

## Tooling

# Chapter 6

## OBJECTIVE

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Set the tooling graphics to match the actual tool installed in the turret.

## INTRODUCTION

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After you have verified that the work holding device is functioning correctly (and safely), you are ready to install the tooling.

**IT WILL ALWAYS BE YOUR RESPONSIBILITY TO INSURE THAT THE TOOLING INSTALLED IN THE TURRET MATCHES THE TOOLING REQUIRED BY YOUR PROGRAM.**

After you have the necessary tooling in the turret, you will need to set-up the graphic representations for the specific tools you installed.

## TOOLING GRAPHICS

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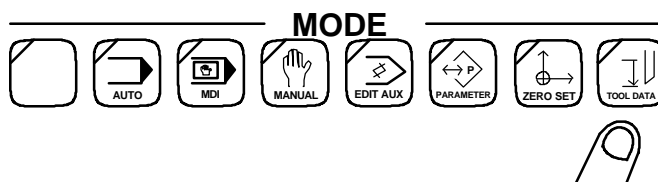
There are two main reasons for wanting the graphics to match the tools you install into the turret.

1. When this information is correctly entered, the graphic display will more closely represent the actual work which will allow for more accurate troubleshooting of the program.

- When you enter the data for Tool Nose Radius compensation, certain helpful guides will be displayed. These guides will **only** be correct if the tooling graphics have been set-up correctly.

To enter the graphic data for your program, use the following procedure.

- On the Operation Panel, select the TOOL DATA mode of operation.



The screen for TOOL DATA SET will be displayed.

The screenshot shows the 'TOOL DATA SET' screen. In the top left corner, 'Page 1' is circled. The screen displays the following information:

- BC=32
- TOOL NO. 1
- \* TOOL FORM SELECT \*
- TOOL CODE NO. 3 ROUGH FACE
- FORM CODE NO. 3
- TOOL EDGE DATA
- TOOL ANGLE A1= 80.0000
- EDGE ANGLE A2= 5.0000
- STICKING OUT L = 1.0000
- OFFSET NO.
- ON1= 0
- ON2= 0
- ON3= 0
- UNIT 1in
- A diagram of a tool nose with a black square labeled 'INTERFER AREA'.

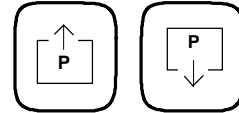
At the bottom of the screen, there is a row of function keys: F1, F2, F3, F4, F5, F6, F7, and F8. Above F6 and F7 are 'ITEM' labels with up and down arrows respectively.

- Select function key [F7] (ITEM down) or [F6] (ITEM up) as many times as necessary until the previous screen is displayed.

Notice that in the upper left corner of the screen TOOL NO. is displayed. The number directly to

the right of this entry represents the turret position for the graphic being displayed.

To view the tool information for a different turret position, select either of the PAGE keys until the correct turret position number is displayed.



3. To change the graphic to match the **actual tool installed in the turret**, select function key [F3] (TOOL KIND).

Another version of the TOOL DATA SET screen will be displayed.

TOOL DATA SET			UNIT 1in	
Page 1				
* TOOL FORM SELECT *				
TOOL NO. 1	TOOL CODE NO. 1 ROUGH OD ←			
FORM CODE NO. 1				
-- TOOL CODE TABLE --				
NO.	NO.	NO.		
1 ROUGH OD	10 FINISH OD	19 GROOVE OD		
2 ROUGH ID	11 FINISH ID	20 GROOVE ID		
3 ROUGH FACE	12 FINISH FACE	21 GROOVE FACE		
4 ROUGH OD	13 THREAD OD	22 DRILL, HSS		
5 ROUGH ID	14 THREAD ID	23 DRILL, CARBIDE		
6 ROUGH FACE	15 THREAD FACE	24 DRILL, CENTER		
7 FINISH OD	16 THREAD OD	25 RECESS OD		
8 FINISH ID	17 THREAD ID	26 RECESS ID		
9 FINISH FACE	18 THREAD FACE			
tool item code NO. !				
SET	ADD	KIND		
			ITEM ↑	ITEM ↓
F1	F2	F3	F4	F5
F6	F7	F8		

This screen displays a list of all the choices for different types of tooling that can be graphically displayed.

Notice that there is a prompt across the bottom of the screen asking you to enter the "tool item code NO.". When you see a prompt like this it will not be necessary to use the function key [F1] (SET).

4. To select a ROUGH OD operation cutting from right to left, you would want to choose number 1. Enter the number 1 at the Extended Keypad followed by the WRITE key.

Another version of the TOOL DATA SET screen will be displayed.

The screenshot shows the 'TOOL DATA SET' screen. At the top left, it says 'Page 1'. At the top right, it says 'UNIT 1in'. Below 'Page 1', it says 'TOOL NO. 1'. To the right of 'TOOL NO. 1', it says '\* TOOL FORM SELECT \*', 'TOOL CODE NO. 1 ROUGH OD ←', and 'FORM CODE NO. 1'. Below this, it says '-- FORM PATTERN FIGURE --'. There are three figures labeled 1, 2, and 3. Figure 1 shows a tool profile with a small chip. Figure 2 shows a tool profile with a larger chip. Figure 3 shows a tool profile with a very large chip. Below the figures, it says 'tool item code No. !' and 'tool form code No. !'. At the bottom, there is a row of buttons: SET, ADD, KIND, and two ITEM buttons with up and down arrows. Below these buttons is a row of function keys: F1, F2, F3, F4, F5, F6, F7, and F8.

You will see the various FORM available for a ROUGH OD tool that can cut from left to right.

Notice that a new prompt is displayed across the bottom of the screen asking you to enter the "tool form code NO.". Once again, it is not necessary to use a function key because there is a specific prompt.

If you do **not** see the FORM you desire, select the PAGE key to display additional choices. If the additional display shows only blank choices, there are no other selections. Select the PAGE key until the FORM that *most closely* depicts your **actual tool** is displayed.

- After you have determined which FORM to use, enter the number at the Extended Keypad followed by the WRITE key. For this exercise enter the number 1.

The original \*TOOL FORM SELECT\* screen will again be displayed.

TOOL DATA SET

Page 1

BC=32

UNIT 1in

\* TOOL FORM SELECT \*

TOOL NO. 1 TOOL CODE NO. 1 ROUGH OD ←

FORM CODE NO. 1

TOOL EDGE DATA

TOOL ANGLE A1= 80.0000

EDGE ANGLE A2= 5.0000

STICKING OUT L = 1.0000

OFFSET NO.

ON1= 0

ON2= 0

ON3= 0

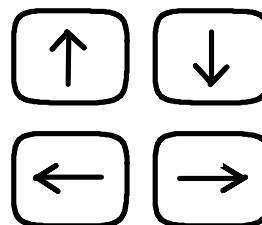
INTERFER AREA

SET ADD KIND ITEM ↑ ITEM ↓

F1 F2 F3 F4 F5 F6 F7 F8

Now that the correct tool graphic is displayed, you will need to enter the remainder of the information.

- Use the CURSOR ARROW keys to position the cursor over the data for TOOL ANGLE.



You must now determine the *included angle* of the insert you are using. This value will be the angle of the actual insert from one side to the other.

Standard insert angles are as follows:

C inserts = 80 degrees

D inserts = 55 degrees

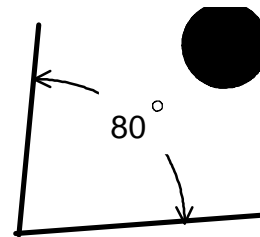
V inserts = 35 degrees

S inserts = 90 degrees

T inserts = 60 degrees

7. Select function key [F1] (SET).

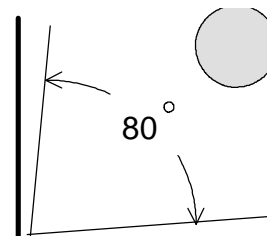
8. At the Extended Keypad, enter the value for the included angle. For this exercise enter the number 80 followed by the WRITE key.



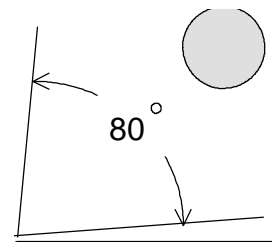
9. Use the CURSOR ARROW keys to position the cursor over the data for EDGE ANGLE.

You must now determine the *leading* EDGE ANGLE. The leading edge of your tool is that portion which is moving **into** the cut.

This example shows where the leading edge angle is located for an insert making an OD cut from right to left.



This example shows where the leading edge angle is located for an insert making a FACE cut toward the center.



10. Select function key [F1] (SET).
11. For this exercise, enter the number 5 at the Extended Keypad followed by the WRITE key.
12. Use the CURSOR ARROW keys to position the cursor over the data for STICKING OUT.

You must now determine how far from the turret face this tool is ***sticking out***. This information is used **only** for graphic representations. This value should be the distance from the tip of the tool back to *what you don't want to run into!*

13. For this exercise enter the number 1 at the Extended Keypad followed by the WRITE key.
14. Use the CURSOR ARROW keys to position the cursor over the data for ON1 (Offset Number 1).

You must now determine which offset was entered for this tool (commonly the same number as the turret tool position). There are three (3) offsets to be used in the event that your program requires more offsets, as is the case with a grooving tool.

15. For this exercise, enter the same number as the TOOL NO. (shown in the upper left corner of the screen) at the Extended Keypad followed by the WRITE key.

At this point, you are finished entering all the necessary tool graphic information for a single tool.

If you have more settings to make, use the PAGE key to display the tool turret position TOOL NO. that needs to be set-up, and return to step 3.

Selecting function key [F7] (ITEM down) will return you to the original \*TOOL OFFSET\* screen, or you can go directly to another mode of operation by selecting the desired MODE SELECT key.