



GETTING STARTED WITH WINMAX LATHE MANUAL

Max Control

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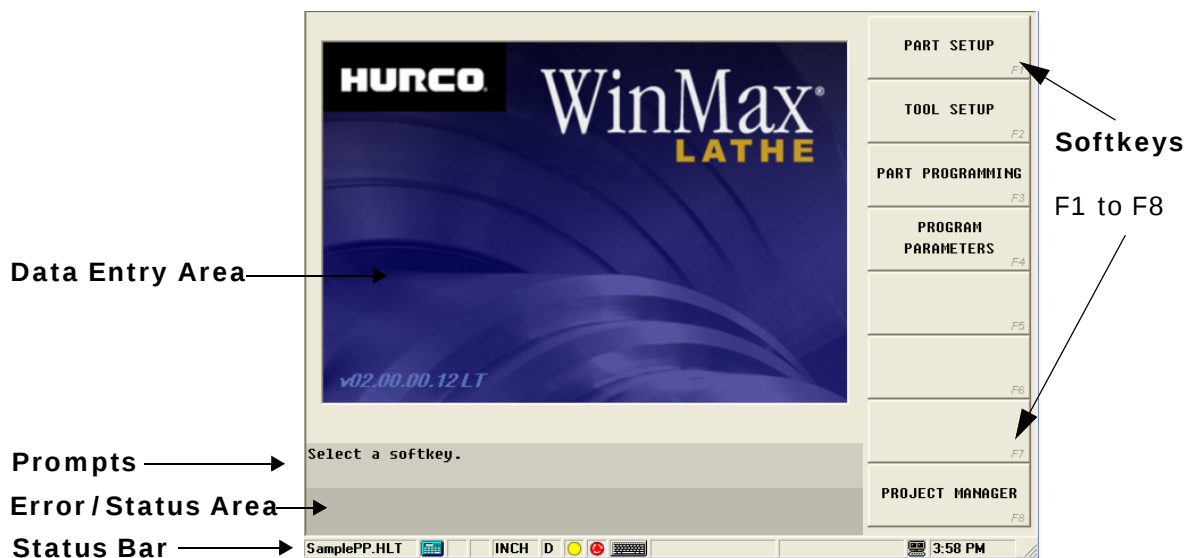
USING THIS MANUAL

This documentation uses several conventions to explain the safety features and emphasize key concepts. These conventions are described in this section.

Additional information is available on the machine's Documentation CD.

Sample Screens

Sample screens in this documentation were taken from a WinMax Lathe single-screen control. All screens are subject to change. The screens on your system may vary slightly. The sample screen here illustrates softkeys and includes a software version.



Softkeys

Softkeys are located on the side of the screen. You can set the softkeys to appear on either the right or left side of the screen. Refer to the *Getting Started with Your WinMax Lathe* for information about making this selection. Softkeys may change upon field entries or other softkey selection. References to softkeys in the documentation appear with the softkey's corresponding F-key. For example, the Part Setup softkey from the Input screen above is referenced as the PART SETUP F1 softkey.

Screen Areas

The screens are divided into the following areas, in addition to the row of softkeys:

Data Entry

The data entry area is located on the opposite side of the screen from the softkeys. Available softkeys may change even when the text and data entry area does not.

Fields in the data entry area display or receive information. Refer to *Using the Touch Screen*, on page [xv](#) for information on entering information in fields.

Prompts and Error/Status Area

The bottom portion of the screen is reserved for prompts, program status and error messages.

Prompts provide help on data entry selections based on the field with the blinking cursor.

Errors and status messages occur anytime the status or error occurs. They are not based on the field with the blinking cursor. These messages provide machine information to the operator.

Error messages may also stop and/or prevent machine operation until the cause of the error is corrected.

Status Bar

The status bar contains

- The name of the open, selected program.
- A calculator icon—select the icon to display a working, on-screen calculator.
- Units of measure (Inch or Millimeters)—select the units of measure in the status bar to toggle between Inch and Metric.
- Programming mode (R for Radius; D for Diameter)—select the programming mode in the status bar to toggle between Radius and Diameter.
- A yellow icon—indicates the feed hold is on when visible.
- A red icon—indicates the Emergency Stop button has been pressed when visible.
- A keyboard icon—select the icon to display a working on-screen keyboard.
- The current time.

Console Buttons and Keys

References to console buttons and keys appear in bold text throughout the documentation. For example, the Start Cycle button appears as the **Start Cycle** button and the Manual key appears as the **Manual** console key in text.

Refer to the *Getting Started with Your WinMax Lathe* for information about console buttons and keys, in addition to other information about using softkeys and the pop-up text entry window.

Using the Touch Screen

The console has a touch screen for entering programming data. To make a selection, tap the screen on a softkey, field, or drop-down list using the stylus attached to the side of the console or another suitable pointing device.

Printing

To print part or all of this manual from the CD, select **File / Print**. Be sure to review the **Print Range** selections and make the appropriate choice for pages. Select **Properties / Paper / Quality** and adjust the **Tray Selection / Paper Source** if necessary.

Printing to a Post Script printer provides the best results.

Icons

This manual may contain the following icons:

Caution/Warning



The operator may be injured and the machine severely damaged if the described procedure is not followed.

Hints and Tricks



Useful suggestions that show creative uses of the WinMax features.

Important



Ensures proper operation of the machine and control.

Troubleshooting



Steps that can be taken to solve potential problems.

Where can we go from here?



Lists several possible options the operator can take.

Table of Contents



To assist with onscreen viewing, this icon is located on the cover page. Click the icon to access the Table of Contents (TOC).

You can also access many of the same TOC entries from the Adobe Reader bookmarks located on the left side of the PDF page.

Using the On-screen Help

On-screen Help provides information about using WinMax. Press the console Help button to display the Help topic. The following list describes Help functions:

- Buttons in the upper left-hand corner of the Help screen are used to move through Help topics and print screens.
 - Use the **Hide** button to hide the navigation pane.
 - Use the **Back** button to return to the previous Help screen.
 - Use the **Print** button to print the current displayed Help topic, if a printer is attached and configured. See *Accessing the On-screen Help in PDF format, on page xvi* for more information about printing.
- Use the arrow buttons to move between pages within a Help topic and to move through topics.
- Use the **Contents** tab for a list of information sorted by subject:
 1. Select the “+” to expand the topic and view sub-topics.
 2. Select the topic to display it.
- Use the **Index** tab to show the Help index:
 1. Quickly scroll to an index topic by typing the topic in the box at the top of the index.
 2. Select a topic and the Display button to view the topic.
- Use the **Search** tab to search the Help for a word or phrase:
 1. Type the search word(s) into the text box at the top of the pane.
 2. Select the List Topics button. A list of topics that contain the search word(s) is displayed.
 3. Select a topic and the Display button to view that topic.
- Use the **Favorites** tab to save Help topics for quick access:
 1. Select the Add button at the bottom of the pane to add the current topic.
 2. Select a topic from the Favorites list, and select the Display button to view it.

Select a topic from the Favorites list, and select the Remove button to remove it from the list.

Accessing the On-screen Help in PDF format

The WinMax On-screen Help is also provided in PDF format for easy printing. The information contained in the PDF files is identical to the on-screen Help. The PDF files may be copied to a floppy disk or USB memory device to be transferred to a PC for viewing or

printing. Here are the steps to access the PDF files:

1. From the Input screen, select the PROJECT MANAGER *F8* softkey.
2. Select the FILE MANAGER *F7* softkey.
3. In the left-hand pane, navigate through the folders:
 - For WinMax Lathe on a machine, the path is D:\Hurco\Hurco Lathe\hlp.
 - For WinMax Desktop on a PC, the path is C:\Program Files\Hurco\Hurco Lathe\hlp.

The PDF files will appear in the right-hand pane.



The SHOW ALL FILE TYPES field in User Interface Settings must be set to YES (default is NO) in order to see the PDF files in the directory. Access the SHOW ALL FILE TYPES field in Auxiliary Mode, Utilities/ User Preferences/ User Interface Settings.

4. Highlight the PDF file(s) in the right-hand pane, and select the COPY *F2* softkey.
5. Ensure that your media is loaded (either a floppy disk in the disk drive or a USB memory device in the USB port), and navigate to the proper location in the left-hand pane of the DISK OPERATIONS screen (either the floppy drive A: or the USB port E:). Highlight the desired location.
6. Place the cursor in the right-hand pane and select the PASTE *F3* softkey to paste the PDF file(s) to the desired location.

You may now remove your media and load the PDF file(s) onto a PC for viewing and printing.

MACHINE AND CONSOLE BASICS

This chapter explains basic machine and console features.

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Machine Components

Before using the machine, you should become familiar with its components. Because of European Committee (CE) requirements, Hurco machines sold in Europe may differ from those sold elsewhere. The figure below identifies some of the easily recognized components of a machine. The location of some components may differ on other models.



- | | |
|-------------------------|--|
| 1. Machine Frame | 7. Enclosure Door. The spindle is located inside the machine behind this door. |
| 2. Console | 8. Power cabinet |
| 3. Turret | 9. Communications panel |
| 4. Parts Catcher option | 10. Tailstock and chuck gauges |
| 5. Conveyor option | 11. Way lube pump |
| 6. Coolant Drip Tray | 12. Bar Feeder option |

Figure 1–1. Hurco TM8 Turning Center with the WinMax Lathe Max Console and Options

Hurco machines are available with several hardware and software options.



Information about options is available from Hurco or your Hurco distributor.

Turret

Hurco turning centers use a turret to hold tools. Each tool is manually inserted into the turret.

- The turret contains boring blocks for holding tools and turning stations for holding turning tools.
- Bolts secure tools inserted in boring blocks; wedge clamps secure tools in their stations.
- Turret stations are numbered to identify and locate each tool.

- Use the Turret + (Plus) or - (Minus) console keys to increment or decrement the tool station.

Tools in the turret are described and programmed during Tool Setup. Refer to *Tool Setup—Geometry Offsets*, on page 4 - 15 for programming information.

Parts Catcher

The optional Parts Catcher holds a part after it has been cut. You can open the Parts Catcher door to take the part out while the next part is being cut. Refer to the *WinMax Lathe Options Manual* for information about this option. Refer to the *Maintenance and Safety Manual* for information about the pneumatic system maintenance for this option.

Chip Conveyor

An optional chip conveyor is available for moving the scrap pieces of metal out of the machine. Chips that are not flushed out of the machine collect in the chip conveyor tank. Refer to the *WinMax Lathe Options Manual* for information about this option. Refer to the *Maintenance and Safety Manual* for information about tank and screen maintenance.

Coolant Drip Tray

The coolant drip tray is located under the machine. This removable tray collects the coolant as it drips during machine operation.

Tailstock and Chuck Gauges

The optional tailstock balances long pieces of stock while the spindle is turning and the piece is being cut. The tailstock touches the loose end of the stock, on the right-hand side, while the chuck holds the stock at the other end. The optional tailstock and chuck operate using hydraulics. The gauges show the hydraulic pressure. Refer to the *WinMax Lathe Options Manual* for information about these options. Refer to the *Maintenance and Safety Manual* for information about hydraulic pressure setting.

Bar Feeder

The optional bar feeder places stock into the spindle, through hole in the left side of the machine. As the stock is cut, the feeder replaces it with a new piece as necessary. You can program a tool with a Bar Feed Block to pull the stock away from the feeder. Refer to the *WinMax Lathe Options Manual* for information about this option.

Console

The WinMax Lathe Single-screen Control console, and the electrical components required to operate it, are called the “control” or the “CNC” (Computer Numeric Control). Some of the electrical components are built into a separate enclosure kept in the machine’s electrical cabinet.

Some of the control’s internal components, such as disk drives and memory, are like those in a PC, as are disk operations, such as copying, deleting and storing files.

The 3.5" floppy drive is an option on the WinMax Lathe Single-screen Control console. The floppy drive is located on the console’s right side panel. To protect the drive from debris, the protective floppy drive cover should be closed, except when inserting or removing a diskette. An optional keyboard is also available for the console.

A job can be programmed at the machine while you read from a blueprint or program worksheet. The prompts on the screen lead you through each element of a part program. Enter machine operations, part dimensions, and other parameters by selecting the appropriate screen softkeys and console buttons or dials.

Set up, run part programs, and manage part program files using the following console features: control panel function groups, softkeys, programming keyboard, and console jog unit.

Control Panel Function Groups

The buttons, keys, and dials on the WinMax Lathe single-screen control are grouped by their functions. Here are the control panel groups on a console:



1. Machine Control buttons
2. Axis and Spindle Control dials
3. Machine Operations keyboard
4. Jog Control functions
5. Programming keyboard

Figure 1–2. Max for Lathe Control Panel Groups

Machine Control

Machine Control buttons start and stop machine operation as follows:

- **Emergency Stop Button**—There is an Emergency Stop button located on the console. Press the Emergency Stop button to stop all motion and remove power from all electrical circuits. The red beacon flashes above the control. This button locks down when pressed. To release it, twist the button in the direction indicated by the arrows.

An **Emergency Stop** icon appears in the status bar at the bottom of the screen to show the Emergency Stop button has been pressed.



Learn the location of all **Emergency Stop** buttons on the turning center *before* operating.



If the **Emergency Stop** button is pressed during execution of a part program, the tool should be jogged clear of the part before resuming operation.

- **Power On**—enables the relay control system. This button must be illuminated to operate the machine, but may be switched off while creating or editing a part program.
- **Start Cycle** —activates machine operation. When the machine is in an active mode, the Start Cycle flashes to indicate the machine is ready. When this button is pressed, the light switches off or may stay on for the duration of the selected operation, depending on the operation.
- **Stop Cycle**—stops axes movement, then stops the spindle. The button lights and remains illuminated until another mode key is pressed.
- **Feed Hold** —stops all axes movement when the tool is in the programmed feedrate region, except a tap operation where motion is stopped when the tap is complete. Pressing the button a second time allows machine positioning to resume. The spindle is on and remains on. A yellow icon appears in the status bar at the bottom of the screen when the Feed Hold button is pressed, and the yellow beacon flashes above the control.



Figure 1–3. Input screen with Feed Hold and Emergency Stop icons

Axis and Spindle Control

The override knobs are used to control machine movement and adjust the spindle and axes. The knobs on the upper console allow you to override the programmed axis feedrate, spindle speed settings, and the rapid traverse feedrate.

- **Axis Feed Rate**—controls the programmed axis feedrate while running a program. Turning the dial counterclockwise slows the feedrate; turning the dial clockwise increases the feedrate.
 - Select *Min* to slow the feedrate to 0% of the programmed value.
 - Select *Max* to increase the feedrate to 150% of the programmed value.
 - Select the 12:00 position (dial indicator straight up) to control the feedrate at its programmed value.
- **Rapid Override**—overrides the programmed rapid traverse feedrate. The turret will move at rapid traverse feedrate during position moves or non-turning motion. Turning the dial counterclockwise slows the feedrate; turning the dial clockwise increases the feedrate.
 - Select *Min* to slow the rapid feedrate to 0% of the programmed value.
 - Select *Max* to increase the rapid feedrate to 100% of the programmed value.
- **Spindle Speed**—controls the spindle speed. Turning the dial counterclockwise slows the spindle; turning the dial clockwise increases spindle speed.
 - Select *Min* to slow spindle speed to 0 RPM.
 - Select *Max* to increase spindle speed to 200% of the programmed spindle speed.



The spindle reacts differently depending upon the Speed and Feed settings in the Tool Setup. Refer to *Tool Setup Fields, on page 4 - 18* for information about programming Speed and Feed.

- If your spindle is set to IPM mode in Tool Setup, axis feedrate is unaffected by spindle speed override.
- If your spindle is set to FPR mode in Tool Setup, the axis feedrate adjusts as the spindle speed is adjusted.



Two-axis (TM series) turning centers have one Spindle Speed knob.
Live-tooling (TMM series) turning centers have two Spindle Speed knobs:

- **Spindle 1 Speed**—controls the Main spindle.
- **Spindle 2 Speed**—controls the Live Tooling spindle.

Machine Operations

The Machine Operations console keys are used to run part programs and control the machine during cutting. These keys are labeled under the Machine Mode, Spindle, Turret, and Coolant groupings. An LED lights next to a selected key to indicate a mode is selected. Refer to *Machine Operation Basics, on page 5 - 1* for details about operating the machine.

Machine Mode

The Machine Mode console keys have these functions:

- **Auto**—allows you to run a part program automatically in Auto mode. Here is an Auto screen:

Figure 1-4. Auto Screen (Conversational Programming)



During execution of the part program in Auto or Single mode, you can switch between **Auto** and **Single** mode by pressing the corresponding console key. You can also select the **Interrupt** or **Opt Stop** keys at any time during execution of a part program in Auto or Single mode.

- **Interrupt**—halts machine operation, stopping the axis feed, spindle speed, and coolant during automatic execution of a program to allow manual functions, such as cleaning the work piece. Press **Auto** or **Single** to resume the part program.
- **Single**—allows you to run a part program automatically, but the machine stops the axes after each data block. The spindle will continue running at the last programmed speed. Press the flashing **Start Cycle** button to resume the automatic machining operation and execute the next block.



Examine the part program to determine the precise tool movement to avoid interference before executing a Single Cycle operation.

- **Opt Stop**—stops the machine when this button is selected and there is a programmed Position block with Option Stop enabled. Machine operation resumes when you press the flashing **Start Cycle** button. If **Opt Stop** is not on, the Program will not stop at the Option Stop block.
- **Manual**—provides access to manual machine operations such as setting the spindle to on or off, opening and closing the chuck, and calibrating the machine.

Here is a Manual screen for a two-axis (TM series) machine:

MANUAL					
MACHINE	PART	AXES STATUS	UNCALIBRATED	SET ACTIVE TOOL F1	
X -0.0001	-0.0001	ACTIVE TOOL	1	MANUAL FUNCTION SETUP F2	
Z -0.0000	-7.0000	SPINDLE RPM	0	DIAGNOSTICS F3	
FPM % 83	RAP % 26	RPM % 104	JOG % 94	ACCESSORY OPERATIONS F4	
AXIS LIMIT SWITCHES:				CHUCK OPERATIONS F5	
CONVEYOR	STOPPED	PARTS CATCHER	UNKNOWN	TOGGLE WORKLIGHT F6	
COOLANT	OFF	TAILSTOCK	UNKNOWN	HOME MACHINE F7	
FEED (IPM)	0.0000	TOOL SETTER	UNKNOWN	CALIBRATE MACHINE F8	
CHUCK STATE				CLOSED	
CHUCKING TYPE				EXTERNAL	
FOOTSWITCH MODE				TOGGLE	
BarFeed.HLT INCH R 9:38 AM					

Figure 1–5. Two-axis (TM series) Manual screen

Here is a Manual screen for a live-tooling (TMM series) machine:

MANUAL					
MACHINE	PART	AXES STATUS	CALIBRATED	SET ACTIVE TOOL F1	
X 14.0945	8.8500	ACTIVE TOOL	1	MANUAL FUNCTION SETUP F2	
Z 23.0709	23.0709	S1 RPM	0	DIAGNOSTICS F3	
C 359.984	359.984	S2 RPM	0	ACCESSORY OPERATIONS F4	
FPM % 100	RAP % 62	S1 % 100	S2 % 100	JOG % 92	CHUCK OPERATIONS F5
AXIS LIMIT SWITCHES:					
CONVEYOR	STOPPED	PARTS CATCHER	RETRACTED	TOGGLE WORKLIGHT F6	
COOLANT	OFF	TAILSTOCK	RETRACTED	HOME MACHINE F7	
FEED (IPM)	0.0000	TOOL SETTER	RETRACTED	CALIBRATE MACHINE F8	
CHUCK STATE				OPENED	
CHUCKING TYPE				EXTERNAL	
FOOTSWITCH MODE				TOGGLE	
SPINDLE CLAMPS				ASSIST ON	
NONAME1.HLT INCH D 11:11 AM					

Figure 1–6. Live-Tooling (TMM series) Manual screen

Coolant

- **Auto**—enables the coolant to be automatically controlled On and Off while running a program in Auto Run mode, depending on the Coolant setting in Tool Setup for each tool used in a program. The Coolant LED is On in Auto mode or when using the optional Verification Graphics when the Coolant is programmed to be On.

When enabled, the Coolant will start whenever the tool is selected in a data block. The coolant turns off at the end of the program or when a tool is selected that does not have Coolant On set. This key cannot be activated in Manual mode. In Auto mode, Coolant is automatically enabled. Pressing this key disables automatic coolant operation. Press **Auto** to enable Auto coolant control.

- **Primary**—functions only on machines equipped with a primary (i.e., flood) coolant system. Activates the primary coolant system when the machine is in Auto or Manual mode, and overrides a Coolant Auto operation. Pressing the Primary key a second time turns off this operation.
- **Secondary**—this feature is not currently available.

Spindle

These Spindle console keys are available for two-axis (TM series) machines:

- **On**—activates the spindle if the machine is in manual mode. The Spindle LED is On in Auto or Single mode. The **Start Cycle** button must also be pushed to start spindle rotation.
- **Off**—stops spindle rotation during manual operation if the **Spindle On** button was previously pressed. You can also use the Off key with the **Feed Hold** button to abort a program.



In addition to pressing the **Off** console key, any of these methods stop spindle rotation for two-axis (TM series) machines:

- Press the **Start Cycle** button.
- Press the **Manual** console key.
- Depress the **Emergency Stop** button.

These Spindle console keys are available for live-tooling (TMM series) machines:

- **1**—activates Spindle 1 when pressed. The LED lights to verify Spindle 1 is active.
- **2**—activates Spindle 2 when pressed. The LED lights to verify Spindle 2 is active.



Use any of these methods stop either active spindle's rotation for live-tooling (TMM series) machines:

- Press the **Spindle 2** console key when Spindle 1 is active.
- Press the **Spindle 1** console key when Spindle 2 is active.
- Press the **Start Cycle** button.
- Press the **Manual** console key.
- Depress the **Emergency Stop** button.

When Spindle 2 (live-tooling spindle) is active, press either the **+** or **- Turret** console key to stop the spindle rotation.

Turret

The Turret console keys are active only in Manual mode. The Turret LED is On during a tool change or if using the optional Verification Graphics when a tool change would occur.

- **- (Minus)**—Decrements the tool station once for each key press. For example, pressing the Turret minus key once changes the Active Tool from Tool 4 to Tool 3.
- **+** (Plus)—Increments the tool station once for each key press. For example, pressing the Turret plus key once changes the Active Tool from Tool 4 to Tool 5.

Console Jog

Use the Console Jog, located on the left-hand side of the console, to manually jog the axes:

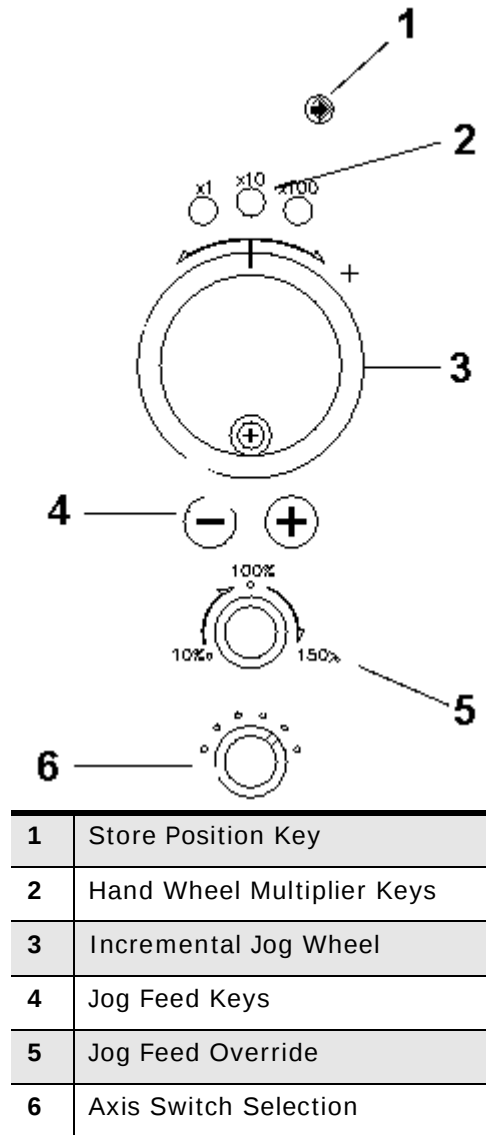


Figure 1-7. Console Jog

Please refer to Machine Operation Basics, Manual Mode, *Jogging the Axes Manually*, on page 5 - 11 and *Setting Jog Unit Parameters*, on page 5 - 11 for information about these manual operations.

The dials and keys on the Console Jog are defined as follows:

- **Store Position Key**— records the absolute position of an axis in a part program's setup screens.
- **Hand Wheel Multiplier Keys**—defines the resolution of each increment of the Jog wheel. Activate the Jog wheel by pressing one of the following ratio buttons:
 - **x1**—defines a 1-to-one ratio (each click equals 0.0001 inch, or 0.001 mm).
 - **x10**—defines a 10-to-one ratio (each click equals 0.0010 inch, or 0.010 mm).
 - **x100**—defines a 100-to-one ratio (each click equals 0.0100 inch, or 0.100 mm).
- **Incremental Jog Wheel**—select minus (-) or plus (+) jog direction, 100 increments per revolution.
- **Jog Feed Keys** —select minus (-) or plus (+) jog direction to move an axis at the manual jog feedrate in the negative or positive direction, respectively.
- **Jog Feed Override**—control the jog speed (10% to 150%) of the manual jog feedrate value. Jog % is displayed on the screen.
- **Axis Select Switch**—select the axis to jog (0, X, Z, C, Y, S).
 - ⇒ • **0** disables jogging. Any illuminated multiplier key LEDs are shut off and have to be reselected before jogging again.
 - Axis selections are **X**, **Z**, **C**, and **Y** depending on the configuration.
 - **S** is for spindle jogging. This selection is useful for heavy parts because you can turn the spindle with the spindle motor to check to be sure the part does not wobble. You can also use this selection to check the part's alignment when clamped in the optional chuck or when using the optional tailstock to support the part.

Programming Keyboard

Programming Mode console keys are named for the screens they activate:

- **Input**—displays the main programming screen used to create and edit part programs. From this screen, access Part Setup, Tool Setup, Part Programming, Programming Parameters, and Project Manager menus.



Figure 1–8. Input Screen

For information about these programming functions, refer to following sections in this manual:

- See “Part Setup—Work Offsets” on page 4 - 10.
- See “Tool Setup—Geometry Offsets” on page 4 - 15.
- See “Part Programming” on page 4 - 2.
- See “Program Parameters” on page 4 - 76.
- See “Project Manager” on page 3 - 1.

- **Review**—for Conversational programs, provides an outline view of the blocks currently programmed, including type of block and tool used. The left-hand pane lists all of the program blocks. The right-hand pane lists the elements for the selected Profile data block. Jump to a desired block by selecting the block and pressing **Enter**.

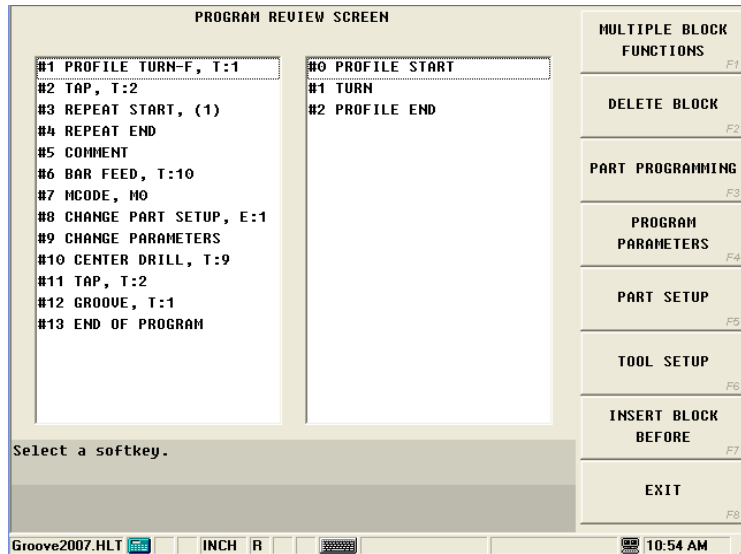


Figure 1–9. Program Review screen—Conversational Part Programming

For Numerical Control (NC) programs, the Review key displays the NC subroutines by number.

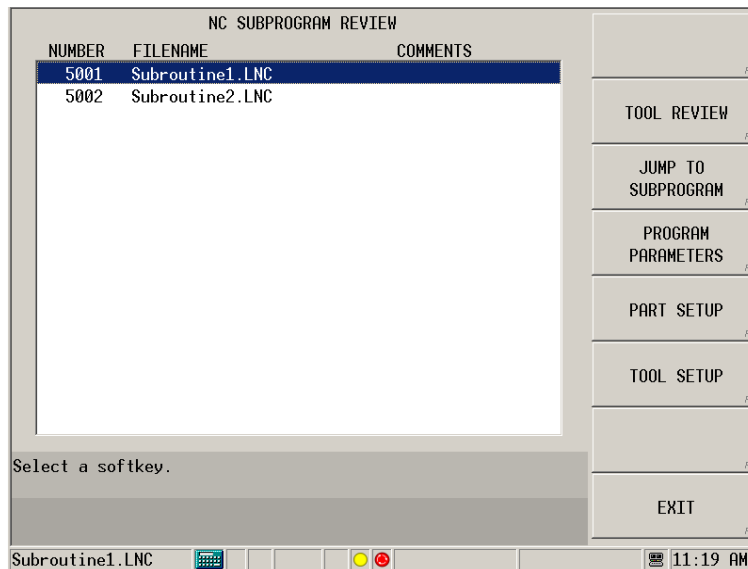


Figure 1–10. Program Review screen—NC Programming

- **Menu**—displays a pop-up menu for accessing functions for developing and managing programs.

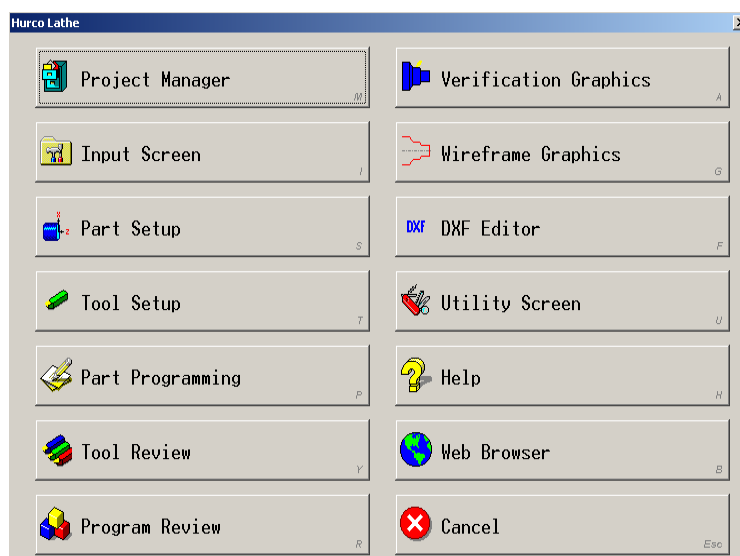


Figure 1-11. Menu Console Key's Pop-up selections

A menu toolbar is also available by selecting anywhere on the status bar at the bottom of the screen. This toolbar provides access to the same functions as the pop-up menu. To close the toolbar, select the X in the upper right corner of the toolbar.



Figure 1-12. Menu Toolbar

- **Help**—displays on-screen help text. Place the cursor on a data entry field and press Help for information about the screen and field. Refer to [Using the On-screen Help, on page - xvi](#) for more information.

Standard Keys

These keys function as they would on a standard AT-keyboard. They perform functions related to the programming mode: Tool Review, Program Review, and the NC editor mode.

- **Insert**—allows you to:
 - insert a tool at the current cursor location in the Tool Review screen.
 - insert a conversational data block at the current cursor location in the Program Review screen.
 - toggle the NC editor mode between Insert and Overwrite.
- **Delete**—allows you to:
 - delete a tool at the current cursor location in the Tool Review screen.
 - delete a conversational data block at the current cursor location in the Program Review screen.
 - delete a character to the right of the cursor for conversational programs.
 - delete all characters in a highlighted field.
 - delete a character at the current cursor location on the NC Editor screen.
- **Home**—positions the cursor:
 - at the first tool listed when in the Tool Review screen.
 - at the first data block listed when in the Program Review screen.
 - in the Block field for the first data block when in a data block other than a Profile.
 - in the Element field when in a Profile data block.
 - at the beginning of the line when in the NC Editor screen.
- **End**—positions the cursor:
 - at the last tool listed when in the Tool Review screen.
 - at the last data block listed when in the Program Review screen.
 - at the End of Program data block when in a data block other than a Profile.
 - at the New Profile Element data block when in the Element field in a Profile.
 - at the end of the line when in the NC Editor screen.

- **Page Up**—allows you to:
 - position the cursor at the beginning of the previous page or move backward in the conversational part program, depending on the type of screen
 - jump to the first visible line in the program on the NC Editor screen.
 - **Page Down**—allows you to:
 - position the cursor at the beginning of the next page or move forward in the conversational part program, depending on the type of screen
 - jump to the last visible line in the program on the NC Editor screen.
-  For details about using the Standard keys for different programming needs, refer to the appropriate manual:
- *Tool Setup—Geometry Offsets, on page 4 - 15* in this manual for specific functions for Tool Setup or Tool Review.
 - *WinMax Lathe Conversational Programming* for using these keys with conversational programming data blocks and Program Review.
 - *WinMax Lathe NC Programming* for using these keys with NC programs and Program Review.

Cursor Control Keys

These keys control cursor movement and perform programming operations:

- **Arrow keys**—up and down arrows move the cursor from one field to the next; left and right arrows cycle through all selections of a menu selection, moves through elements of a profile, or moves the cursor within a numeric field.
- **Enter key** (↵)—accepts the information typed in a text field or moves to the next field.

Special Function Keys

These keys provide additional functionality to many other keys. For example:

- **alt** (alternate) console key
 - alt + Input** Display the Pop-up Text Entry Window.
 - alt + Help** Produce a bmp screen capture.
 - alt + right arrow** Tab through fields or through the windows in File Manager.
 - alt + left arrow** Reverse tab through fields or the windows in File Manager.
 - alt + Select** Simulate a right mouse click.
 - alt + F + left arrow** Reverse tab through fields or the windows in File Manager. (Same function as alt + left arrow.)
 - alt + F + Select** Simulate Shift + left mouse click.
- **C** (clear) console key—press to clear the value at the current cursor position. The **C** key works like an Esc key on a keyboard.
- **F** (function) console key
 - F + Delete** Delete the character to the left of the cursor.
 - F + Help** Produce a bmp screen capture.
 - F + End** Move the cursor to the end of a list.
 - F + Home** Move the cursor to the top of a list.
 - F + Page Down** Move through a list.
 - F + Page Up** Move through a list.
 - F + Select** Simulate a left mouse click.
 - F + up arrow** Move cursor to previous data block.
 - F + down arrow** Moves cursor to next data block.
 - F + left arrow** Moves cursor to previous element.
 - F + right arrow** Moves cursor to next element.
 - F + decimal (.)** Enable Full Precision Editing. This feature displays a pop-up window showing 12 digits to the right of the decimal for the current field.
 - F + 1 through 8** Simulate function keys on keyboard (F1, F2, F3,...F8).

Numeric Keypad

The numeric keypad allows you to enter numbers and calculate values on the screen.

- Enter numeric data into fields on the screen.
- Perform calculations using the mathematical symbols ($\div$, $\times$, $-$, $+$) on the keypad.

Follow these steps to calculate data values for screen fields:

1. Position the cursor on the field you want to calculate.
2. Type the number used in the calculation.
3. Press the console key of the operation you want to perform ($\div$, $\times$, $-$, $+$).
4. Press the **Enter** key.

For example, if a field contains the number 2, you can add 3.5 to the field by positioning the cursor in the field, typing "3.5," pressing the "+" key, and pressing the **Enter** key.

Pop-up Keyboard

Enter part program names using the on-screen, pop-up keyboard if the console does not have an optional AT-keyboard. The pop-up keyboard is available for entering text, such as naming a part program.

1. Either select the keyboard icon located in the screen's status bar or simultaneously press the **Alt** and **Input** keys on the console to activate the keyboard.
2. Use a stylus to select characters from the keyboard.
3. Press the **Enter** key to update a field and advance the cursor after the characters are selected in the text field (e.g., after creating a program name).
4. Select the **X** located in the lower left corner of the text entry window to close the keyboard.

Pop-up Calculator

Select the calculator icon in the Status Bar to open the calculator on screen.

- To perform calculations, select the calculator keys on screen.
- To minimize the calculator and retain the last calculation, select the "-" key in the upper right corner.
- To erase the last calculation and close the calculator, select the "X" in the upper right corner.

Optional AT-Keyboard

If the console is equipped with an optional AT-keyboard, it may be used to enter data into a field. Press the **Enter** key to update a field and advance the cursor.



Press F1 through F8 to make softkey selections.

Draw Key

In addition to the Wireframe Graphics that appear on the Auto Run screen when running a program, you can access Wireframe Graphics and view a line drawing of the part by pressing the **Draw** console key.

Press the **Draw** console key to display or re-draw the graphic.

For machines equipped with the standard 2D graphics, this screen appears:

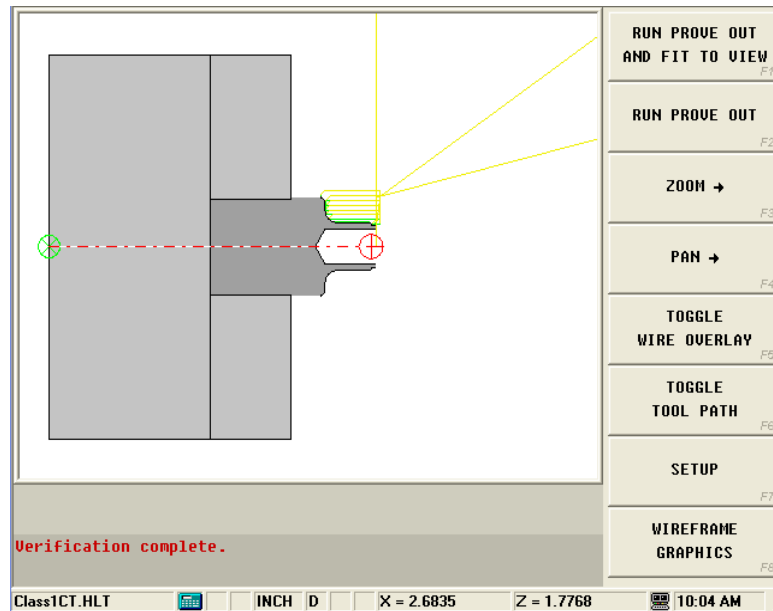


Figure 1-13. 2D Wireframe Graphics Screen

For machines equipped with the optional 3D graphics, this screen appears:

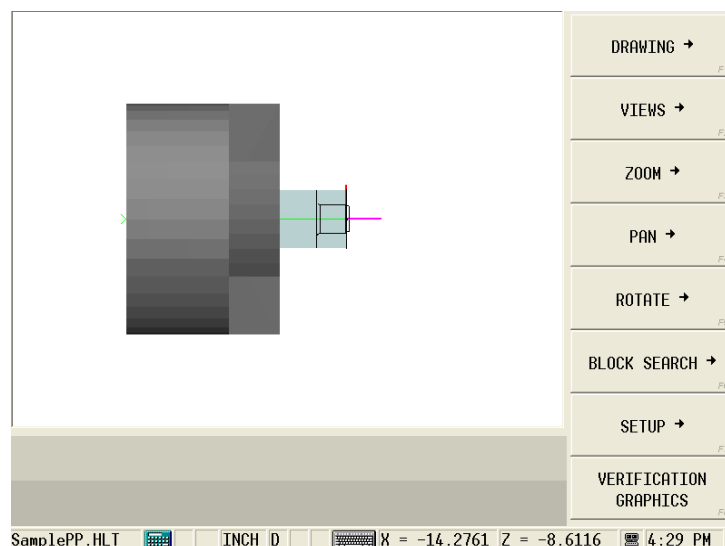


Figure 1-14. 3D Wireframe Graphics Screen

Verify Key

You can access either the 2D Verification Graphics or the 3D Verification Graphics and view the part by pressing the **Verify** console key.

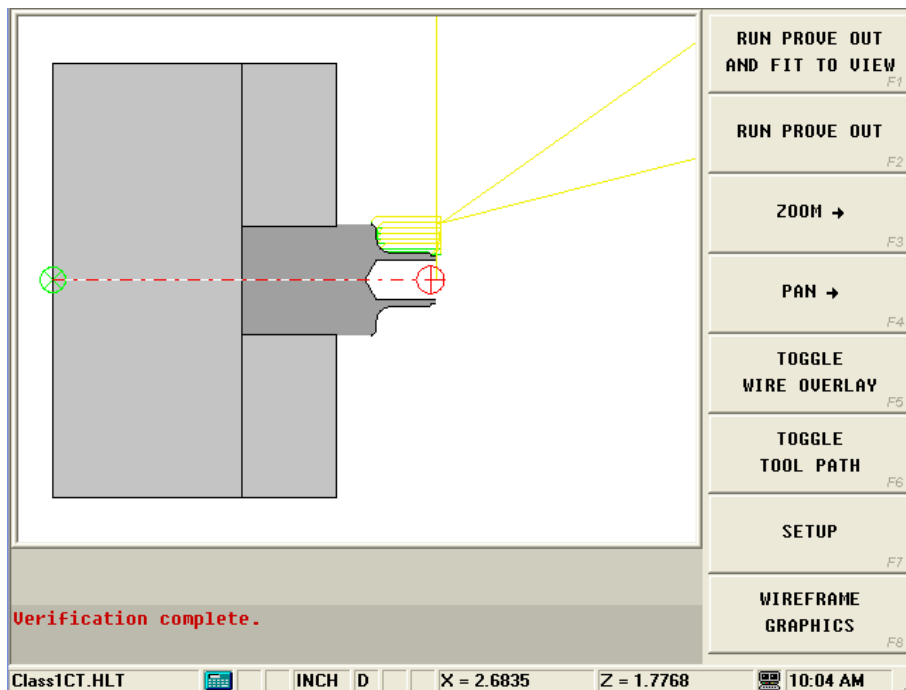


Figure 1–15. 2D Verification Graphics Screen

Press the **Verify** console key to display or re-draw the graphic.

For information on using graphics with part programs, see *Verifying Part Programs—Graphics*, on page 4 - 79.

Softkeys

Softkeys have a three-dimensional look on the touch screen of the console. Each softkey is labeled with an operation. Touching the softkey selects its operation.

If a softkey appears “grayed out,” the operation is not available because the cursor is not in a specific field or the machine does not support the option.



Another way to activate a softkey operation is to press and hold the *F* console key while you simultaneously press the number key that corresponds to the softkey number (F1, F2, . . . F8).

Communications Panel

Each Hurco machine may be connected to peripheral devices through a communications panel located on the machine's electrical cabinet.

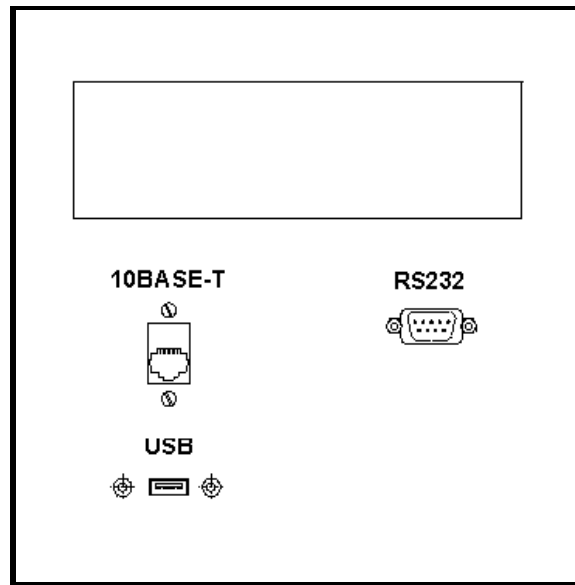


Figure 1–16. Communications Panel

Communication connectors may include a USB port, a serial port, and a network connector.

- The USB port is a high-speed port that allows you to connect multiple devices to the panel.
- The serial port is for sending and receiving serial data transmissions.
- The RJ45 connector is used for 10Base-T, unshielded twisted pair network cabling.

Refer to the *Maintenance and Safety Manual for Turning Centers* for more information about using the Communications Panel.

UTILITIES

This chapter explains how to customize system settings, change screen appearance, print whole programs or parts of programs, perform serial read/write functions, and manage log files. These operations are accessed through the Utilities screen.

System Configuration	2 - 2
User Preferences	2 - 16
Printing	2 - 25
Integrator Support Services.	2 - 26
Restart Control.	2 - 27
Shutdown Control.	2 - 27
Serial I/O	2 - 28
Log Files	2 - 29



Hurco recommends using the Shutdown Control command prior to turning off machine power to ensure that no data is lost. Please refer to the *Shutdown Control, on page 2 - 27* section later in this chapter for details.

Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu. You can also use the menu toolbar and select the **Utilities** icon to access this screen.

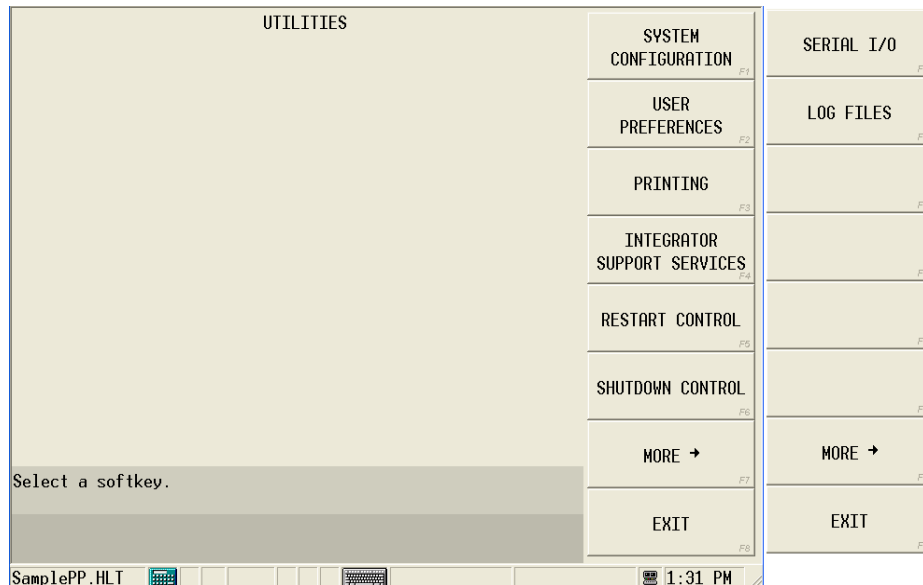


Figure 2–1. Utilities screen

System Configuration

Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu. From the Utilities screen, select the **SYSTEM CONFIGURATION F1** softkey to access the system settings. The System Configuration screen appears.

SYSTEM CONFIGURATION				UNKNOWN		DATE / TIME SETTINGS F1	
MMI VERSION						WinMax Lathe: Ver 02.02.02.00.02.00 Aug 19	
CONTROL POWER OFF TIMER (MINS)						120 F2	
MAXIMUM NUMBER OF TOOLS						12	
MAXIMUM SPINDLE RPM						3000	
MAXIMUM SPINDLE OVERRIDE (%)						200	
MAXIMUM FEED OVERRIDE (%)						150	
						HARDWARE CONFIGURATIONS F3	
						DISPLAY SOFTWARE OPTIONS F4	
						DISPLAY WRC FILE CONFIGURATION F5	
						BACKUP CONFIG FILES F6	
						RESTORE CONFIG FILES F7	
						EXIT F8	
Enter the amount of time the machine will sit idle before control power automatically shuts off.							
AXIS MINUS LIMIT PLUS LIMIT MAX SPEED X -1.1811 (IN) 7.9134 (IN) 75.0 (IPM) Z 2.9528 (IN) 25.0394 (IN) 94.5 (IPM)							
SPINDLE ON TIME DAYS				0		HH:MM:SS 00:00:00	
MACHINE ON TIME DAYS				0		HH:MM:SS 00:00:00	
Dune Buggy Par INCH 1:34 PM							

Figure 2-2. System Configuration screen

System Configuration Fields

The majority of System Configuration screen fields contain values that reflect your machine's software version, maximum settings, limits, and a record of the spindle and machine usage. However, you enter the value for the Control Power Off Timer field.

The machine type is displayed to the right of the System Configuration screen title.

⇒ For the WinMax Lathe Desktop software, "Unknown" appears for the machine type.

- **MMI VERSION**—displays the current software version.
- **CONTROL POWER OFF TIMER (MINS)**—contains the number of minutes the machine can sit idle before the control power is automatically shut off. The units for this field is minutes. The range is from 0 to 600.
 - When 0 is entered, the timer is off, or there is no time out.
 - When a number from 1 to 600 is entered, that number represents the number of minutes the machine can sit idle before shutting off the control power.

- **MAXIMUM NUMBER OF TOOLS**—displays the number of tools that can be programmed.
- **MAXIMUM SPINDLE RPM**—displays the highest possible spindle rpm speed.
- **MAXIMUM SPINDLE OVERRIDE (%)**—displays the highest possible override spindle speed. This setting overrides the manual setting on the Spindle Speed dial.
- **MAXIMUM FEED OVERRIDE (%)**—displays the highest possible override feedrate that programs can run. This setting overrides the manual setting on the Axis Feed dial.
- **X AND Z AXIS MINUS LIMIT, PLUS LIMIT, MAX SPEED**—display the maximum limit setting for each of these points.
- **SPINDLE ON TIME**—displays how many days, hours, minutes, and seconds the spindle is turned on.
- **MACHINE ON TIME**—displays how many days, hours, minutes, and seconds the machine is turned on.

System Configuration Softkeys

The softkeys on this screen access menus for customizing system settings.

- **DATE/TIME SETTINGS F1**—System date and time are maintained even when the console is off. These fields should be checked and modified as required.

Enter Date and Time into the System

1. Select the **DATE/TIME SETTINGS F1** softkey. The *Date and Time Properties* pop-up window appears with two tabs: Date & Time and Time Zone.

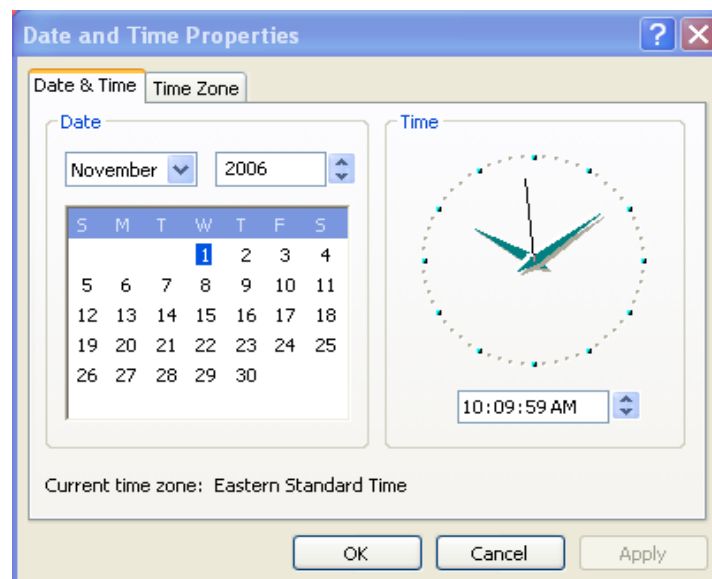


Figure 2-3. Date and Time Properties pop-up window/Date& Time tab

2. From the Date & Time page, use the stylus and select the month and year from the drop-down lists.
3. Select the date on the calendar.
4. Select the time using the up and down arrows next to the display in the Time section of the window.
5. From the Time Zone page, select the appropriate zone from the pull-down menu.

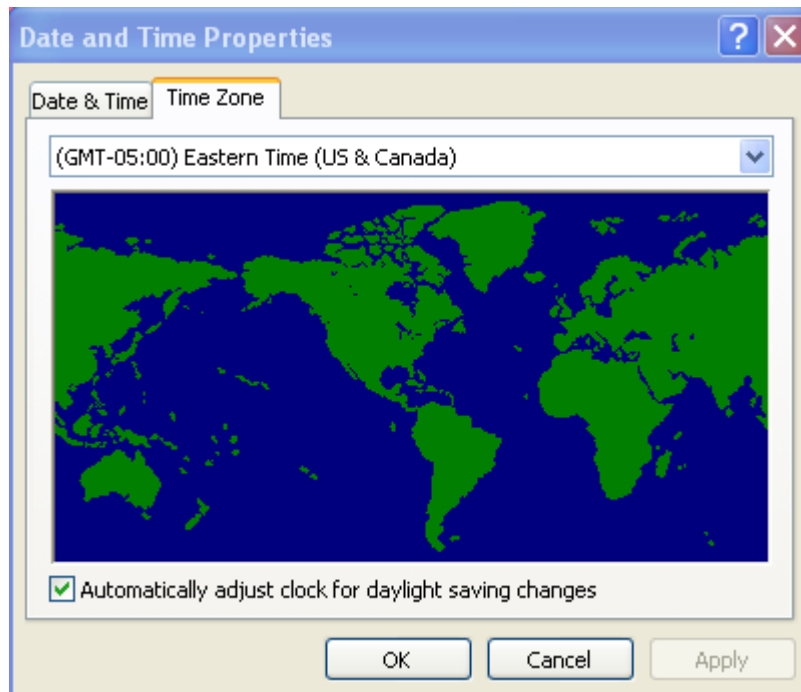


Figure 2–4. Date and Time Properties pop-up window/Time Zone tab

6. When you are finished with your selections, select the APPLY softkey followed by the OK softkey.
- **DISPLAY MACHINE IP ADDRESS F2**—displays the machine's IP address in a pop-up window. Select OK in the window to close the pop-up window.

An IP (Internet Protocol) address is used to identify a particular host on a network. Each host on a network must have a unique IP address consisting of a 32-bit number usually presented in dotted decimal format; for example, 200.100.150.1. This format divides the address into four single byte values separated by decimal points. On most networks, the first three bytes represent the network and the last byte is the host. Following this practice, the first three bytes are the same for all hosts and the last byte is different for each host. On the Internet, these cryptic addresses usually are not used—most addresses are represented as plain text, which are converted to IP addresses by DNS, or Domain Name Server. The underlying protocol still uses the unique 32-bit IP addresses.

- **HARDWARE CONFIGURATIONS F3**—accesses the Hardware Configuration softkeys.

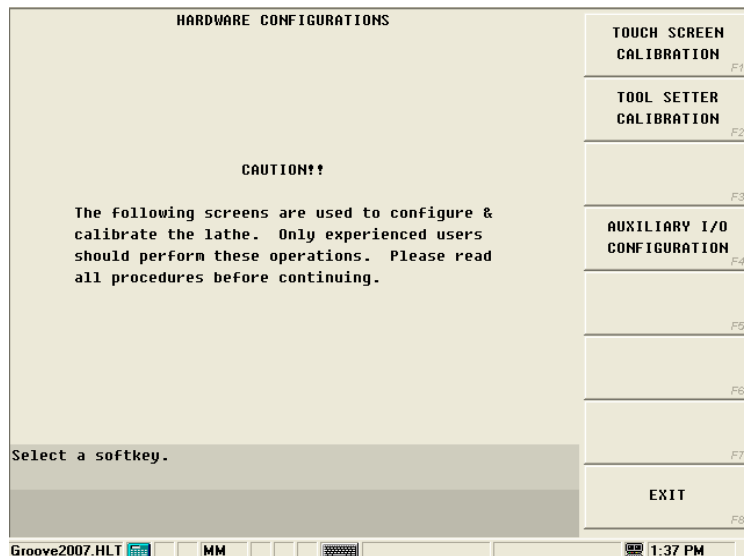


Figure 2-5. Hardware Configurations screen

- **TOUCH SCREEN CALIBRATION F1**—opens a *Pen Mount Control Panel* pop-up window with options to adjust settings for screen calibration. Refer to the *Maintenance and Safety* manual for information about this feature.



Figure 2-6. Touch Screen Calibration pop-up window

- **TOOL SETTER CALIBRATION F2**—provides options for configuring the Tool Setter option. Refer to the *WinMax Lathe Options Manual* for information about this feature.

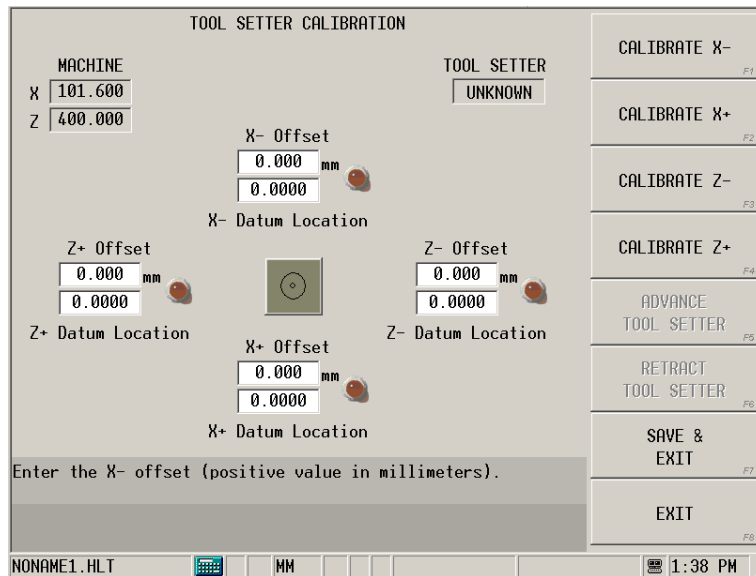


Figure 2–7. Tool Setter Calibration screen

- **AUXILIARY I/O CONFIGURATION F4**—accesses the Auxiliary I/O Configuration screen, which in turn accesses four (4) Auxiliary Input/Output Configuration screens from these softkey choices:

- **OUTPUT 1 (M52 / M62) F1**
- **OUTPUT 2 (M53 / M63) F2**
- **OUTPUT 3 (M54 / M64) F3**
- **OUTPUT 4 (M55 / M65) F4**

Individually enable auxiliary equipment or a unique machine function from within a part program with these screens. Each of these screens allows you to program M codes for turning On and Off an auxiliary feature:

- M52 (on) / M62 (off)
- M53 (on) / M63 (off)
- M54 (on) / M64 (off)
- M55 (on) / M65 (off)

A screen like the sample below appears for each output selection. Each screen shows its Output M codes in its heading (circled in the sample).

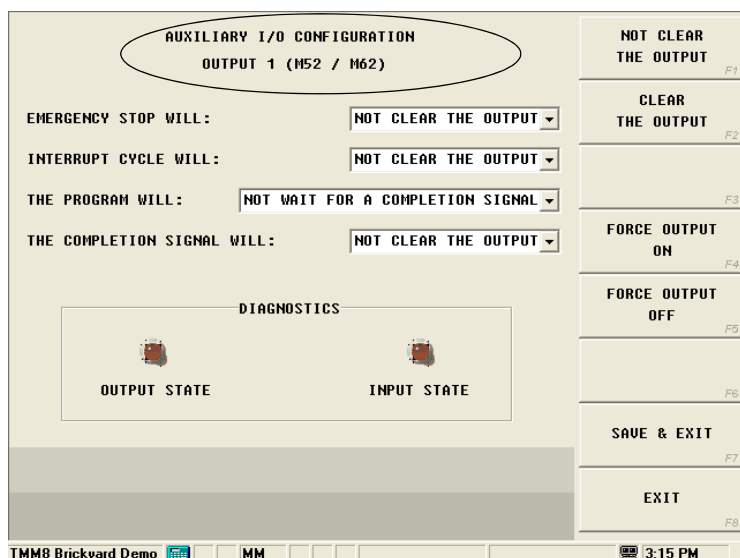


Figure 2–8. Auxiliary I/O Configuration Output screen

Program the auxiliary device using the fields and softkeys. When the following selections are made, the M codes will turn on and off the device as described in these fields:

- **EMERGENCY STOP WILL**—select either NOT CLEAR THE OUTPUT or CLEAR THE OUTPUT. While a part program is running and the **Emergency Stop** button is pressed, the state of the output is based on the selection here.
- **INTERRUPT CYCLE WILL**—select either NOT CLEAR THE OUTPUT or CLEAR THE OUTPUT. While a part program is running and the **Interrupt Cycle** button is pressed, the state of the output is based on the selection here.
- **THE PROGRAM WILL**—select either NOT WAIT FOR A COMPLETION SIGNAL or WAIT FOR A COMPLETION SIGNAL upon completing the part program.
- **THE COMPLETION SIGNAL WILL**—select either NOT CLEAR THE OUTPUT or CLEAR THE OUTPUT upon completing the part program.

To check that the logic is functioning properly and test the state of the circuitry, these softkeys are available:

- **FORCE OUTPUT ON F4**—the Output State on-screen LED lights when this softkey is selected and the auxiliary hardware is properly connected.
- **FORCE OUTPUT OFF F5**—the Input State onscreen LED lights when this softkey is selected and the auxiliary hardware is properly connected.

- **DISPLAY SOFTWARE OPTIONS F4**—displays a read-only list of software options. If the option is currently installed, a check mark appears next to its name on the list.

When Lathe Options are installed, “Not Timed” appears in the **Days Remaining** field next to the installed option. This feature is currently not active.

Refer to *Add or Remove Options*, on page 2 - 9 on the following pages for information about these procedures.

SYSTEM CONFIGURATION		
SOFTWARE OPTIONS		
DESCRIPTION	DAYS REMAINING	
☒ Max Classic (Verification Graphics)	NOT TIMED	F1
☒ DXF	NOT TIMED	ADD/REMOVE OPTIONS F2
☒ Ultinet	NOT TIMED	F3
☒ NCPP	NOT TIMED	F4
☒ Tool Setter	NOT TIMED	F5
☒ Rotating Bar Feed	NOT TIMED	F6
☒ 3D Graphics	NOT TIMED	F7
☒ Rigid Tapping	NOT TIMED	EXIT F8
☒ Ultipockets	NOT TIMED	

A checkmark indicates the option is installed.

Demo.HLT 10:45 AM

Figure 2–9. System Configuration screen Software Options

Add or Remove Options

Select the **ADD/REMOVE OPTIONS** F2 softkey. The *OptiClient* pop-up window appears with four tabs: Install, Remove, Pending, and Help. The window opens with the Install tab license selections:

- **Lathe System**—identifies the type of Lathe software and its part number.
- **Lathe Options**—identifies the options available for installation and their part numbers.



Figure 2–10. OptiClient pop-up window with Install License Selections

The *Select Type* buttons at the top of the pop-up window identify the type of machine, Lathe or Mill, to be used with the software options. These selections are inactive after the software is installed on a machine. The OptiClient software version number, machine serial number, and current date and time appear in the OptiClient status bar at the bottom of the window.

Select the **DONE** screen button at any time to return to the Software Options screen.

In addition to the OptiClient tabs, you can select from these menu items:

- Select **File/Exit** as an alternative to clicking the **x** button in the upper right corner to close the dialog box.
- Select **Tools** to access these functions:
 - **View Removal History**—displays a list of options that have been removed from your system. A message appears stating that no options have been removed, if that is the case.
 - **Activate Options From File**—displays an *Open* pop-up window containing files that can be selected for activation following receipt of the license codes for installation. Refer to *Activate Options by Pending File*, on page 2 - 12 for information about this procedure.

Add Options

1. From the System Configuration Software Options screen, select the **ADD / REMOVE OPTIONS F2** softkey.
2. Select the plus sign next to the **Lathe Options** license selection, and the options appear with check boxes next to them.

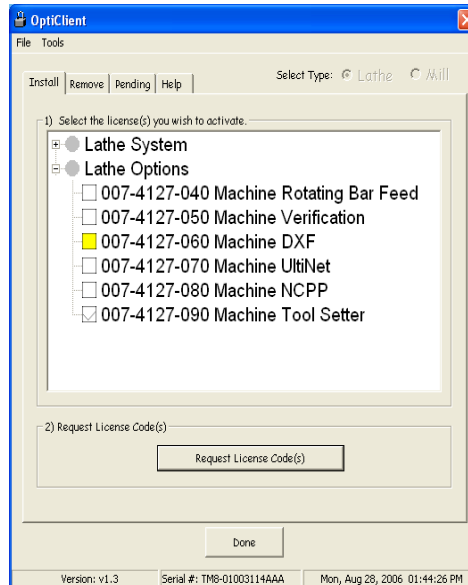


Figure 2–11. Lathe Options License Selections

3. Select an option. A check mark appears in the check box next to the selected option.

⇒ You may select multiple options at once by clicking each selection.

Colors in a check box are defined as follows:

- **Blank**—when no color is present, the option can be selected to be installed.
- **Green**—the option is already installed and cannot be reselected for installation.
- **Yellow**—the option has been previously requested to be installed but has not been installed with a license. The option cannot be reselected for installation.

4. Select the **Request License Code** screen button.

5. Select the *Pending* tab to view the selected option(s). Each option will have a Local Machine ID and a Local Token ID Number.

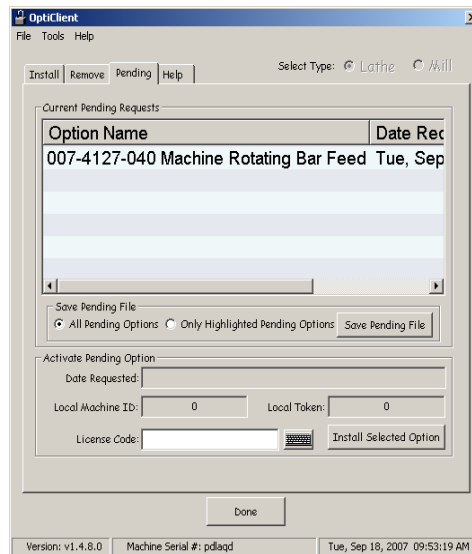


Figure 2–12. OptiClient Pending Tab with example of Pending Options

6. In the Save Pending File area, select **All Pending Options**.



Pending Options will be displayed with Yellow boxes on the *Install* dialog box. Once an option is requested, you cannot clear the request.

7. Select the **Save Pending File** screen button. The Save As dialog box opens. Select the A drive or the USB device drive in the Save In field. Enter your **Sales Order Number** for the file name. A Text File is created using this file name.



Include the location of the pending file in the file name as either a floppy drive or a USB drive to facilitate the Option Request File transmission to Hurco.



This Text File contains the date and time, Machine Serial Number, Part number for the option(s), date each option is requested, Machine ID number, and Local Token number for each option requested. Here is a sample Text File requesting the DXF and Tool Setter options:

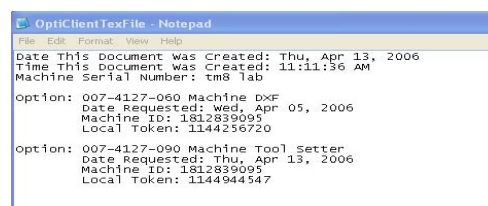


Figure 2–13. OptiClient Text File

8. Provide this Text File to your Hurco representative using e-mail, regular mail, or fax. Hurco will then provide a License Code in an Options Activation File to activate that option.
9. Repeat steps 1 through 6 for additional options you wish to install. These additional options will be added to the *Pending* tab.

Activate Options by Pending File

Upon receipt of the Options Activation File containing the License Codes,

1. Save the file to a floppy drive or a USB device. The filename extension will be ".optauto."



This optauto file contains license codes for each option being requested.

2. Insert the floppy drive or UBS device into the control.
3. Select the **Add/Remove Options F2** softkey on the System Configuration Software Options screen. The *OptiClient* dialog box opens.
4. Select the **Tools** from the Menu bar. A drop-down list appears.
5. Select **Activate Options From File**. The *Open* dialog box appears.
6. Locate and select the **Options Activation File**. The activation codes will install automatically upon selection.
 - The check box next to the option in the *Install* dialog box is green when the option is installed.
 - The activated options are removed from the Pending tab.
7. Select the **Done** screen button to close OptiClient and return to the Software Options screen. For confirmation, the software options that were installed with a License Code now display a check mark.



The control may need up to 25 seconds for the check mark to be displayed in the software options field.

Activate Options by License Code

To install options individually,

1. Select the **Add/Remove Options F2** softkey on the System Configuration Software Options screen. The *OptiClient* dialog box opens.
2. Select the Pending tab.
3. Highlight the option and enter its code in the **License Code** field in the Activate Pending Option area.
4. Select the **Install Selected Option** screen button.



When an option is successfully installed, it is removed from the *Pending* dialog box.

5. Repeat the steps for each option.
6. Select the **Done** screen button after all license codes have been entered.



The control may need up to 25 seconds for the check mark to be displayed in the software options field.

Remove Options



Do NOT remove the Machine System selection in the Lathe System license selection.

To remove options,

1. Select the **Add/Remove Options** F2 softkey on the System Configuration Software Options screen. The *OptiClient* dialog box opens.
2. Select the *Remove* tab to remove an option from the machine.
3. Select the + next to Lathe Options to expand the options list for viewing.
4. Select the option to be removed. Only options with green in the checkbox can be removed.
5. Select the **Remove Selected Option** screen button.



If you Remove an option, the option is immediately off the machine.

6. Be sure to record the Removal Code, which appears in the **Removal Code** field immediately after the option is removed. The Removal code is required as proof the option has been removed from the machine.
7. Select the **Done** screen button.
8. If an option is removed and you later want to reinstall it, you must contact Hurco for confirmation of a Removal Code and to obtain a new Installation Code.

- **DISPLAY WRC FILE CONFIGURATION F5**—displays the language files initially installed on your system. The screen lists each file and identifies any files that have been replaced or changed since the initial version.

The number of files is listed at the top of the window. The number of mismatched files, or different versions of files, appears at the top of the window also. Scroll through the list of files using the scroll bar on the right-hand side of the window to view any mismatched filenames. This sample screen shows that there is one mismatched file, Lathe.wrc (circled).

FILE:	VERSION
COMPILER.WRC	2004 0003 0023 0011 0022 0010
FTP.WRC	2004 0007 0016 0010 0029 0006
*** LATHE.WRC (should be)	2005 0001 0020 0012 0006 0002 2005 0001 0020 0012 0006 0001
LATHEACMSG.WRC	2004 0005 0026 0016 0040 0048
LATHEBLKCALC.WRC	2004 0012 0003 0009 0042 0053

*** Mismatched versions may cause a software conflict. ***
Call your local Hurco Service Representative
for further information.

Select a softkey.

EXIT

NONAME1.HLT INCH R 2:42 PM

Figure 2–14. WRC Language File Configuration screen



Ideally, the number of mismatched files is 0 because mismatched files may cause a software conflict. Call your Hurco Service Representative if this screen shows any mismatched files.

- **BACKUP CONFIG FILES F6**—copies machine configuration files onto a floppy diskette. Backup these files upon completion of a software upgrade.

Backup Machine Configuration Files

1. Insert the disk containing the configuration files into the floppy drive.
 2. Select the **BACKUP CONFIG FILES F6** softkey.
 3. Remove the disk when the backup is complete, and store it in a safe location.
- **RESTORE CONFIG FILES F7**—restores previously saved machine configuration data.

Restore Machine Configuration Files

1. Insert the disk containing the back up configuration files.
2. Select the **RESTORE CONFIG FILES F7** softkey. The system reboots when configuration files are restored. The software displays a pop-up message asking if it is OK to reboot now.
 - Select **OK** to continue or **Cancel** to stop the process.
3. Remove the disk when the restoration is complete, and store it in a safe location.

User Preferences

Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu. From the Utilities screen, select the USER PREFERENCES F2 softkey. The User Preferences menu accesses softkey menus for changing screen settings. Select the MORE → F7 softkey to access additional user preferences.

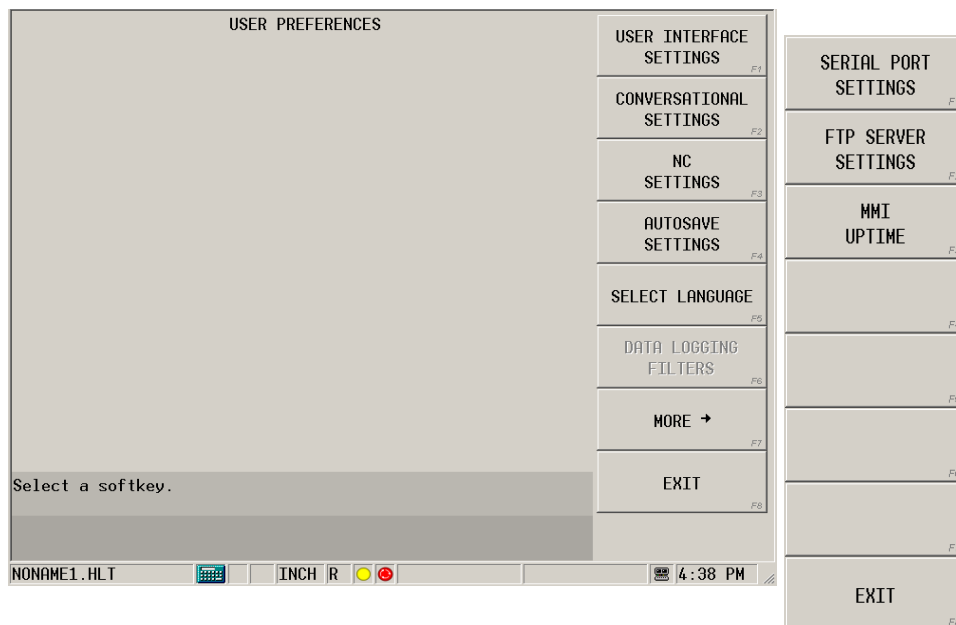


Figure 2–15. User Preferences screen

User Interface Settings

Change the screen appearance or behavior with the User Interface selections.

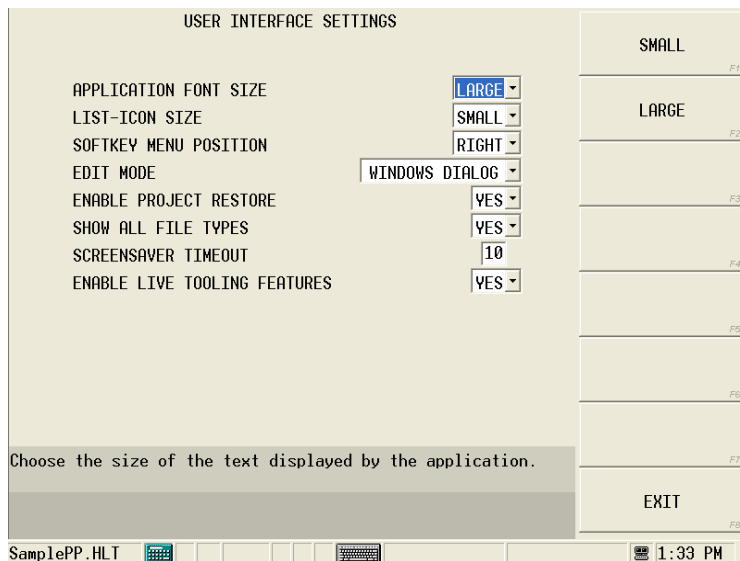


Figure 2-16. User Interface Settings screen

The USER INTERFACE SETTINGS F1 softkey accesses a screen with the following fields. For all of these fields, you can either use softkeys or the drop-down list to make selections.

- **APPLICATION FONT SIZE**—select Large or Small for the size of the font used on the screen display. This field is available only on the desktop version of the software.
- **LIST-ICON SIZE**—select Large or Small.
- **SOFTKEY MENU POSITION**—select Right or Left and the softkey menus appear on the side of the screen that you select.
- **EDIT MODE**—provides a choice between Windows and Ultimax editing behavior. The software defaults to Windows Dialog.
 - **Ultimax Classic**—operates like previous Hurco Ultimax products, i.e., when you input data, you must press the Enter key for the software to accept the data.
 - **Windows Dialog**—operates like Windows software products. The software accepts data selected in an edit box or typed in a field without having to use the Enter key.
- **ENABLE PROJECT RESTORE**—select Yes and all programs that are open upon machine power off will re-open for the next machine power on. Select No and all programs will close upon machine power off and will not be restored upon machine power on. If No is selected, AutoSave will not restore the program either.
- **SHOW ALL FILE TYPES**—select Yes or No for all file types to appear in the Project Manager screen when opening files.

- **SCREENSAVER TIMEOUT**—Determine how long the console can remain idle before it goes blank. Enter a time in minutes in this field. The screen will go blank after the entered time if console keys or buttons are not selected.

⇒ To re-display blank screens, touch the screen or press any console key. The first key or touch is used to re-activate the blank screen and will not activate the key or softkey pressed.

- **ENABLE LIVE TOOLING FEATURES**—select Yes for TMM series or No for TM series. Yes enables the features for live tooling on software screens. This selection is available only for the desktop version of the software.

Conversational Settings

The CONVERSATIONAL SETTINGS F2 softkey accesses this screen:

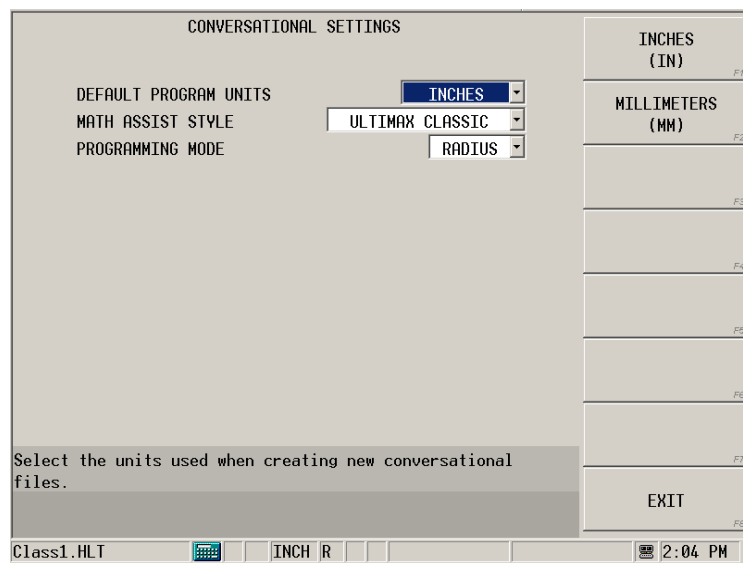


Figure 2-17. Conversational Settings screen

- **DEFAULT PROGRAM UNITS**—determines default units of measurement (in inches or millimeters) for all subsequently created HLT part programs.

⇒ Alternatively, you can select the “INCH” or the “MM” in the status bar at the bottom of the screen to toggle between the two units of measurement.

- **MATH ASSIST STYLE**—select Ultimax Classic or Standard Calculator.
 - **ULTIMAX CLASSIC**—uses an operating logic that uses the Enter key to perform functions.

⇒ Examples of Ultimax Classic Math Assist:

- If a field contains a value of 5 and you type “-2” the 5 changes to “-2.”
- If a field contains a value of 5 and you type “2-” the 5 changes to “3.”

- **STANDARD CALCULATOR**—works like a calculator.



Examples of Standard Calculator Math Assist:

- If a field contains a value of 5 and you type “-2” the 5 changes to “3.”
- If a field contains a value of 5 and you type “2-” the 5 changes to “2” because the control expects a second value to be subtracted from 2.

- **PROGRAMMING MODE**—select Radius or Diameter.

- **RADIUS**—displays X dimensions in radial values.
- **DIAMETER**—displays X dimensions in diameter values.



Alternatively, you can select the “D” or the “R” in the status bar at the bottom of the screen to toggle between the two programming modes.

NC Settings

The NC SETTINGS F3 softkey accesses the screen to select default settings for NC Programs:

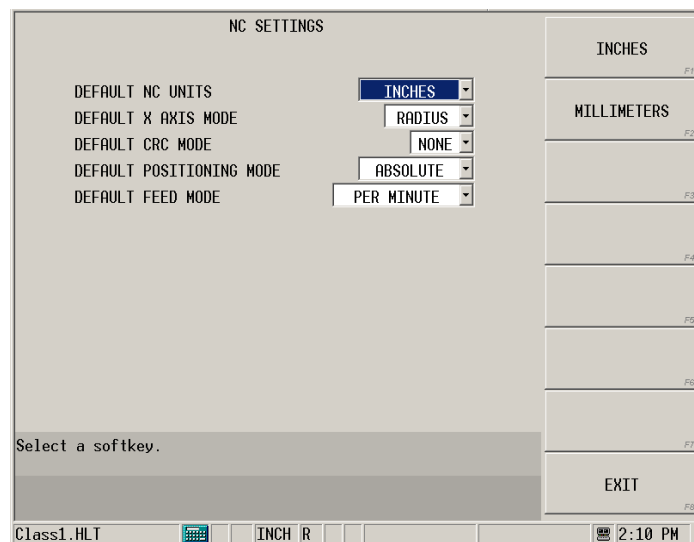


Figure 2-18. NC Settings screen

- **DEFAULT NC UNITS**—select Inches or Millimeters. This field specifies the units assumed by the part program interpreter when the program does not specify G20 (inch) or G21 (millimeter).
- **DEFAULT X AXIS MODE**—select Radius or Diameter.
 - **RADIUS**—displays X dimensions in radial values.
 - **DIAMETER**—displays X dimensions in diameter values.

- **DEFAULT CRC MODE**—select None, Left, or Right. CRC mode is the default Cutter Radius Compensation applied to NC programs. This field specifies the mode assumed by the part program interpreter when either G40 (none), G41 (left), or G42 (right) are not programmed.
- **DEFAULT POSITIONING MODE**—select Absolute or Incremental. This field specifies the mode assumed by the part program interpreter when either G90 (absolute) or G91 (incremental) are not programmed.
- **DEFAULT FEED MODE**—select Inverse Time, Per Minute, or Per Revolution. This field specifies the mode assumed by the part program interpreter when either G93 (inverse time), G94 (per minute), or G95 (per revolution) is not programmed.

AutoSave Settings

The AutoSave *F4* softkey accesses the AutoSave Settings screen.

Figure 2–19. AutoSave Settings screen

Use the AutoSave feature to periodically save a copy of the Conversational part program. While the part program is being saved, the system displays the “Autosaving Part Program” message.

- **ENABLE AUTOMATIC SAVE**—select Yes or No.
- **SAVE FREQUENCY (MINUTES)**—enter the minutes to specify the frequency for saving files if enabled.
- **SAVE ACTIVE PROGRAM ONLY**—select Yes to specify if only the active program should be saved or No if all open programs should be saved.

Programming changes made after the last AutoSave are lost if the machine is powered off. When the machine power is on and Enable Project Restore is active, the last AutoSave version of the program automatically appears on the screen.



AutoSave does not save a program to its original program name or drive. Refer to *Save Files*, on page 3 - 5 for instructions on saving a program.

Select Language

The SELECT LANGUAGE *F5* softkey accesses the Language Selection screen.

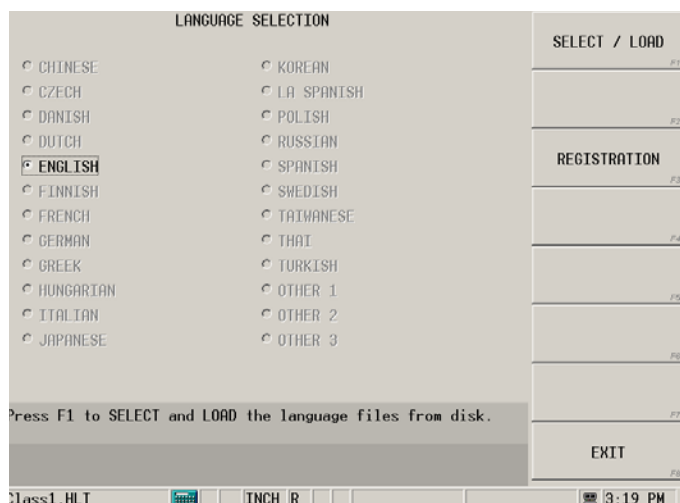


Figure 2–20. Language Selection screen

To select a language,

1. Press the SELECT LANGUAGE *F5* softkey. The Language Selection screen appears. Languages that have not been installed and registered are grayed out on the list.
2. Select an installed language.
3. Press the SELECT/LOAD *F1* softkey to install the Language files. You can also press the *F1* key to perform this function.

To register a new language,



After a Certified Hurco Service Representative installs a new language file by upgrading your system, you need to register the new language.

1. Press the REGISTRATION *F3* softkey to register alternate languages and enter map and hlp filenames.
 - a. Define the language to appear on the screen by using the drop-down list or select a softkey.
 - b. Select the Map filename and HLP filename for the language. The Max Control for Lathes requires the HLP file for the online Help.
 - c. Select the Register button so the software registers the language selection.
2. Select EXIT to return to the Language Selection screen.

Data Logging Filters

This feature is not currently available.

Serial Port Settings

Two serial port settings are available for transferring part programs between the control and various peripheral devices, such as a PC or an external disk drive. Make selections for mapping serial ports and setting Protocol, Baud Rate, Character Length, Stop Bits, and Parity for both ports on this screen.

SERIAL PORT SETTINGS

PORT 1 SETTINGS

COM PORT: 1

PROTOCOL: FULL HANDSHAKE

BAUD RATE: 2400

CHARACTER LENGTH: 8

STOP BITS: 1

PARITY: NONE

PORT 2 SETTINGS

COM PORT: 2

PROTOCOL: XON/XOFF

BAUD RATE: 9600

CHARACTER LENGTH: 8

STOP BITS: 1

PARITY: NONE

Enter the COM port number.

EXIT

Class1.HLT 2:47 PM

Figure 2–21. Serial Port Settings screen

Serial Port Setup

- **COM PORT**—map each port as desired by entering the appropriate serial port. The range is 1 through 256.
- **PROTOCOL**—identifies the method that data is transferred between two devices. “Handshaking” is another term for protocol. The CNC uses hardware and software protocols. An operator writing communications utilities will find this information useful. Here are descriptions of the types of Protocol you can select from the Protocol field:
 - **CTS/RTS**—identifies the hardware flow control method as Clear to Send/Request to Send.
 - **XON/XOFF**—identifies the protocol using a software flow control method.
 - **FULL HANDSHAKE**—identifies the protocol using a software flow control method similar to XON/XOFF. The difference lies in the synchronization stage of Full Handshake.

- **BAUD RATE**—determines how fast data is transferred between two serial modems. Choose between seven baud rates using the drop-down list or softkeys. The baud rate is measured in characters per second.



Improper cable connections and incompatible communications settings are the most common problems that prevent communication between two electronic devices. Refer to the *Parts Listing and Wiring Diagrams* manual for cabling requirements.



Always use your fastest computer for transferring programs to the CNC.

Conversational and NC programs can be transferred between the CNC's memory and peripheral devices.

- **CHARACTER LENGTH**—choose between 7 character bits or 8 character bits for Conversational or NC programming using the softkeys or drop-down list.
- **STOP BITS**—choose between 1 and 1.5 stop bits for Conversational or NC programming using the softkeys or drop-down list.
- **PARITY**—choose among None, Odd, or Even for Conversational or NC programming using the softkeys or drop-down list.

FTP Server Settings

Select the FTP SERVER SETTINGS *F2* softkey to access the FTP Server Settings screen.

FTP SERVER SETTINGS

ENABLE FTP SERVER NO *F1*

FTP SERVER PORT 21 *F2*

MAXIMUM IDLE TIME (MINS) 0 *F3*

USER 1 NAME PASSWORD *F4*

USER 1 PATH *F5*

USER 2 NAME PASSWORD *F6*

USER 2 PATH *F7*

USER 3 NAME PASSWORD *F8*

USER 3 PATH *F9*

USER 4 NAME PASSWORD *F10*

USER 4 PATH *F11*

Enable or disable FTP server *F12*

F1 NO

F2 YES

F3 DISPLAY MACHINE IP ADDRESS

F4 CHANGE FTP ROOT DRIVE

F5 DISCONNECT ALL USERS

F6 EXIT

Class1.HLT INCH R 3:31 PM

Figure 2–22. FTP Server Settings screen



Refer to the *WinMax Lathe Options* manual, UltiNet Option, for information about this option.

MMI Uptime

Press the MMI UPTIME *F3* softkey to show the UPTIME screen, which shows the date and time the MMI (Man-Machine Interface) began running. The Runtime field displays the number of days (D), hours (H), minutes (M) and seconds (S) for machine power on.

UPTIME

The MMI has been running since:

5/2/2005 11:13:37 AM *F1*

Runtime:

0D 4H 22M 10S *F2*

F3

F4

F5

F6

F7

F8

F9

F10

F11

F12 EXIT

Class1.HLT INCH R 3:36 PM

Figure 2–23. Uptime screen

Printing

Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu. From the Utilities screen, select the **PRINTING F3** softkey to access the Printing screen. The Printing screen allows you to print sections of programs or entire part programs from the console. You can connect a printer to the machine using the USB port on the Communications Panel or print to a networked printer.

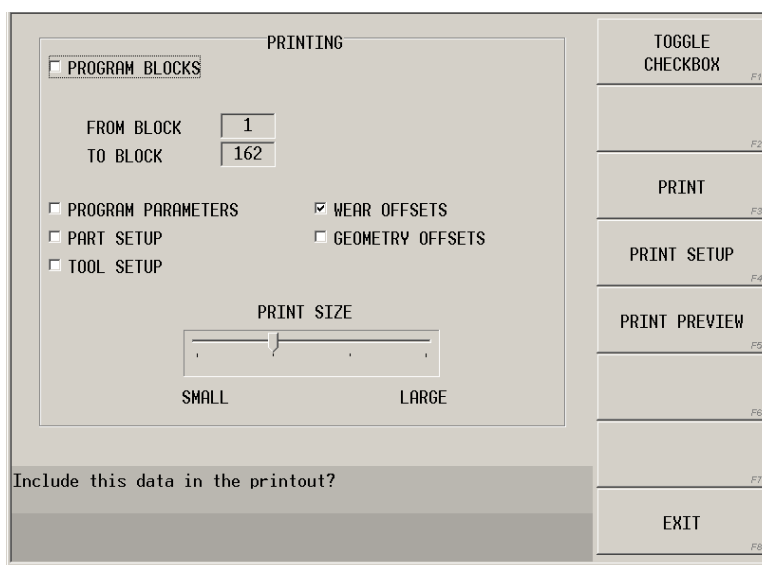


Figure 2-24. Printing screen

Use the arrow keys to move to each field or select a field with the stylus. Then use the **TOGGLE** check box **F1** softkey for making selections to include when printing programs.



Refer to *Programming Basics*, on page 4 - 1 for information about part programs.

You can print the entire program by selecting all of the check boxes or only select boxes for the parts of the program you wish to print. The following fields are available on the Printing screen for selecting programming information to include when printing:

- **PROGRAM BLOCKS**—you can either select Program Blocks to print all blocks or, you can identify a range of blocks to print in the FROM BLOCK and TO BLOCK fields.
- **PROGRAM PARAMETERS**
- **PART SETUP**
- **TOOL SETUP**
- **WEAR OFFSETS**
- **GEOMETRY OFFSETS**
- **PRINT SIZE**—move the slider from SMALL to LARGE to adjust the size of the printed text.

These softkeys are available on the Printing screen:

- **TOGGLE CHECKBOX F1**—select which sections of the current program to print.
- **PRINT F3**—display the Print pop-up window for entering printer selections. This is a standard Windows dialog for selecting a printer, print range, and number of copies.
- **PRINT SETUP F4**—display the Print Setup pop-up window for entering setup selections, such as printer, paper size, and orientation.
- **PRINT PREVIEW F5**—display a preview of the print selection. Use the softkeys that appear at the top of this preview screen to view different pages, zoom, and print.

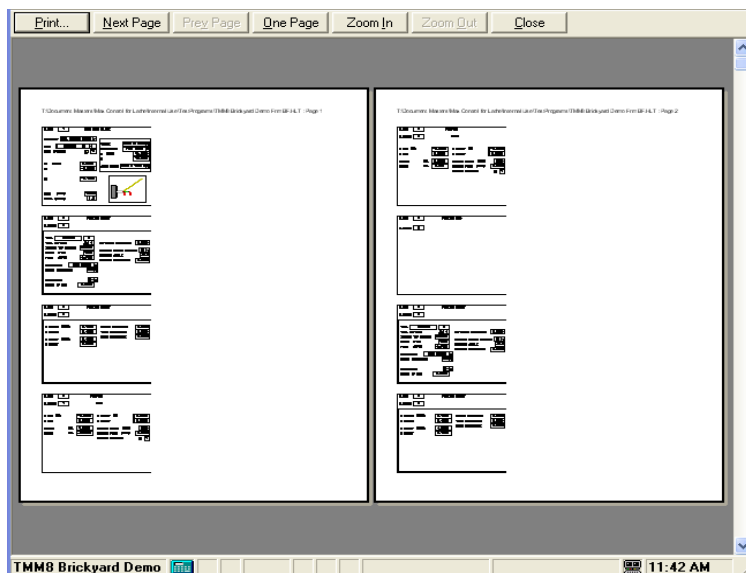


Figure 2-25. Print Preview screen

Integrator Support Services



The Integrator Support Services screen is for Hurco Certified Technicians' use only in configuring and setting up the machine.

Restart Control

The Restart Control command will remove control power, save all open programs in Project Manager, complete an orderly shutdown of the WinMax Lathe single-screen control, and then restart.

Follow these steps to use the Restart Control command:

1. Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu.
2. From the Utilities screen, select the **RESTART CONTROL F5** softkey to access the Restart Control command. A pop-up message appears: “Are you sure you want to restart the control?”
3. Select Yes or No. When Yes is selected, the Restart Control command is performed. This feature saves time and avoids having to shut down the entire machine when it is only necessary to restart the control.

Shutdown Control

The Shutdown Control command will remove control power, save all open programs in Project Manager, and then complete an orderly shutdown of the WinMax Lathe single-screen control.



Hurco recommends using the Shutdown Control command prior to turning off machine power to ensure that no data is lost.

1. Follow these steps to use the Shutdown Control command:
2. Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu.
3. From the Utilities screen, select the **SHUTDOWN CONTROL F6** softkey to access the Shutdown Control command. A pop-up message appears: “Are you sure you want to shut down the control?”
4. Select Yes or No. When Yes is selected, the Shutdown Control command is performed.
5. Wait for the shutdown process to finish before shutting off machine power at the Main Disconnect switch.

Serial I/O

Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu. From the Utilities screen, select the MORE → F7 softkey followed by the SERIAL I/O F1 softkey to access the Serial I/O screen. Two serial ports are available on the control. The Serial I/O screen contains Status and Bytes Transferred fields for both ports. In addition, there are read, write, and abort softkeys for both ports.

The screenshot displays the SERIAL I/O screen. It features two main sections for PORT 1 and PORT 2. For PORT 1, the STATUS is 'AVAILABLE' and BYTES TRANSFERRED is '384'. For PORT 2, the STATUS is 'NOT AVAILABLE' and BYTES TRANSFERRED is '0'. To the right of these sections is a vertical column of softkeys: BEGIN READING FROM PORT 1 (F1), BEGIN WRITING TO PORT 1 (F2), ABORT PORT 1 OPERATION (F3), a blank key (F4), BEGIN READING FROM PORT 2 (F5), BEGIN WRITING TO PORT 2 (F6), ABORT PORT 2 OPERATION (F7), and EXIT (F8). Below the port sections is a 'Select a softkey.' prompt. The bottom status bar shows 'NONAME2.HLT', a keypad icon, 'INCH R', a yellow light, a red light, and the time '3:47 PM'.

Figure 2-26. Serial I/O screen

These fields appear on the Serial I/O screen:

- **STATUS**—displays status for this port as Available or Not Available.
- **BYTES TRANSFERRED**—indicates the number of bytes transferred for this port.

These softkeys are available on the Serial I/O screen. Duplicate sets of fields and softkeys are available on the Serial I/O screen for Port 1 and Port 2.

- **BEGIN READING FROM PORT F5**—brings up 2 softkey choices: READ NC FROM PORT and READ CONV FROM PORT to identify the program format to read.
- **BEGIN WRITING TO PORT F6**—writes the program to the port.
- **ABORT PORT OPERATION F7**—halts the read or write operation for the port.

Log Files

Press the **Menu** key followed by the **Utility Screen** softkey to access the Utilities screen and softkey menu. From the Utilities screen, select the MORE → F7 softkey followed by the LOG FILES F2 softkey to access the Log Files screen. As the turning center runs, it generates three types of text prompts: Notification, Error, and Status. The Error and Status messages can be viewed in log files. Select the LOG FILES F7 softkey to access these log file selections.

- **ACTIVE ERROR LISTING F1**—displays a list of errors still in effect in the Active Error Listing screen. This list includes a date, time, filename and description for each error. PREVIOUS PAGE F1 and NEXT PAGE F2 softkeys become available for accessing multiple page lists. A CLEAR ALL F4 softkey clears the list.
- **ACTIVE STATUS LISTING F2**—displays a list of status messages still in effect in the Active Status Listing screen. Status messages relay information about the machine. PREVIOUS PAGE F1 and NEXT PAGE F2 softkeys become available for accessing multiple page lists. A CLEAR ALL F4 softkey clears the list.
- **ERROR HISTORY F3**—displays the last 50 error messages in the Error History screen. This list includes a date, time, filename and description for each error. PREVIOUS PAGE F1 and NEXT PAGE F2 softkeys become available for accessing multiple page lists. A CLEAR ALL F4 softkey clears the list.
- **STATUS HISTORY F4**—displays the last 50 status messages in the Status History screen. This list includes a date, time, filename and description for each status message. PREVIOUS PAGE F1 and NEXT PAGE F2 softkeys become available for accessing multiple page lists. A CLEAR ALL F4 softkey clears the list.
- **RETRIEVE EVENT LOG FILES F6**—copies Significant Event files to your hard drive and notifies you where the files were copied.
- **VIEW EVENT LOG FILE F7**—accesses the folder on your hard drive containing the Significant Event files in an *Open* pop-up window.

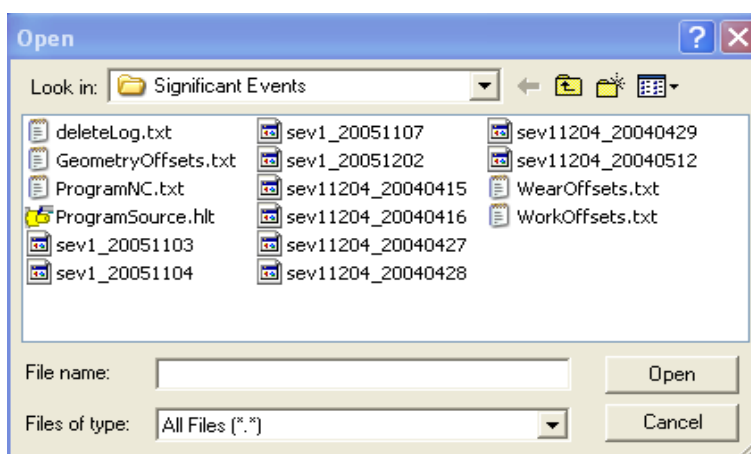


Figure 2-27. Open pop-up window for Significant Events files

PROJECT MANAGER

This chapter explains how to create and manage files and directories, set program properties, use File Manager, and access the UltiNet option using FTP Manager. Refer to the *WinMax Lathe Options Manual* for details about UltiNet. The following topics are explained in this section:

Overview	3	-	2
Create a New File	3	-	4
Open a File	3	-	4
Save Files	3	-	5
Close a File	3	-	6
Set Program Properties	3	-	6
Use File Manager	3	-	7
Use the FTP Manager	3	-	9

Either press the **Menu** key or the **Input** key followed by the **PROJECT MANAGER F8** softkey to access the Project Manager screen and softkey menu. You can also use the menu toolbar and select the **Project Manager** icon to access this screen.

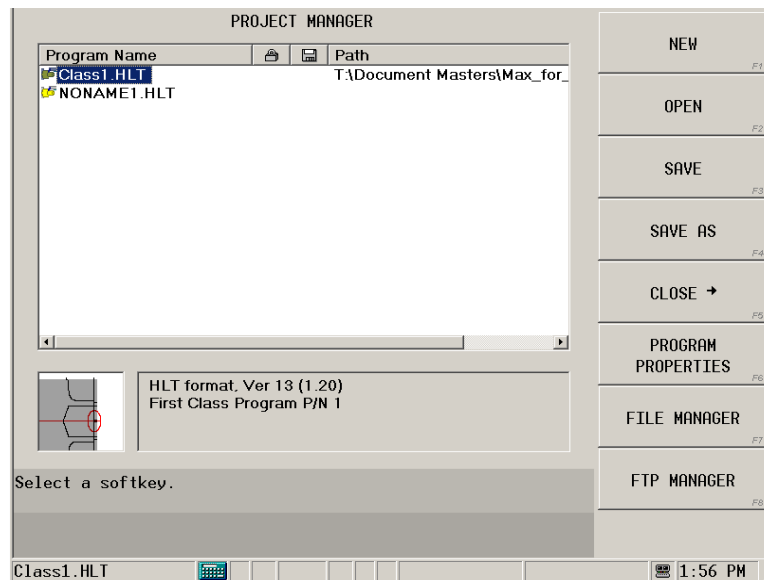


Figure 3–1. Project Manager screen



For detailed information about NC programming, refer to *WinMax Lathe NC Part Programming*, *NC Part Programming Principles* or *Program Editing Features*.

Overview

Part programs are stored on the Computer Numeric Control (CNC) hard drive, network drive, or on floppy drive diskettes. Each drive contains one main directory—the *root directory*. An operator cannot create this directory, but folders and sub-folders can be stored in it or in other drives, such as floppy drives or network drives.

Compare file management to a filing cabinet. The drives are like drawers in the filing cabinet. Subdirectories are the folders inside a drawer, or a drive. Folders and files are stored in the cabinet drawers. Part programs are like individual sheets of paper that are stored loosely on the drives or inside folders.

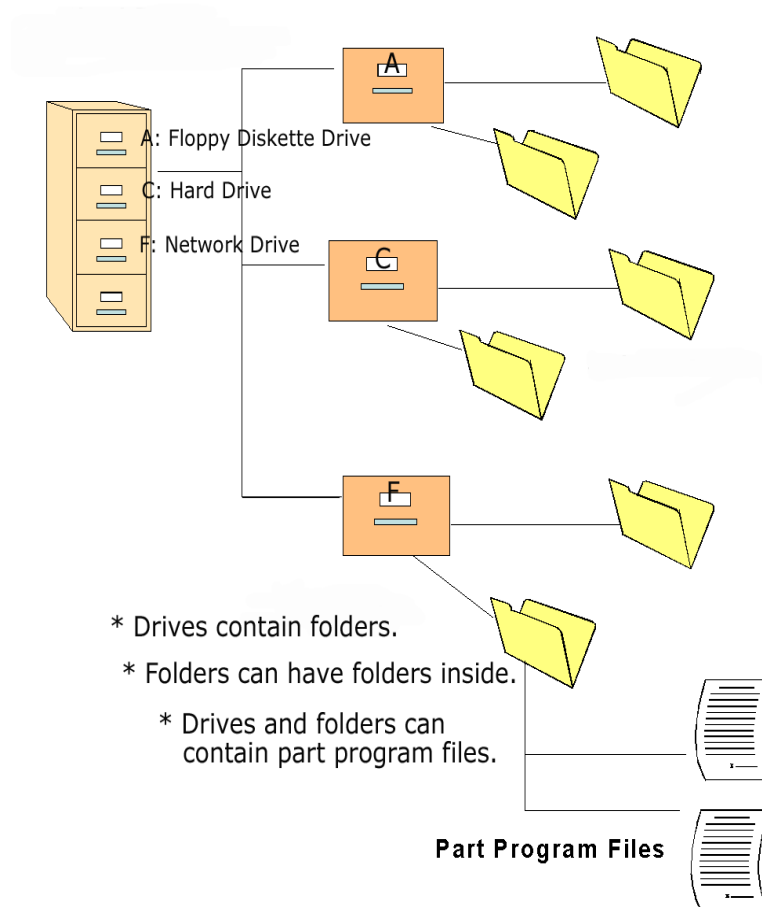


Figure 3–2. Directory Structure

The Project Manager screen displays the Program Name, directory path, snapshot of the program, file format, and version for the highlighted file, in addition to softkey selections for performing other project functions.

A lock icon appears between the program name and path name when the file is in use on a network. When this icon is visible, the file cannot be edited, saved, or closed.

An “!” (exclamation mark) appears between the program name and path name when the file has been modified and not saved. Save the file to keep changes.

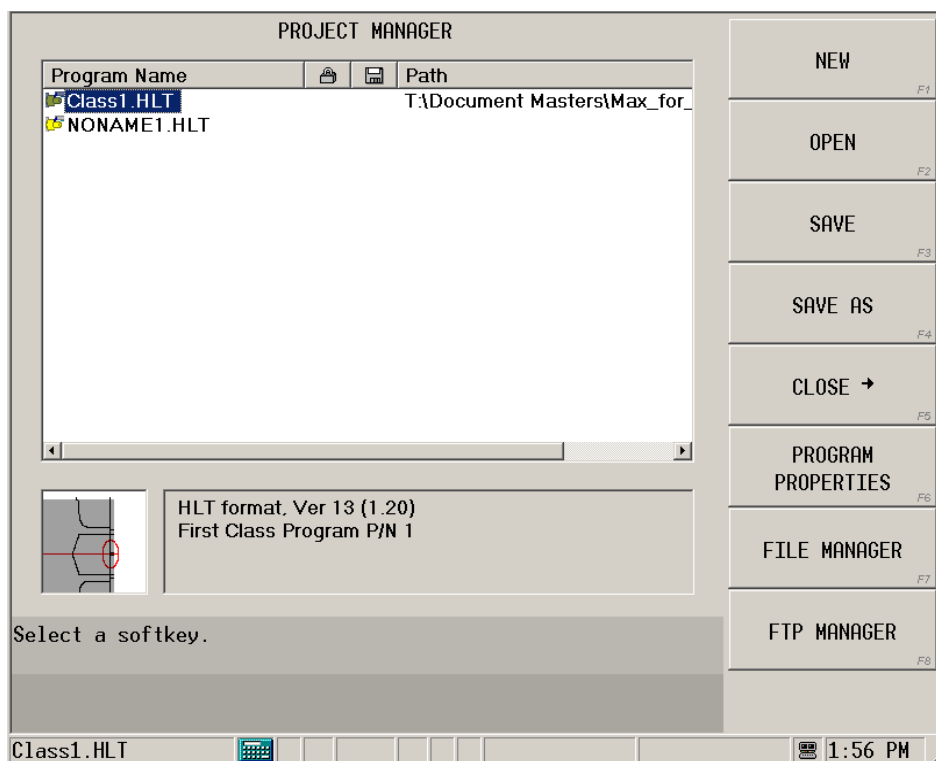


Figure 3–3. Project Manager screen

- ⇒ More than one program can be loaded in memory at a time. However, only the program that is highlighted will be the active program for editing, graphing, and running.

Create a New File

Either press the **Menu** key or the **Input** key followed by the **PROJECT MANAGER F8** softkey to access the Project Manager screen and softkey menu. You can also use the menu toolbar and select the **Project Manager** icon to access this screen.

Select the **NEW F1** softkey to create a blank part program. Choose the file type by selecting one of these softkeys:

- **CREATE HLT PROGRAM F1**—creates a new conversational part program named NONAME1.HLT.
- **CREATE NC PROGRAM F2**—creates a new NC part program named NONAME1.LNC.



Use the Save As feature to change the name from the default NONAME1.HLT or NONAME1.LNC to avoid saving one file over another. Refer to *Save Files, on page 3 - 5* for details.

Open a File

Select the **OPEN F2** softkey to open a previously saved part program. The Open screen displays a list of drives and folders for locating existing programs.

1. Select a folder and the files within the folder appear on the right-hand side.
2. Highlight the file to open.
3. Select the **LOAD SELECTED FILE(S) F1** softkey.



The Open screen allows you to sort the file list by File, Size, or Date. To sort the list by any of these criteria, simply use the stylus and tap the appropriate header.

If you sort by one header and then by another, the file list will sort first by the most recent header selected then by the previous selection. For example, selecting **File** then **Date** will sort the file list in ascending order by Date. If any files have the same date listed, they will be sorted alphabetically by file name within each date.

Selecting a heading a second time inverts the order. For example, the alphabetical order for files sorted from A to Z will be sorted from Z to A with the second click of the heading.

Save Files

Select the **SAVE F3** softkey to save the current part program onto a drive to which you have access. Select the **SAVE AS F4** softkey to create a file by saving the current part program under a different name, as a different file type, or in a different location.

The Save screen appears. The left-hand pane shows the drives and folders. When you select a folder, the files stored in the folder appear in the right-hand pane. The file's size and date it was saved appear next to the file name.

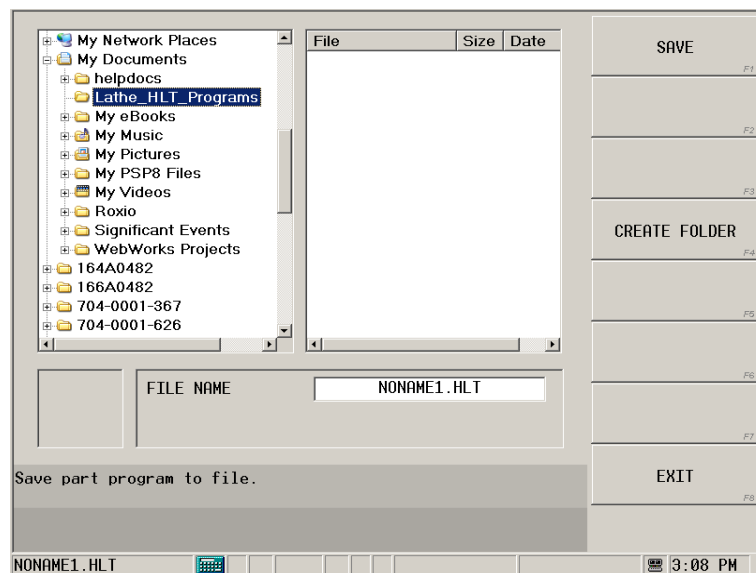


Figure 3-4. List of System Directories and File Names—Saving a File

If the program name is the default NONAME1 or if you want to save a file with a different name, select the **SAVE AS F4** softkey and the screen reverts to the list of drives and folders. The list opens in the same location as the current program with NONAME1.HLT in the FILE NAME field.

If the program was previously saved, you can select **SAVE F1** and the program will save in the same drive, directory, and filename.



Change the name from the default NONAME1.HLT to avoid saving one file over another.

Creating a New Folder for Storing A File:	Saving the File in a Different Folder:
1. Highlight the folder where the new folder will reside.	1. Highlight the appropriate folder.
2. Select CREATE FOLDER F4 .	2. Enter a file name.
3. Enter the folder name in the pop-up window and select OK .	3. Select SAVE F1 .

Close a File

Press the Menu key to access the Project Manager screen and softkey menu. Select the **CLOSE → F5** softkey to remove a program or programs from the file listing. Multiple programs can be open (in memory) at one time. Having too many programs open can affect system performance. Close files to free up internal memory used for editing, graphing, and running programs.

Select **CLOSE ALL PROGRAMS F3** or **CLOSE SELECTED PROGRAM F5**. If only one program is listed, then either softkey can be used. If more than one program is listed, then be sure to select the appropriate softkey.

Make note of the “!” (exclamation mark) status as closing a program that has not been saved will lose all changes made since the last time it was saved. If modifications have been made to a program that has not been saved, a prompt appears before closing.

- Select **OK** to continue the close operation without saving.
- Select **Cancel** to cancel the operation.

Set Program Properties

Select the **PROGRAM PROPERTIES F6** softkey to change and store properties for the selected file. The settings originate from the User Preferences/Conversational Settings. Refer to *Conversational Settings, on page 2 - 18* for more information about the settings. You can override the defaults for a program using Program Properties.

These fields appear when this softkey is selected:

- **DISPLAY UNITS**—enter Inches or Millimeters for the unit of measurement used throughout the part programming for HLT files. This field does not apply to NC programs.
- **PROGRAMMING MODE**—enter Radius or Diameter for the programming mode. This field does not apply to NC programs.
- **DESCRIPTION**—enter a text description of the selected file. You can enter up to 47 characters on each of two lines. This text appears at the bottom of the Project Manager screen when the file is highlighted.
- **WRITE PROTECTION**—select **ON** to provide write protection for the current program. This selection prevents changes to the program from being saved. Select **OFF** to remove write protection and allow editing of the program.

These fields are displayed but cannot be changed on this screen:

- **NAME**—displays the file name of the program. This field is read-only. To change the name of the saved file, select the Exit key followed by the **SAVE AS** softkey.
- **PATH**—displays the path to the saved file. This field is read-only. To change the path for the saved file, select the **EXIT F8** softkey followed by the **SAVE AS F4** softkey.

Use File Manager

From the Project Manager screen, select the **FILE MANAGER F7** softkey to perform file management functions, such as renaming a folder or file name, or deleting files or folders from the drive.

Folders

When a folder is highlighted in the left-hand pane, the softkey menu displays folder management options.

- **CUT FOLDER F1**—removes the selected folder from its current location and places it on a “clipboard.” You may then paste the folder in another location. Make sure you do not cut or copy another folder before pasting the folder in its new location. The clipboard contains only the most recently cut or copied folder. Cutting a folder also cuts all files and folders contained within the folder.
- **COPY FOLDER F2**—places a copy of the selected folder on a “clipboard.” Once a folder has been placed on the clipboard, you may paste it in a new location. The clipboard contains only the most recently cut or copied folder. Copying a folder also copies all files and folders contained within the folder.
- **PASTE FILE(S) INTO FOLDER F3**—places a copy of the most recently cut or copied file(s) or folder to the “clipboard” in the selected location. The file(s) or folder will remain on the clipboard and can be pasted elsewhere until another file or folder is cut or copied to the clipboard. Pasting a folder also pastes all files and folders contained within the folder.
- **CREATE FOLDER F4**—creates a new folder in the selected location. The control prompts you to enter a name for the new folder when you select this softkey. Enter the name that you wish to use for the new folder and click OK.
- **RENAME FOLDER F5**—allows you to rename the selected folder. When you select this softkey, a pop-up window appears prompting you to “Enter new file name.” Enter the name for the folder and select OK. Select Cancel to keep the same folder name.
- **DELETE FOLDER F6**—deletes the selected folder along with any folders or files contained within the folder. This will not place a copy of the folder on the clipboard and you will not be able to retrieve a folder once it has been deleted. Use extreme caution when using this softkey. A message appears when you select it asking “Continue with delete operation?” If you are sure that you want to delete the folder, select OK. If you do not wish to delete the folder, select Cancel.

Files

When a file name is highlighted in the right-hand pane, the softkey menu provides file management options.

- **CUT FILE(S)** *F1*—removes the selected file from its current location and places it on a “clipboard.” You may then paste the file in another location. Make sure you do not cut or copy another file before pasting the file in its new location. The clipboard contains only the most recently cut or copied file.
- **COPY FILE(S)** *F2*—places a copy of the selected file on the “clipboard.” Once a file has been placed on the clipboard, you may paste it in a new location. The clipboard contains only the most recently cut or copied file.
- **PASTE FILE(S)** *F3*—places a copy of the last file that was cut or copied to the “clipboard” in the selected location. The file will remain on the clipboard after pasting and can be pasted elsewhere until another file is cut or copied to the clipboard.
- **RENAME FILE(S)** *F4*—allows you to rename the selected file. When you select this softkey, a pop-up window appears asking you to “Enter new file name.” Enter the name you want to name the file and select OK. Select Cancel to keep the file name.
- **DELETE FILE(S)** *F5*—deletes the selected file. This will not place a copy of the file on the clipboard and you will not be able to retrieve a file once it has been deleted. Use extreme caution when using the Delete File(s) softkey. A message appears when you select this softkey asking “Continue with delete operation?” If you are sure that you want to delete the file, select OK. If you do not wish to delete the file, select Cancel.
- **LOAD SELECTED FILE** *F6*—loads the selected file into memory (this selection opens the file just as it does with the Project Manager/Open menu.

Other Softkeys

These softkeys appear on the File Manager screen whether a filename is highlighted or a folder is highlighted:

- **FTP MANAGER** *F7*—accesses the FTP Manager softkey menu. On the Project Manager screen, the FTP MANAGER softkey is *F8*. Refer to the *WinMax Lathe Options* manual for details about the UltiNet option.
- **EXIT** *F8*—returns to the Project Manager screen

Use the FTP Manager

FTP (File Transfer Protocol) is a method of transferring files from one computer to another using the Internet and access the UltiNet option. Refer to the *WinMax Lathe Options Manual* for details about UltiNet.

Press the Menu key to access the Project Manager screen and softkey menu. The **FTP MANAGER** F8 softkey accesses the FTP Host List screen. The FTP MANAGER F7 softkey on the File Manager screen also accesses this same screen. From here, you can connect to or disconnect from, add, edit, and delete FTP servers which are identified on this list.

Figure 3-5. FTP Host Properties screen



Refer to the *WinMax Lathe Options* manual for information about setting up the FTP server.

PROGRAMMING BASICS

This chapter explains basic programming information for Conversational and NC programming, such as required setup, program checking, editing, and running of the program.

Part Programming	4 - 2
Part and Tool Loading	4 - 6
Part Setup—Work Offsets	4 - 10
Tool Setup—Geometry Offsets	4 - 15
Tool Review	4 - 72
Program Parameters	4 - 76
Verifying Part Programs—Graphics	4 - 79
Software Options	4 - 92
Programming Training	4 - 93

Part Programming

There are five main steps to follow before creating a part program on the control:

1. Plan the part programming operations.
2. Perform the tool- and part-loading operations. Refer to *Part and Tool Loading*, on page 4 - 6.
3. Enter the Part Setup information. Refer to *Part Setup—Work Offsets*, on page 4 - 10.
4. Enter the Tool Setup information. Refer to *Tool Setup—Geometry Offsets*, on page 4 - 15.
5. Enter the Program Parameters information. Refer to *Program Parameters*, on page 4 - 76.

The Input screen contains softkeys for accessing menus for the programming tasks.



Figure 4–1. Input Screen

The following diagram shows how the software is set up, starting with the Input screen, accessing Part Setup F1, Tool Setup F2, Part Programming F3, Data blocks, Program Parameters F4, and Project Manager F8.

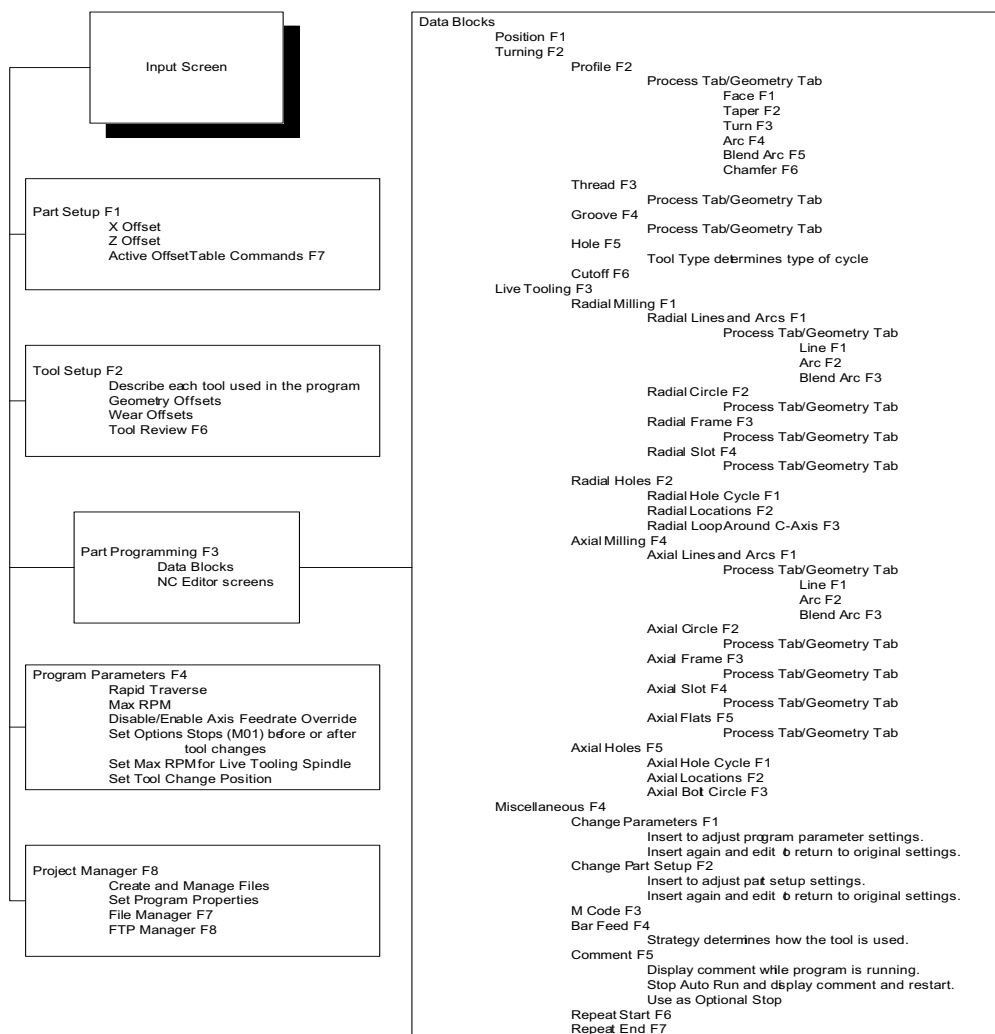


Figure 4–2. Part Programming diagram

Planning

Before you begin programming, decide what material and tools are needed. It is important to be familiar with the axes motion on the machine and how to obtain the information required for the setup screens. These topics are described in this section.



Save your program with a unique, correct name before proceeding. Following this practice can help avoid accidentally deleting a file because of a generic filename. Refer to *Save Files*, on page 3 - 5 for details about saving files.

Axes Movement

Be familiar with the axis movement in preparation for programming.

Two-Axis Turning Center Axis Movement

This diagram identifies plus and minus axis movement.

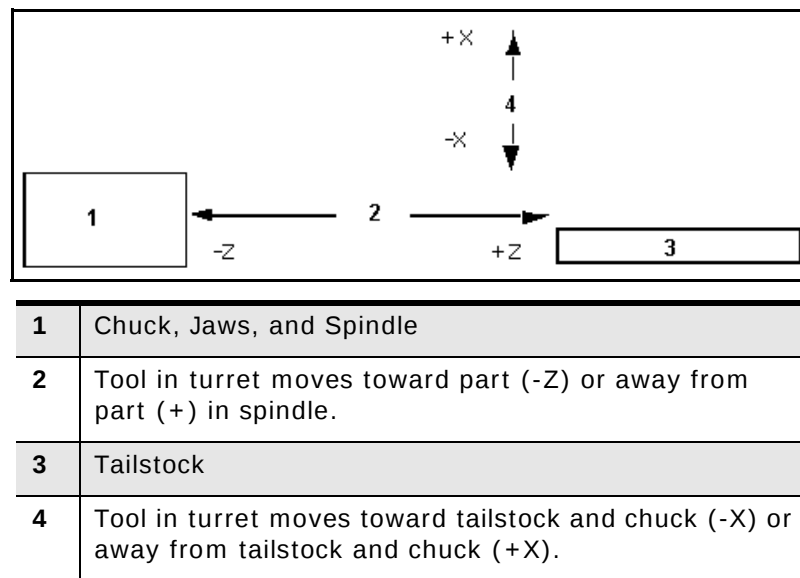


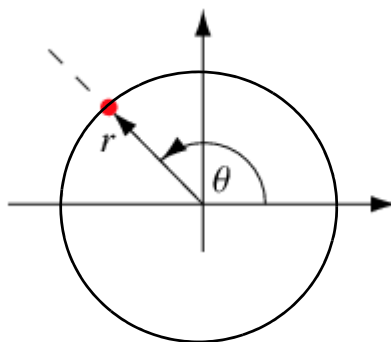
Figure 4–3. Two-Axis Turning Center Axes Motion

Live-Tooling Turning Center Axis Movement

Radial and axial tools are used for live tooling.

- Radial tooling approaches the stock in the -X axis direction shown in the previous figure.
- Axial tooling approaches the stock in the -Z axis direction shown in the previous figure.

This diagram identifies the radial and angular polar coordinates for live-tooling turning centers.



r	The radial coordinate (the radial distance from the center).
θ	The angular coordinate, or the polar angle (counterclockwise angle from the X-axis).

Figure 4–4. Live-Tooling Turning Center Polar Coordinate Axes Motion

Setup Screens

The part and tool setup screens describe the part and the tools used to cut the part. This information is necessary for the system to draw the part.

To perform many of the setup functions, use the axis controls to move the turret and record positions. Refer to *Axis and Spindle Control*, on page 1 - 6 for information about axis controls.



Part and Tool Setup information is saved with conversational programs but not with NC programs.

Part and Tool Loading

This section describes loading the workpiece and the tools in preparation for programming the Part and Tool Setup screens.

Loading the Workpiece

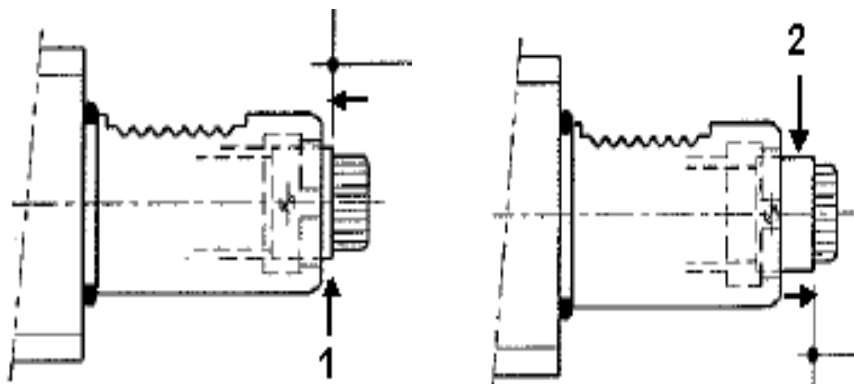
In order to determine the reference point (part zero) in the part, first load the work piece (raw material or stock) into the chuck or optional collet. Refer to the *Maintenance and Safety* manual for information about hydraulic settings for the optional collet. Refer to the *WinMax Lathe Options Manual* for information about operating the chuck.

Loading Live Tooling Tool Holders (TMM series)

Hurco TMM Series turning centers use tool holders mounted in turret turning stations to hold tools. Each tool holder must be inserted into the turret.

To insert the tool holder into the turret,

1. Index the turret forward or backward one station. Refer to *Load Tools in Turret and Assign Tool Numbers*, on page 4 - 8 for directions for indexing the turret.
2. Turn the splineshaft for the tool holder until the notch fits into the detent and the collar slides out. The following figures first show the collar in its original position (1) and second in its final position (2).



1	Collar in original position
2	Collar in final position

Figure 4-5. Live Tooling Tool Holder Collar

3. Follow the directions in the *Load Tools in Turret and Assign Tool Numbers*, on page 4 - 8 to mount the live tool holder in a non Active Tool Index location.



Before using a live tool, check these items:

- the sealing rings are present and not damaged.
- the coupling profile is clean and not damaged.
- the spindle locking mechanism is engaged.

Loading Tools

Hurco turning centers use a turret to hold tools. Each tool is manually inserted into the turret. There are two types of turning centers: two axis and live tooling. Tools in the turret are described and programmed during Tool Setup. Refer to *Tool Setup—Geometry Offsets, on page 4 - 15* for programming information.

Two Axis (TM series)

- The turret contains boring blocks for holding tools and turning stations for holding turning tools.
- Bolts secure tools inserted in boring blocks; wedge clamps secure tools in their stations.

Live Tooling (TMM series)

- Tool holders are inserted and locked in place with VDI set screws.
- Static holders are used for turning and boring tools.
- Live tools use collet holders.

Two Axis and Live Tooling (TM and TMM series)

- Turret stations are numbered to identify and locate each tool.
- Use the Turret Plus (+) or Minus (-) console keys to increment or decrement the tool station.

Load Tools in Turret and Assign Tool Numbers

To load tools in the turret and assign their tool numbers on the control,

1. Press the **Manual** console key to display the Manual screen.
2. Select the **SET ACTIVE TOOL F1** softkey. The softkey menu changes for indexing the turret.

MANUAL					
MACHINE	PART	AXES STATUS	CALIBRATED	INCREMENT NEXT TOOL NUMBER	F1
X 8.0000	8.0000	ACTIVE TOOL	0	DECREMENT NEXT TOOL NUMBER	F2
Z 15.7480	6.7480	SPINDLE RPM	0		F3
FPM % 100	RAP % 100	RPM % 100	JOG % 100		F4
AXIS LIMIT SWITCHES:				INDEX TURRET SHORT WAY	F5
CONVEYOR	STOPPED	PARTS CATCHER	UNKNOWN	INDEX TURRET FORWARD	F6
COOLANT	OFF	TAILSTOCK	UNKNOWN	INDEX TURRET REVERSE	F7
FEED (IPM)	0.0000	TOOL SETTER	UNKNOWN		F8
NEXT TOOL	5	CHUCK STATE	CLOSED		
		CHUCKING TYPE	INTERNAL		
		CHUCKING PRESSURE	HIGH		
Enter next tool turret station.					
				EXIT	
Class1.HLT				INCH D	4:09 PM

Figure 4-6. Two-Axis (TM Series) Turret Indexing menu

MANUAL					
MACHINE	PART	AXES STATUS	CALIBRATED	INCREMENT NEXT TOOL NUMBER	F1
X 15.6693	15.6693	ACTIVE TOOL	0	DECREMENT NEXT TOOL NUMBER	F2
Z 24.9606	17.4606	S1 RPM	0		F3
C 0.000	0.000	S2 RPM	0		F4
FPM % 100	RAP % 100	S1 % 100	S2 % 100	JOG % 100	F5
AXIS LIMIT SWITCHES:				INDEX TURRET SHORT WAY	F6
CONVEYOR	STOPPED	PARTS CATCHER	UNKNOWN	INDEX TURRET FORWARD	F7
COOLANT	OFF	TAILSTOCK	RETRACTED	INDEX TURRET REVERSE	F8
FEED (IPM)	0.0000	TOOL SETTER	UNKNOWN		
NEXT TOOL	5	CHUCK STATE	CLOSED		
		CHUCKING TYPE	EXTERNAL		
		FOOTSWITCH MODE	TOGGLE		
		SPINDLE CLAMPS	BOTH OFF		
Enter next tool turret station.					
				EXIT	
SamplePP.HLT				INCH D	2:33 PM

Figure 4-7. Live-Tooling (TM M Series) Turret Indexing menu

3. Enter the indexed tool number in the NEXT TOOL field. You can either
 - select the INCREMENT NEXT TOOL NUMBER *F1* OR DECREMENT NEXT TOOL NUMBER *F2* softkey, or
 - type in the tool number using the number pad on the console.
4. Move the turret into position and set the number in the Active Tool field using one of three softkey choices:
 - **INDEX TURRET SHORT WAY *F4***—moves the turret either forward or backward, whichever distance is the shortest to the Active Tool position.
 - **INDEX TURRET FORWARD *F5***—moves the turret forward to the Active Tool position. For example, if the turret needs to move from tool 7 to tool 3, the turret moves through the positions as follows: tool 7, tool 8, tool 9, tool 10, tool 11, tool 12, tool 1, tool 2, tool 3. This example applies to 12 station turning centers. For 10 station turning centers, tool 1 follows tool 10.
 - **INDEX TURRET REVERSE *F6***—moves the turret back to the Active Tool position. For example, if the turret needs to move from tool 7 to tool 3, the turret moves through the positions as follows: tool 7, tool 6, tool 5, tool 4, tool 3.



Move the turret in the most efficient manner, keeping in mind the length of tools and how moving the turret will affect their position during each index.

Part Setup—Work Offsets

To set up your part you need to define the X and Z offsets that define the zero reference location for the part. All part program data will be referenced from the zero location.



The Change Part Setup data block can be used to insert changes in part setup information within a part program. For information about this type of data block, refer to *WinMax Lathe Conversational Part Programming, Change Part Setup*.

Each part offset is stored in the Part Offset—Work Offsets screen. The offsets represent the X and Z values shifted from the machine zero location to the face of the part. Machine zero is set at the face and centerline of the spindle. The turret face is calibrated to the face, and the boring blocks are set to the centerline.

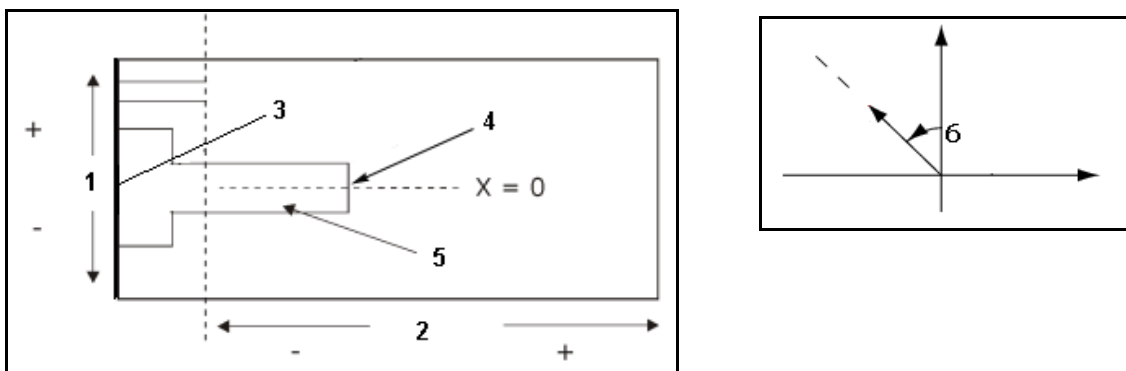


You may want to insert a tool in the turret to use as an edge finder when identifying the part offset.



Travel must stop before reaching Machine Zero.

This diagram shows the Part Offset (4) relative to Machine Zero (3):



1	X Axis
2	Z Axis
3	Machine Zero
4	Part Offset
5	Work Piece
6	C Axis (from the end of the stock)

Figure 4–8. Part Offset Relative to Machine Zero

There are up to 99 work offsets that can be programmed. Each offset is defined by storing the machine position for that axis. Typically this is done by jogging a tool to the part and storing the Machine Position for that tool.



In most programs, only one offset is used. A second offset is typically used when a part needs to be turned over, or flipped, in the same setup for establishing the zero location on the second side.

The current Work Offsets are saved with each Conversational program. You can save the Work Offsets to a separate file to use later. Refer to *Part Setup Softkeys, on page 4 - 14* for information about saving and restoring offsets.

Begin the programming setup process with the Part Setup screen.

Either press the **Menu** key or the **Input** key followed by the **PART SETUP F1** softkey to access the Part Setup screen and softkey menu. You can also use the menu toolbar and select the **Part** icon to access this screen.

PART SETUP - WORK OFFSETS					PAGE UP F1	
MACHINE		PART		ACTIVE TOOL	F2	
X	14.1732	14.1732		0	PAGE DOWN	
Z	15.7480	6.4452		0	F3	
#		☒ X OFFSET	Z OFFSET	ACTIVE OFFSET	F4	
0		0.0000	0.0000	1	SELECT OFFSET	
1		0.0000	9.3029		F5	
2		0.0000	0.0000		STORE MACHINE POSITION	
3		0.0000	0.0000		F6	
4		0.0000	0.0000		TABLE COMMANDS →	
5		0.0000	0.0000		F7	
6		0.0000	0.0000		EXIT	
7		0.0000	0.0000		F8	
8		0.0000	0.0000			
9		0.0000	0.0000			
Enter a value or select a softkey.						
TMM8 Brickyard Demo					INCH D 9:06 AM	

Figure 4-9. Two-Axis (TM Series) Part Setup—Work Offsets screen

PART SETUP - WORK OFFSETS

MACHINE		PART		ACTIVE TOOL		0		PAGE UP F1
X	14.1732	14.1732						PAGE DOWN F2
Z	15.7480	6.4452		SPINDLE RPM	0			

#	☒ C OFFSET	☒ X OFFSET	Z OFFSET	ACTIVE OFFSET	
0	0.000	0.0000	0.0000		1
1	0.000	0.0000	9.3029		
2	0.000	0.0000	0.0000		
3	0.000	0.0000	0.0000		
4	0.000	0.0000	0.0000		
5	0.000	0.0000	0.0000		
6	0.000	0.0000	0.0000		
7	0.000	0.0000	0.0000		
8	0.000	0.0000	0.0000		
9	0.000	0.0000	0.0000		

Enter a value or select a softkey.

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SELECT OFFSET
F4
STORE MACHINE POSITION
F5
TABLE COMMANDS →
F7
EXIT
F8

Figure 4-10. Live-Tooling (TMM Series) Part Setup—Work Offsets screen

Use either the stylus or the arrow keys to move the cursor to each Offset field and use the softkeys or type in data for the part setup for your part program.



The **Home** key jumps to the first offset in the program.

The **End** key jumps to the last offset in the program.

The **Page Up** key jumps to the previous page of the offset list, in increments of 10.

The **Page Down** key jumps to the next page of the offset list, in increments of 10.

Definitions for the fields and softkeys are located in these sections: *Part Setup Fields*, on page 4 - 13 and *Part Setup Softkeys*, on page 4 - 14.

Part Setup Fields

The Part Setup fields are defined as follows:

- **#**—contains the index value that identifies each offset.
- **C OFFSET checkbox**—select this checkbox to enable the C Offset fields. When the checkbox is cleared, the C Offsets cannot be edited. The status of this checkbox is modal. It stays in effect until you change it, even upon a control reboot. This field is available for Live Tooling turning centers only.
- **X OFFSET checkbox**—select this checkbox to enable the X Offset fields. When the checkbox is cleared, the X Offsets cannot be edited. The status of this checkbox is modal. It stays in effect until you change it, even upon a control reboot.
- **C OFFSET**—contains the C location in machine coordinates for part zero. This field is available for Live Tooling turning centers only.
- **X OFFSET**—contains the X location in machine coordinates for part zero.
- **Z OFFSET**—contains the Z location in machine coordinates for part zero.



When the cursor is in a Z Offset field and **Store Machine Position** is pressed, a pop-up window appears requesting a tool offset (0-99). The control will adjust for the tool offset before entering the position in the selected field.

The pop-up contains the active tool's programmed geometry offset. If the active tool is not programmed in Tool Setup, then the active tool number is used as the default offset.

Entering a zero (0) does not apply an adjustment.

After entering or accepting the tool offset, select **OK** to continue or **Cancel** to stop the operation.

- **ACTIVE OFFSET**—contains the index value (1 – 99) specifying which offset is active.



You can also define a new Active Offset by inserting a Change Part Setup data block within your part program. Refer to the *WinMax Lathe Conversational Programming* manual for details.

Part Setup Softkeys

The Part Setup softkeys provide the following options:

- **PAGE UP F1**—scrolls up through the # fields, displaying groups of offsets.
- **PAGE DOWN F2**—scrolls down through the # fields, displaying groups of offsets.
- **SELECT OFFSET F4**—changes the Active Offset index value to the offset of the current cursor location.
- **STORE MACHINE POSITION F5** (or **Store Machine Position** console key)—sets the current axis position as a Part Zero location. The cursor location defines which axis (C, X, or Z) will be set. The current axis position appears in the DRO Part column as zero.
- **TABLE COMMANDS F7**—displays an additional softkey menu with choices for saving and restoring the offsets.
 - **WRITE TABLE TO FILE F2**—opens a Save As dialog box for naming and saving the offsets to a file. You can assign the file extension of your choice in the **File name** field. It is not possible to select an extension using the **Files of type** field.
 - **READ TABLE FROM FILE F4**—opens the Open dialog box for selecting a folder and filename. When an offset file is selected from this dialog box, those offsets are read from the file and the values appear on the Part Setup - Work Offsets screen.
 - **CLEAR TABLE F7**—resets all values in the table to 0.000. A confirmation window appears prior to resetting the values.
 - **EXIT F8**—exits the Table Commands menu and returns to the first Part Setup - Work Offsets menu.
- **EXIT F8**—exits the part setup process and returns to the Input screen.

Tool Setup—Geometry Offsets

You must enter data to describe the tools that will be used for the part program on a Tool Setup screen for each tool. If the Tool Number, Type, Insert Shape, and Edge Length (mm) or Insert Size (in) are not entered for each tool, the system will not have enough information to draw the part properly on the Graphics screen or to run the part.



When running a previously created part program, the Tool Setup must be carefully checked to be certain the tools described for the old program match the tools in the turret. If a tool breaks or is not available when running a previously created part program, the Tool Setup information must be changed.

Tool offsets are stored in the Tool Geometry Offsets screen in Tool Setup. Touch off the diameter and length of each tool from the part to identify these offsets. The information in the Geometry Offsets screen remains in the machine memory and is independent of the part program. You can save the offsets to a separate file to use later. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for information about saving and restoring offsets.

Geometry offset and wear offset settings for each tool in Tool Setup are stored in the machine's memory so you can switch programs without having to touch off the tools each time you change programs. Speeds and feeds may change for each program, but the relative tool positions and dimensions do not change if the tools are not moved or changed in the turret.



Create tool setup templates to simplify program development. Renaming the template file preserves the original template file for later use.

- To create a tool setup template, enter the tool description. Save the information as a program, using a program name that indicates the type of tools described.
- To use the saved template, recall the tool setup program, make any necessary changes for the new part program, and save the changed setup under a new name.

Either press the **Menu** key or the **Input** key followed by the **TOOL SETUP F2** softkey to access the Tool Setup screen and softkey menu. You can also use the menu toolbar and select the **Tool** icon to access this screen.

Figure 4–11. Tool Setup New Tool screen

The DRO (top left of the screen) shows the real-time position of the axes and machine status. The Machine and Part position information in the DRO will not appear if the machine is not calibrated. The fields in the bottom part of the screen describe the tool.

To enter information for a specific tool, or to find out whether any data already exists for that tool, type the tool number into the Tool field and press Enter. For example,

- If you enter a 1 in the Tool field, the screen will update to show existing data for tool number 1.
- If no data had been saved previously for tool 1, the TYPE field is empty and the remaining fields contain default values. This means that tool number 1 is currently available to be programmed.

Use either the stylus or the arrow keys to move the cursor to each Tool Setup field and use the softkeys or type in data to set up the tool descriptions for your part program.



The **Home** key jumps to the first tool in the program.

The **End** key jumps to the last tool in the program.

The **Page Up** key jumps to the previous tool in Tool Setup.

The **Page Down** key jumps to the next tool in Tool Setup.

The following figure is a sample Tool Setup screen with a tool number and tool type selected. Definitions for the fields and softkeys are located in the *Tool Setup Fields*, on page 4 - 18 and *Tool Setup Softkeys*, on page 4 - 62 sections.

TOOL SETUP				PREVIOUS TOOL F1			
MACHINE	14.1732	PART	14.1732	ACTIVE TOOL	0		
X	15.7480	Z	6.4452	SPINDLE RPM	0		
				NEXT TOOL F2			
TOOL	1	INSERT SHAPE		GEOMETRY OFFSETS F3			
TYPE	TURNING	DIAMOND - 80°		WEAR OFFSETS F4			
COMMENT					DELETE TOOL F5		
MAX DEPTH OF CUT	0.1000	INSERT SIZE (IC)	0.5000	TOOL REVIEW F6			
TOOL OFFSETS	1	LEAD ANGLE	-5.000	MORE → F7			
INSERT TIP RADIUS	0.0312			EXIT F8			
SPEED (FPM)	1000			CW			
FEED (IPR)	0.0120						
COOLANT	PRIMARY						
Enter tool number.							

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Figure 4-12. Tool Setup screen

Tool Setup Fields

The fields on the Tool Setup screens change based on the tool type, unit of measurement, and programming mode.

Two-Axis Turning Center Tool Setup Fields

The fields for these tools are described on these pages:

Custom	4 - 19
Turning	4 - 21
Boring	4 - 23
Fixed Center Drill	4 - 26
Fixed Drill	4 - 27
Threading	4 - 29
Grooving	4 - 30
Cutoff	4 - 32
Back Turning	4 - 35
Back Boring	4 - 37
Fixed Tap	4 - 40
Fixed Ream	4 - 41
Inserted Drill	4 - 43

Live-Tooling Turning Center Tool Setup Fields

The fields for these live tools are described on these pages:

End Mill	4 - 46
Ball End Mill	4 - 48
Bull Nose Mill	4 - 50
Live Center Drill	4 - 52
Live Drill	4 - 54
Live Tap	4 - 56
Live Ream	4 - 57
Live Custom	4 - 59

Custom

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE F7 softkey followed by the SPEED AS CSS F1 softkey for the Feet or Meters per Minute value.

Select the MORE F7 softkey followed by the SPEED AS RPM F2 softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.

- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.

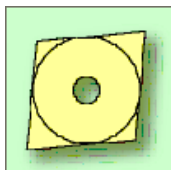


Select the MORE F7 softkey followed by the FEED PER MINUTE F4 softkey for the Inches or Millimeters per Minute feed rate.

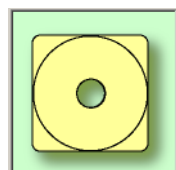
Select the MORE F7 softkey followed by the FEED PER REVOLUTION F5 softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **INSERT SHAPE**—identifies the geometry of the insert. This field is used only for graphical part program verification and is not required to run a part program. Select a shape from the standard shapes provided in the Insert Shape field's drop-down list.

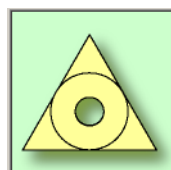
A graphical representation of the insert appears on the screen. Here are some examples of the available shapes:



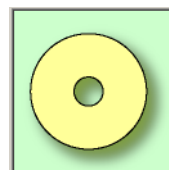
Diamond - 80°



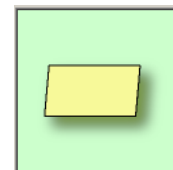
Square - 90°



Triangle - 60°



Round



Parallelogram - 82°

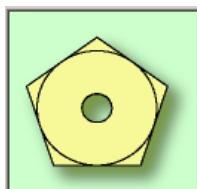
Figure 4-13. Sample Insert Shapes—Custom Tool Setup

- **INSERT SIZE (IC)** for Inch mode—identifies the size of the insert for programs using tools measuring in inches, which are defined by their Inscribed Circle diameter (IC). Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **EDGE LENGTH** for Metric mode—identifies the length of the insert for programs using metric tools, which are defined by their Edge Length. Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **INSERT LENGTH**—identifies the length of the insert when Parallelogram or Rectangle is the Insert Shape.
- **INSERT HEIGHT**—identifies the height of the insert when Parallelogram or Rectangle is the Insert Shape.

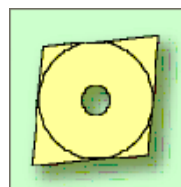


There are no size, length, or height fields when Round is the Insert Shape.

- **LEAD ANGLE**—identifies the angle of the vertical plane and the front edge of the tool.



Positive Lead Angle—the front edge is leaning into the vertical plane



Negative Lead Angle—The front edge is leaning back and the tip of the tool reaches the plane first

Figure 4-14. Positive and Negative Lead Angle examples—Custom Tool Setup

Turning

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.

- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE F7 softkey followed by the SPEED AS CSS F1 softkey for the Feet or Meters per Minute value.

Select the MORE F7 softkey followed by the SPEED AS RPM F2 softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.

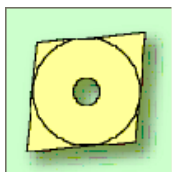


Select the MORE F7 softkey followed by the FEED PER MINUTE F4 softkey for the Inches or Millimeters per Minute feed rate.

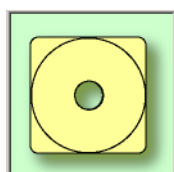
Select the MORE F7 softkey followed by the FEED PER REVOLUTION F5 softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **INSERT SHAPE**—identifies the geometry of the insert. This field is used only for graphical part program verification and is not required to run a part program. Select a shape from the standard shapes provided in the Insert Shape field's drop-down list.

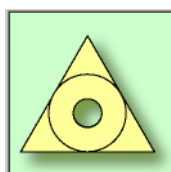
A graphical representation of the insert appears on the screen. Here are some examples of the available shapes:



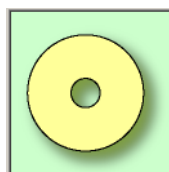
Diamond - 80°



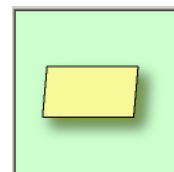
Square - 90°



Triangle - 60°



Round



Parallelogram - 82°

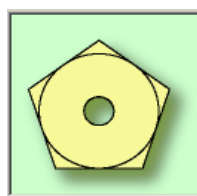
Figure 4-15. Sample Insert Shapes—Turning Tool Setup

- **INSERT SIZE (IC)** for Inch mode—identifies the size of the insert for programs using tools measuring in inches, which are defined by their Inscribed Circle diameter (IC). Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **EDGE LENGTH** for Metric mode—identifies the length of the insert for programs using metric tools, which are defined by their Edge Length. Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **INSERT LENGTH**—identifies the length of the insert when Parallelogram or Rectangle is the Insert Shape.
- **INSERT HEIGHT**—identifies the height of the insert when Parallelogram or Rectangle is the Insert Shape.

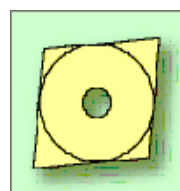


There are no size, length, or height fields when Round is the Insert Shape.

- **LEAD ANGLE**—identifies the angle of the vertical plane and the front edge of the tool.



Positive Lead Angle—the front edge is leaning into the vertical plane



Negative Lead Angle—The front edge is leaning back and the tip of the tool reaches the plane first

Figure 4-16. Positive and Negative Lead Angle examples—Turning Tool Setup

Boring

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.

- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE F7 softkey followed by the SPEED AS CSS F1 softkey for the Feet or Meters per Minute value.

Select the MORE F7 softkey followed by the SPEED AS RPM F2 softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.



Select the MORE F7 softkey followed by the FEED PER MINUTE F4 softkey for the Inches or Millimeters per Minute feed rate.

Select the MORE F7 softkey followed by the FEED PER REVOLUTION F5 softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.

- **INSERT SHAPE**—identifies the geometry of the insert. This field is used only for graphical part program verification and is not required to run a part program. Select a shape from the standard shapes provided in the Insert Shape field's drop-down list.

A graphical representation of the insert appears on the screen. Here are some examples of the available shapes:



Diamond - 80° Square - 90° Triangle - 60° Round Parallelogram - 82°

Figure 4-17. Sample Insert Shapes—Boring Tool Setup

- **INSERT SIZE (IC)** for Inch mode—identifies the size of the insert for programs using tools measuring in inches, which are defined by their Inscribed Circle diameter (IC). Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
 - **EDGE LENGTH** for Metric mode—identifies the length of the insert for programs using metric tools, which are defined by their Edge Length. Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
 - **INSERT LENGTH**—identifies the length of the insert when Parallelogram or Rectangle is the Insert Shape.
 - **INSERT HEIGHT**—identifies the height of the insert when Parallelogram or Rectangle is the Insert Shape.
- ⇒ There are no size, length, or height fields when Round is the Insert Shape.
- **LEAD ANGLE**—identifies the angle of the vertical plane and the front edge of the tool.



Positive Lead Angle—the front edge is leaning into the vertical plane

Negative Lead Angle—The front edge is leaning back and the tip of the tool reaches the plane first

Figure 4-18. Positive and Negative Lead Angle examples—Boring Tool Setup

Fixed Center Drill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. If the Surface Speed is defined as FPM, diameter is used to calculate the RPM. The diameter range is from 0 to 9.999.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **SURFACE SPEED**—identifies the Surface Speed in feet per minute (or meters per minute). When a value is entered in this field, the control automatically calculates the value for the Speed field.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED PER REV**—identifies the Feed per Revolution.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.



The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.

- **TOOL TIP ANGLE and TOOL LENGTH**—enter the tool tip angle and length in the fields that appear in the graphic.

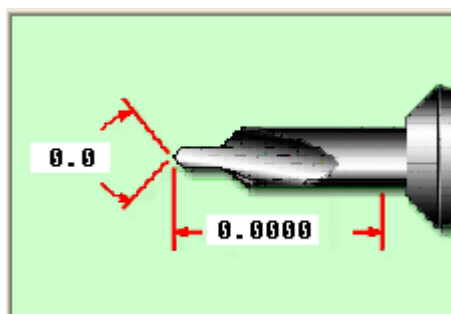


Figure 4-19. Tool Tip Angle and Tool Length fields—Fixed Center Drill

Fixed Drill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. If the Surface Speed is defined as FPM, diameter is used to calculate the RPM. The diameter range is from 0 to 9.999.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.
- **MAX X OFFSET**—identifies the maximum amount a tool can be offset from the spindle center line when boring a hole with a drill. This is useful for cases where you need to bore a hole larger than the tool diameter.
- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.

- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
 - **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
 - **FEED PER REV**—identifies the Feed per Revolution.
 - **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.
- ⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.
- **TOOL TIP ANGLE and TOOL LENGTH**—enter the tool tip angle and length in the fields that appear in the graphic.

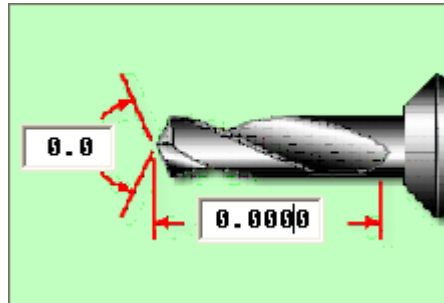


Figure 4-20. Tool Tip Angle and Tool Length fields—Fixed Drill

Threading

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **TOOL TIP ANGLE and TOOL LENGTH**—enter the tool tip angle and length in the fields that appear in the graphic.

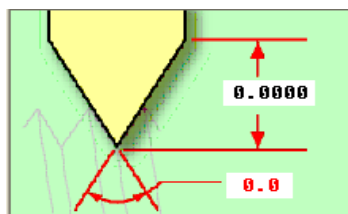


Figure 4-21. Tool Tip Angle and Tool Length fields—Threading Tool

Grooving

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX STEP OVER (%)**—the maximum distance the tool can step over between grooving passes. The step over is a percentage of the tool width.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE F7 softkey followed by the SPEED AS CSS F1 softkey for the Feet or Meters per Minute value.

Select the MORE F7 softkey followed by the SPEED AS RPM F2 softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.

- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.



Select the MORE F7 softkey followed by the FEED PER MINUTE F4 softkey for the Inches or Millimeters per Minute feed rate.

Select the MORE F7 softkey followed by the FEED PER REVOLUTION F5 softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **CALIBRATED CORNER**—identifies the corner of the tool that has been calibrated. Select Corner 1 or Corner 2 using the drop-down list or the softkeys.



Grooving tools can point down, to the left, or up. The **Calibrated Corner** field and the **Orientation** determine the direction.

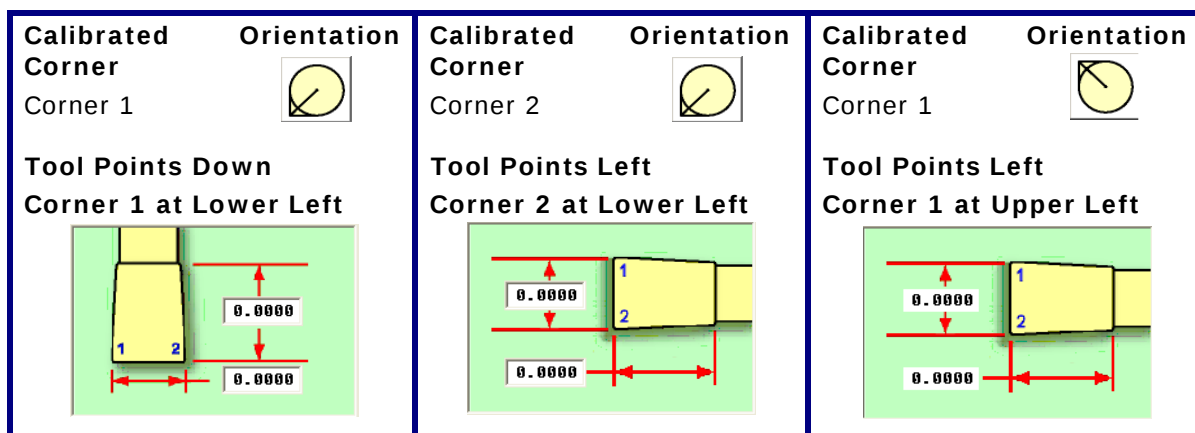


Figure 4-22. Orientation and Calibrated Corner examples—Grooving Tool

If an illegal orientation is selected, the screen displays this image:



Figure 4-23. Illegal Orientation and Calibrated Corner example—Grooving Tool

- **TOOL WIDTH and TOOL LENGTH**—enter the tool width and length in the fields that appear in the graphic.

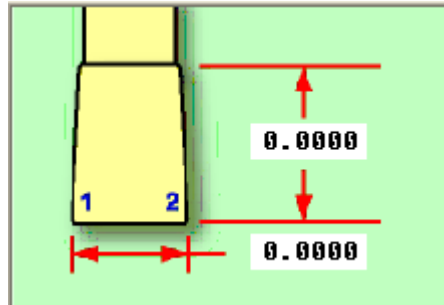


Figure 4-24. Width and Tool Length fields—Grooving Tool

Cutoff

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX STEP OVER (%)**—the maximum distance the tool can step over between grooving passes. The step over is a percentage of the tool width.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.

- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE *F7* softkey followed by the SPEED AS CSS *F1* softkey for the Feet or Meters per Minute value.

Select the MORE *F7* softkey followed by the SPEED AS RPM *F2* softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.



Select the MORE *F7* softkey followed by the FEED PER MINUTE *F4* softkey for the Inches or Millimeters per Minute feed rate.

Select the MORE *F7* softkey followed by the FEED PER REVOLUTION *F5* softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.

- **CALIBRATED CORNER**—identifies the corner of the tool that has been calibrated. Select Corner 1 or Corner 2 using the drop-down list or the softkeys.



Cutoff tools can point down, to the left, or up. The **Calibrated Corner** field and the **Orientation** determine the direction.

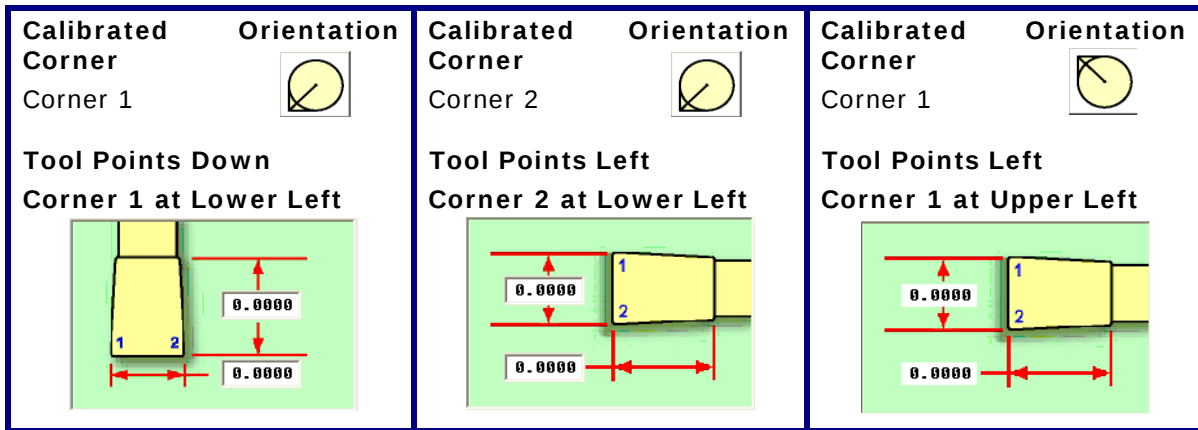


Figure 4-25. Orientation and Calibrated Corner examples—Cutoff Tool

If an illegal orientation is selected, the screen displays this image:



Figure 4-26. Illegal Orientation and Calibrated Corner example—Cutoff Tool

- **TOOL WIDTH and TOOL LENGTH**—enter the tool width and length in the fields that appear in the graphic.

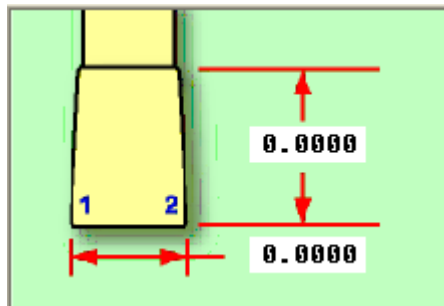


Figure 4-27. Width and Tool Length fields—Cutoff Tool

Back Turning

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE F7 softkey followed by the SPEED AS CSS F1 softkey for the Feet or Meters per Minute value.

Select the MORE F7 softkey followed by the SPEED AS RPM F2 softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.

- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.

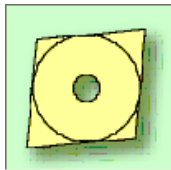


Select the MORE F7 softkey followed by the FEED PER MINUTE F4 softkey for the Inches or Millimeters per Minute feed rate.

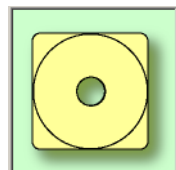
Select the MORE F7 softkey followed by the FEED PER REVOLUTION F5 softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **INSERT SHAPE**—identifies the geometry of the insert. This field is used only for graphical part program verification and is not required to run a part program. Select a shape from the standard shapes provided in the Insert Shape field's drop-down list.

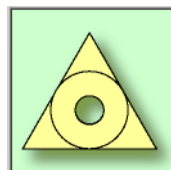
A graphical representation of the insert appears on the screen. Here are some examples of the available shapes:



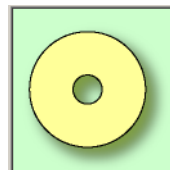
Diamond - 80°



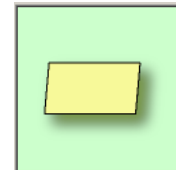
Square - 90°



Triangle - 60°



Round



Parallelogram - 82°

Figure 4-28. Sample Insert Shapes—Back Turning Tool Setup

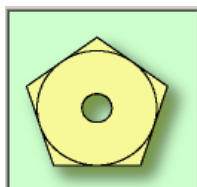
- **INSERT SIZE (IC)** for Inch mode—identifies the size of the insert for programs using tools measuring in inches, which are defined by their Inscribed Circle diameter (IC). Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **EDGE LENGTH** for Metric mode—identifies the length of the insert for programs using metric tools, which are defined by their Edge Length. Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **INSERT LENGTH**—identifies the length of the insert when Parallelogram or Rectangle is the Insert Shape.

- **INSERT HEIGHT**—identifies the height of the insert when Parallelogram or Rectangle is the Insert Shape.

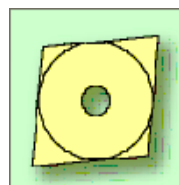


There are no size, length, or height fields when Round is the Insert Shape.

- **LEAD ANGLE**—identifies the angle of the vertical plane and the front edge of the tool.



Positive Lead Angle—the front edge is leaning into the vertical plane



Negative Lead Angle—The front edge is leaning back and the tip of the tool reaches the plane first

Figure 4-29. Positive and Negative Lead Angle examples—Back Turning Tool Setup

Back Boring

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **INSERT TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.

- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE *F7* softkey followed by the SPEED AS CSS *F1* softkey for the Feet or Meters per Minute value.

Select the MORE *F7* softkey followed by the SPEED AS RPM *F2* softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPR**—Inches per Revolution.
 - **MMPR**—Millimeters per Revolution.
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters per Minute.



Select the MORE *F7* softkey followed by the FEED PER MINUTE *F4* softkey for the Inches or Millimeters per Minute feed rate.

Select the MORE *F7* softkey followed by the FEED PER REVOLUTION *F5* softkey for the Inches or Millimeters per Revolution feed rate.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.

- **INSERT SHAPE**—identifies the geometry of the insert. This field is used only for graphical part program verification and is not required to run a part program. Select a shape from the standard shapes provided in the Insert Shape field's drop-down list.

A graphical representation of the insert appears on the screen. Here are some examples of the available shapes:



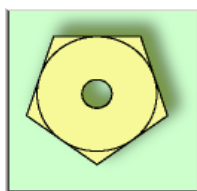
Diamond - 80° Square - 90° Triangle - 60° Round Parallelogram - 82°

Figure 4-30. Sample Insert Shapes—Back Boring Tool Setup

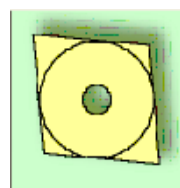
- **INSERT SIZE (IC)** for Inch mode—identifies the size of the insert for programs using tools measuring in inches, which are defined by their Inscribed Circle diameter (IC). Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **EDGE LENGTH** for Metric mode—identifies the length of the insert for programs using metric tools, which are defined by their Edge Length. Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **INSERT LENGTH**—identifies the length of the insert when Parallelogram or Rectangle is the Insert Shape.
- **INSERT HEIGHT**—identifies the height of the insert when Parallelogram or Rectangle is the Insert Shape.

⇒ There are no size, length, or height fields when Round is the Insert Shape.

- **LEAD ANGLE**—identifies the angle of the vertical plane and the front edge of the tool.



Positive Lead Angle—the front edge is leaning into the vertical plane



Negative Lead Angle—The front edge is leaning back and the tip of the tool reaches the plane first

Figure 4-31. Positive and Negative Lead Angle examples—Back Boring Tool Setup

Fixed Tap

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **PITCH**—identifies the distance between the threads. When you enter a value for Pitch, the control calculates the value for TPI.
- **TPI** or **TPMM**—identifies the threads per inch for inch taps or the threads per millimeter for metric taps. When you enter a value for TPI or TPMM, the control calculates the value for Pitch.
- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **DIRECTION**—identifies Right-Handed or Left-Handed for the tap direction.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED (IPM)** or **FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.



The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and either the Pitch or TPI/TPMM field.

- **TOOL LENGTH**—enter the tool length in the field that appears in the graphic.

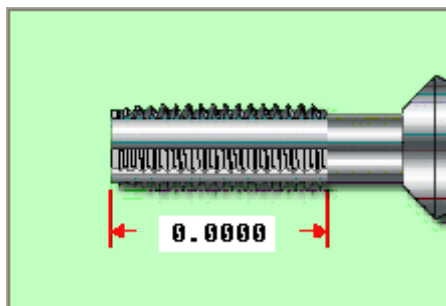


Figure 4-32. Tool Length field—Fixed Tap

Fixed Ream

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **Orientation Icon**—shows the orientation of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.
- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the Surface Speed. When a value is entered in this field, the control automatically calculates the value for the Speed field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED PER REV**—identifies the Feed per Revolution.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.



The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.

- **TOOL LENGTH**—enter the tool length in the field that appears in the graphic.

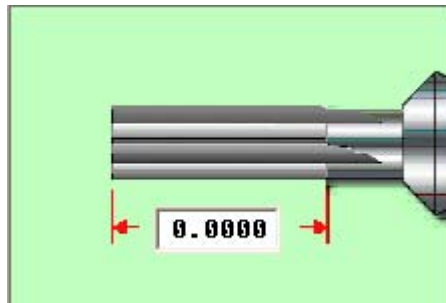


Figure 4-33. Tool Length field—Fixed Ream

Inserted Drill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999.
- **DRILL GEOMETRY OFFSETS**—identifies the Tool Geometry Offset and Wear Offset used for this drill.
- **MAX X OFFSET**—identifies the maximum amount a tool can be offset from the spindle center line when boring a hole with a drill. This is useful for cases where you need to bore a hole larger than the tool diameter.
- **SPEED (RPM), SPEED (FPM), or SPEED (MPM)**—identifies the RPM value or Constant Surface Speed (CSS) value for this tool.
 - **RPM**—Revolutions per Minute (RPM value).
 - **FPM**—Feet per Minute (Constant Surface Speed (CSS) value).
 - **MPM**—Meters per Minute (Constant Surface Speed (CSS) value).



Select the MORE F7 softkey followed by the SPEED AS CSS F1 softkey for the Feet or Meters per Minute value.

Select the MORE F7 softkey followed by the SPEED AS RPM F2 softkey for the Revolutions per Minute value.

- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW.
- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.

- **FEED (IPR), FEED (MMPR), FEED (IPM), or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:

- **IPR**—Inches per Revolution.
- **MMPR**—Millimeters per Revolution.
- **IPM**—Inches per Minute.
- **MMPM**—Millimeters per Minute.

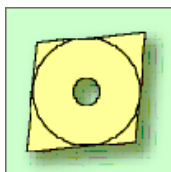


Select the MORE F7 softkey followed by the FEED PER MINUTE F4 softkey for the Inches or Millimeters per Minute feed rate.

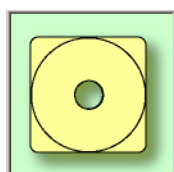
Select the MORE F7 softkey followed by the FEED PER REVOLUTION F5 softkey for the Inches or Millimeters per Revolution feed rate.

- **TOOL LENGTH**—identifies the length of the tool.
- **BORE INSERT** programming area:
 - **MAX DEPTH OF CUT**—identifies the maximum depth of cut that you can program with this tool. This value is copied into each new data block in the part program that uses this tool. If necessary, this parameter can be changed within a new data block when programming the part.
 - **GEOMETRY OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this boring tool.
 - **TIP RADIUS**—displays the tip radius based on the Radius selection in Geometry Offsets. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
 - **INSERT SHAPE**—identifies the geometry of the insert. This field is used only for graphical part program verification and is not required to run a part program. Select a shape from the standard shapes provided in the Insert Shape field's drop-down list.

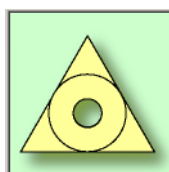
A graphical representation of the insert appears on the screen. Here are some examples of the available shapes:



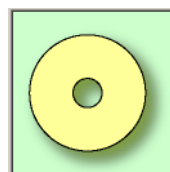
Diamond - 80°



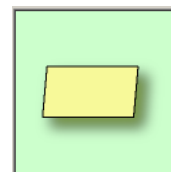
Square - 90°



Triangle - 60°



Round

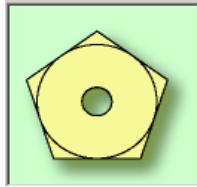


Parallelogram - 82°

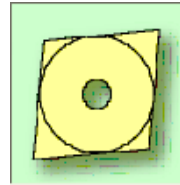
Figure 4-34. Sample Insert Shapes—Inserted Drill Tool Setup

- **INSERT SIZE (IC)** for Inch mode—identifies the size of the insert for programs using tools measuring in inches, which are defined by their Inscribed Circle diameter (IC). Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.

- **EDGE LENGTH** for Metric mode—identifies the length of the insert for programs using metric tools, which are defined by their Edge Length. Select a size using the softkeys. This field is used only for graphical part program verification and is not required to run a part program.
- **LEAD ANGLE**—identifies the angle of the vertical plane and the front edge of the tool.



Positive Lead Angle—the front edge is leaning into the vertical plane



Negative Lead Angle—The front edge is leaning back and the tip of the tool reaches the plane first

Figure 4–35. Positive and Negative Lead Angle examples—Inserted Drill Tool Setup

Live Tooling Turning Center Tool Setup Screens

End Mill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.

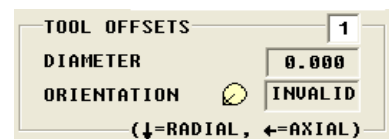
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-36. Live Tooling Orientation examples—End Mill Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.
- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED / FLUTE (TOOTH)**—identifies the tool's chipload. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FLUTES**—identifies the number of cutting flutes for the tool. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.

⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.
- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by length.

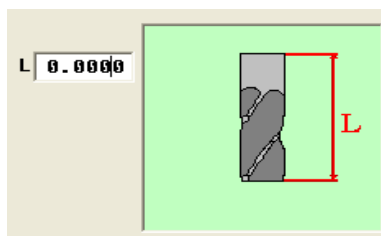


Figure 4-37. Tool Length field—End Mill

Ball End Mill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.

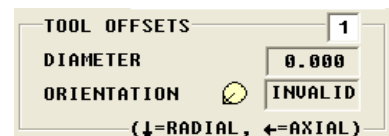
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-38. Live Tooling Orientation examples—Ball End Mill Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.

- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED / FLUTE (TOOTH)**—identifies the tool's chipload. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FLUTES**—identifies the number of cutting flutes for the tool. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.

⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.
- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

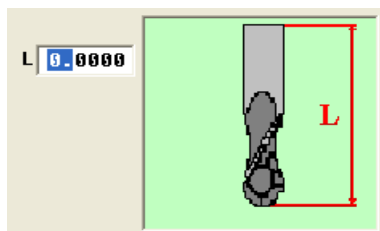


Figure 4–39. Tool Length field—Ball End Mill

Bull Nose Mill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.

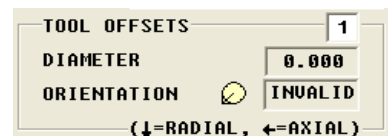
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-40. Live Tooling Orientation examples—Bull Nose Mill Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.

- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED / FLUTE (TOOTH)**—identifies the tool's chipload. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FLUTES**—identifies the number of cutting flutes for the tool. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.

⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.

- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

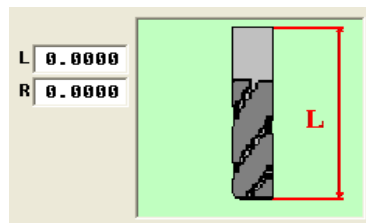


Figure 4-41. Tool Length field—Bull Nose Mill

- **R**—enter the radius of the tool tip. When the cursor is in this field, the graphic changes to define what is meant by this radius.

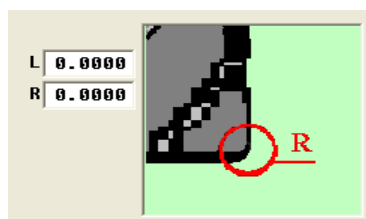


Figure 4-42. Tool Tip Radius field—Bull Nose Mill

Live Center Drill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.

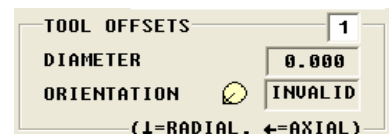
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-43. Live Tooling Orientation examples—Live Center Drill Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.

- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
 - **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
 - **FEED PER REV**—identifies the Feed per Revolution.
 - **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.
- ⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.
- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

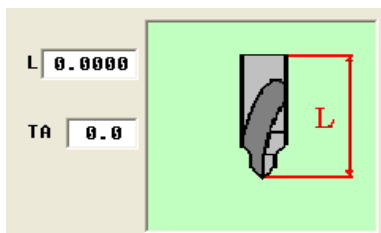


Figure 4-44. Tool Length field—Live Center Drill

- **TA**—enter the angle of the tool tip. When the cursor is in this field, the graphic changes to define what is meant by this angle.

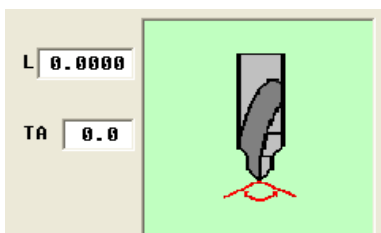


Figure 4-45. Tool Tip Angle field—Live Center Drill

Live Drill

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.

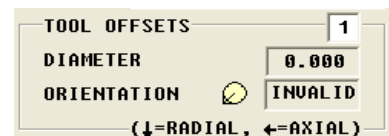
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-46. Live Tooling Orientation examples—Live Drill Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.

- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED PER REV**—identifies the Feed per Revolution.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.

⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.

- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

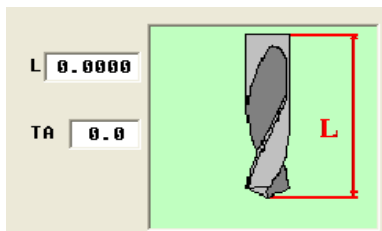


Figure 4-47. Tool Length field—Live Drill

- **TA**—enter the angle of the tool tip. When the cursor is in this field, the graphic changes to define what is meant by this angle.

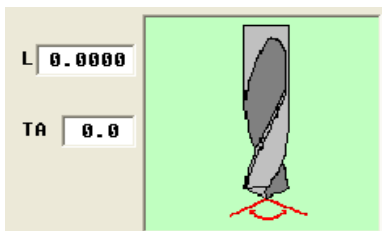


Figure 4-48. Tool Tip Angle field—Live Drill

Live Tap

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius*, on page 4 - 67 for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation*, on page 4 - 68 for definitions of each icon.

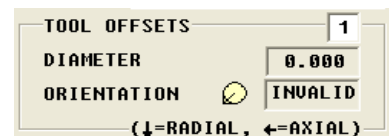
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-49. Live Tooling Orientation examples—Live Tap Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED**—identifies the Revolutions per Minute (RPM) value for this tool.
- **DIRECTION**—identifies Right-Handed or Left-Handed for the tap direction.

- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **PITCH**—identifies the distance between the threads. When you enter a value for Pitch, the control calculates the value for TPI.
- **TPI** or **TPMM**—identifies the threads per inch for inch taps or the threads per millimeter for metric taps. When you enter a value for TPI or TPMM, the control calculates the value for Pitch.
- **FEED (IPM)** or **FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.



The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and either the Pitch or TIP/TPMM field.

- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

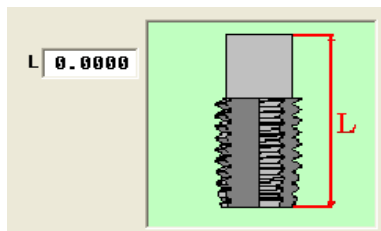


Figure 4-50. Tool Length field—Live Tap

Live Ream

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets*, on page 4 - 64 and *Tool Wear Offsets*, on page 4 - 69 for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.
- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.

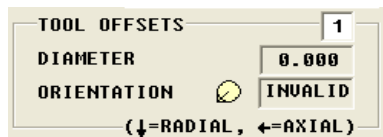
In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:



Radial—the tool orientation is around the outside of the stock, along the C axis.



Axial—the tool orientation is perpendicular to the plane of the stock, along the Z axis.



Invalid—an incorrect orientation has been selected. Reset the orientation from the Orientation pop-up window in Tool Geometry Offsets.

Figure 4-51. Live Tooling Orientation examples—Live Ream Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.
- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED PER REV**—identifies the Feed per Revolution

- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.
- ⇒ The value for the Feed (IPM) or (MMPM) is calculated by the control using the Speed and Feed Per Rev field.
- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

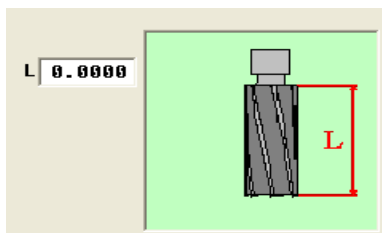


Figure 4-52. Tool Length field—Live Ream

Live Custom

- **TOOL**—identifies the tool number that will be used in the part program. Up to 99 tools can be defined. Use the number keys on the console to enter the tool number.
- **TYPE**—identifies the tool type to use for this tool number. The tool type determines the parameters required to define each tool. Select a tool type from the choices listed in this field. Select the down arrow to expand the list.
- **COMMENT**—allows you to enter up to 20 characters to help describe the tool. This field does not affect the part program. You can use either the programming keypad, the pop-up text window, or the optional keyboard to enter characters.
- **TOOL OFFSETS**—defines the Tool Geometry Offset and Wear Offset used for this tool. This value defaults to the current tool number.



Be sure to verify Geometry and Wear Offsets for the tool. Refer to *Tool Geometry Offsets, on page 4 - 64* and *Tool Wear Offsets, on page 4 - 69* for details about these offsets.

- **DIAMETER**—identifies the tool's diameter. It is used for part program graphical verification. The diameter range is from 0 to 9.999. This field is read-only and can only be edited from the Radius field in the Geometry Offset screen. Refer to *Select a Radius, on page 4 - 67* for information about changing this entry.

- **ORIENTATION**—shows the orientation icon for of the tool, selected from the Orientation pop-up window in Tool Geometry Offsets. Refer to *Select an Insert Orientation, on page 4 - 68* for definitions of each icon.

In addition to the Orientation Icon, **Radial**, **Axial**, or **Invalid** appears in the Orientation field to identify the live tool's orientation. Here are examples:

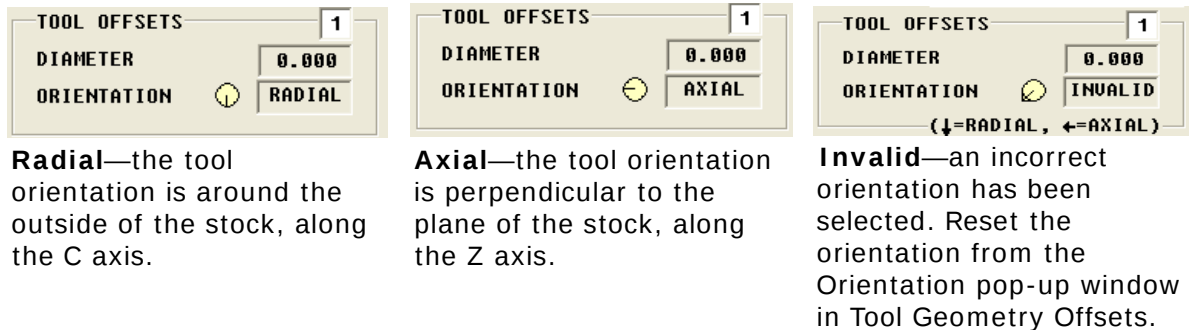


Figure 4-53. Live Tooling Orientation examples—Live Custom Tool Setup



Be aware of the length of radial tools. Radial tools that are too long can interfere with the Z-axis way cover when indexing the turret.

- **SPEED (RPM)**—identifies the Revolutions per Minute (RPM) value for this tool.
- **Spindle Direction**—identifies clockwise (CW) or counterclockwise (CCW) for the direction the tool will turn. The default is CW, which is the direction for right-hand tools when programming live tools.
- **SURFACE SPEED (FPM) or SURFACE SPEED (MPM)**—identifies the surface speed per minute. When a value is entered in this field, the control automatically calculates the value for the SPEED field.
 - **FPM**—Feet per Minute.
 - **MPM**—Meters per Minute.
- **COOLANT**—identifies the type of coolant to be used for this tool. Coolant may be programmed as OFF or Primary. During Auto mode when running the program, the Primary coolant will be enabled whenever this tool is used if the Auto Coolant LED is on and OFF is not selected in the COOLANT field.
- **FEED / FLUTE (TOOTH)**—identifies the tool's chipload. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FLUTES**—identifies the number of cutting flutes for the tool. This entry will be used to automatically calculate the mill feed in all data blocks for this part program using this tool.
- **FEED (IPM) or FEED (MMPM)**—identifies the programmed feed rate for this tool as either:
 - **IPM**—Inches per Minute.
 - **MMPM**—Millimeters Per Minute.



The value for the Feed (IPM) or (MPPM) is calculated by the control using the Speed and Feed Per Rev field.

- **L**—enter the length of the tool. When the cursor is in this field, the graphic changes to define what is meant by this length.

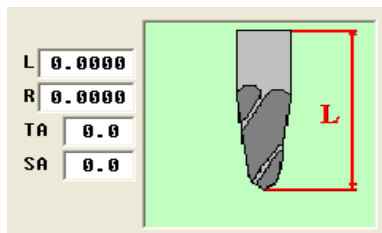


Figure 4-54. Tool Length field—Live Custom

- **R**—enter the radius of the tool tip. When the cursor is in this field, the graphic changes to define what is meant by this radius.

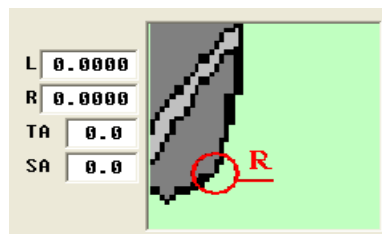


Figure 4-55. Tool Tip Radius field—Live Custom

- **TA**—enter the angle of the tool tip. When the cursor is in this field, the graphic changes to define what is meant by this angle.

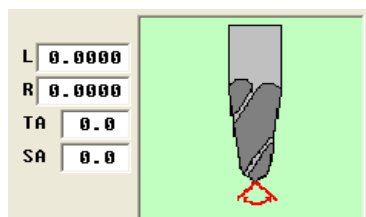


Figure 4-56. Tool Tip Angle field—Live Custom

- **SA**—enter the angle of the tool shaft. When the cursor is in this field, the graphic changes to define what is meant by this angle.

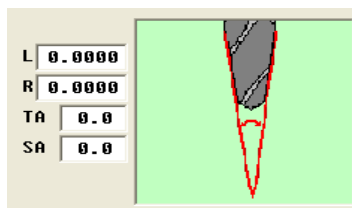


Figure 4-57. Tool Shaft Angle field—Live Custom

Tool Setup Softkeys

Here is a Tool Setup screen showing the softkey menu that appears when you first enter Tool Setup.

Figure 4–58. Tool Setup screen

The softkeys on the Tool Setup screen perform these tasks:

- **PREVIOUS TOOL F1**—displays the Tool Setup for the previous sequentially numbered tool. This softkey is not available for the first tool.
- **NEXT TOOL F2**—displays the Tool Setup for the next sequentially numbered tool. This softkey is not available for the last tool.
- **GEOMETRY OFFSETS F3**—displays the Tool Geometry Offsets screen. Refer to *Tool Geometry Offsets*, on page 4 - 64 for details about this screen.
- **WEAR OFFSETS F4**—displays the Tool Wear Offsets screen. Refer to *Tool Wear Offsets*, on page 4 - 69 for details about this screen.
- **DELETE TOOL F5**—deletes all program settings for the tool number entered in the Tool field.
- **TOOL REVIEW F6**—accesses the Tool Review Screen, listing each tool in numerical order and providing new softkey choices. Refer to *Tool Review*, on page 4 - 72 for details about this screen.

- **MORE → F7**—accesses a second softkey menu with additional Tool Setup softkeys.

Figure 4-59. Tool Setup More → softkey menu

- **SPEED AS CSS F1**—sets the cutting mode to use as the default for data blocks using this tool. Constant surface speed (CSS) produces a surface finish based on the proximity of the tool to the center of the part.
- **SPEED AS RPM F2**—sets the cutting mode to use as the default for data blocks using this tool. RPM uses the same amount of revolutions per minute, regardless of the proximity of the tool to the center of the part.
- **FEED PER MINUTE F4**—sets the cutting mode to use as the default for data blocks using this tool. The tool feeds forward at a constant rate regardless of the revolution of the spindle.
- **FEED PER REVOLUTION F5**—sets the cutting mode to use as the default for data blocks using this tool. The tool feeds forward by a specified amount for each revolution of the spindle.
- **CHANGE TOOL NUMBER F6**—displays a pop-up window for entering a new number for the tool showing in the Tool Setup screen.
- **TOGGLE UNITS F7**—changes the units for all tools in the program from inch to metric or metric to inch.
- **EXIT F8**—exits the tool setup process and returns to the Input screen.

Tool Geometry Offsets

The Tool Geometry Offsets screen stores the positions of your tools. The information in this screen remains in the machine memory and is independent of the part program. Generally, the offset is the same number as the tool in the turret. These offsets remain valid for the tool being programmed in Tool Offsets, provided the tool is not removed from the turret when switching from one program to another. You can save the Tool Geometry Offsets to a separate file to use later. Refer to *Tool Geometry Offsets Softkeys*, on page 4 - 66 for information about saving and restoring offsets.

Select the TOOL GEOMETRY OFFSETS F3 softkey from the Tool Setup screen. The Tool Geometry Offset screen displays and the cursor is located in the offset for the active, programmed tool. If the tool has not been programmed in Tool Setup, the cursor is located in the offset equal to the index of the active turret station. In the sample screen below, Tool 3 is the active tool in tool setup; therefore, the cursor is located in the field for Z Offset 3.

TOOL GEOMETRY OFFSETS						PAGE UP F1	
MACHINE	PART		ACTIVE TOOL		PAGE DOWN F2		
X 8.0000	8.0000	0		ORIENTATION → F3			
Z 15.7480	0.0000	SPINDLE RPM 0		HOME MACHINE F4			
☐ JOB BLOCK Z 0.0000 ☒ WORK OFFSET Z 1 0.0000						TOOL SETTER → F5	
#	X OFFSET	Z OFFSET	NOSE RADIUS		STORE MACHINE POSITION F6		
0	0.0000	0.0000	0.0000		TABLE COMMANDS → F7		
1	0.0000	-0.0000	0.0470		EXIT F8		
2	0.0000	0.0000	0.0470				
3	0.0000	0.0000	0.0000				
4	0.0000	8.9315	0.0000				
5	0.0000	0.0000	0.0000				
6	16.7165	17.0315	0.0000				
7	0.0000	0.0000	0.0000				
8	0.0000	0.0000	0.0000				
9	0.0000	0.0000	0.0000				
Enter a value or select a softkey.							
Class1.HLT						11:09 AM	

Figure 4–60. Tool Geometry Offsets screen

Tool Geometry Offsets Fields

The Tool Geometry Offsets screen contains these fields:

- **JOB BLOCK Z**—displays the dimension for the Job Block Z plane. The Job Block Z plane is identified measuring a reference surface from Machine Zero. Touch tools against this plane to establish Z-axis geometry offsets relative to the turret face. Press the **Store Position** key to store the offset in the Job Block Z field. This selection is unavailable when Work Offset Z is selected.
- **WORK OFFSET Z**—displays the dimension for the Work Offset Z plane. The Work Offset Z plane is measured from the stock centerline to the outer edge of the stock. Touch tools against this plane to establish Z-axis geometry offsets. This selection is unavailable when Job Block Z is selected.
- **#**—contains the index value that identifies each offset.
- **X OFFSET**—displays the X offset tool position.
- **Z OFFSET**—displays the Z offset tool position.
- **RADIUS**—displays the tool radius obtained from the tool catalog.



The Tool Radius must be less than 1/4 of the insert size.

- **Orientation Icon**—appears to the right of the Radius field and shows the tool orientation, which is established from the selections available in the Orientation pop-up window.

Tool Geometry Offsets Softkeys

The Tool Geometry Offsets softkeys provide these functions:

- **PAGE UP F1**—scrolls up through the # fields, displaying groups of offsets.
- **PAGE DOWN F2**—scrolls down through the # fields, displaying groups of offsets.
- **ORIENTATION → F3**—activates the Orientation pop-up window for selecting tool orientation. See *Select an Insert Orientation, on page 4 - 68* for more information.
- **HOME MACHINE F4**—return the turret from any location in the work area back to home position at rapid traverse feedrate. See *Home the Machine, on page 5 - 5* for more information.
- **TOOL SETTER → F5**—refer to the “Tool Setter” section of the *WinMax Lathe Options* manual for information about this option.
 - **STANDARD LATHE TOOL → F13**
 - **BEGIN TOUCH X- F1**
 - **BEGIN TOUCH X+ F2**
 - **BEGIN TOUCH Z- F3**
 - **BEGIN TOUCH Z+ F4**
 - **BACK F8**
 - **RADIAL LIVE TOOL → F2**
 - **RADIAL TOOL BEGIN TOUCH X- F1**
 - **RADIAL TOOL BEGIN TOUCH X+ F2**
 - **RADIAL TOOL BEGIN TOUCH Z- F3**
 - **RADIAL TOOL BEGIN TOUCH Z+ F4**
 - **RADIAL HOLDER CENTERLINE F5**
 - **BACK F8**
 - **AXIAL LIVE TOOL → F3**
 - **AXIAL TOOL BEGIN TOUCH X- F1**
 - **AXIAL TOOL BEGIN TOUCH X+ F2**
 - **AXIAL TOOL BEGIN TOUCH Z- F3**
 - **AXIAL TOOL BEGIN TOUCH Z+ F4**
 - **BACK F8**
 - **ADVANCE TOOL SETTER F6**
 - **RETRACT TOOL SETTER F7**
 - **BACK F8**

- **STORE MACHINE POSITION F5** (or **Store Machine Position** console key)—stores an offset for the tool length based on the plane selection (Job Block Z or Work Offset Z) relative to the machine position. The cursor location defines which axis (X or Z) will be set.
- **TABLE COMMANDS → F7**—displays an additional softkey menu with choices for saving and restoring the offsets.
 - **WRITE TABLE TO FILE F2**—opens a Save As dialog box for naming and saving the offsets to a file. You can assign the file extension of your choice in the **File name** field. It is not possible to select an extension using the **Files of type** field.
 - **READ TABLE FROM FILE F4**—opens the Open dialog box for selecting a folder and filename. When an offset file is selected from this dialog box, those offsets are read from the file and the values appear on the Tool Geometry Offsets screen.
 - **CLEAR TABLE F7**—resets all values in the table to 0.000. A confirmation window appears prior to resetting the values.
 - **EXIT F8** —exits the Table Commands menu and returns to the Tool Geometry Offsets menu.
- **EXIT F8** —exits the tool setup process and returns to the Input screen.

Select a Radius

1. Place the cursor in the Radius field for the offset that corresponds with the tool number in Tool Setup.
2. Select the **SELECT RADIUS → F6** softkey and the softkey menu provides radius values from which to choose for two-axis (TM Series) tools.



Live tools (TMM Series) must use a radius value for this field. Divide the tool diameter by two (2) and enter the radius.

3. Select the appropriate radius. The value appears in the Radius field and carries over to the BORE INSERT/TIP RADIUS field for two-axis (TM Series) tools or the DIAMETER field for Live tools (TMM Series) in the Tool Setup screen.
4. Select the **EXIT F8** softkey to return to the Tool Setup screen.

Select an Insert Orientation

1. Select the ORIENTATION → F3 softkey. The Orientation pop-up window appears:

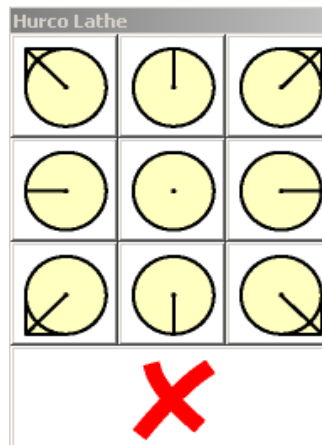


Figure 4-61. Orientation Icon pop-up window

2. Select the appropriate orientation from the pop-up window.



In general, ID tools use the orientations shown in the top row and OD tools use the orientations shown in the bottom row. The middle icon is used for tools requiring no orientation, such as a button tool.



The Orientation selection does not affect the program for Fixed Center Drills, Fixed Drills, Fixed Taps, and Fixed Reams. The program does check the Orientation selection for all other tool types, including Live Tools.

Determine the Geometry Offsets

1. Select either JOB BLOCK Z or WORK OFFSET Z and enter its value under the selection to identify the Z plane.
2. Make sure the tool in the turret has the same tool number as the offset number that is being set.
3. Set the Axis Select Switch on the Jog Unit for the X axis.
4. Move the X axis and touch the tool off the workpiece.
5. Store the position with either the Store Position button on the jog unit or the STORE POSITION F6 softkey. Repeat steps 2 through 5 for the Z axis.
6. Enter the appropriate Radius for this tool.
7. Press the ORIENTATION F3 softkey to select the orientation for this tool from the pop-up window.

Tool Wear Offsets

It is good practice to periodically check tools for wear. You can store offsets for each tool in the Tool Wear Offsets screen.

Like the Tool Geometry Offsets screen, the Tool Wear Offsets screen stores adjusted values for any wear that occurs for a tool. The information in this screen remains in the machine memory and is independent of the part program. You can save the Tool Wear Offsets to a separate file to use later. Refer to *Tool Wear Offset Softkeys, on page 4 - 70* for information about saving and restoring offsets.

The offset must use the same number as the tool in the turret. These offsets remain valid for the tool being programmed in Tool Offsets, provided the tool is not removed from the turret when switching from one program to another.

TOOL WEAR OFFSETS			
MACHINE	PART	ACTIVE TOOL	
X 8.0000	8.0000	0	
Z 15.7480	0.0000	SPINDLE RPM	0
#	X WEAR	Z WEAR	RADIUS WEAR
0	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000

Enter a value or select a softkey.

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Figure 4-62. Tool Wear Offsets screen

Tool Wear Offset Fields

The Tool Wear Offsets screen contains these fields:

- **#**—contains the index value that identifies each offset.
- **X WEAR**—displays the amount of tool wear in the X axis.
- **Z WEAR**—displays the amount of tool wear in the Z axis.
- **RADIUS WEAR**—displays the amount of tool wear in the Radius.

Tool Wear Offset Softkeys

The Tool Wear Offsets softkeys provide these functions:

- **PAGE UP** *F1*—scrolls up through the # fields, displaying groups of offsets.
- **PAGE DOWN** *F2*—scrolls down through the # fields, displaying groups of offsets.
- **ADJUST** → *F5*—provides selections for the X, Z, or Radius offset. The choices are +0.0001 *F1*, +0.001 *F2*, +0.01 *F3*, -0.01 *F4*, -0.001 *F5*, and -0.0001 *F6*.
- **TABLE COMMANDS** → *F7*—displays an additional softkey menu with choices for saving and restoring the offsets.
 - **WRITE TABLE TO FILE** *F2*—opens a Save As dialog box for naming and saving the offsets to a file. You can assign the file extension of your choice in the **File name** field. It is not possible to select an extension using the **Files of type** field.
 - **READ TABLE FROM FILE** *F4*—opens the Open dialog box for selecting a folder and filename. When an offset file is selected from this dialog box, those offsets are read from the file and the values appear on the Tool Wear Offsets screen.
 - **CLEAR TABLE** *F7*—resets all values in the table to 0.000. A confirmation window appears prior to resetting the values.
 - **EXIT** *F8* —exits the Table Commands menu and returns to the Tool Wear Offsets menu.
- **EXIT** *F8* —exits the tool setup process and returns to the Input screen.

Determine if Tool Wear Exists

To determine if tool wear exists and enter offsets when appropriate,

1. Cut a part.
2. Measure the part after the cut.
3. Select the WEAR OFFSETS *F4* softkey on the Tool Setup screen.
4. Position the cursor in the X Wear, Z Wear, or Radius Wear field that matches the tool number of the tool in the turret.
5. Select the ADJUST → *F5* softkey for softkey choices to enter for the X, Z, or Radius offset. The choices are +0.0001 *F1*, +0.001 *F2*, +0.01 *F3*, -0.01 *F4*, -0.001 *F5*, and -0.0001 *F6*.

Automatic Feed and Speed Calculations

During Tool Setup, the control can calculate the appropriate feedrates and spindle speeds for drilling operations.



The operator can manually change all feed and speed values calculated by the control.

Entering Zero for Speed (RPM) Value

In order for the control to calculate spindle speed and axis feedrate for a tool during Tool Setup and carry those values forward throughout all the blocks that use that (drilling) tool number, follow these steps:

1. Enter a 0 in the **Speed (RPM)** field.
2. Enter a value in the **Surface Speed** field. The **Feed per Rev** field appears.
3. Enter value for the **Feed per Rev** field.



The control uses nominal feeds and speeds in calculating the initial feed and speed values. The control does not take into account material hardness and depth of cut. Be sure to check computed feeds and speeds to ensure they are appropriate and make any necessary adjustments.

Entering Actual Speed (RPM) Value

If you enter Speed (RPM) in Tool Setup, this value is transferred to all new data blocks using this tool. The feedrates must be entered manually in the data blocks.



If the Speed (RPM) field is changed in Tool Setup, the tool number must be re-entered in the data blocks in order to force the control to update the value.



Do not enter the Surface Speed value in the Tool Setup screen if the Speed (RPM) value is entered.

Formulas for Automatic Calculations

When performing a *drilling* operation, the control automatically calculates *spindle speeds* using this formula:

$$\text{RPM} = \frac{\text{SurfaceSpeed}}{\text{Diameter} * \pi}$$

When performing a *drilling* operation, the control uses this equation to calculate the feedrate:

$$\text{Feedrate} = \text{Feed Per Rev} \times \text{RPM}$$

Tool Review

The Tool Review screen lists each tool in numerical order. A summary of the tools programmed for the part program is displayed. You can select a tool on the list to access the Tool Setup screen for that tool.

Select the **TOOL REVIEW** F6 softkey from the Tool Setup screen, or press the **Menu** key followed by the **TOOL REVIEW** softkey to access the Tool Review screen and softkey menu. You can also use the menu toolbar and select the **Tool Review** icon to access this screen.

TOOL REVIEW SCREEN					MULTIPLE TOOL FUNCTIONS	
##	TYPE	DIA / TNR	SPEED	FEED		
1	TURNING	0.0000 IN R	1000 FPM CW	0.0120 IPR	F1	
2	TURNING	0.0470 IN R	1000 FPM CW	0.0060 IPR		
4	FIXED DRILL	0.7500 IN D	3819 RPM CW	17.2 IPH	DELETE TOOL	
6	BORING	0.0000 IN R	800 FPM CW	0.0060 IPR	F2	
7	END MILL	0.0000 IN D	4800 RPM CW	24.0 IPH	PART PROGRAMMING	
8	LIVE DRILL	0.0000 IN D	4800 RPM CW	14.4 IPH	F3	
9	END MILL	0.0000 IN D	4800 RPM CW	28.8 IPH	PROGRAM PARAMETERS	
10	LIVE DRILL	0.0000 IN D	2291 RPM CW	6.9 IPH	F4	
11	TURNING	0.0000 IN R	0 FPM CW	0.0000 IPR	PART SETUP	
12	CUTOFF	0.0000 IN R	800 FPM CW	0.0030 IPR	F5	
					TOOL SETUP	
					F6	
					ADD TOOL	
					F7	
					EXIT	
					F8	

Select a softkey.

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Figure 4-63. Tool Review screen

These standard console keys perform these functions with the Tool Review screen:

- The **Insert** key functions the same as the ADD TOOL F7 softkey:
 - Highlight a data block in the Tool Review screen.
 - Press the **Insert** key. The Tool Setup screen appears with the New Tool field.
 - Enter a number for the new tool and press Enter. The Tool Setup screen appears with fields for entering tool setup information for the new tool.
- The **Delete** key functions the same as the DELETE TOOL F2 softkey:
 - Highlight the tool to be deleted in the Tool Review screen.
 - Press the **Delete** key. A pop-up message appears asking if you are sure you want to delete the tool.
 - Select **OK** to delete the tool or **Cancel** to cancel the deletion.

- The **Page Up** key jumps to the first tool visible on the screen.
- The **Page Down** key jumps to the last tool visible on the screen.



When the entire part program contains more tools than can be displayed on one screen, use the **Page Down** and **Page Up** console keys or the scroll bar located on the right-hand side of the screen to scroll through the listed tools.

You can cut, copy, and move tools to another location in a part program or even another program.



To select multiple tools, select the tool listed first and move the stylus down to the last tool without lifting the stylus.



With the optional AT-keyboard, you can use **Ctrl + select** (using the stylus) to select non-consecutive tools.

Edit from the Tool Review Screen

Position the cursor on the tool you wish to edit, and select the MULTIPLE TOOL FUNCTIONS **F1** softkey on the Tool Review screen to access these editing features:

- **MULTIPLE TOOL FUNCTIONS F1**—accesses tool editing softkeys:
 - **CUT F1**—removes a tool from one program and allows you to paste it into another program. Refer to the steps listed in *To cut tools from a program and move to another, on page 4 - 75* for directions for using this softkey.
 - **COPY F2**—copies tool setup information so you can either create a new tool using that tool setup or copy the tool information into another part program. Refer to *To copy a tool, on page 4 - 74* or *To copy a tool to another part program, on page 4 - 74* for directions for using this softkey.
 - **PASTE F3**—pastes tool setup information that has been copied or cut. Refer to these sections for directions for using this softkey: *To cut tools from a program and move to another, on page 4 - 75*, *To copy a tool, on page 4 - 74*, or *To copy a tool to another part program, on page 4 - 74*.
 - **DELETE F4**—deletes tool setup information for a tool or tools from the Multiple Tool Functions menu. Refer to the steps listed in *To delete tools, on page 4 - 75* for directions for using this softkey.
- **DELETE TOOL F2**—deletes the selected tool or tools from the Tool Review screen. A pop-up message appears confirming the action. Select OK to continue or Cancel.



You can also delete tools from the Tool Review screen using either the **DELETE TOOL F4** softkey in the Multiple Tool Functions menu or the **Delete** key.

- **TOOL SETUP F6**—accesses the Tool Setup screen for the selected tool. To change a tool number after it is programmed, select TOOL SETUP F6, MORE F7, and CHANGE TOOL NUMBER F6.
- **ADD TOOL F7**—accesses the Tool Setup screen for adding a new tool. Enter a tool number and set up a new tool from here.

To copy a tool

You can copy a tool and renumber it to create a new tool in Tool Setup.

1. Select the tool you want to copy.
2. Select MULTIPLE TOOL FUNCTIONS F1.
3. Select COPY F2.
4. Highlight the tool that will follow the copied tool.
5. Select PASTE F3. A pop-up window appears asking if you want to replace the tool that has been copied. For example, if you copy tool 2, the window contains this text:

“Tool 2 already exists. Replace it? Yes No Cancel”

- Select **Yes** to paste the copied tool over itself.
- Select **No** and the window changes to ask what tool number to assign. Select Yes to accept the number provided in the window or type in a new number and select Yes to proceed.

The copied tool appears in order in the list with the tool number assigned.

6. Save the revised program.

To copy a tool to another part program

You can copy a tool to a different part program using the COPY F2 and PASTE F3 softkeys.

1. Select the tool you want to copy.
2. Select MULTIPLE TOOL FUNCTIONS F1.
3. Select COPY F2.
4. Access the Project Manager screen and Open the second part program if it is not already open.
5. Access the Tool Review screen for the second part program.
6. Highlight the tool that will follow the copied tool.
7. Select MULTIPLE TOOL FUNCTIONS F1.
8. Select PASTE F3. The tool that was copied from the other program appears above the highlighted tool on the Tool Review screen.
9. Save the revised program.

To cut tools from a program and move to another

You can cut a tool from a part program and move it to another part program. To tag a tool to be cut from a program and move it,

1. Select the tool you want to cut.
2. Select MULTIPLE TOOL FUNCTIONS *F1*.
3. Select CUT *F1*.
4. Access the Project Manager screen and Open the second part program.
5. Access the Tool Review screen for the second part program.
6. Highlight the tool that will follow the cut tool.
7. Select MULTIPLE TOOL FUNCTIONS *F1*.
8. Select PASTE *F3*. The tool that was copied from the other program appears above the highlighted tool on the Tool Review screen.
9. Save the revised program.



If you accidentally cut a tool from a program and you want to return it to the program, select PASTE *F3* prior to another keystroke.

To delete tools

You can permanently remove tools from the part program. To delete tools from the Multiple Tool Functions menu,

1. Select the tool you want to delete.
2. Select MULTIPLE TOOL FUNCTIONS *F1*.
3. Press the DELETE *F4* softkey.



You can also delete tools directly from the Tool Review screen using the DELETE TOOL *F2* softkey or the **Delete** key.

4. Save the revised program.

To insert tools

To insert a tool into a part program,

1. Select the ADD TOOL *F7* softkey from the Tool Review screen or the **Insert** key. The Tool Setup screen appears.
2. Enter the tool number in the NEW TOOL field. The Tool Setup screen expands to include programming fields. Refer to the *Getting Started with Your WinMax Lathe manual* for information about Tool Setup.



Select TOOL REVIEW *F6* to return to the Tool Review screen. The new tool is listed in order in the list.

3. Save the revised program.

Program Parameters

Program Parameters are stored with the conversational part program. These parameters apply to all data blocks in the conversational part program and are available for

- Entering the rapid traverse feedrate.
- Setting maximum spindle RPM for both the primary spindle and the live tooling spindle, if applicable.
- Disabling or enabling axis feedrate override.
- Setting an optional stop before or after each tool change.
- Defining a tool change position for each tool change.

Either press the **Menu** key or the **Input** key followed by the **PROGRAM PARAMETERS** F4 softkey to access the Program Parameters screen and softkey menu. This softkey is also available from other menus, such as Part Programming.

Here is a Program Parameters screen for a two-axis (TM Series) machine:

PROGRAM PARAMETERS

RAPID TRAVERSE (IPM) 19.7 F1

MAX RPM (PRIMARY SPINDLE) 0 F2

FEED OVERRIDE LOCKOUT NO

STOP BEFORE TOOL CHANGES NO

STOP AFTER TOOL CHANGES NO

USER DEFINED TOOL CHANGE POSITION

WHERE MOVE TO HOME

REFERENCE PART ZERO

X (DIA) 15.8268

Z 25.0394

AXIS ORDER MOVE X THEN Z

Enter rapid traverse rate.

PART PROGRAMMING F3

PROGRAM PARAMETERS F4

PART SETUP F5

TOOL SETUP F6

EXIT F8

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Figure 4-64. Two-Axis (TM Series) Program Parameters screen

Here is a Program Parameters screen for a live-tooling (TMM Series) machine:

PROGRAM PARAMETERS

RAPID TRAVERSE (IPM) 19.7 F1

MAX RPM (PRIMARY SPINDLE) 200 F2

FEED OVERRIDE LOCKOUT NO F3

STOP BEFORE TOOL CHANGES NO F4

STOP AFTER TOOL CHANGES NO F5

MAX RPM (LIVE TOOLING SPINDLE) 0 F6

USER DEFINED TOOL CHANGE POSITION

WHERE MOVE TO HOME F7

REFERENCE PART ZERO F8

X (DIA) 15.8268

Z 25.0394

AXIS ORDER MOVE X THEN Z

Enter rapid traverse rate.

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Figure 4-65. Two-Axis (TM Series) Program Parameters screen

A description of each of the program parameters follows:

- **RAPID TRAVERSE**—contains the feedrate for the axes to move between data blocks or in position blocks for positioning to turret rotation location.
- **MAX RPM (PRIMARY SPINDLE)**—identifies the maximum spindle speed for the primary spindle, no matter what CSS/FPM is programmed. This field can be set for each program depending on the setup, such as type of jaws, workpiece weight, workpiece strength.
- **FEED OVERRIDE LOCKOUT**—disables the axis feedrate override when YES is selected. The program will run in Auto at the programmed feedrate regardless of the position of the override knobs.

The Feed Override Lockout does not affect the Rapid and Spindle overrides.

- **STOP BEFORE TOOL CHANGES**—inserts an optional stop (M01) before each tool change if YES is selected. You must also enable the **Opt Stop** console key to activate this function when running the program. If YES is selected and the **Opt Stop** key is not enabled, the optional stop will not occur.

Select NO if an optional stop is not required before each tool change. NO is the default.

- **STOP AFTER TOOL CHANGES**—inserts an optional stop (M01) after each tool change if YES is selected. You must also enable the **Opt Stop** console key to activate this function when running the program. If YES is selected and the **Opt Stop** button is not enabled, the optional stop will not occur.

Select NO if an optional stop is not required after each tool change NO is the default.

- **MAX RPM (LIVE TOOLING SPINDLE)**—contains the maximum spindle RPM for the live tooling spindle.
- **USER DEFINED TOOL CHANGE POSITION**—contains default settings to be used if a tool change is required. These settings apply to each data block in the program for use when the tool specified in a data block is different than the tool in the previous block or when the current tool necessitates a tool change.



These defaults can be overridden with selections in the Tool Change Override area on the Position Block screen or with the User Defined Tool Change Position selections in the Change Parameters data block.

- **WHERE**—moves turret to selected position:
 - **DON'T MOVE**—perform the tool change at current machine position.
 - **MOVE TO HOME**—moves the turret to the home position for the tool change.
 - **MOVE TO XZ**—moves the turret to the defined X, Z position. When MOVE TO XZ is selected, the Reference and X (Dia) or X (Rad) fields are available for entering data.
- **REFERENCE**—determines whether the X and Z locations are relative to Part Zero or Machine Zero.
- **X (DIA) or (RAD)**—contains the X diameter or radius coordinate where the turret should move. When the cursor is in this field, the STORE MACHINE POSITION F2 softkey appears. Select this softkey to store the current machine position into the field.
- **Z**—contains the Z coordinate where the turret should move. When the cursor is in this field, the STORE MACHINE POSITION F2 softkey appears. Select this softkey to store the current machine position into the field.
- **AXIS ORDER**—contains the selection for the order the axes will move:
 - **MOVE X THEN Z**—from the current position, the turret moves the X axis first to the X position then the Z axis to the Z position.
 - **MOVE Z THEN X**—from the current position, the turret moves the Z axis first to the Z position then the X axis to the X position.
 - **SIMULTANEOUS**—from the current position, the turret moves both axes together to the X and Z positions.



You can change Program Parameters within a part program using the Change Parameters data block. Refer to the *WinMax Lathe Conversational Part Programming* manual for details.

Verifying Part Programs—Graphics

You can program at the machine while referring to a part print. Graphics are available for viewing the part on the screen as programmed and verifying the program has no errors. If there are errors in the program, you can use Block Search to go directly to the data block containing the error and edit the program.

The Wireframe Graphics screen shows the part shape and the Verification Graphics screen shows the tool path and stock removal.

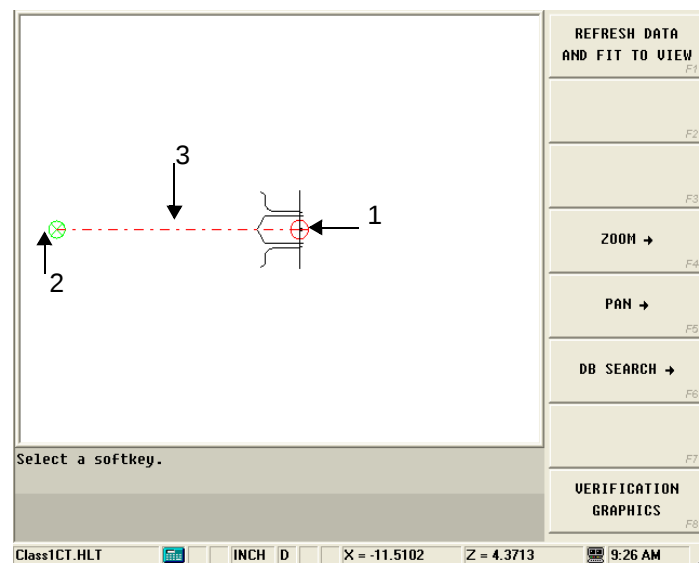
Two-Dimensional Wireframe Graphics

Two-axis Turning centers (TM series) are equipped with two-dimensional (2D) Wireframe graphics. With the Max Classic software option package, 2D Verification graphics are available for TM series machines.

Another verification graphics option for this type of turning center is the three-dimensional (3D), solid rendering verification graphics. This section describes the 2D Wireframe and optional 2D Verification graphics. Please refer to the *Three-Dimensional Graphics, on page 4 - 84* section for details about that option.

Press either the **Draw** key to view the Wireframe Graphics screen or the **Menu** key followed by the **Wireframe Graphics** softkey. You can also use the menu toolbar and select the **Wireframe** icon to access this screen.

Wireframe graphics show the shape of the part. This sample screen includes callouts to help identify the colors and symbols defined in the table below:



1	The red circle represents part zero.
2	The green circle represents machine zero.
3	The dotted red line represents the centerline of the stock.

Figure 4–66. 2D Wireframe Graphics screen with callouts

Press the **Draw** console key to display or re-draw the Wireframe graphic.

The following functions are performed by the Wireframe Graphics softkeys:

- **REFRESH AND FIT TO VIEW F1**—update the programmed data and center the drawing on the screen in full size so that entire stock and chuck are shown.
- **ZOOM → F4**—accesses the Zoom softkey menu:
 - **ZOOM IN F1**—enlarges the drawing by 20% each time the softkey is pressed.
 - **ZOOM OUT F2**—reduces the drawing by 33.3% each time the softkey is pressed.
 - **FIT TO VIEW F4**—maximizes the drawing to show all turning operations.
 - **EXIT F8**—returns to the previous softkey menu.

Using the Zoom Feature

You can either select the ZOOM IN F2 softkey or use a stylus to draw a rectangle around an area on the screen and Zoom In. From there you can use either the ZOOM IN F1 or ZOOM OUT F2 softkey to adjust the view.

To draw a rectangle for the Zoom In feature,

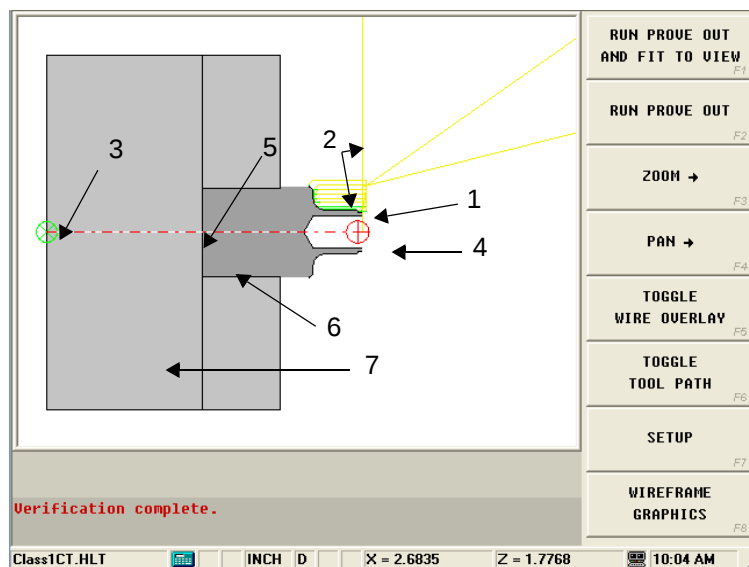
1. Select a location of the screen using the stylus.
 2. Drag the stylus diagonally across the screen or tap the stylus at an opposite diagonal location. A rectangle appears representing the selected area.
 3. Lift the stylus and the selected area is enlarged to fill the screen.
 4. Select the FIT TO VIEW F4 softkey to maximize the drawing to show all turning operations.
- **PAN → F5**—accesses Pan softkey menu (PAN UP F1, PAN DOWN F2, PAN LEFT F3, and PAN RIGHT F4). Pan allows you to move the drawing inside the screen in the direction selected with the softkey. You can also select Pan and drag the drawing using the stylus.
 - **DB SEARCH → F6**—allows you to select a line on the drawing and display the part programming screen for that operation. Select a line on the drawing and select the JUMP TO BLOCK F1 softkey to display the data block on the screen.
 - **VERIFICATION GRAPHICS F8**—accesses the Verification Graphics menu. Refer to *Two-Dimensional Verification Graphics, on page 4 - 81* for information about the optional Verification Graphics.

Two-Dimensional Verification Graphics

Verification graphics show the tool paths and stock removal of the program. In addition, the appropriate console LEDs light when the coolant is programmed to be on, when the spindle is programmed to be on, and when there is a programmed tool change.

Press either the **Verify** key to view the Verification Graphics screen or the **Menu** key followed by the **Verification Graphics** softkey. You can also use the menu toolbar and select the **Verification** icon to access this screen.

The Verification graphics screen uses color and symbols to show movement and identify machine and part zero. This sample screen includes callouts to help identify the colors and symbols defined in the table below:



1	Green lines represent feedrate moves.
2	Yellow lines represent rapid feedrate moves.
3	The green circle represents machine zero.
4	The red circle represents part zero.
5	The dotted red line represents the centerline of the stock.
6	The dark gray area represents the stock.
7	The light gray area represents the chuck.

Figure 4–67. 2D Verification Graphics screen with callouts



You can run Verification Graphics on a range of data blocks instead of the entire program. To view a range of data blocks graphically,

1. Press the **Auto** console key.
2. Enter the Start Block and End Block you wish to see.
3. Press the **Verify** console key to return to Verification Graphics.
4. Select the RUN PROVE OUT *F2* softkey to view the selected data block range. This range stays in effect until you return to Auto mode by pressing the **Auto** console key again.

Press the **Verify** console key to display Verification graphics.

The Verification Graphics softkeys perform these functions:

- **RUN PROVE OUT AND FIT TO VIEW *F1***—runs the program graphically, updates the drawing, and centers it on the screen in full size so that entire stock and chuck are shown.
- **RUN PROVE OUT *F2***—runs the program graphically without changing the zoom or pan settings.
- **ZOOM → *F4***—accesses the Zoom softkey menu:
 - **ZOOM IN *F1***—enlarges the drawing by 20% each time the softkey is pressed.
 - **ZOOM OUT *F2***—reduces the drawing by 33.3% each time the softkey is pressed.
 - **FIT TO VIEW *F4***—maximizes the drawing to show all turning operations.
 - **EXIT *F8***—returns to the previous softkey menu.
- **PAN → *F5***—accesses Pan softkey menu (PAN UP *F1*, PAN DOWN *F2*, PAN LEFT *F3*, and PAN RIGHT *F4*). Pan allows you to move the drawing inside the screen in the direction selected with the softkey. You can also select Pan and drag the drawing using the stylus.
- **TOGGLE WIRE OVERLAY *F5***—allows you to turn on or off the wire overlay that represents the centerline, machine zero, and part zero.
- **TOGGLE TOOL PATH *F6***—allows you to turn on or off the yellow lines representing the tool path.
- **SETUP *F7***—accesses the Setup menu with SNAPSHOT *F1*, STOCK SETUP *F3*, CHUCK & JAW SETUP *F5* softkey choices.
 - **SNAPSHOT *F1***—updates the snapshot, or thumbnail, embedded in the part program. Select Yes or No from the pop-up window to replace the image that appears in the lower portion of the Project Manager screen.



When a Snapshot is updated, the Project Manager screen shows that the Conversational part program has changed and needs saving. Refer to the “Overview” section in *Project Manager, on page 3 - 1* for information about this screen.



The Snapshot feature is only available with Conversational part programs. It does not appear for NC programs.

- **FAST F2**—adjusts the Run Prove Out speed to Fast.
- **SLOW F3**—adjusts the Run Prove Out speed to Slow.
- **STOCK SETUP F3**—adjust the stock length and diameter with the entries in the Stock Setup screen. These entries are only for visual verification. They have no effect on the part program.
 - **STOCK LENGTH**—identifies the length of the stock. Adjust this value by typing a new value for the length in this field.
 - **STOCK OUTSIDE DIAMETER**—identifies the outside diameter of the stock. Adjust this value by typing a new value for the outside diameter in this field.
 - **STOCK INSIDE DIAMETER**—identifies the inside diameter of the stock. Adjust this value by typing a new value for the inside diameter in this field.
 - **EXIT F8**—returns to the previous softkey menu.
- **CHUCK & JAW SETUP F5**—customize the dimensions of the chuck and jaw with the entries in the Chuck & Jaw Setup screen. These entries are only for visual verification. They have no effect on the part program.
 - **CHUCK WIDTH**—identifies the width of the chuck. Adjust this value by typing a new value for the width in this field.
 - **CHUCK DIAMETER**—identifies the diameter of the chuck. Adjust this value by typing a new value for the diameter in this field.
 - **JAW WIDTH**—identifies the width of the jaw. Adjust this value by typing a new value for the width in this field.
 - **JAW HEIGHT**—identifies the height of the jaw. Adjust this value by typing a new value for the height in this field.
 - **EXIT F8**—returns to the previous softkey menu.
- **WIREFRAME GRAPHICS F8**—accesses the Wireframe Graphics screen.

Three-Dimensional Graphics

Solid three-dimensional (3D) rendering is available as an option for the Two-Axis (TM Series) Turning Center and as standard equipment for the Live-Tooling (TMM Series) Turning Center. Here is a sample 3D Graphics screen:

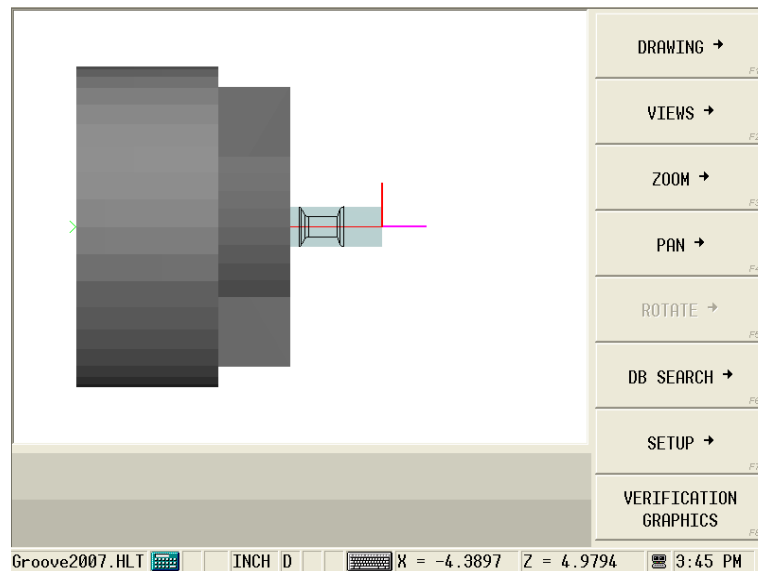


Figure 4–68. 3D Graphics screen

Colors are used as follows for representing items and actions in the 3D rendering:

Representative Color	Item / Action
white lines	tool dimensions
black lines	programmed geometry
green lines	feedrate moves
yellow lines	rapid moves
red lines	X and Y axes orientation
pink line	Z axis orientation
green circle at the rear of the chuck	machine zero
red circle at the front of the stock	part zero
red line inside the stock	stock centerline
blue line around the stock	C zero on the C axis
dark gray color that can be viewed as opaque or translucent	chuck
light gray color that can be viewed as opaque or translucent	stock

You can make selections with the softkeys to display different features. The softkey selections are described below.

3D Wireframe Graphics

Press either the **Draw** key to view the Wireframe Graphics screen or the **Menu** key followed by the **Wireframe Graphics** softkey. You can also use the menu toolbar and select the **Wireframe** icon to access this screen.

The following are descriptions of the softkeys for 3D Wireframe graphics:

- **DRAWING** → *F1*—accesses the 3D Wireframe Graphics drawing softkey menu:
 - **REFRESH** *F1*—for Wireframe only—updates the drawing.
 - **REFRESH AND FIT TO VIEW** *F2*—for Wireframe only—updates the drawing and centers it on the screen in full size so that the entire stock and chuck are shown.
 - **EXIT** *F8*—returns to the previous softkey menu.
- **VIEWS** → *F2*—accesses the Graphics VIEWS softkey menu to select a different perspective from which to display the part.
 - **XZ (SIDE)** *F1*—displays a side view of the drawing from the XZ axis perspective.
 - **XY (END)** *F2*—displays an end view of the drawing looking down the Z axis.
 - **3D VIEW** *F3*—displays a three-dimensional view of the drawing.
 - **YZ (TOP)** *F4*—displays a top view of the drawing from the YZ axis perspective.
 - **ALL VIEWS** *F5*—displays drawings in all four views at once.
 - **VIEW OPTIONS** *F7*—accesses the View Options softkey menu. This menu allows you to set up the graphic display with the following selections:
 -  These selections are saved on the control and remain in effect after a power cycle.
- **SHOW / HIDE TOOL PATH** *F1*—shows or hides the tool path. Green lines represent feedrate moves; yellow lines represent rapid feedrate moves. The tool path appears when the animated cut is finished. The softkey toggles between show and hide upon each selection.
- **SHOW / HIDE PART SURFACE** *F2*—shows or hides the part surface. White lines represent the tool dimensions on the part. Black lines represent the programmed geometry. The softkey toggles between show and hide upon each selection.
- **SHOW / HIDE STOCK** *F3*—shows or hides the stock. The softkey toggles between show and hide upon each selection.
- **1 / 2 VIEW** *F4*—shows the stock cut in half.
- **3 / 4 VIEW** *F5*—shows the stock with one fourth of it cut out.
- **FULL VIEW** *F6*—shows the entire piece of stock.
- **TRANSLUCENT / OPAQUE** *F7*—shows the stock in a solid (opaque) or clear (translucent) view.

- **EXIT F8**—returns to the previous softkey menu.
- **EXIT F8**—returns to the previous softkey menu.
- **ZOOM → F2**—accesses the Zoom softkey menu:
 - **ZOOM IN F1**—enlarges the drawing by 20% each time the softkey is pressed.
 - **ZOOM OUT F2**—reduces the drawing by 33.3% each time the softkey is pressed.
 - **FIT TO VIEW F5**—maximizes the drawing to show all turning operations.
 - **EXIT F8**—returns to the previous softkey menu.
- **PAN → F4**—accesses Pan softkey menu: PAN UP F1, PAN DOWN F2, PAN LEFT F3, PAN RIGHT F4, and CENTER VIEW F5. Pan allows you to move the drawing inside the screen in the direction selected with the softkey. You can also select Pan and drag the drawing using the stylus.
- **ROTATE → F5**—accesses the Rotate softkey menu: ROTATE UP F1, ROTATE DOWN F2, ROTATE LEFT F3, ROTATE RIGHT F4, and DEFAULT ROTATION F5. Rotate allows you to move the drawing inside the screen in the direction selected with the softkey. You can also select Rotate and drag the drawing using the stylus. The Default Rotation puts the drawing back in its original position.
- **DB SEARCH → F6**—allows you to select a line on the drawing and display the part programming screen for that operation. Select a surface or feature on the drawing and select the JUMP TO BLOCK F1 softkey to display the data block on the screen.
- **SETUP → F7**—access the Setup softkey menu:
 - **SNAPSHOT F1**—updates the snapshot, or thumbnail, embedded in the part program. Select Yes or No from the pop-up window to replace the image that appears in the lower portion of the Project Manager screen.
 - ⇒ When a Snapshot is updated, the Project Manager screen shows that the Conversational part program has changed and needs saving. Refer to the “Overview” section in *Project Manager, on page 3 - 1* for information about this screen.
 - ⇒ The Snapshot feature is only available with Conversational part programs. It does not appear for NC programs.
 - **STOCK SETUP F3**—adjust the stock length and diameter with the entries in the Stock Setup screen.
 - **STOCK LENGTH**—identifies the length of the stock.
 - **STOCK OUTSIDE DIAMETER**—identifies the outside diameter of the stock.
 - **STOCK INSIDE DIAMETER**—identifies the inside diameter of the stock.
 - **EXIT F8**—returns to the previous softkey menu.
 - **CHUCK & JAW SETUP F5**—customize the dimensions of the chuck and jaw with the entries in the Chuck & Jaw Setup screen. These entries affect the graphic shown in Verification Graphics.

- **CHUCK WIDTH**—identifies the width of the chuck.
- **CHUCK DIAMETER**—identifies the diameter of the chuck.
- **JAW WIDTH**—identifies the width of the jaw.
- **JAW HEIGHT**—identifies the height of the jaw.
- **EXIT F8**—returns to the previous softkey menu.
- **SETTINGS F7**—Accesses the Graphics Settings screen containing these fields.



The control defaults to the selections in the Graphics Settings screen for each part program.

- **SHOW TOOL PATH**—YES and NO selections are available. Select YES and the tool path is represented by green lines.
- **SHOW RAPIDS**—YES and NO selections are available. Select YES and the rapid moves are represented by yellow lines.
- **PART SURFACE TURNING MODE**—2-D and 3-D selections are available for selecting the mode to draw turning blocks. Select 2-D for drawing 2-D graphics, and select 3-D for drawing 3-D graphics.
- **DRAW CHUCK AND JAW**—YES and NO selections are available. Select YES to view the chuck and jaw in the drawing. Select No to view only the material, tool, tool path, and rapids in the drawing.
- **GRAPHICS ERROR TOLERANCE**—identifies the acceptable deviation between the graphical display of the cut and the actual cut.
- **BACKGROUND COLOR**—BLACK and WHITE selections are available for setting the screen background color.
- **EXIT F8**—returns to the previous softkey menu.

3D Verification Graphics

Press either the **Verify** key to view the Verification Graphics screen or the **Menu** key followed by the **Verification Graphics** softkey. You can also use the menu toolbar and select the **Verification** icon to access this screen.

The following are descriptions of the softkeys for 3D Verification graphics:

- **DRAWING →F1**—accesses the 3D Verification Graphics drawing softkey menu:
 - **DRAW F1**—updates the programmed data in a three-dimensional animated drawing. This softkey is replaced by the **PAUSE F1** softkey when the animation is active.
 - **DRAW AND FIT TO VIEW F2**—updates the programmed data and centers the drawing on the screen in full size so that the entire stock and chuck are shown.
 - **SHOW / HIDE ANIMATION F3**—shows or hides the tool cutting the part graphically. When Hide is selected, the motion stops. The softkey toggles between show and hide upon each selection.
 - **SINGLE BLOCK F4**—runs one block of the part program.
 - **NEXT TOOL CHANGE F5**—runs the part program until there is a tool change.
 - **SLOW / FAST F6**—toggles between running the part program at a slow or fast speed.
 - **ABORT F7**—stops the part program from running.
 - **EXIT F8**—returns to the previous softkey menu.
- **VIEWS →F2**—accesses the Graphics VIEWS softkey menu to select a different perspective from which to display the part.
 - **XZ (SIDE) F1**—displays a side view of the drawing from the XZ axis perspective.
 - **XY (END) F2**—displays an end view of the drawing looking down the Z axis.
 - **3D VIEW F3**—displays a three-dimensional view of the drawing.
 - **YZ (TOP) F4**—displays a top view of the drawing from the YZ axis perspective.
 - **ALL VIEWS F5**—displays drawings in all four views at once.
 - **VIEW OPTIONS F7**—accesses the View Options softkey menu. This menu allows you to set up the graphic display with the following selections:



These selections are saved on the control and remain in effect after a power cycle.

- **SHOW / HIDE TOOL PATH F1**—shows or hides the tool path. Green lines represent feedrate moves; yellow lines represent rapid feedrate moves. The tool path appears when the animated cut is finished. The softkey toggles between show and hide upon each selection.
- **SHOW / HIDE PART SURFACE F2**—shows or hides the part surface. White lines represent the tool dimensions on the part. Black lines represent the programmed geometry. The softkey toggles between show and hide upon each selection.
- **SHOW / HIDE STOCK F3**—shows or hides the stock. The softkey toggles between show and hide upon each selection.
- **1 / 2 VIEW F4**—shows the stock cut in half.
- **3 / 4 VIEW F5**—shows the stock with one fourth of it cut out.
- **FULL VIEW F6**—shows the entire piece of stock.
- **TRANSLUCENT / OPAQUE F7**—shows the stock in a solid (opaque) or clear (translucent) view.
- **EXIT F8**—returns to the previous softkey menu.
- **EXIT F8**—returns to the previous softkey menu.
- **ZOOM → F2**—accesses the Zoom softkey menu:
 - **ZOOM IN F1**—enlarges the drawing by 20% each time the softkey is pressed.
 - **ZOOM OUT F2**—reduces the drawing by 33.3% each time the softkey is pressed.
 - **FIT TO VIEW F5**—maximizes the drawing to show all turning operations.
 - **EXIT F8**—returns to the previous softkey menu.
- **PAN → F4**—accesses Pan softkey menu: PAN UP F1, PAN DOWN F2, PAN LEFT F3, PAN RIGHT F4, and CENTER VIEW F5. Pan allows you to move the drawing inside the screen in the direction selected with the softkey. You can also select Pan and drag the drawing using the stylus.
- **ROTATE → F5**—accesses the Rotate softkey menu: ROTATE UP F1, ROTATE DOWN F2, ROTATE LEFT F3, ROTATE RIGHT F4, and DEFAULT ROTATION F5. Rotate allows you to move the drawing inside the screen in the direction selected with the softkey. You can also select Rotate and drag the drawing using the stylus. The Default Rotation puts the drawing back in its original position.
- **DB SEARCH → F6**—allows you to select a line, surface, or feature on the drawing on the drawing and display the part programming screen for that operation.
 - **JUMP TO BLOCK F1**—displays the data block on the screen.
 - **EXIT F8**—returns to the previous softkey menu.

- **SETUP → F7**—access the Setup softkey menu:
 - **SNAPSHOT F1**—updates the snapshot, or thumbnail, embedded in the part program. Select Yes or No from the pop-up window to replace the image that appears in the lower portion of the Project Manager screen.
 - ⇒ When a Snapshot is updated, the Project Manager screen shows that the Conversational part program has changed and needs saving. Refer to the “Overview” section in *Project Manager, on page 3 - 1* for information about this screen.
 - ⇒ The Snapshot feature is only available with Conversational part programs. It does not appear for NC programs.
 - **STOCK SETUP F3**—adjust the stock length and diameter with the entries in the Stock Setup screen.
 - **STOCK LENGTH**—identifies the length of the stock.
 - **STOCK OUTSIDE DIAMETER**—identifies the outside diameter of the stock.
 - **STOCK INSIDE DIAMETER**—identifies the inside diameter of the stock.
 - **EXIT F8**—returns to the previous softkey menu.
 - **CHUCK & JAW SETUP F5**—customize the dimensions of the chuck and jaw with the entries in the Chuck & Jaw Setup screen. These entries affect the graphic shown in Verification Graphics.
 - **CHUCK WIDTH**—identifies the width of the chuck.
 - **CHUCK DIAMETER**—identifies the diameter of the chuck.
 - **JAW WIDTH**—identifies the width of the jaw.
 - **JAW HEIGHT**—identifies the height of the jaw.
 - **EXIT F8**—returns to the previous softkey menu.
 - **SETTINGS F7**—Accesses the Graphics Settings screen containing these fields.



The control defaults to the selections in the Graphics Settings screen for each part program.

- **SHOW TOOL PATH**—YES and NO selections are available. Select YES and the tool path is represented by green lines.
- **SHOW RAPIDS**—YES and NO selections are available. Select YES and the rapid moves are represented by yellow lines.
- **PART SURFACE TURNING MODE**—2-D and 3-D selections are available for selecting the mode to draw turning blocks. Select 2-D for drawing 2-D graphics, and select 3-D for drawing 3-D graphics.

- **DRAW CHUCK AND JAW**—YES and NO selections are available. Select YES to view the chuck and jaw in the drawing. Select No to view only the material, tool, tool path, and rapids in the drawing.
- **GRAPHICS ERROR TOLERANCE**—identifies the acceptable deviation between the graphical display of the cut and the actual cut.
- **BACKGROUND COLOR**—BLACK and WHITE selections are available for setting the screen background color.
- **RUN TIME GRAPHICS LEVEL**—adjusts the rate at which the graphics are refreshed in the Auto Run screen by the control, based on the selection (High, Medium, or Low). Low is the default, and no graphics will be processed on the Auto Run screen with this selection.

When Low is initially selected, no graphics appear on the Auto Run screen. If Medium or High have been selected previously, the graphic from that selection will still be on the screen; changing to Low keeps the static version of the previous selection on the screen.

Medium and High selections increase the graphic quality, but slow performance.

- **GRAPHICS QUALITY LEVEL**—adjusts the rate at which the graphics are refreshed in the 3D Verification Graphics screen by the control, based on the selection (High, Medium, or Low). Medium is the default. Medium and High selections increase the graphic quality, but slow performance.
- **EXIT F8**—returns to the previous softkey menu.

Software Options

The WinMax Lathe single-screen control contains software used to process data and display screens in much the same manner that personal computers use software programs. As with other software systems, WinMax Lathe has additional software options that can be purchased for the system. Contact Hurco or your Hurco distributor for details about purchasing software options.

- **Max Classic Package**—includes 256 MB ram, 2GB hard drive, 3.5" floppy disk, NCPP Option with the NC Productivity Package software for producing smaller, more powerful, and easier to maintain NC programs and 2D Verification graphics. Refer to *Two-Dimensional Verification Graphics*, on page 4 - 81 for more information about 2D verification graphics.
- **DXF Option**—allows you to convert an AutoCAD™ DXF file into a set of conversational data blocks. Refer to the *WinMax Lathe Options* manual for details.
- **UltiNet Package**—includes the interface cable and UltiNet software. UltiNet connects your control to your Local Area Network (LAN) so you can communicate with other Hurco CNCs and PCs in your shop or office. Refer to the *WinMax Lathe Options* manual for details.
- **Tool Setter Option**—includes tool setter hardware and software. The option allows you to check tool dimensions and check for wear. Refer to the *WinMax Lathe Options* manual for details.
- **Rotating Bar Feed**—allows the spindle to rotate at a programmed RPM while feeding stock. Refer to the Bar Feed data block in the *WinMax Lathe Conversational Part Programming* manual for details.
- **3D Graphics**—provides solid rendering, three-dimensional graphics with dynamic rotation. The 3D graphics are standard for the Live-Tooling Turning Centers. Refer to *Three-Dimensional Graphics*, on page 4 - 84 for more information about 3D graphics.
- **Rigid Tapping**—allows you to tap the same hole multiple times, keeping the tool's orientation with previously cut threads. Refer to the *WinMax Lathe Conversational Part Programming* manual for details.
- **Ultipocket**—adds special milling routines for machining pocket boundaries with islands. This option is only available with Live-Tooling Turning Centers. Refer to the *WinMax Lathe Options* manual for details.

Programming Training

Learn how to create part programs in minutes on the easy-to-use WinMax Lathe Single-Screen Control. Hurco offers hands-on training classes to demonstrate the powerful programming capabilities of the control. Every customer will gain an advantage by attending the training classes.

WinMax Lathe Single-Screen Control training classes teach the machine operator to:

- Create part programs from blueprints.
- Minimize programming time.
- Decrease or eliminate programming mistakes—reducing scrap and programming downtime, and extending tool life.
- Increase productivity.
- Enhance part programming capability with WinMax Lathe Single-Screen Control options.

Contact Hurco or your Hurco distributor for details about a Program Training class.

MACHINE OPERATION BASICS

This chapter explains basic machine operations.

Power Up.	5	-	2
Machine Operations	5	-	6
Running a Program	5	-	22
Shut Down.	5	-	29

Power Up

The operator must perform routine checks before attempting to power up the machine. The machine is powered up first, then the control is powered up.

Routine Daily Checks

Several mechanical elements require visual inspection, regular maintenance, and lubrication checks to ensure proper machine operation. For detailed descriptions of these operations, refer to the *Maintenance and Safety Manual*.

Machine Power

The machine's On/Off switch supplies power to the entire machine, including the control. The power switch is located behind the machine on the electrical cabinet door.

When the machine is turned on and boots up, start up and self-test information appears on the screen. When the machine boots up, the following information is displayed:

- BIOS Configuration information.
- Initialization messages.
- Windows® OS messages.
- The Hurco Lathes screen appears before all of the software is active.
- Boot up is complete when the Input screen is displayed, as shown below.



Figure 5–1. Input Screen

If the Input screen does not appear or contains error messages, refer to the *Maintenance and Safety Manual*, Troubleshooting, for assistance.

Control Power

Perform the following steps to perform Control Power On:

1. If necessary, release all Emergency Stop buttons.
2. Press the **Manual** console key.
3. Press the **Power On** console button. This button lights up, and the **Start Cycle** console button begins to flash.
4. Press the **Start Cycle** button to turn on the machine servos. The Start Cycle button stops flashing. The lube pump and hydraulic pump are enabled; servo and spindle amplifiers are enabled.

Calibrate the Machine

The axes must be calibrated each time the machine is powered up. Machine calibration establishes the machine coordinate zero locations when viewed facing the machine.

- X Zero is the centerline of the spindle.
- X Home is at the back of the machine.
- Z Zero is at the left of the machine.
- Z Home is at the far right of the machine.
- C Zero is determined by the X axis, with either a radial or axial tool, with the C axis at C Home position.
- C Home is the repeatable index position for the C axis.

To avoid collisions, the X axis calibrates first in X positive direction, moving toward the back of the machine. Then the Z axis calibrates in Z positive direction, moving toward the right of the machine.

- The calibrated X value is the maximum X travel limit to the Spindle centerline.
- The calibrated Z value is the maximum Z travel limit.
- The calibrated C value is the repeatable index position for the C axis.

To calibrate the machine, the machine and control power must be on, as described in *Machine Power, on page 5 - 2* and *Control Power, on page 5 - 3*:

1. Press the **Manual** button on the console to display the Manual screen.
2. Press the CALIBRATE MACHINE F8 softkey. The **Start Cycle** lamp flashes.
3. Press the **Start Cycle** button for axis calibration.
4. Press the **Start Cycle** button again for turret calibration.

Two-Axis (TM Series) Turning Center

After the machine has been calibrated, the axes positions appear in the Machine X and Z fields on the Manual screen, as shown here.

MANUAL				
MACHINE	PART	AXES STATUS	CALIBRATED	SET ACTIVE TOOL F1
X 4.0000	4.0000	ACTIVE TOOL	0	MANUAL FUNCTION SETUP F2
Z 15.7480	6.7480	SPINDLE RPM	0	
FPM % 100	RAP % 100	RPM % 100	JOG % 100	F3
AXIS LIMIT SWITCHES:				ACCESSORY OPERATIONS F4
CONVEYOR	STOPPED	PARTS CATCHER	UNKNOWN	CHUCK OPERATIONS F5
COOLANT	OFF	TAILSTOCK	UNKNOWN	
FEED (IPM)	0.0000	TOOL SETTER	UNKNOWN	TOGGLE WORKLIGHT F6
		CHUCK STATE	CLOSED	HOME MACHINE F7
		CHUCKING TYPE	INTERNAL	
		CHUCKING PRESSURE	HIGH	CALIBRATE MACHINE F8
NONAME1.HLT				11:00 AM

Figure 5–2. TM Series Manual Screen Showing Calibrated Axes

Live Tooling (TMM Series) Turning Center

After the machine has been calibrated, the axes positions appear in the Machine X, Z, and C fields on the Manual screen, as shown here.

MANUAL				
MACHINE	PART	AXES STATUS	CALIBRATED	SET ACTIVE TOOL F1
X 14.0945	8.8500	ACTIVE TOOL	1	MANUAL FUNCTION SETUP F2
Z 23.0709	23.0709	S1 RPM	0	
C 359.984	359.984	S2 RPM	0	DIAGNOSTICS F3
FPM % 100	RAP % 62	S1 % 100	S2 % 100	JOG % 92
AXIS LIMIT SWITCHES:				ACCESSORY OPERATIONS F4
CONVEYOR	STOPPED	PARTS CATCHER	RETRACTED	CHUCK OPERATIONS F5
COOLANT	OFF	TAILSTOCK	RETRACTED	
FEED (IPM)	0.0000	TOOL SETTER	RETRACTED	TOGGLE WORKLIGHT F6
		CHUCK STATE	OPENED	HOME MACHINE F7
		CHUCKING TYPE	EXTERNAL	
		FOOTSWITCH MODE	TOGGLE	CALIBRATE MACHINE F8
		SPINDLE CLAMPS	ASSIST ON	
NONAME1.HLT				11:11 AM

Figure 5–3. TMM Series Manual Screen Showing Calibrated Axes

Home the Machine

Home Machine is a rapid traverse feedrate move to return the axes from anywhere in the work area back to home (the original calibrated position). Before HOME MACHINE *F7* can be selected, the Control Power must be On, and the machine must be calibrated.

Follow this procedure to home the machine:

1. Press the **Manual** key to display the Manual screen.
2. Select the HOME MACHINE *F7* softkey. The **Start Cycle** button flashes.
3. Press the **Start Cycle** button. The machine moves to the home position.

Warm Up the Machine and Spindle

Warming up an idle machine improves its performance. A machine that has been idle for at least an hour should be warmed up before cutting parts.

Follow this procedure to warm up the machine and spindle:

1. Calibrate the axes.
2. Activate the spindle and move the axes using the Jog Unit on the control.
3. Write a program to position X and Z while the spindle is running.
4. Use a pattern to run the program indefinitely.
5. Let the spindle run for a few minutes before stopping motion and beginning to program or run a part.

Live Tooling (TMM Series) Turning Center

MACHINE		PART		AXES STATUS		CALIBRATED			
X	14.0945	8.8500		ACTIVE TOOL	1			SET ACTIVE TOOL F1	
Z	23.0709	23.0709		S1 RPM	0			MANUAL FUNCTION SETUP F2	
C	359.984	359.984		S2 RPM	0			DIAGNOSTICS F3	
FPM % 100		RAP % 62		S1 % 100		S2 % 100		JOG % 92	
AXIS LIMIT SWITCHES: CONVEYOR STOPPED PARTS CATCHER RETRACTED COOLANT OFF TAILSTOCK RETRACTED FEED (IPM) 0.0000 TOOL SETTER RETRACTED									
						CHUCK STATE OPENED		ACCESSORY OPERATIONS F4	
						CHUCKING TYPE EXTERNAL		CHUCK OPERATIONS F5	
						FOOTSWITCH MODE TOGGLE		TOGGLE WORKLIGHT F6	
						SPINDLE CLAMPS ASSIST ON		HOME MACHINE F7	
								CALIBRATE MACHINE F8	
NONAME1.HLT INCH D 11:11 AM									

Figure 5-5. TMM Series Manual screen

Manual Mode Fields

These fields are available on the Manual screen:

- **MACHINE and PART X, Z, and C**—displays the current position of each axis relative to machine and part zero. Refer to the *Part Setup—Work Offsets*, on page 4 - 10 for more information about setting Part Zero.
- **AXES STATUS**—displays Calibrated or Uncalibrated.
- **ACTIVE TOOL**—displays the currently indexed tool, located in the turret facing the spindle.
- **SPINDLE RPM**—displays the current Spindle RPM.
- **FPM %**—displays the current Feedrate Per Minute percentage set by the Axis Feed Rate override knob.
- **RAP %**—displays the current Rapid Feedrate Per Minute percentage set by the Rapid override knob.
- **RPM %**—displays the current Revolutions Per Minute percentage set by the Spindle Speed override knob.
- **JOG %**—displays the current Jog Feedrate Per Minute percentage set by the Jog Feed override knob.
- **AXIS LIMIT SWITCHES:**—displays +X and +Z during calibration. In addition to the calibration verification, this field is also a diagnostic tool. Please refer to the *Maintenance and Safety Manual*, Turret Diagnostics, for information about turret diagnostics.
- **CONVEYOR**—displays Stopped, Forward, or Reverse. This field displays information based on the entry from the MANUAL FUNCTION SETUP F2 screen.
- **COOLANT**—displays On or Off based on the console key selection.

- **FEED**—identifies the feed rate for this tool as either Inches per Minute (IPM) or Millimeters per Minute (MMPM) during Calibrate, Home Machine, and manual jog operations.
- **PARTS CATCHER**—displays Retracted, Advanced, or Unknown. This field displays information based on entries made in the ACCESSORY OPERATIONS *F4* softkey menu. Unknown appears when Retracted or Advanced are not selected.
- **TAILSTOCK**—displays Retracted, Advanced, or Unknown. This field displays information based on entries made in the ACCESSORY OPERATIONS *F4* softkey menu. Unknown appears when Retracted or Advanced are not selected.
- **TOOL SETTER**—displays Retracted, Advanced, or Unknown. This field displays information based on entries made in the ACCESSORY OPERATIONS *F4* softkey menu. Unknown appears when Retracted or Advanced are not selected.
- **CHUCK STATE**—displays Closed or Opened. This field displays information based on entries made in the CHUCK OPERATIONS *F5* softkey menu.
- **CHUCKING TYPE**—displays Collet, Internal, or External. This field displays information based on entries made in the CHUCK OPERATIONS *F5* softkey menu.
- **FOOTSWITCH MODE**—displays either Toggle or Hold-Open based on entries made in the CHUCK OPERATIONS *F5* softkey menu.
- **SPINDLE CLAMPS**—displays either Hold On, Assist On, or Both On, or Both Off based on softkey selections in the CHUCK OPERATIONS *F5* softkey menu.

Manual Mode Softkeys

These are the softkeys for Manual mode:

- **SET ACTIVE TOOL *F1***—indicates which tool is currently in the turret facing the spindle. Select turret positions by indexing forward and reverse with the + (plus) or - (minus) Turret keys. Refer to *Loading Tools, on page 4 - 7* for more information about using this softkey.
- **MANUAL FUNCTION SETUP *F2***—accesses the Manual Function menu with Jog Feed, Spindle Speed, Spindle Direction, Chip Conveyor, Lube, and Toggle Worklight settings. Refer to *Setting Jog Unit Parameters, on page 5 - 11* for more information.
- **DIAGNOSTICS *F3***—accesses the TURRET DIAGNOSTICS *F1* softkey selection which allows you to perform turret diagnostics. Refer to [Turret Diagnostics, on page 5 - 12](#) for information about Turret Operation.
- **ACCESSORY OPERATIONS *F4***—access options such as Tool Setter, Parts Catcher, Tailstock, and Washdown Gun. This menu provides softkeys for each operation.
 - Refer to the *WinMax Lathe Options Manual* for information about operating these optional accessory operations.
 - Refer to the *Maintenance and Safety Manual* for information about maintenance for the Accessory Operations (optional Parts Catcher, Tailstock, and Tool Setter).

- **CHUCK OPERATIONS F5**—set the chuck type to external or internal clamping or the optional collet chuck, open or close the chuck, and set the footswitch mode with this softkey menu.
 - Refer to *Chuck Operations*, on page 5 - 9 for information about operating the chuck.
 - Refer to the *WinMax Lathe Options Manual* for information about the optional collet chuck.
 - Refer to the *Maintenance and Safety Manual* for information about maintenance for the Chuck Operations.
- **TOGGLE WORKLIGHT F6**—turn the worklight located inside the machine on or off.
- **HOME MACHINE F7**—return the turret from any location in the work area back to home position at rapid traverse feedrate. See *Home the Machine*, on page 5 - 5 for more information.
- **CALIBRATE MACHINE F8**—establish absolute zero for each axis on the turning center. See *Calibrate the Machine*, on page 5 - 3 for more information.

Chuck Operations

To access chuck operations,

1. Press the **Manual** console key to access the Manual screen.
2. Select the CHUCK OPERATIONS F5 softkey to access the Chuck softkey menu.

MANUAL					
MACHINE	PART	AXES STATUS	CALIBRATED	CLOSE CHUCK F1	
X 4.0000	4.0000	ACTIVE TOOL	0	OPEN CHUCK F2	
Z 15.7480	15.7480	SPINDLE RPM	0	CHUCKING TYPE EXTERNAL F3	
FPM % 100	RAP % 100	RPM % 100	JOG % 100	CHUCKING TYPE INTERNAL F4	
AXIS LIMIT SWITCHES:				CHUCKING TYPE COLLET F5	
CONVEYOR	STOPPED	PARTS CATCHER	UNKNOWN	FOOTSWITCH TOGGLE MODE F6	
COOLANT	OFF	TAILSTOCK	UNKNOWN	FOOTSWITCH HOLD-OPEN MODE F7	
FEED (IPM)	0.0000	TOOL SETTER	UNKNOWN	EXIT F8	
CHUCK STATE				CLOSED	
CHUCKING TYPE				INTERNAL	
FOOTSWITCH MODE				TOGGLE	
NONAME1.HLT INCH R 3:24 PM					

Figure 5-6. Chuck Operations softkeys

The Chuck Operations softkeys are defined as follows:

- **CLOSE CHUCK F1**—closes the chuck and displays “CLOSED” for the chuck state.
 - The jaws will move outward for the Internal chucking type.
 - The jaws will move inward for the External chucking type.



The machine will only run in Auto mode when the chuck is closed.

- **OPEN CHUCK F2**—opens the chuck and displays OPEN for the chuck state.
 - The jaws will move inward for the Internal chucking type.
 - The jaws will move outward for the External chucking type.
- **CHUCKING TYPE EXTERNAL F3**—sets the chuck type to External. The External chuck type holds stock on the outside of the stock, or externally.
- **CHUCKING TYPE INTERNAL F4**—sets the chuck type to Internal. The Internal chuck type holds stock on the inside of the stock or internally.



Refer to the chuck's operator's manual and the *Turning Centers Maintenance and Safety* manual for hydraulic pressure recommendations.

- **CHUCKING TYPE COLLET F5**—sets the chuck type to Collet. The Collet holds bar-feed material. This softkey selection is only available if you purchase the optional Collet Chuck. Refer to the *WinMax Lathe Options Manual* for information about the Collet Chuck.
- **More--> F7**—accesses the next page of softkey selections.
- **FOOTSWITCH TOGGLE MODE F1**—sets the footswitch to modal operation. Once a selection is made with the CLOSE CHUCK F1 or OPEN CHUCK F2 softkey, the chuck output changes to that state and stays on until another chuck selection is made. When this softkey is selected, TOGGLE appears in the Footswitch Mode field.
- **FOOTSWITCH HOLD-OPEN MODE F2**—sets the footswitch to remain open as long as the footswitch is depressed. When the footswitch is released, the chuck closes again. When this softkey is selected, HOLD-OPEN appears in the Footswitch Mode field. This functionality allows you to open the chuck slightly while setting the part in the chuck.
- **HOLDING CLAMP ON F4**—activates the hydraulic high pressure disc brake located at the rear of the spindle. This selection is only available for TMM-series machines.
- **ASSIST CLAMP ON F5**—activates the hydraulic low pressure disc brake located at the rear of the spindle. This selection is only available for TMM-series machines.



To select both high and low pressure clamps, select Holding Clamp On F4 followed by Assist Clamp On F5. When these selections are made, BOTH ON appears in the Spindle Clamps field. This functionality prevents the spindle from moving during setup. Use the C axis Incremental Jog Wheel to move the spindle when the clamps are on.

- **BOTH CLAMPS OFF F6**—turns off both the high pressure disc brake and the low pressure disc brake. This functionality allows you to move the spindle during setup without having to use the C axis Incremental Jog Wheel. This selection is only available for TMM-series machines.

Jogging the Axes Manually

Follow these steps to manually jog the axes:

1. Select an axis with the Axis Select Switch.
2. Select a hand wheel multiplier key. The key illuminates when selected.
3. Use the Jog Feed Keys to jog the axis direction by selecting either + or –.
4. Override the programmed axis feedrate by turning the Jog Feed Override dial.
5. Rotate the Incremental Jog Wheel to manually jog the axes.

Setting Jog Unit Parameters

The Jog Unit Parameters are valid in Manual mode or Part and Tool Setup. To access,

1. Press the Manual console key to display the Manual screen.
2. Press the MANUAL FUNCTION SETUP F2 softkey. The Jog Unit parameters appear:
 - **Jog Feed**—enter the desired manual jog axis feedrate. The feedrate can range from the maximum axis feedrate down to 1% of the maximum axis feedrate. The feedrate varies depending on the machine type: TM6, TM8, and TM10.

Note that not all axes may have the same maximum feedrate. Setting the Jog Feed to a value greater than the maximum feedrate of an axis will only jog that axis at its maximum feedrate.

For example, the X axis on a machine has a maximum jog feedrate of 787 inches per minute (ipm). The Z axis has a maximum jog feedrate of 100 ipm, Jog Feed is set to 787 ipm. Without using the jog feedrate override, the X axis can jog at 787 ipm, but the Z axis is limited at 100 ipm.

- **Spindle Speed**—enter the spindle speed used when the Spindle On console key is pressed. This value cannot be greater than the machine's maximum spindle speed.
- **Spindle Direction**—select CW or CCW direction for right-hand and left-hand tools, respectively.

Turret Diagnostics

To perform Turret Diagnostics and move the turret manually in single moves, select the DIAGNOSTICS F3 softkey in Manual mode. Select the TURRET DIAGNOSTICS F1 softkey to access the Turret Diagnostics screen for either Two-Axis (TM Series) machines or Live-Tooling (TMM Series) machines. Refer to the appropriate section below for information about performing turret diagnostics.

Two-Axis (TM Series) Machines

The following Turret Diagnostics screen appears for two-Axis (TM Series) machines:

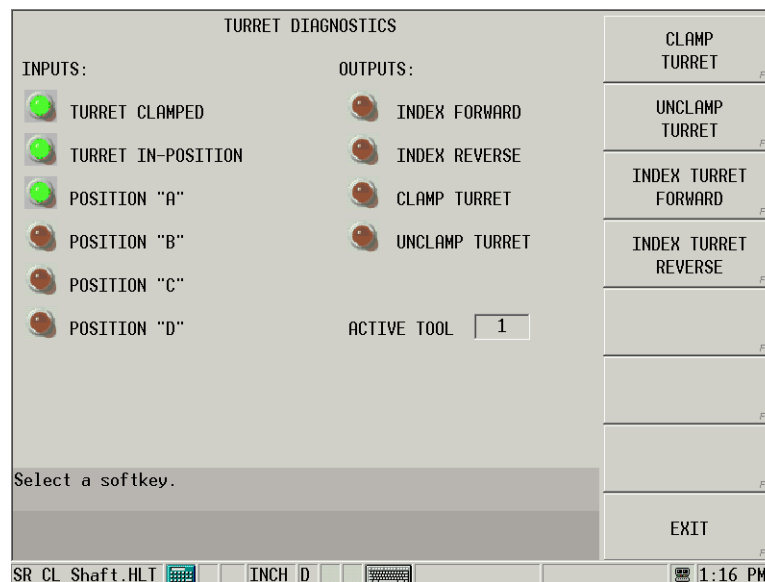


Figure 5-7. TM Series Turret Diagnostics screen



When the CE Option is Active, the enclosure door must be closed in order to perform Turret Diagnostics.

TM Series Turret Diagnostics Fields

Screen LEDs simulate a green LED when items are active and no color when items are off. The fields on the Turret Diagnostics screen are defined as follows:

TM Series Inputs Fields

- **TURRET CLAMPED**—indicates the input is active when the LED is green; indicates the turret is unclamped when the LED is off.
- **TURRET IN-POSITION**—indicates the turret is at a valid station, either clamped or unclamped, when the LED is green; indicates the turret is not at a valid station when the LED is off.
- **POSITION “A”, “B”, “C”, “D”**—indicates the sensor state for decoding the turret position. The combination of ABCD sensor inputs determines the turret position.



Refer to the following table to see which Position Sensors match each Turret Position.

TM Series Turret Diagnostics Position Sensor Status

The following table shows which Position LEDs are active for each turret position:

Turret Position	Active Tool	Position Sensor Status 10 Station	Position Sensor Status 12 Station
1	1	A B	A
2	2	C D	C
3	3	A B	B
4	4	A C D	A D
5	5	B C	A C
6	6	B D	B C
7	7	A D	A B D
8	8	A C	A C D
9	9	A B C	A B C
10	10	B C D	B C D
11	11	Not applicable	B D
12	12	Not applicable	D

Table 5-1. Position Sensor Status

When the turret is in the proper position and ready to operate in other modes, the following **Input Status fields** will have green LEDs:

- TURRET CLAMPED
- TURRET IN-POSITION
- POSITIONS as appropriate according to the Position Sensor Status

In addition to the Input LEDs, the **Output CLAMP TURRET** LED will be green.

TM Series Turret Diagnostics Softkeys

When a Turret Diagnostics softkey is pressed, the **Start Cycle** button flashes. The Turret Diagnostics softkeys perform these functions after the **Start Cycle** button is pressed, activating the selected function:

- **CLAMP TURRET F3**—signals the turret to clamp by enabling the CLAMP TURRET Output. Upon completion of the operation, this state is indicated by both the Input TURRET CLAMPED and the Output CLAMP TURRET LEDs turning green.
- **UNCLAMP TURRET F4**—signals the turret to unclamp by enabling the UNCLAMP TURRET Output. Upon completion of the operation, this state is indicated by both the Input TURRET UNCLAMPED and the Output UNCLAMP TURRET LEDs turning green.
- **INDEX TURRET FORWARD F5**—increments the turret by one position. The appropriate Position Sensors turn green.
- **INDEX TURRET REVERSE F6**—decrements the turret by one position. The appropriate Position Sensors turn green.

TM Series Outputs Fields

The **Start Cycle** button must be pressed for the corresponding softkey to activate the output. The softkeys allow the turret to be moved one step at a time.

- **INDEX FORWARD**—indicates the state of the forward output after pressing the INDEX TURRET FORWARD F4 softkey.
- **INDEX REVERSE**—indicates the state of the reverse output after pressing the INDEX TURRET REVERSE F5 softkey.
- **CLAMP TURRET**—indicates the turret is clamped when the LED is green.
- **UNCLAMP TURRET**—indicates the turret is unclamped when the LED is green.
- **ACTIVE TOOL**—identifies the turret position.

TMM Series Turret Diagnostics Fields

Screen LEDs simulate a green LED when items are active and no color when items are off. The fields on the Turret Diagnostics screen are defined as follows:

TMM Series Input Status Fields

- **TURRET CLAMPED**—indicates the input is active when the LED is green; indicates the turret is unclamped when the LED is off.
- **TURRET IN-POSITION**—indicates the turret is at a valid station, either clamped or unclamped, when the LED is green; indicates the turret is not at a valid station when the LED is off.
- **POSITION BIT1, BIT2, BIT4, BIT8, BIT16**—indicates the sensor state for decoding the turret position. The combination of BIT sensor inputs determines the turret position. If the Turret Controller reports an alarm, then the LED next to the position bit containing the alarm turns green. This action determines the 1 digit (xX) in the Alarm Code.
- **ALARM BIT1, BIT2, BIT4**—sends binary code alarms to the control. If the Turret Controller reports an alarm, then the LED next to the alarm bit containing the alarm turns green. This action determines the 10 digit (Xx) in the Alarm Code.
- **SP ORIENT COMPLETE**—indicates the spindle is in position for the turret to index.
- **ACTIVE TOOL**—indicates the active tool turret position upon completion of a successful Turret Reference/Calibration process.

TMM Series Turret Diagnostics Position Sensor Status



Refer to the following table to see which Position Sensors match each Turret Position.

The following table shows which Position LEDs are active for each turret position:

Turret Position	Active Tool	Position Sensor Bit Status 12 Station
1	1	1
2	2	2
3	3	1, 2
4	4	4
5	5	1, 4
6	6	2, 4
7	7	1, 2, 4
8	8	8
9	9	1, 8
10	10	2, 8
11	11	1, 2, 8
12	12	4, 8

Table 5-2. Position Sensor Bit Status

When the turret is in the proper position and ready to operate in other modes, the following **Input Status fields** will have green LEDs:

- TURRET CLAMPED
- TURRET IN-POSITION
- POSITION BITs as appropriate according to the Position Sensor Status
- SP ORIENT COMPLETE

TMM Series Turret Diagnostics Softkeys

When a Turret Diagnostics softkey is pressed, the **Start Cycle** button flashes. The Turret Diagnostics softkeys perform these functions after the **Start Cycle** button is pressed, activating the selected function:

- **ORIENT LT SPINDLE F1**—signals the turret to go to the Orient Position. Upon completion of the operation, the SP ORIENT COMPLETE screen LED turns green.
- **REFERENCE TURRET F2**—signals the turret to go to Tool 1. Upon completion of the operation, the TURRET CLAMPED, TURRET IN-POSITION, TURRET POSITION BIT1 screen LEDs turn green.
- **CLAMP TURRET F3**—signals the turret to clamp by enabling the CLAMP TURRET Output. Upon completion of the operation, this state is indicated by both the Input TURRET CLAMPED and the Output CLAMP TURRET LEDs turning green.
- **UNCLAMP TURRET F4**—signals the turret to unclamp by enabling the UNCLAMP TURRET Output. Upon completion of the operation, this state is indicated by both the Input TURRET UNCLAMPED and the Output UNCLAMP TURRET LEDs turning green.
- **INDEX TURRET FORWARD F5**—increments the turret by one position. The appropriate Position Sensors turn green.



The turret must be Unclamped before executing this command.

- **INDEX TURRET REVERSE F6**—decrements the turret by one position. The appropriate Position Sensors turn green.



The turret must be Unclamped before executing this command.

TMM Series Output Command Fields

The **Start Cycle** button must be pressed for the corresponding softkey to activate the output. The softkeys allow the turret to be moved one step at a time.

- **PBIT-01, PBIT-02, PBIT-04, PBIT-08; PBIT-16**—indicates the turret index position when the turret controller is in either Mode-01, Mode-02, or Mode-03.
- **PARITY BIT**—indicates parity in binary code for requested turret position codes. The turret controller requires an even-numbered parity command. The Parity Bit is used to meet this requirement.
- **MODE-01, MODE-02, MODE-03**—indicates the turret mode selected in binary code. The following turret modes are supported:
 - 0 = Turret Motion Stop / Fault Reset
 - 1 = Automatic Mode Set Index Direction to Shortest Path
 - 2 = Automatic Mode Set Index Direction to CW Direction
 - 3 = Automatic Mode Set Index Direction to CCW direction
- **PTAB-01**—indicates an 8 tool turret is in use when screen LED is green.
- **PTAB-02**—indicates a 12 tool turret is in use when screen LED is green.
- **PTAB-03**—indicates Low or High inertia turret.
 - The system is set to Low (Standard) Inertia when the screen LED is green.
 - The system is set to High Inertia when the screen LED is off.
- **SPEEDSEL**—indicates Standard or Maintenance index speed.
 - The system is set to Standard Speed when the screen LED is green.
 - The system is set to Maintenance Speed when the screen LED is off.
- **PSTART**—signals the start of the Turret Index cycle.
- **ORIENT SP**—signals the start of the Spindle Orient cycle.

Auto Mode

Press the **Auto** or **Single** key to access the Auto screen and set up the part program to be run on the machine. The part program name loaded in memory appears on this screen. There are also fields for identifying the blocks in the part program and number of cycles to be run. This screen also provides access to the RUN PROGRAM F8 softkey described in *Running a Program, on page 5 - 22*.

Here is an Auto screen, which appears in Auto mode with the file name for the part program to be executed showing in the Part Program field:

The screenshot shows the 'AUTO (CONVERSATIONAL)' screen. It has a light beige background with a dark beige border. On the right side, there are eight function key labels: F1, F2, F3, F4, F5, F6, F7, and F8. The main area contains the following fields and controls:

- PART PROGRAM:** A text field containing 'Groove2007.HLT'.
- START BLOCK:** A numeric field containing '1'.
- END BLOCK:** A numeric field containing '19'.
- CYCLES TO RUN:** A numeric field containing '1'.
- CYCLES COMPLETED:** A numeric field containing '0'.
- PREVIOUS CYCLE TIME:** A time field showing '0 : 00 : 00'.
- TEST RUN:** A button located between F4 and F5.
- RUN PROGRAM:** A button located between F7 and F8.
- Enter number of desired block.** A prompt at the bottom of the main area.

The bottom status bar is dark grey and contains the following information from left to right: 'Groove2007.HLT', a small icon, 'INCH D', a small icon, and '1:43 PM'.

Figure 5–9. Auto Screen—Conversational Programming

Auto Screen Fields

These fields are available on the Auto screen:

- **START BLOCK** and **END BLOCK**—identify the program's first and last data blocks for Conversational part programs to be run. Start Block defaults to 1; End Block defaults to the last block number in the program. If you want to execute only a certain portion of the conversational part program, these fields may be changed.



When the Start Block or End Block are changed from the default to run a partial program, the control maintains the values entered in the Start Block and End Block fields after the program is run. The **Start Cycle** button flashes and a pop-up message appears on the screen listing the range of blocks that will be run if the **Start Cycle** button is pressed.

- Select **OK** to clear the pop-up message.
- If you want to re-run the partial program using the Start and End Blocks that were set previously, press the flashing **Start Cycle** button.
- If you don't want to run the partial program again, or if you are finished with the program, press the **Manual** button on the console to escape from Auto Mode.
- If you want to run the entire program, press the **Manual** button followed by the **Auto** button to return to the Auto screen with the Start and End Blocks reset to 1 and the last block number.



If the Start Block follows any work offset change, Change Part Setup data block, or Change Parameter data block, the control processes that information prior to starting the program at the Start Block.

For NC Programs, the Start and End Blocks are not displayed. Identify the Start and End data blocks of an NC Program by using the SET START MARKER F2 and SET END MARKER F3 softkeys in the NC editor.

- **CYCLES TO RUN**—identifies the number of cycles to run. A cycle consists of the Start Block to the End Block of a part program. This tells the control to repeat running the program the number of times identified in this field.
- **CYCLES COMPLETED**—identifies the number of cycles that have been run. When Cycles Completed equals Cycles to Run, the program stops.



You can set this field to any number and the control will count up from that number. This process can help if you have already run a certain number of parts. If you have run 200 parts, you can enter 200 in the field and watch the number of parts increase by the total entered in Cycles to Run. You can keep track of the total number of parts as they are completed.

- **PREVIOUS CYCLE TIME**—displays the length of time required to complete the previous program or cycle.

Auto Screen Softkeys

The following softkeys are available on the Auto screen:

- **TEST RUN F4**—places the machine in Test Cycle mode. Axis motion is frozen while all other machine operations for the part program function as programmed. This feature is currently not available.
- **RUN PROGRAM F8**—initiates program execution and displays monitoring information:

During execution of the part program, you can switch between Auto and Single Cycle operations by pressing the corresponding console key.

Run the Program Automatically

1. Press the **Auto** key to display the Auto screen.
2. Select the RUN PROGRAM F8 softkey. The **Start Cycle** button and yellow beacon above the control flash.
3. Press the **Start Cycle** button. The program runs. If the machine is not calibrated, the Manual screen immediately displays.

Run the Program Block by Block

1. Press the **Single** console key to display the Auto screen.
2. Select the RUN PROGRAM F8 softkey. The **Start Cycle** button and yellow beacon above the control flash.
3. Press the **Start Cycle** button. The program runs, but the machine stops the axes at the end of each data block. If the machine is not calibrated, the Manual screen immediately displays.
4. Press the flashing **Start Cycle** button to resume with the next block. In Conversational Programming the machine halts (with the spindle running) after each operation. For NC Programming, the machine halts with the spindle running after each data block is executed.

Running a Program

When a program has been verified using the Wireframe or optional Verification Graphics, you can set the machine to automatically run a program. This section describes the steps for starting and stopping automatic operation.

Automatic Machine Operation

To run a program following machine calibration and Auto or Single machine mode selection,

1. Press the RUN PROGRAM F8 softkey on the Auto screen. The **Start Cycle** button and the yellow beacon above the control flash.
2. Press the **Start Cycle** button to run the program.

The Auto Run screen appears, showing the program status and machine operation as the part runs in the selected cycle. When this screen initially opens, it contains the softkeys shown here. The softkey menu automatically changes to provide the selections defined in *Auto Run Softkeys, on page 5 - 24*.

Two-Axis (TM Series) Turning Center

AUTO RUN					
MACHINE	PART	DTG	CONVEYOR	OFF	
X 14.0945	14.0945	0.0000	TOOL NUMBER	3	
Z 23.0709	23.0709	0.0000	TOOL OFFSET	0	
			WORK OFFSET	0	
SPINDLE RPM	0	(CSS OFF)			
FEED (IPM)	0.0000	F(%) 46	R(%) 41	S(%) 82	
			BLOCK NUMBER	0	
			CYCLE TIME	0:00:00	
			CYCLES COMPLETED	0	
			CYCLES REMAINING	1	
			CHIP CONVEYOR FORWARD	F1	
			CHIP CONVEY REVERSE	F2	
			CHIP CONVEYOR STOP	F3	
			SELECT DRO	F4	
			NC MONITOR	F5	
			TOOL WEAR OFFSETS	F6	
			ZOOM / PAN	F7	
			TOGGLE WORKLIGHT	F8	
NONAME1.HLT INCH D 5:11 AM					

Figure 5-10. TM Series Auto Run Screen

Live-Tooling (TMM Series) Turning Center

MACHINE	PART	DTG	CONVEYOR	OFF	
X 15.6693	15.6693	0.0000	TOOL NUMBER	0	
Z 24.9606	24.9606	0.0000	TOOL OFFSET	0	
C 0.000	0.000	0.000	WORK OFFSET	0	
S1 RPM 0 (CSS OFF)	S2 RPM 0				
FEED (IPM) 0.0000	F% 100	R% 100	S1% 100	S2% 100	
BLOCK NUMBER 0 CYCLE TIME 0 : 00 : 00 CYCLES COMPLETED 0 CYCLES REMAINING 1					
					CHIP CONVEYOR FORWARD F1
					CHIP CONVEYOR REVERSE F2
					CHIP CONVEYOR STOP F3
Dune Buggy Par INCH D 3:22 PM					

Figure 5–11. TMM Series Auto Run Screen

Auto Run Fields

- **MACHINE** and **PART X** and **Z**—displays the current positions of both axes relative to absolute zero for the machine and part zero for the part.
- **DTG**—indicates the Distance To Go as each programmed data block runs for the X and Z axes.
- **CONVEYOR**—displays On or Off. On appears when the option is turned on; Off appears when the option is turned off or the option is not installed.
- **TOOL NUMBER**, **TOOL OFFSET**, and **WORK OFFSET**—display the current tool information based on selections in Tool Setup. Refer to *Tool Setup Fields*, on page 4 - 18 for details.
- **SPINDLE** and **FEED**—display the current spindle speed and feed based on selections in Tool Setup. Refer to *Tool Setup Fields*, on page 4 - 18 for details.
- **F (%)**—displays the current Feedrate Per Minute percentage set on the Axis Feed Rate override knob.
- **R (%)**—displays the current Rapid Traverse Feedrate percentage set on the Rapid override knob.
- **S (%)**—displays the current spindle RPM percentage set on the Spindle Speed override knob

- The center left area of the screen graphically displays tool motion. Use the **ZOOM**, **PAN**, and **FIT TO VIEW** softkey menus to adjust the graphic. These softkey menus function the same way as the Wireframe Graphics softkey selections.
 - Use the ZOOM menu to enlarge or reduce size of the graphic.
 - Use the PAN menu to move the graphic around in the window.
 - Use FIT TO VIEW to resize the graphic.

Refer to *Two-Dimensional Wireframe Graphics*, on page 4 - 79 for details about these menu selections: View, Viewing Options, Zoom, Pan, and Rotate.

Refer to *Three-Dimensional Graphics*, on page 4 - 84 for Graphics Settings information from the Settings F8 softkey menu.

- **Block Number**—displays the data block being executed.
- **Cycle Time**—indicates the amount of time a program takes to run one cycle.
- **Cycles Completed**—identifies the number of cycles in the program that have been completed. The counter counts up to the value indicated in Cycles to Run. Cycles Completed defaults to the entry set on the Auto screen.
- **Cycles Remaining**—identifies the number of cycles remaining to run continuously. The **Start Cycle** button flashes between cycles requiring the operator press it to start each cycle. The counter counts down to 0. Cycles Remaining defaults to the value in Cycles to Run minus the number of completed cycles.
- **Spindle Load Meter**—shows a color vertical bar representing the power required on the spindle by the cut, graduating from green to yellow to red as horsepower increases to maximum (red).

Auto Run Softkeys

These softkeys are available for Auto Run mode:

- **CHIP CONVEYOR FORWARD F1** option— turn the chip conveyor in the forward (clockwise) direction on or off. This softkey is only available if your turning center uses a chip conveyor.
- **CHIP CONVEYOR REVERSE F2** option— turn the chip conveyor in the reverse (counterclockwise) direction on or off. This softkey is only available if your turning center uses a chip conveyor.
- **CHIP CONVEYOR STOP F3** option—stop the chip conveyor. This softkey is only available if your turning center uses a chip conveyor.
- **SELECT DRO F4**—change the size of the digital read out (DRO) on the screen. From the Select DRO screen you can see machine information displayed in full-screen view. The Select DRO softkey menu provides these choices:
 - **STANDARD F2**—returns the DRO to its standard size, at the top of the Auto Run screen. Refer to *Auto Mode*, on page 5 - 19 for an example.

- **MACHINE RELATIVE (QUAD-SIZE DRO) F4**—shows real-time location of machine information in full screen view: Xm, Zm, Spindle, Feed, Block. Select the SELECT DRO F4 softkey followed by the STANDARD DRO F2 softkey to return to the Auto Run screen.

Two-Axis (TM Series) Turning Center

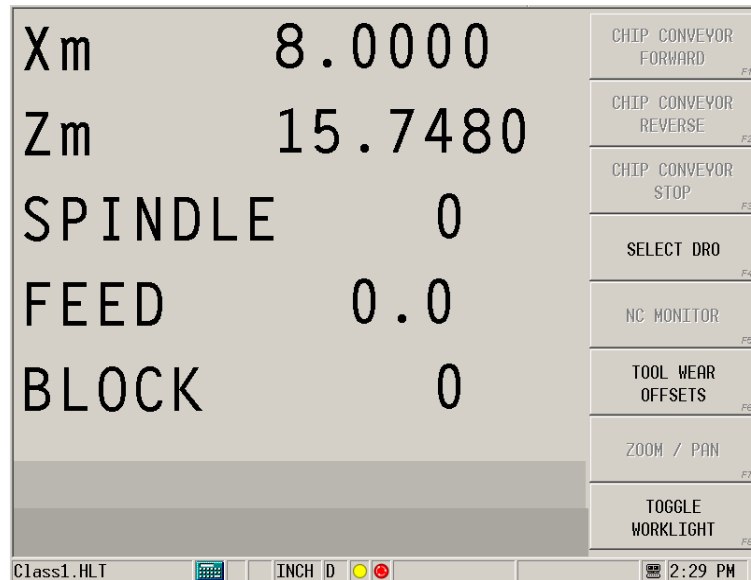


Figure 5–12. TM Series Machine Relative Quad-Size DRO screen

Live-Tooling (TMM Series) Turning Center

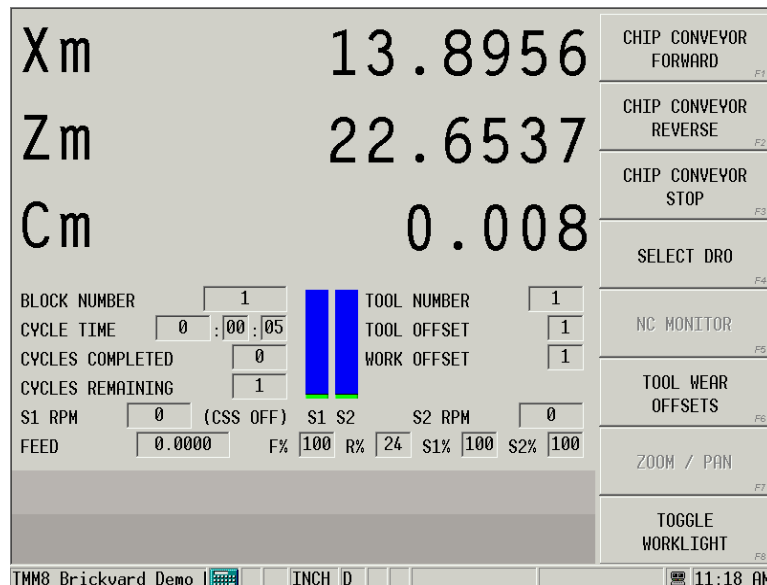


Figure 5–13. TMM Series Machine Relative Quad-Size DRO screen

- **PART RELATIVE (QUAD-SIZE DRO) F5**—shows real-time location of part information in full screen view: Xp, Zp, Spindle, Feed, Block. Select the SELECT DRO F4 softkey followed by the STANDARD DRO F2 softkey to return to the Auto Run screen.

Two-Axis (TM Series) Turning Center

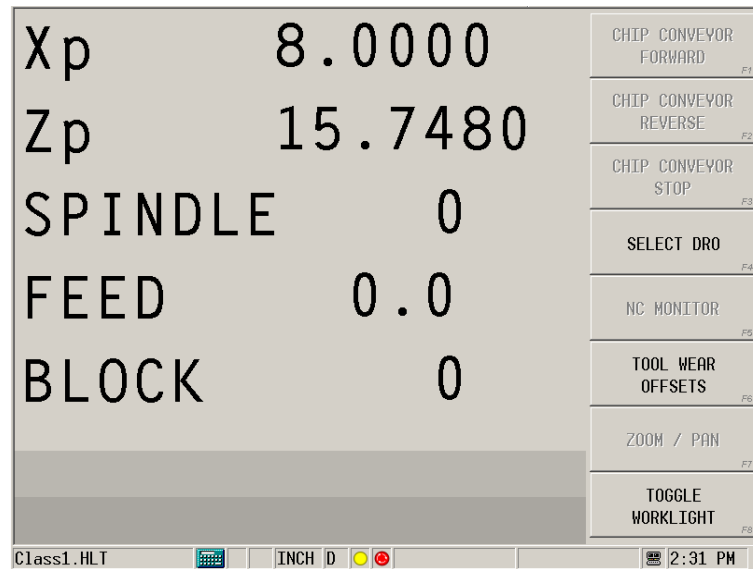


Figure 5–14. TM Series Part Relative Quad-Size DRO screen

Live-Tooling (TMM Series) Turning Center

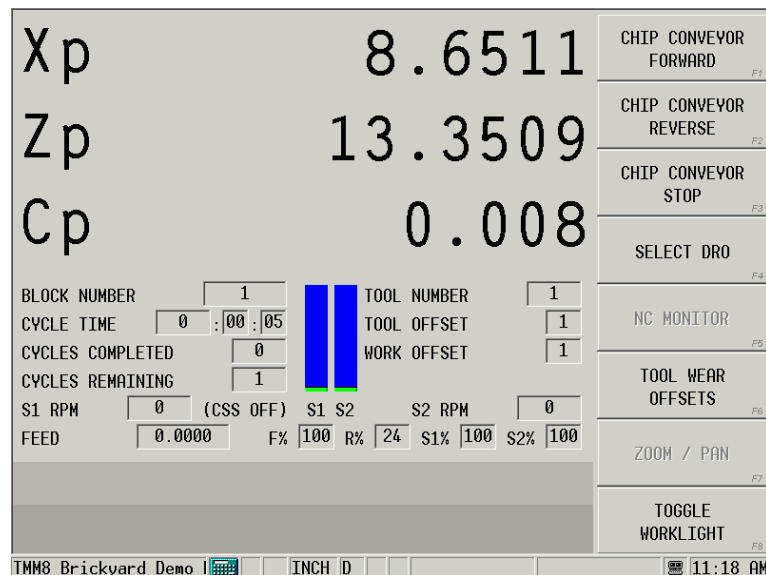


Figure 5–15. TMM Series Part Relative Quad-Size DRO screen

- **DISTANCE TO GO (QUAD-SIZE DRO) F6**—shows the amount of time for completing each move in full screen view: Xdtg, Zdtg, Spindle, Feed, Block. Select the SELECT DRO F4 softkey followed by the STANDARD DRO F2 softkey to return to the Auto Run screen.

Two-Axis (TM Series) Turning Center

Xdtg	0.0000	CHIP CONVEYOR FORWARD	F1
Zdtg	0.0000	CHIP CONVEYOR REVERSE	F2
SPINDLE	0	CHIP CONVEYOR STOP	F3
FEED	0.0	SELECT DRO	F4
BLOCK	0	NC MONITOR	F5
		TOOL WEAR OFFSETS	F6
		ZOOM / PAN	F7
		TOGGLE WORKLIGHT	F8

NONAME1.HLT INCH D 5:12 AM

Figure 5–16. TM Series Distance To Go Quad-Size DRO screen

Live-Tooling (TMM Series) Turning Center

Xdtg	0.0000	CHIP CONVEYOR FORWARD	F1
Zdtg	0.0000	CHIP CONVEYOR REVERSE	F2
Cdtg	0.000	CHIP CONVEYOR STOP	F3
		SELECT DRO	F4
		NC MONITOR	F5
		TOOL WEAR OFFSETS	F6
		ZOOM / PAN	F7
		TOGGLE WORKLIGHT	F8

BLOCK NUMBER 0
 CYCLE TIME 0:00:00
 CYCLES COMPLETED 0
 CYCLES REMAINING 1
 S1 RPM 0 (CSS OFF) S1 S2 S2 RPM 0
 FEED 0.0000 F% 100 R% 100 S1% 100 S2% 100
 TOOL NUMBER 0
 TOOL OFFSET 0
 WORK OFFSET 0

Dune Buggy Par INCH D 3:08 PM

Figure 5–17. TMM Series Distance To Go Quad-Size DRO screen

- **NC MONITOR F5**—displays a pop-up window containing the current NC code. This feature allows you to view the code as the program runs.
- **TOOL WEAR OFFSETS F6**—accesses the tool Wear Offset screen. This feature allows you to adjust the tool position as a result of wear. Refer to *Tool Setup—Geometry Offsets, on page 4 - 15* for details.
- **ZOOM / PAN F7**—accesses zoom and pan softkey menus for adjusting the graphics. These softkey menus function the same way as the Wireframe Graphics softkey selections.
 - Use the ZOOM menu to enlarge or reduce size of the graphic.
 - Use the PAN menu to move the graphic around in the window.
 - Use FIT TO VIEW to resize the graphic.

Refer to *Two-Dimensional Wireframe Graphics, on page 4 - 79* for details about these menu selections: View, Viewing Options, Zoom, Pan, and Rotate.

Refer to *Three-Dimensional Graphics, on page 4 - 84* for Graphics Settings information from the Settings F8 softkey menu.

- **TOGGLE WORKLIGHT F8**—sets the enclosure worklight On or Off.

Stop Automatic Machine Operation

To Stop an Automatic Machine Operation, either press the **Stop Cycle** button to stop the axis which stops axes and spindle motion simultaneously and disables coolant, or follow these steps:

1. Press the **Feed Hold** console button to stop axis motion.
2. Press the **Off** console key in the **Spindle** group to stop the spindle.
3. Press the **Feed Hold** console button again to release the Feed Hold.

Shut Down

To shut down the machine quickly, press the **Emergency Stop** button. The red beacon above the control lights up and the Emergency Stop icon appears in the status bar on the screen. Lube and hydraulic pump operation is disabled. Servo and spindle amp are disabled.

⇒ Emergency Stop shut down is not recommended while the machine is in motion, except for an emergency.

You should select the HOME MACHINE *F7* softkey before pressing the Emergency Stop button. It is recommended to Emergency Stop the machine when the machine will not be in use for a period of time. In a non-emergency situation, it is recommended that the turret be in a position away from the spindle, workpiece, or other internal fixtures.

With the Emergency Stop enabled, you cannot move the machine or run a program. To release the **Emergency Stop** button, twist and release the button. Refer to *Control Power, on page 5 - 3* for information about restoring Control Power on. Always perform Control Power off before performing Machine Power off. Turn the main power switch located at the back of the machine to Off to perform Machine Power off.

⇒ If the machine will not be used for several days, it is recommended to turn off machine power at the main power switch.

RECORD OF CHANGES

704-0115-104, April 2009, ECN 16508

Revised by: K. Gross

Approved by: D. Skrzypczak, J. Mulkey, C. Thale, G. Traicoff April 2009

Changes

704-0115-104 rC: Updates based on changes through v2.02.05 software. Moved Turret Diagnostics section from *Maintenance and Safety* manual to this manual, Machine Operation Basics chapter. April 2009

704-0115-104 rB: Updates based on changes through v2.02.03 software. Jan. 2009

704-0115-104 rA: Updates based on changes through v2.02.02 software. Added information to front matter about On-screen Help and accessing the On-screen Help in PDF format. Nov. 2008.

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Changes

Updates based on v1.1, v1.2, and v2.0 software and the introduction of the Live Tooling (TMM Series) machine.

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Changes

New manual release.

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