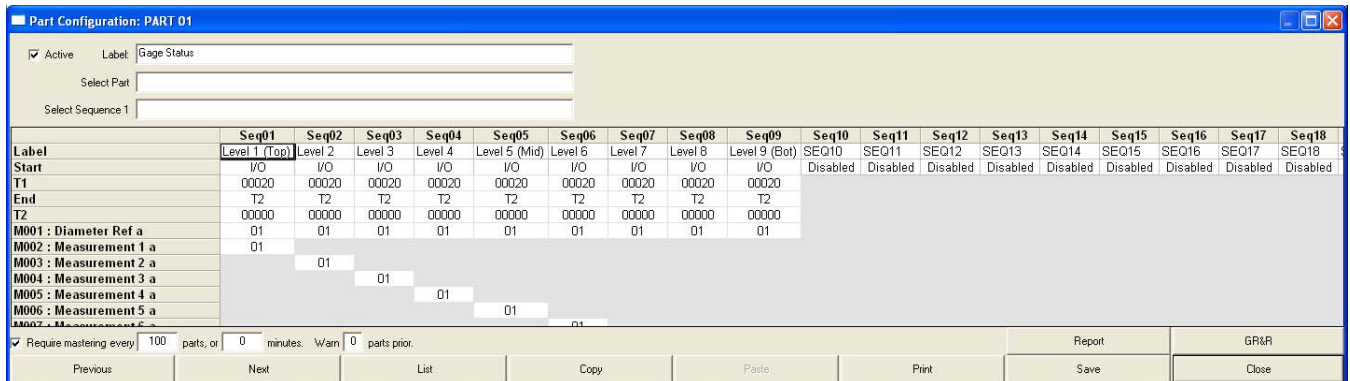
The CMZ32 can be setup such that the system will require to be mastered after so many parts have been gaged. This is done from the 'Part/Master' page in the PROJECT menu.

i. Part Master Menu

Press the <2> MASTER key to get into the CMZ32 Projects Menu.



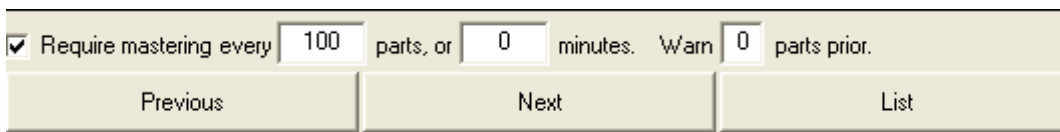
From the Project Menu screen, press the <F4> PART MASTER key to enter the Part Configuration window. The bottom-left corner of the Part Configuration window provides a means for setting up the CMZ32 to automatically require re-mastering after gaging x-amount of parts.



To enable this feature:

- The 'Require mastering every ...' check box must be checked.
- A value of how many parts that have to be gaged before requiring mastering must be entered

In the example below, the CMZ32 is setup so it will set a flag showing that it has to be re-mastered after gaging 100 parts.



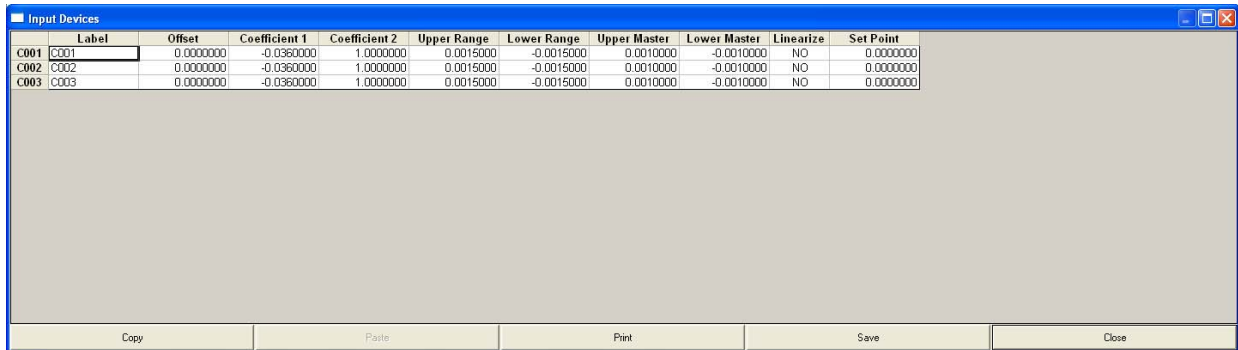
NOTE: For multi-column machines, the first gage column meeting these requirements will cause all other gage columns to be re-mastered also.

Setting up the Etamic CMZ32 Air Gage System

IV. Setup

i. Input Devices

From the Project Menu use the <F3> 'Input Devices' button to configure offsets, coefficients, and limits for Input Devices as they apply to a CMZ32 Project.



Label	Offset	Coefficient 1	Coefficient 2	Upper Range	Lower Range	Upper Master	Lower Master	Linearize	Set Point
C001 C001	0.0000000	-0.0360000	1.0000000	0.0015000	-0.0015000	0.0010000	-0.0010000	NO	0.0000000
C002 C002	0.0000000	-0.0360000	1.0000000	0.0015000	-0.0015000	0.0010000	-0.0010000	NO	0.0000000
C003 C003	0.0000000	-0.0360000	1.0000000	0.0015000	-0.0015000	0.0010000	-0.0010000	NO	0.0000000

The column labeled "Coefficients 1" is used to "tweak" the +/- full-range of the actual output. That is, it allows a means for the operator to adjust the output during calibration of the selected input device. The full range output of the device should be calibrated using a set of certified Maximum & Minimum Master Gage Rings.

The initial value of "Coefficient 1" (or "Gain") should be equal to the coefficient portion of the pneumatic formula divided by 10. This number should then be adjusted to correct the value of the input device. To do this, first, measure the Maximum Master Gage Ring, Measure the Minimum Master Gage Ring, and then take the difference of these two. Next, take the difference of the actual inside bore diameters of the Minimum & Maximum Master Gage Rings that is recorded in their respective certification sheets. The difference in the certification diameters should equal the difference measured earlier.

Increase the value of "Coefficient 1" if the measured difference is less then the difference found in the certification sheets. Decrease the value of "Coefficient 1" if the measured difference is greater then the difference found in the certification sheets.

For example:

The air gaging system was designed with the following pneumatic formula:

Pneumatic formula: $7/(8) \mathbf{G.75} B7/0$


Coefficient value

As shown, the portion of the pneumatic formula representing the coefficient value is "G.75". The actual number that should be entered under "Coefficients 1" is .075 (= .75 / 10).

The Minimum Master Ring Gage measured 9.991mm. The Maximum Master Gage Ring measured at 10.007mm. The Minimum Master Ring Gage certification equaled 9.992mm. The Maximum Master Gage Ring certification equaled 10.008mm.

The measured difference is less then the difference shown in the certification sheets such that the "Coefficient 1" (or "Gain") parameter should be slightly increased. We started with 0.075 so we should increase to 0.076 or 0.077 and repeat the procedure until we are within the +/- tolerance of the type of Master Ring Gage.

Refer to the CMZ help file for more details (press the <F1> key in any of the CMZ32 menus).

Setting up the Etamic CMZ32 Air Gage System

V. Diagnostics

i. Input Devices

From the Diagnostic Menu use the <F2> 'Input Devices' button to view all connected input devices. This feature is used to monitor the raw data coming from the TPE-99 air-to-electronic transducer. Ideally the indicator on the bar graph should be GREEN and it should be near the middle of the graph).



Example of the raw data from the inputs of the TPE-99



Setting up the Etamic CMZ32 Air Gage System

VI. Tuning the Air Gage Comp Control

i. Introduction

This section explains how to program specific Tool Comp parameters in the CMZ32. These parameters affect how the CMZ32 controls the SV machine. Describing and explaining each and every parameter is beyond the scope of this manual. Refer to the CMZ help file for more details (use the <F1> key in any of the CMZ32 menus).

Some parameters may require adjustments or “tuning”. Others should be set to one specific value and not changed. The goal is to adjust the parameters on the CMZ side so the correct comps are generated and sent to the SV machine. Both types are described in the following section.

NOTE:

Every application is going to be different so some of the CMZ parameters having to do with the comps will most likely have to be tweaked.

NOTE:

Refer to the Etamic <F1> “HELP” feature on any question regarding any of the CMZ32 menus, parameters, functions, etc...

The following is a brief discussion & pointers to help explain what will need to be done on the CMZ to tune the gage control system:

It is strongly suggested that the machine first hone with all gage columns working but with all comps disabled. When you first begin, have the machine hone and gage the parts while you monitor the status of the comps that the CMZ makes (this will be explained in more detail below). As long as the overall comp control is enabled on the SV side ('Enable Automatic Adjustments' in the System Settings menu) the CMZ will continuously monitor the honed parts and generate the necessary adjustments (comp) to the SV machine. The individual comps made by the CMZ32 can be seen and monitored on various CMZ screens (i.e. the 'Diagnostic Tool Comp Monitor' window, and the 'Scatter Chart' graph).

Refer to the Sunnen SV Gage Operating Display Screens manual for more information regarding enabling and disabling comps.

Note – How to monitor comps:

Disable the individual comps in the Setup menu. This will cause the machine to ignore all comps coming from the CMZ. However, you can see what comps are made from the CMZ if you look on the 'Tool Comp Monitor' window.

Setting up the Etamic CMZ32 Air Gage System

An example of the 'Diagnostic Tool Comp Monitor' window is shown in the picture below.

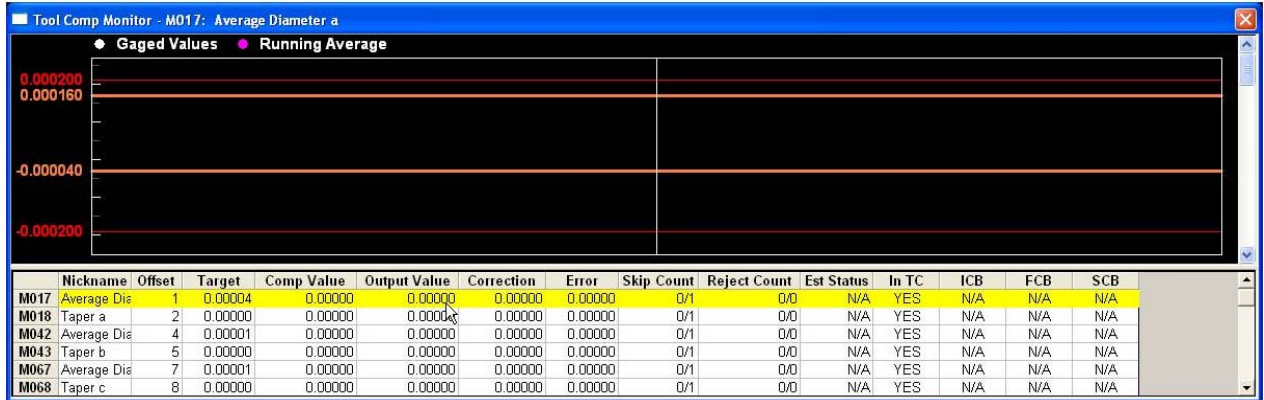


Figure VI-1

NOTE:

Press 'Diagnostic' in the upper-left corner of the CMZ screen and select the 'Tool Comp Monitor' option to bring up the Tool Comp Monitor window.



All adjustments will either be from the 'Measurement' or 'Compensation' CMZ screens. Both are selectable from the CMZ Project menu (shown below).

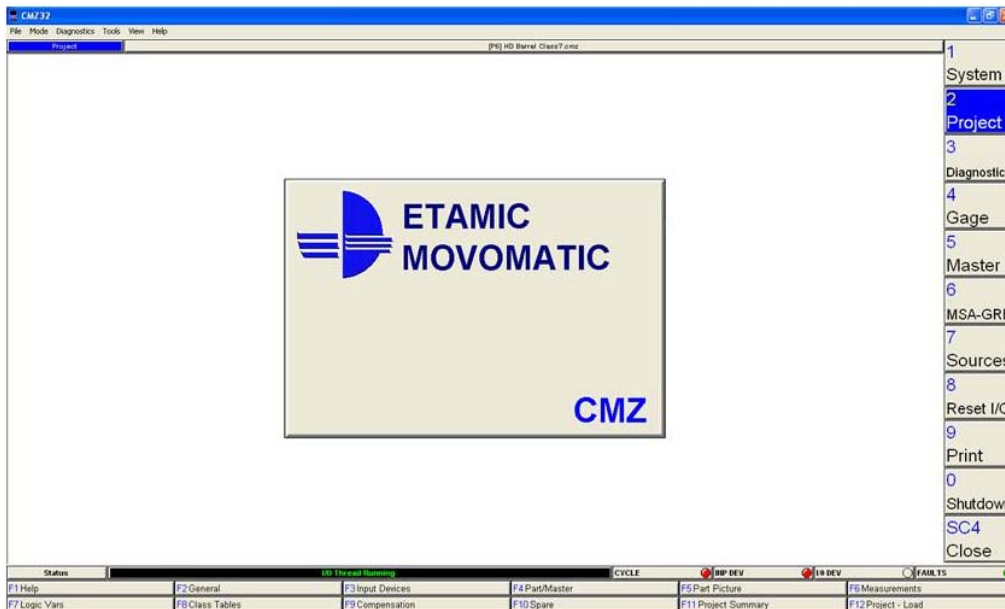


Figure VI-2

Setting up the Etamic CMZ32 Air Gage System

ii. Measurement Screen

1. Measurement Screen Setup using CMZ32 version 4.6.0

***** For CMZ32 version 4.6.0 built date 053107 *****

!!!! WARNING !!!!

**THERE ARE 300 POSSIBLE MEASUREMENT VARIABLES IN THE CMZ32 UNDER THE 'MEASUREMENT CONFIGURATION' SCREEN. (M001 THRU M300)
THESE ARE ORGANIZED INTO 12 GROUPS; EACH GROUP HAS 25 MEASUREMENT VARIABLES.**

- THE 12 GROUPS ARE DIVIDED INTO 2 SECTIONS (6 GROUPS EACH) -
- THE DATA IN THE 1ST HALF ARE ALL ENTERED IN UNITS OF INCHES -
- THE DATA IN THE 2ND HALF ARE ALL ENTERED IN UNITS OF MM -

THE FIRST 6 GROUPS ARE THE MAIN MEASUREMENT VARIABLES USED TO DETERMINE TOOL COMPS.

THE VALUES FOR ALL MEASUREMENT VARIABLES IN THE 1ST 6 GROUPS MUST BE ENTERED IN ENGLISH UNITS (inch)

THE LAST 6 GROUPS ARE ONLY USED FOR DISPLAYING THE MEASURED VALUES IN METRIC. (REFER TO THE LAST PAGES OF THE <F9> 'Part Picture' SCREEN IN THE 'Gage' MENU)

THE VALUES IN THE LAST 6 GROUPS MUST "MIRROR" THE 1ST 6 GROUPS. THAT IS, THEY ARE SET TO THE SAME VALUE BUT ARE ENTERED IN UNITS OF INCHES IN THE 1ST 6 GROUPS AND IN UNITS OF MM IN THE 2ND

M001 (in) = M151 (mm)
M002 (in) = M152 (mm)

M149 (in) = M259 (mm)
M150 (in) = M300 (mm)

EVERY VALUE IN THE LAST 6 GROUPS MUST BE SET TO THE SAME VALUE AS ITS MATCHING MEASUREMENT VARIABLE IN THE 1ST GROUP

Example:

The '*Nominal*' value for M042, '*Average Diameter b*', (under the '*Master*' tab) is entered in (units are in inches) as: **0.393937**

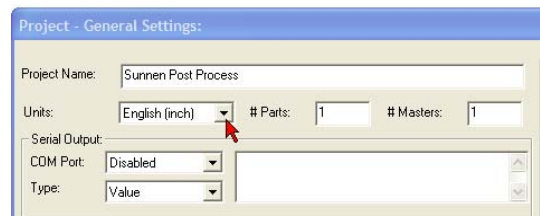
The equivalent "metric" measurement variable would be M192.

The '*Nominal*' value for M192 would be entered in (units are in mm) as: **10.006**

!!! WARNING !!!

The "Units" selection on the '*Project – General Settings*' page **MUST ALWAYS** have '*English (inch)*' selected!

!!! DO NOT CHANGE THIS SETTING !!!



FAILURE TO DO FOLLOW THESE INSTRUCTIONS PROPERLY MAY RESULT IN CAUSING THE CMZ TO INCORRECTLY SET THE PART STATUS AS "GOOD" OR "BAD"!

Setting up the Etamic CMZ32 Air Gage System

2. Measurement Screen Setup using CMZ32 version 4.6.16

***** For CMZ32 version 4.6.16 built date 090808 (or later) *****

!!!! WARNING !!!!

ONLY THE FIRST 150 MEASUREMENT VARIABLES IN THE CMZ32 UNDER THE 'MEASUREMENT CONFIGURATION' SCREEN ARE USED. (M001 THRU M150)

THESE ARE ORGANIZED INTO 6 GROUPS; EACH GROUP HAS 25 MEASUREMENT VARIABLES.

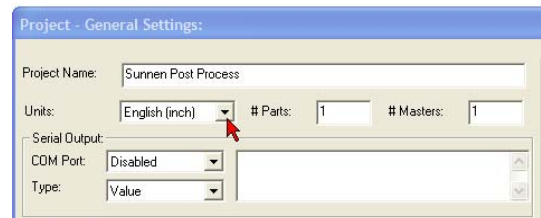
NOTE:

THE DATA IS ENTERED EITHER IN UNITS OF INCHES (in) OR METRIC (mm).
THE UNITS SELECTED IS DETERMINED BY WHAT IS CHECKED IN THE 'GENERAL SETTINGS' PAGE LOCATED IN THE 'PROJECT MENU'.

Example:

The '*Nominal*' value for M042, '*Average Diameter b*', (under the '*Master*' tab) is entered as: **0.393937**

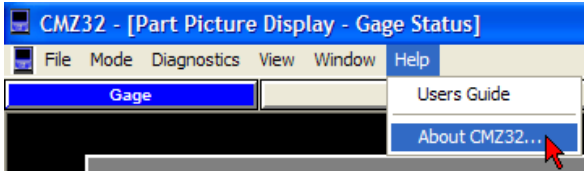
The data entered is in "inches" such that the 'Units' selected in the 'General Settings' page is: 'English (inch)



FAILURE TO DO FOLLOW THESE INSTRUCTIONS PROPERLY MAY RESULT IN CAUSING THE CMZ TO INCORRECTLY SET THE PART STATUS AS "GOOD" OR "BAD"!

Setting up the Etamic CMZ32 Air Gage System

To Find CMZ32 version: Go to 'Help' at top of screen and select 'About CMZ32'



NOTE:

Only those measurement variables (M001-M300) required for the particular SV machine should be enabled!

- Those being used need to have their 'Active' parameter set to 'YES'.
- Those not used must be set to 'NO'.
- Use the <+> key to change the state from 'YES' to 'NO'.
- Use the <-> key to change the state from 'NO' to 'YES'.

NOTE:

1. By default all the measurement variables should already be set to their proper states.
2. Not all measurement variables in a single group may be used (active). Some of these have their '*Nickname*' set to 'Spare' and are reserved for future use.
3. By default the CMZ is setup to take a maximum of 9 of the possible 15 measurements (The unused measurements 10-15 are reserved for future use).

Measurement Configuration										
All Formula Limits Master Display Flags Serial Network										
	Active	Nickname	Tol Type	Flier %	Upper Tol	Upper Approach	Lower Approach	Lower Tol	Master Upper	Master Lower
M001	YES	Diameter Ref a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000060	-0.000060
M002	YES	Measurement 1 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M003	YES	Measurement 2 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M004	YES	Measurement 3 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M005	YES	Measurement 4 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M006	YES	Measurement 5 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M007	YES	Measurement 6 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M008	YES	Measurement 7 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M009	YES	Measurement 8 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M010	YES	Measurement 9 a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
	NO	Measurement 10 a	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Measurement 11 a	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Measurement 12 a	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Measurement 13 a	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Measurement 14 a	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Measurement 15 a	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
M017	YES	Average Diameter a	Bilateral	0	0.000200	0.000160	-0.000040	-0.000200	0.000000	0.000000
M018	YES	Taper a	Bilateral	0	0.000160	0.000120	-0.000120	-0.000160	0.000000	0.000000
	NO	Spare	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Spare	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
M021	YES	Straightness a	Bilateral	0	0.000160	0.000120	-0.000120	-0.000160	0.000000	0.000000
	NO	Spare	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Spare	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Spare	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	NO	Spare	Bilateral	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Figure VI-3: Example of the 'Measurement Configuration' screen

Setting up the Etamic CMZ32 Air Gage System

- ⇒ The 'Nominal' parameter must be set to the nominal value of the "MEAN" Master Gaging Ring. This parameter is usually set to the same value as the associated Spindle Column final diameter. For example, if Spindle Column 'B' is configured so its final size is 0.472008 " (11.989mm) then the '*Nominal*' parameter for Gage Column 'b' would also be set to 0.472008".
- ⇒ The "MEAN" Master Gaging Ring is the ring installed on the Gage Column 'Auto Zero Bracket' and is used when "Zeroing" the Gage Column.

Note that the actual size of the "MEAN" Master Gaging Ring may not be the exact same size as the nominal size entered in the '*Nominal*' parameter.

This difference is noted on the rings 'Certification' letter shipped with every SV machine incorporating an Air Gage Column.

The difference must be set in the '*M1 Offset*' parameter.

In the example below, the 'Measurement Configuration' screen shows that the nominal value of the "MEAN" Master Gaging Ring is 0.472008"

The '*M1 Offset*' is set to 0.000020" which means that the actual value of the "MEAN" master Gaging Ring is 0.472028" (0.472008" + 0.000020").

	Active	Nickname	Master Ref	M1 Offset	M2 Offset	M3 Offset	Nominal
M001	YES	Diameter Ref a	001	0.000020	0.000000	0.000000	0.472008
M002	YES	Measurement 1 a	000	0.000000	0.000000	0.000000	0.000000

Figure VI-4

- ⇒ You'll need to make sure that the 'Upper Tol' & 'Lower Tol' are set to the parts +/- tolerance. These two parameters determine the "RED" zone in the gage graphs.
- ⇒ Program the 'Upper Approach' & 'Lower Approach' limits to the same value you set the 'UCL' & 'LCL' to on the Tool Compensation screen (refer to next section below). The actual values set in these parameters are sent to the SV machine. They determine the "YELLOW" & "GREEN" regions of the Gage Bar Graph displayed on the SV.

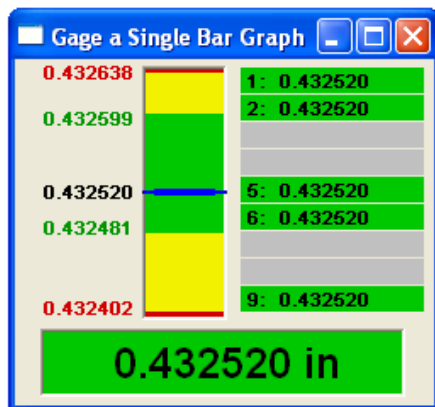


Figure VI-5: Example of Gage Column 'a' Bar Graph displayed in the Run Menu

NOTE:

1. You must set all the values mentioned above for '*Diameter ref a*', '*Measurement 1 a*' thru '*Measurement 9 a*' and '*Average Diameter a*'.
2. A part is set to 'BAD' if ANY of its measured values fall outside the upper & lower tolerance limits!
3. You'll have to set the +/- tolerance for '*Taper a*' & '*Straightness a*' based on the specific application.
That is, the value entered will be based on what measured value do you want the system to reject and tag a part 'BAD' (when a part's taper and straightness is beyond a certain limit).
4. Even if you decide you do not want to enable a specific comp (Straightness for example) you MUST still have a valid value entered in these locations!

Setting up the Etamic CMZ32 Air Gage System

iii. Tool Compensation Screen

Refer to the 'Measurement - Tool Compensation Configuration' picture below.

- ⇒ The 'Output Type' parameter:
 - This parameter should be set to 'DISABLED' on all measurement variables except for the Average Bores Size, Taper, and Straightness.
 - These have to be set to 'Socket' otherwise the CMZ32 will not send the appropriate comp to the SV machine!
 - EXCEPTION:
 - Some SV machines may have the 'Straightness' comp set to 'DISABLE'.
 - This was due to the fact that at the time the machine was being "tuned" it was found that there wasn't a need to enable the automatic Stroke Length adjustment (Straightness comp).
- ⇒ The 'UCL' & 'LCL' parameters:
 - You'll need to adjust the '*UCL*' & '*LCL*' for '*Average Diameter a*', '*Taper a*', and '*Straightness a*' to the values specific to your application.
 - The Upper Control Limit sets the threshold when a negative adjustment is required to reduce whatever comp that particular limit is linked to.
 - The Lower Control Limit sets the threshold when a positive adjustment is required to reduce whatever comp that particular limit is linked to.
- ⇒ Program the 'Upper Approach' & 'Lower Approach' limits on the 'Measurement' screen to the same value you set the 'UCL' & 'LCL' to on the Tool Compensation screen (refer to the last section above).
- ⇒ The 'Target' parameter:
 - Used to set how much above or below the nominal value you want the gaging system to aim for.
 - Normally this is only used for the '*Average Diameter a*' comp.
 - In the picture below you can see that the gaging system was setup so the bore size comp would try to reach 0.000040" (~1µm) above the nominal bore size.
 - This is usually set to a value such that any positive bore size comp will attempt to get the next size a little higher than normal but still below the '*LCL*'.
- ⇒ The 'Max Comp' parameter:
 - This should not be set higher than the upper/lower tolerance (set in the 'Measurement' screen).
- ⇒ The 'Max Cum Comp' parameter:
 - This should be set to '0'.

Setting up the Etamic CMZ32 Air Gage System

⇒ The '*Comp Inc*' parameter:

This is used to "boost" the comp value calculated by the CMZ before it is sent to the SV machine. This is normally changed when the operator feels that the feed system (or stoker in regards to Taper & Straightness comps) needs a little more (or a little less) adjustment then what the CMZ would have generated if this value is set to '1'.

NOTE:

- ❖ This value is actually divided into the compensation value, '*Comp Value*', generated by the CMZ before being sent out to the SV machine.

Such that, the actual output comp, '*Output Value*', from the CMZ to the SV is:

$$'Output Value' = 'Comp Value' / 'Comp Inc'$$

Refer to the <F9> 'Compensation' screen in the 'Project Menu' ((shown below) and also the bottom of the 'Tool Comp Monitor' window (shown above).

- ❖ Default settings:

1. '*Average Diameter a*' → This should be set to '-1.0'.

Such that the '*Output Value*' = **-1** * '*Comp Value*'

This means that the actual Bore Size Comp from the CMZ to the SV machine will track the error in the bore size but in the opposite direction of the error.

That is, the Feed Axis will expand a little more the next cycle (based from the last final diameter) when the CMZ determines that the bore is getting too small.

It will expand a less amount then the last final diameter when the CMZ determines that the bore is getting too big.

2. '*Taper a*' → This should be set to '-0.001'.

Such that the '*Output Value*' = **-1000** * '*Comp Value*'

This means that the actual Stroke Position Comp from the CMZ to the SV machine will change by 0.001" for every 0.000001" of error in the bore's taper but in the opposite direction of the error.

That is, the Center of Stroke will be moved down a little more the next cycle (based from the last center of stroke position) when the CMZ determines that the bore is getting too small on the bottom (or too big on the top of the bore).

The Center of Stroke will be moved up a less more (then the last position it was at) when the CMZ determines that the bore is getting too small on top (or too big on the bottom of the bore).

3. '*Straightness a*' → This should be set to '-0.001'.

Such that the '*Output Value*' = **-1000** * '*Comp Value*'

This means that the actual Stroke Length Comp from the CMZ to the SV machine will change by 0.001" for every 0.000001" of error in the bore's straightness but in the opposite direction of the error.

That is, the amount that the Stroker Axis will stroke up & down during the next cycle will decrease a little more then the last cycle when the CMZ determines that the bore is getting too small in the middle (or too big on the ends).

The length of the stroke will increase a less more (then the last cycle) when the CMZ determines that the bore is getting too big in the middle (or too small on the ends).

Setting up the Etamic CMZ32 Air Gage System

❖ Examples of changing the default setting:

1. '*Average Diameter a*' → If the operator wanted to double the Bore Size comp value sent to the SV then the '*Comp Inc*' parameter would be set to -0.5.

$$\begin{aligned}\text{'Output Value'} &= \text{'Comp Value'} / \text{'Comp Inc'} \\ &= \text{'Comp Value'} / \mathbf{-0.5} \\ &= \text{'Comp Value'} * \mathbf{-2}\end{aligned}$$

2. '*Taper a*' → If the operator wanted the Stroke Position to change by 0.002" for every 0.000001" of error in the bore's taper then the '*Comp Inc*' parameter would be set to -0.0005

$$\begin{aligned}\text{'Output Value'} &= \text{'Comp Value'} / \text{'Comp Inc'} \\ &= \text{'Comp Value'} / \mathbf{-0.0005} \\ &= \text{'Comp Value'} * \mathbf{-2000}\end{aligned}$$

3. '*Straightness a*' → If the operator wanted the Stroke Length to change by 0.0005" for every 0.000001" of error in the bore's straightness then the '*Comp Inc*' parameter would be set to -0.002.

$$\begin{aligned}\text{'Output Value'} &= \text{'Comp Value'} / \text{'Comp Inc'} \\ &= \text{'Comp Value'} / \mathbf{-0.002} \\ &= \text{'Comp Value'} * \mathbf{-500}\end{aligned}$$

⇒ The 'Stray' parameter:

This is the maximum amount between two com values sent to the SV machine.

That is, if the CMZ determines that the latest comp that it has generated is above this amount from the last comp given then it will abort the comp and not send it to the SV machine.

The CMZ uses this feature to ignore bogus (or "Stray") readings like what may occur if a finished part was sent back through the SV machine.

The default on this may be 0.001" however every application is different so you may find that this settings needs to be adjusted'.

⇒ The 'ICB' parameter:

Tells the CMZ how many parts it needs to measure before it is allowed to make the initial comp (the very first comp after resetting the CMZ controls).

This should be set to '1'.

⇒ The 'FCB' parameter:

This tells the CMZ how many parts it must measure before generating a comp once the part falls outside the Upper/Lower Control Limits (and after a ICB type comp was made).

This should be set to '2'.

⇒ The 'SCB' parameter:

This tells the CMZ how many parts must be measured while inside the Upper/Lower Control Limits. That is, the CMZ makes a "Running Average" using this number of parts.

You can think it as a number of parts in a "Sub-Group".

This parameter is normally set to '3' but can be changed.

Too small a number and you risk the Gaging System Output Control to oscillate (responding to quickly to changes).

Too high a number and you risk the Gaging System Output to fall behind (responding too slowly to changes).

⇒ The 'Skip' parameter:

This value lets the CMZ know how many parts are between the gage and spindle column.

For example: the Spindle Column will be honing a part at the SAME time that the Gage Column is measuring a part.

The CMZ will need to know that the next part ('1' part) did NOT have the comp that the CMZ just generated based on the part it had just measured.

This parameter MUST be set to '1' on all normal SV machines!

Setting up the Etamic CMZ32 Air Gage System

NOTE:

1. Normally we have the Upper Control Limit, 'UCL', for the 'Average Diameter a' set very high so we do not make unnecessary negative bore size adjustments. That is, it is preferred that the abrasive naturally wear down rather than make a bore size comp to reduce the bore size. Of course, when you do this, the trade off is you'll need to decide how much greater from the nominal size you are willing to have the bore honed to before the system must generate a negative bore comp.
2. Set the Lower Control Limit, 'LCL', for the 'Average Diameter a' to a value that will allow the system to make a positive bore size comp early enough before honing too small of a diameter.
(Remember that the Spindle Column is honing a part at the same time that the gaging system is measuring a part such that any comps that the gage system generates will be too late for the existing part being honed).
3. The parameters should be set such that the stones on the honing tool are allowed to wear normally without any need to make additional positive bore comps and at the same time not too high so we do not have to make any negative bore comps. The actual graph shown on the 'Tool Comp Monitor' screen should look "Saw Tooth" as shown in Figure VI-7 below.

Note in Figure VI-6 below that the comps for 'Straightness a' has been disabled ('Output Type' = Disabled). You may or may not want this comp enabled for your specific application. Refer to the notes above for 'Output Type'.

Meas. Nickname	Output Type	Output Mode	UCL	LCL	Target	Max Comp	Max Cum Comp	Comp Incr	Stray	ICB	FCB	SCB	Skip	
M001	Diameter Ref a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M002	Measurement 1 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M003	Measurement 2 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M004	Measurement 3 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M005	Measurement 4 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M006	Measurement 5 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M007	Measurement 6 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M008	Measurement 7 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M009	Measurement 8 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M010	Measurement 9 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M011	Measurement 10 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M012	Measurement 11 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M013	Measurement 12 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M014	Measurement 13 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M015	Measurement 14 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M016	Measurement 15 a	Disabled	Incremental	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	00	00	00	00
M017	Average Diameter a	Socket	Incremental	0.0001600	-0.0000400	0.0000400	0.0002000	0.0000000	-1.0000000	0.0001000	01	02	03	01
M018	Taper a	Socket	Incremental	0.0001200	-0.0001200	0.0000000	0.2000000	0.0000000	-0.0010000	0.1200000	01	02	03	01
M019	Spare	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	00	00	00	00
M020	Spare	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	00	00	00	00
M021	Straightness a	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	-0.0010000	0.0000000	01	02	03	01
M022	Spare	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	00	00	00	00
M023	Spare	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	00	00	00	00
M024	Spare	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	00	00	00	00
M025	Spare	Disabled	Incremental	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	00	00	00	00

Figure VI-6: 'Measurement - Tool Compensation Configuration' screen

Setting up the Etamic CMZ32 Air Gage System

iv. Examples

1. Properly tuned system

Example of a properly tuned Gaging System controlling the bores size diameter on Spindle Column 'A':

Each White dot represents a measured part.

Each purple dot represents a sub-group.

A sub-group may represent 1 or more parts. (This can be 1, 2, or 3 depending on when the previous comp was made.)

In this example the sub-group is 2 (refer to section above explaining the parameters in the 'Tool Compensation' screen).

The +/- tolerance was set to 0.000200".

The Upper Control Limit was set to 0.000160".

The Lower Control Limit was set to -0.000040".

As you can see from the graph, the machine honed the first 36 parts no only within tolerance but also within the +/- Bore Size Control Limits.

A positive bore comp was generated by the CMZ when it detected that the average diameter of part #37 fell below the Lower Control Limit.

The CMZ then ignored the next part (#38) (the 'SKIP' parameter) because it was honed at the same time the last part (#37) was gaged.

The 38th & 39th part made up the next subgroup (which is denoted by the next purple dot on the graph).

In fact, in this example, the gaging system only made 3 positive bore comp during the first 100 parts.

(After measuring the 37th, 73rd, and 97th parts)

The 3 vertical lines on the graph below, represents when the bore size comps were generated by the CMZ.

After each positive bore comp the machine was able to hone the next part back within the control limits.

The graph also shows that the stones were allowed to wear down naturally, eliminating the need for any negative comps.

This gives the graph that "Saw-tooth" effect mentioned above.

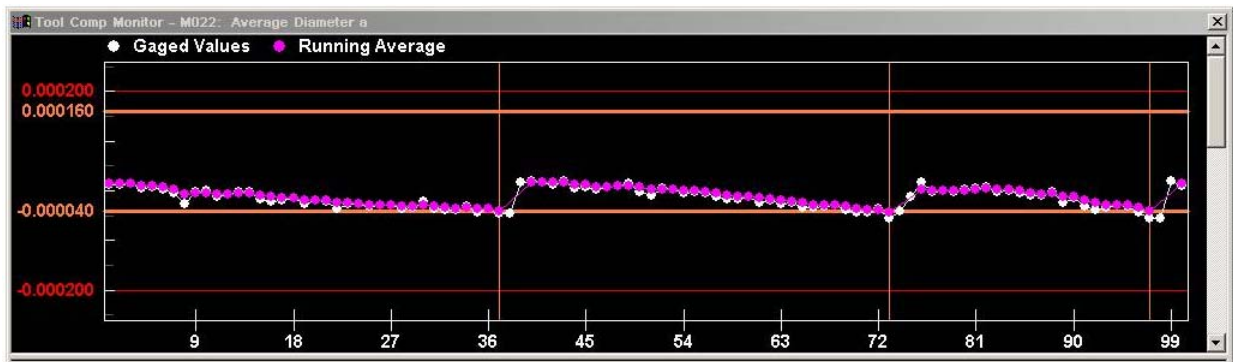


Figure VI-7

Setting up the Etamic CMZ32 Air Gage System

2. Setting up a Offset on Nominal Size

Some machines require a means to hone at multiple sizes. That is, a machine may be setup in such a way that setup 'A' has the final size at x.yy-mm and then have another setup, 'B', almost identical to 'A' except that the final size is different by a small amount, say only 0.0005mm. This may be done when an operator wishes to have a group of parts honed at various sizes to match a set of plungers that have been segregated into groups of "classes", each class differing only slightly in bore size from the next.

One way to achieve this is to adjust the '*Nominal*' value set in the 'Measurement' screen to this "difference" in bore size. Then make the same adjustment to the '*M1 Offset*' value but in the opposite direction. That is, if you add a "difference" to the '*Nominal*' then subtract the same amount to the value in the '*M1 Offset*' parameter.

Example:

Suppose you had a setup in the CMZ32 called, '*Sunnen Post Process 3 Spindle - 11mm*'. The '*Nominal*' size was set to 0.4330696" (11.0000-mm) and the '*M1 Offset*' parameter was set to -0.000004" (-0.0001-mm). You want to hone some parts exactly like this setup however you need the bore to be 0.0000197" (0.0005-mm) larger.

1. The first thing to do would be to copy the existing setup and then rename it:
 - ✓ Go to the 'System' Menu.
 - ✓ Press the <F3> 'Project Files' key.
 - ✓ From the Projects window (shown below) highlight the setup you want to copy.
 - ✓ Press the 'Save As' button in the Projects window.
 - ✓ The new file will automatically be named the same as the copied file but with a prefix.
 - ✓ Edit the name of the file.
 - NOTE: This must be done in two places on the screen**
 - Rename the file name shown in the "File Name" box located in the upper-right corner of the screen. Rename the file name in the same manner to the second file listed shown on the bottom-middle of the screen.
 - ✓ Select which file you want loaded in the CMZ. To do this, highlight the file name and then press the 'Select' button to load that setup.

Setting up the Etamic CMZ32 Air Gage System

In this example we will rename it to "Sunnen Post Process 3 Spindle - 11_0005mm".

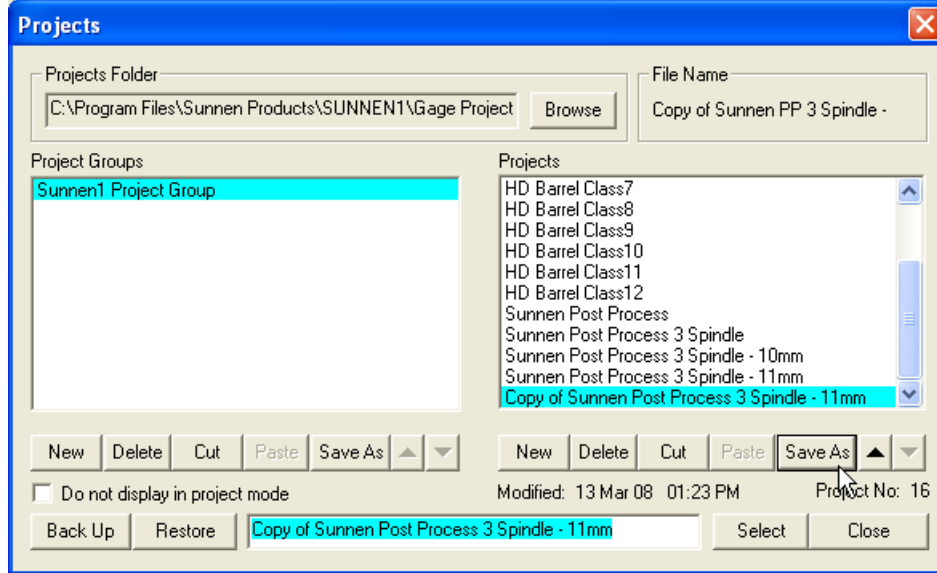


Figure VI-8: Example of copying an existing setup

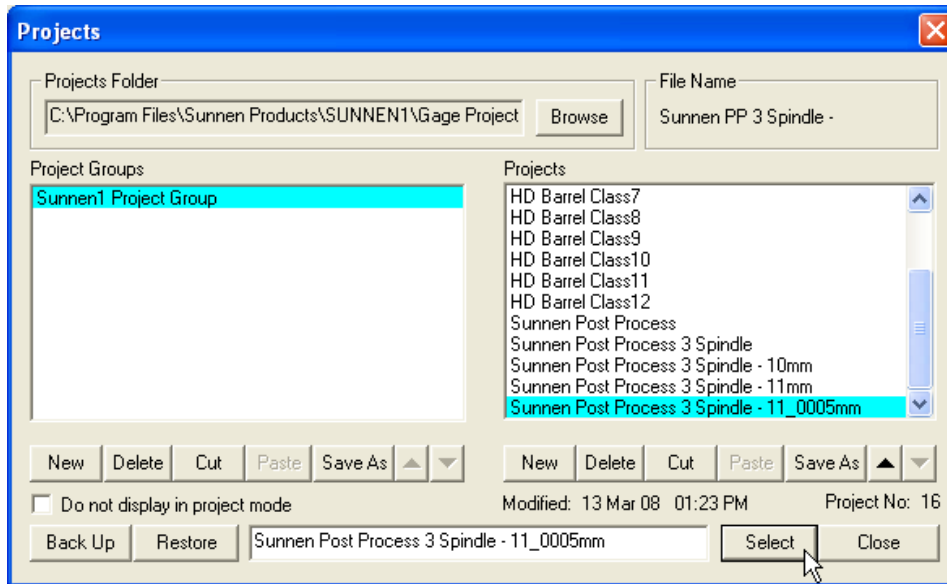


Figure VI-9: Example of renaming the newly copied setup

2. The 2nd step would be to edit the 'Measurement' Parameters:
You would then proceed to edit this new setup with the changes. That is, the '*Nominal*' parameter now becomes 11.0005-mm (= 11.0000 + 0.0005). The '*M1 Offset*' parameter now needs to be edited to offset the change we just made to the '*Nominal*' parameter. Such that, '*M1 Offset*' is now -0.0006-mm (= -0.0001-mm - 0.0005-mm).

Setting up the Etamic CMZ32 Air Gage System

VII. Gaging

i. Selecting the CMZ setup file.

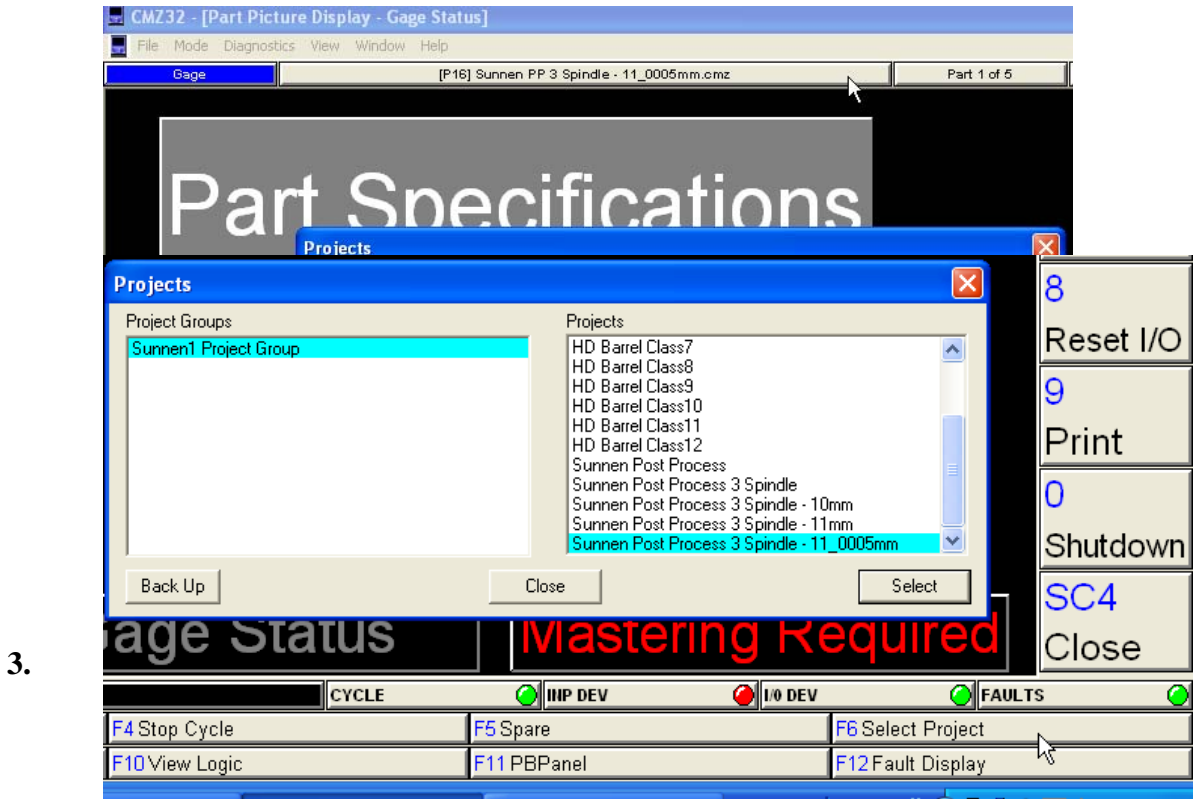
There are various methods to select a setup file.

1. Accessing from the System Menu

The setup files can be selected by going to the 'System' menu. Refer to the instructions above under "Setting up a Offset on Nominal Size".

2. Using the Top Menu key:

Select the CMZ setup file from one of the other menus. Example, Press the button between 'GAGE' and 'Part 1 of 5' buttons located on the top-left side of the Gage menu. This will bring up a window listing all of the CMZ setups. Highlight the file and press the 'Select' key to load the file.



Setting up the Etamic CMZ32 Air Gage System

VIII. Appendix

i. CMZ32 Worksheet

Use the following worksheets to organize how the various parameters are to be entered in the CMZ32.

NOTE:

1. The 'Upper Approach' setting must be the same exact value entered for the UCL.
2. The 'Lower Approach' setting must be the same exact value entered for the LCL.
3. These setting (highlighted in RED) are factory set and **MUST NOT BE CHANGED!**
4. The setting for 'Target' size should initially be set to zero when first starting. Refer to the SV manual for setting up the CMZ32.
5. As a 'Rule of Thumb", the 'Max Comp' should not be set greater then the absolute value of the lower Tolerance [Max Comp < ABS(-TOL)].
6. These values are 'Factory Set" and are recommended settings but can be changed. Refer to the SV manual for setting up the CMZ32.

Setting up the Etamic CMZ32 Air Gage System

GAGE AXIS	MASTER GAGE RING			TUNING PARAMETERS (in the CMZ32 PROJECT Menu)					
				MEASUREMENT SCREEN (F6)					
				<i>Nominal</i>	<i>M1 Offset</i>	<i>+TOL</i>	<i>Upper Approach</i> <small>(see note #1)</small>	<i>Lower Approach</i> <small>(see note #2)</small>	<i>-TOL</i>
NOMINAL SIZE	CERTIFIED DIFFERENCE								
A			SIZE						
			TAPER						
			STRAIGHTNESS						
B			SIZE						
			TAPER						
			STRAIGHTNESS						
C			SIZE						
			TAPER						
			STRAIGHTNESS						
D			SIZE						
			TAPER						
			STRAIGHTNESS						

Tuning Parameter Worksheet – CMZ32 Measurement Screen (F6) in Project Menu

Setting up the Etamic CMZ32 Air Gage System

GAGE AXIS	MASTER GAGE RING			TUNING PARAMETERS (in the CMZ32 PROJECT Menu)											
	NOMINAL SIZE	CERTIFIED DIFFERENCE		COMPENSATION SCREEN (F9)											
				Output Type (#3)	UCL	LCL	Target (#4)	Max Comp (#5)	Max Cum Comp (#3)	Comp Inc (#6)	Stray	ICB (#6)	FCB (#6)	SCB (#6)	Skip (#3)
A			SIZE	Socket					0	-1		1	2	3	1
			TAPER	Socket					0	-0.001		1	2	3	1
			STRAIGHTNESS	Socket					0	-0.001		1	2	3	1
B			SIZE	Socket					0	-1		1	2	3	1
			TAPER	Socket					0	-0.001		1	2	3	1
			STRAIGHTNESS	Socket					0	-0.001		1	2	3	1
C			SIZE	Socket					0	-1		1	2	3	1
			TAPER	Socket					0	-0.001		1	2	3	1
			STRAIGHTNESS	Socket					0	-0.001		1	2	3	1
D			SIZE	Socket					0	-1		1	2	3	1
			TAPER	Socket					0	-0.001		1	2	3	1
			STRAIGHTNESS	Socket					0	-0.001		1	2	3	1

Setting up the Etamic CMZ32 Air Gage System



FRACTION / DECIMAL / MILLIMETER EQUIVALENTS CHART

INCH			INCH			INCH		
FRACTION	DECIMAL	MILLIMETER	FRACTION	DECIMAL	MILLIMETER	FRACTION	DECIMAL	MILLIMETER
....	.003937	0,1000	9/32	.281250	7,1438	21/32	.656250	16,6688
....	.007874	0,2000	19/64	.296875	7,5406	....	.669291	17,0000
....	.011811	0,3000	5/16	.312500	7,9375	43/64	.671875	17,0656
1/64	.015625	0,3969	....	.314961	8,0000	11/16	.687500	17,4625
....	.015748	0,4000	21/64	.328125	8,3344	45/64	.703125	17,8594
....	.019685	0,5000	11/32	.343750	8,7313	....	.708661	18,0000
....	.023622	0,6000	....	.354331	9,0000	23/32	.718750	18,2563
....	.027559	0,7000	23/64	.359375	9,1281	47/64	.734375	18,6531
1/32	.031250	0,7938	3/8	.375000	9,5250	....	.748031	19,0000
....	.031496	0,8000	25/64	.390625	9,9219	3/4	.750000	19,0500
....	.035433	0,9000	....	.393701	10,0000	49/64	.765625	19,4469
....	.039370	1,0000	13/32	.406250	10,3188	25/32	.781250	19,8438
3/64	.046875	1,1906	27/64	.421875	10,7156	....	.787402	20,0000
1/16	.062500	1,5875	....	.433071	11,0000	51/64	.796875	20,2406
5/64	.078125	1,9844	7/16	.437500	11,1125	13/16	.812500	20,6375
....	.078740	2,0000	29/64	.453125	11,5094	....	.826772	21,0000
3/32	.093750	2,3813	15/32	.468750	11,9063	53/64	.828125	21,0344
7/64	.109375	2,7781	....	.472441	12,0000	27/32	.843750	21,4313
....	.118110	3,0000	31/64	.484375	12,3031	55/64	.859375	21,8281
1/8	.125000	3,1750	1/2	.500000	12,7000	....	.866142	22,0000
9/64	.140625	3,5719	....	.511811	13,0000	7/8	.875000	22,2250
5/32	.156250	3,9688	33/64	.515625	13,0969	57/64	.890625	22,6219
....	.157480	4,0000	17/32	.531250	13,4938	....	.905512	23,0000
11/64	.171875	4,3656	35/64	.546875	13,8906	29/32	.906250	23,0188
3/16	.187500	4,7625	....	.551181	14,0000	59/64	.921875	23,4156
....	.196850	5,0000	9/16	.562500	14,2875	15/16	.937500	23,8125
13/64	.203125	5,1594	37/64	.578125	14,6844	....	.944882	24,0000
7/32	.218750	5,5563	....	.590551	15,0000	61/64	.953125	24,2094
15/64	.234375	5,9531	19/32	.593750	15,0813	31/32	.968750	24,6063
....	.236220	6,0000	39/64	.609375	15,4781	....	.984252	25,0000
1/4	.250000	6,3500	5/8	.625000	15,8750	63/64	.984375	25,0031
17/64	.265625	6,7469	....	.629921	16,0000	1	1.000000	25,4000
....	.275591	7,0000	41/64	.640625	16,2719	1-1/16	1.062500	26,9880

FORMULAS:

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">MULTIPLY</td> <td></td> <td style="text-align: center;">BY</td> <td></td> <td style="text-align: center;">TO GET</td> </tr> <tr> <td style="text-align: center;">INCHES (in)</td> <td style="text-align: center;">x</td> <td style="text-align: center;">25.4</td> <td style="text-align: center;">=</td> <td style="text-align: center;">MILLIMETERS (mm)</td> </tr> <tr> <td style="text-align: center;">FEET (ft)</td> <td style="text-align: center;">x</td> <td style="text-align: center;">0.3048</td> <td style="text-align: center;">=</td> <td style="text-align: center;">METERS (m)</td> </tr> </table>	MULTIPLY		BY		TO GET	INCHES (in)	x	25.4	=	MILLIMETERS (mm)	FEET (ft)	x	0.3048	=	METERS (m)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">MULTIPLY</td> <td></td> <td style="text-align: center;">BY</td> <td></td> <td style="text-align: center;">TO GET</td> </tr> <tr> <td style="text-align: center;">MILLIMETERS (mm)</td> <td style="text-align: center;">x</td> <td style="text-align: center;">0.03937</td> <td style="text-align: center;">=</td> <td style="text-align: center;">INCHES (in)</td> </tr> <tr> <td style="text-align: center;">METERS (m)</td> <td style="text-align: center;">x</td> <td style="text-align: center;">3.281</td> <td style="text-align: center;">=</td> <td style="text-align: center;">FEET (ft)</td> </tr> </table>	MULTIPLY		BY		TO GET	MILLIMETERS (mm)	x	0.03937	=	INCHES (in)	METERS (m)	x	3.281	=	FEET (ft)
MULTIPLY		BY		TO GET																											
INCHES (in)	x	25.4	=	MILLIMETERS (mm)																											
FEET (ft)	x	0.3048	=	METERS (m)																											
MULTIPLY		BY		TO GET																											
MILLIMETERS (mm)	x	0.03937	=	INCHES (in)																											
METERS (m)	x	3.281	=	FEET (ft)																											

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