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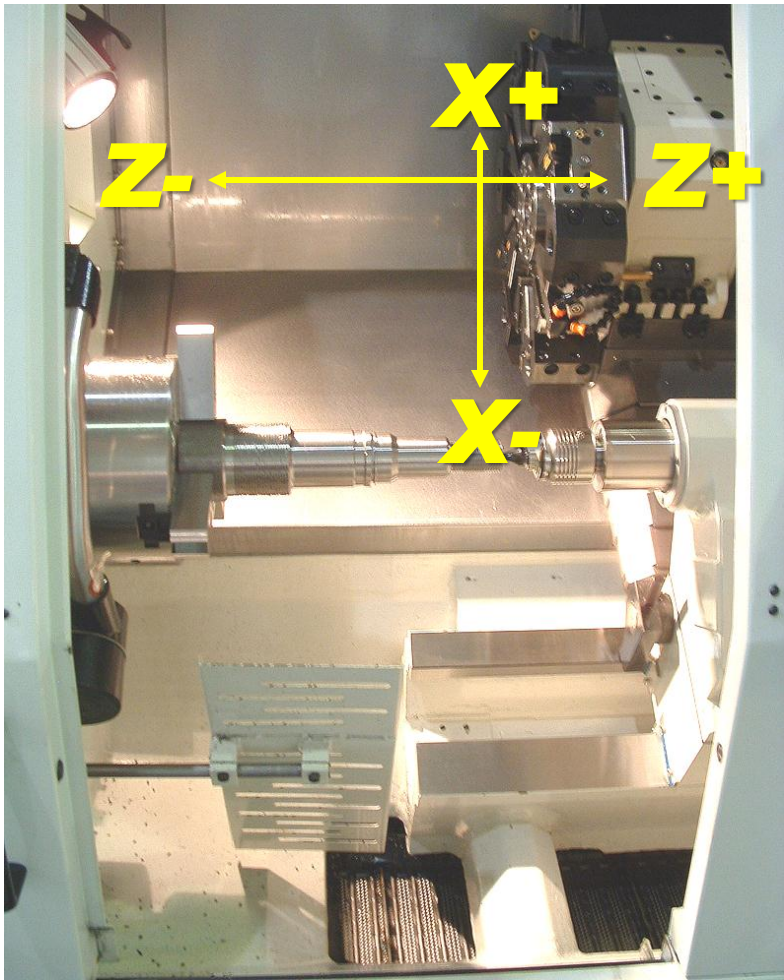
Lathe Intro Worksheets

Machine Basics

- Axis Description
  - X = Diameters
  - Z = Depth



Lathe Programming Procedures

1. **Initial Part Set-up** (to allow the use of verification graphics):
Because the part set-up is saved with each individual part program the "Z" axis work offset defaults to zero when a new program is created. With this value set to zero, the verification graphics will not run. Therefore, the value must be set to an arbitrary positive value (9.0000" for example) to allow the verification graphics to be used. The actual part set-up will be performed once the program has been created, and part is ready to run.

2. **Tool Set-up:**
To allow the speeds and feed fields of the part program to be automatically populated as the program is being written, the tool set-up must be performed BEFORE the program is written. With the exception of actual tool touch-off, all aspects of the tool set-up should be performed prior to part programming. This will aid in eliminating arbitrary errors that may occur while viewing the part program in verification mode, or when the program is ready to run on the machine.

3. **Part Programming:**
Now that the preliminary steps above have been completed it is time to write the actual part program.

Part Set-up
(Without a tool setter probe)

1. **Define a Master Tool:**
A "master tool" should be defined. This tool will be used to teach the work offset ("Z" zero) if there isn't a tool setter probe installed on the machine - the master tool is usually a turning tool, and normally in turret position number one. This tool will be defined as the master tool by simply setting the "Z" axis tool length offset to 0.0000".
2. **Setting the Work Offset** (Part Set-up):
   - By using the hand wheel in manual mode, jog the tool tip down until it makes contact with the face of the part.
   - Go to the part set-up screen and be sure the cursor is in the desired work offset field of the table.
   - Press the store machine position soft key.
   - The work offset ("Z" zero) is now set.

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3. Touching off the tools:

Start with the master tool:

- Using the hand wheel in manual mode, jog the tool tip down until it is in contact with a known diameter. Turn a short shoulder using the hand wheel if necessary and measure.
- Go to the tool set-up screen and make sure the cursor is on the "X" axis field of the correct tool, and press the store machine zero soft key.
- You will be prompted to enter the measured diameter, and press okay.
- The tool is now set.

Continue the above process for next tool and then proceed with the steps below for "Z" - repeat both above and below steps for all of the remaining tools. **DO NOT CHANGE THE "Z" FOR THE MASTER TOOL.**

- Using the hand wheel in manual mode, jog the tool tip down until it is contact with the face of the part.
- Press the store machine position soft key.
- The control will ask what tool offset you want to use for setting the tool – this is typically the same as the tool number.
- Press enter.
- Proceed with the remaining tools.

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Calculations

Basics of Feeds and Speeds

- CSS = Constant Surface Speed
- CSF = Constant Surface Footage
- SFM = Surface Feet Per Minute

- IPR = Inch Per Revolution
- IPM = Inch Per Minute

The cutting speed of any material is based on the speed of the material passing over the cutting tool. This speed is measured as SFPM – Surface Feet Per Minute.

This is based on the circumference size of the part or cutter.

$$CSS = \frac{RPM \times Diameter}{3.82}$$

$$RPM = \frac{CSS \times 3.82}{Diameter}$$

$$FPR\ (IPR) = IPM / RPM$$

$$IPM = IPR \times RPM$$

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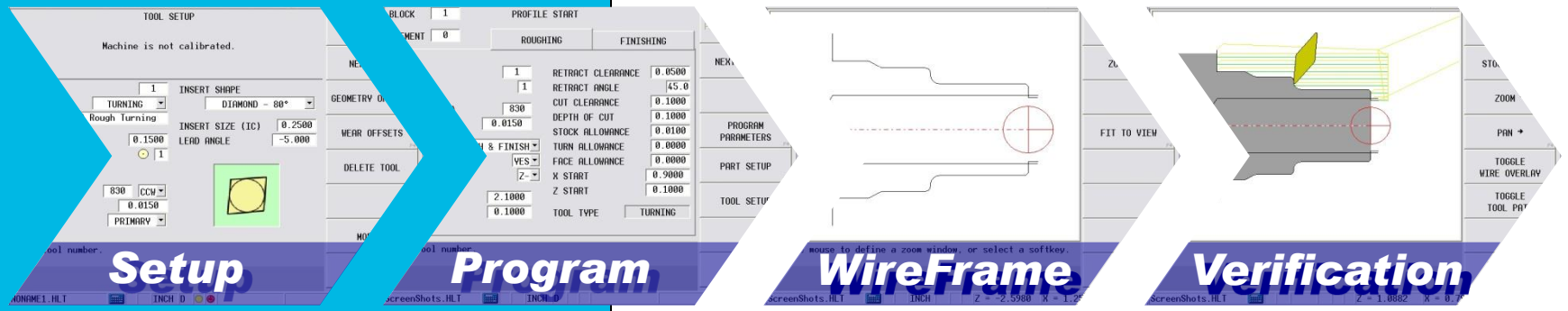
Basic Programming



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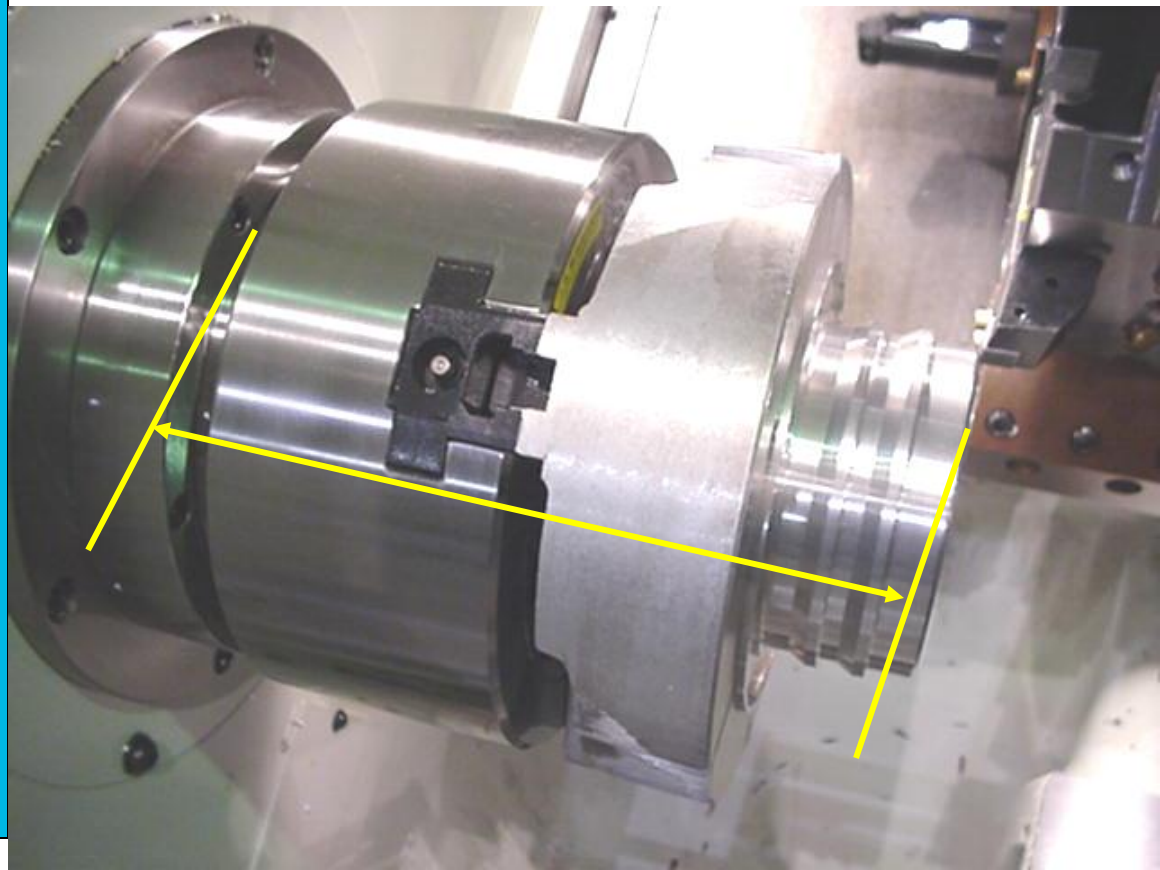
Introduction to Lathe Software

- Machine Zero
  - X – C'Line
  - Z – Spindle Face

- Part Setup



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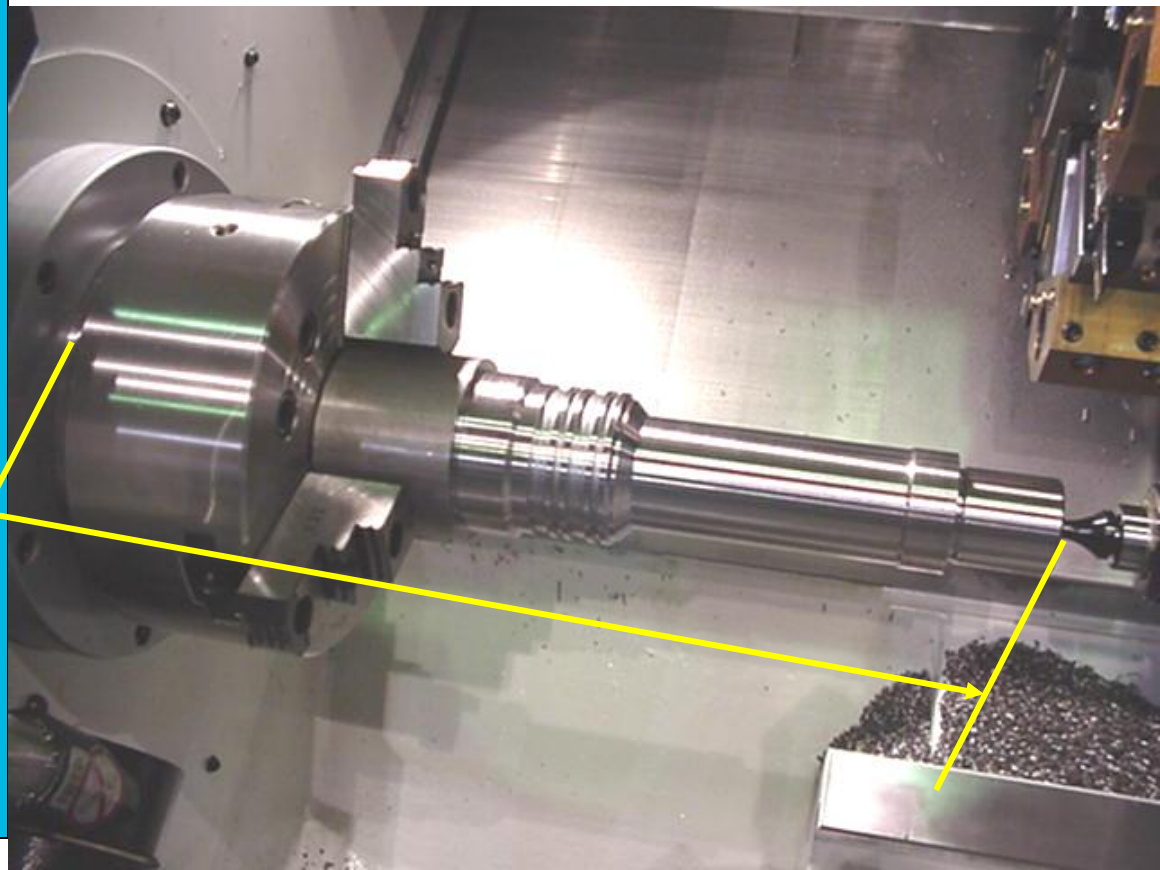

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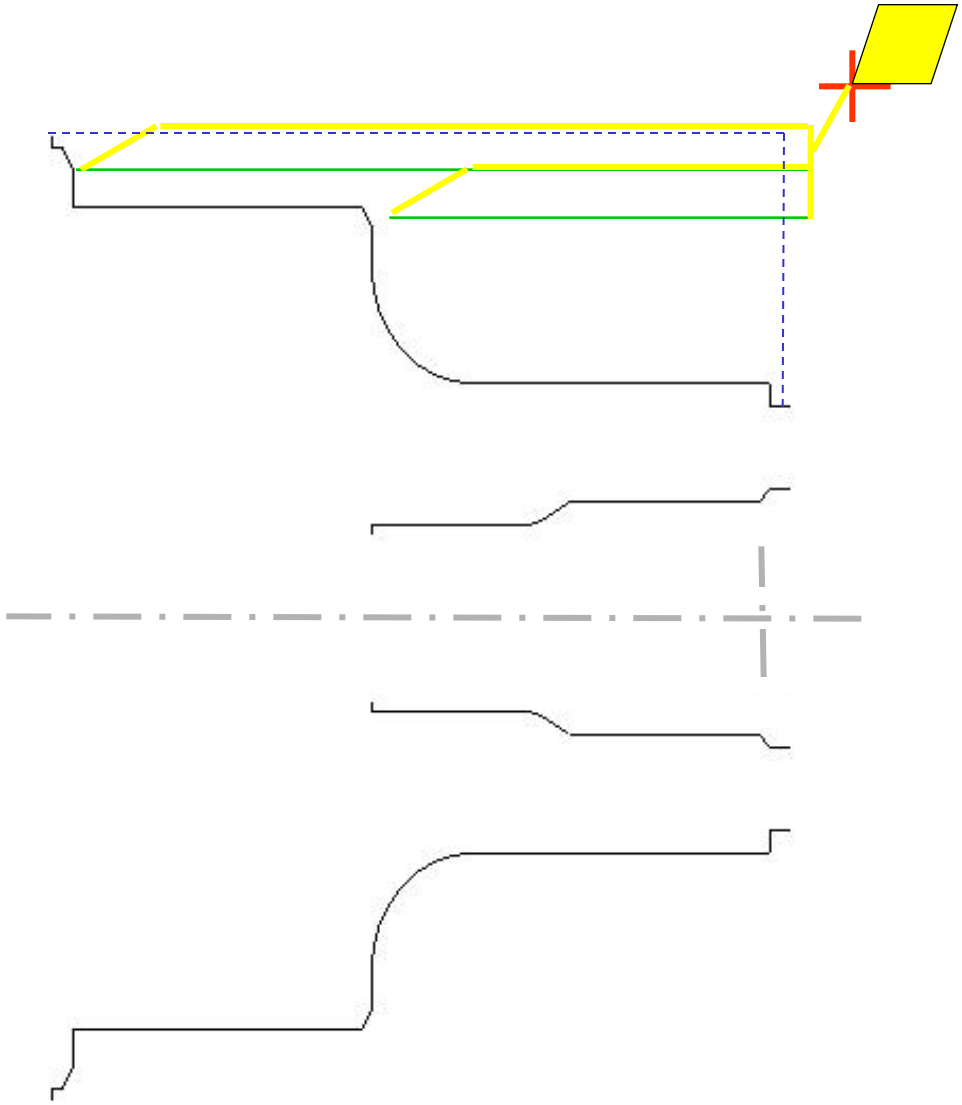
Rules of Lathe Software

Profiles

- Rapid (Start) Point is also Return Point
- Defining Start & End Positions & Moves
  - Must Be Perpendicular
  - Defines Stock



Max Control

Keyboard Shortcuts

F-Arrows	Navigation Within Data Block
F-.	Full Precision Editing
F-Help	Screen Capture
Alt-Input	On Screen Keyboard

Copy & Pasting Shortcuts

Data Blocks

Go to Review (Program Review), highlight the data block you want copied, press Multi Block Functions (top right button on screen), then press Copy, highlight the data block you want to paste in front of, and then press Paste.

From Program to Program

Go to Review (Program Review), highlight the data block or blocks you want copied, press Multi Block Functions (top right button on screen), then press Copy.
Now go to Project Manager, highlight the program you want to paste to, go to Program Review, highlight the data block you want to paste in front of, and then press Paste.

Tools

Copy and paste work the same way as the data block copy and paste, but you go to the Tool Review screen (press menu and then Tool Review).

Elements

You cannot copy and paste individual elements as they are dependent on adjacent blocks for calculations or end points, etc.

Verification Shortcut

Data Block Range:

To run only a certain data block range in verification graphics, go to Auto mode, type the block range you want to see, then immediately switch back to Verification Graphics and press Run Prove Out.

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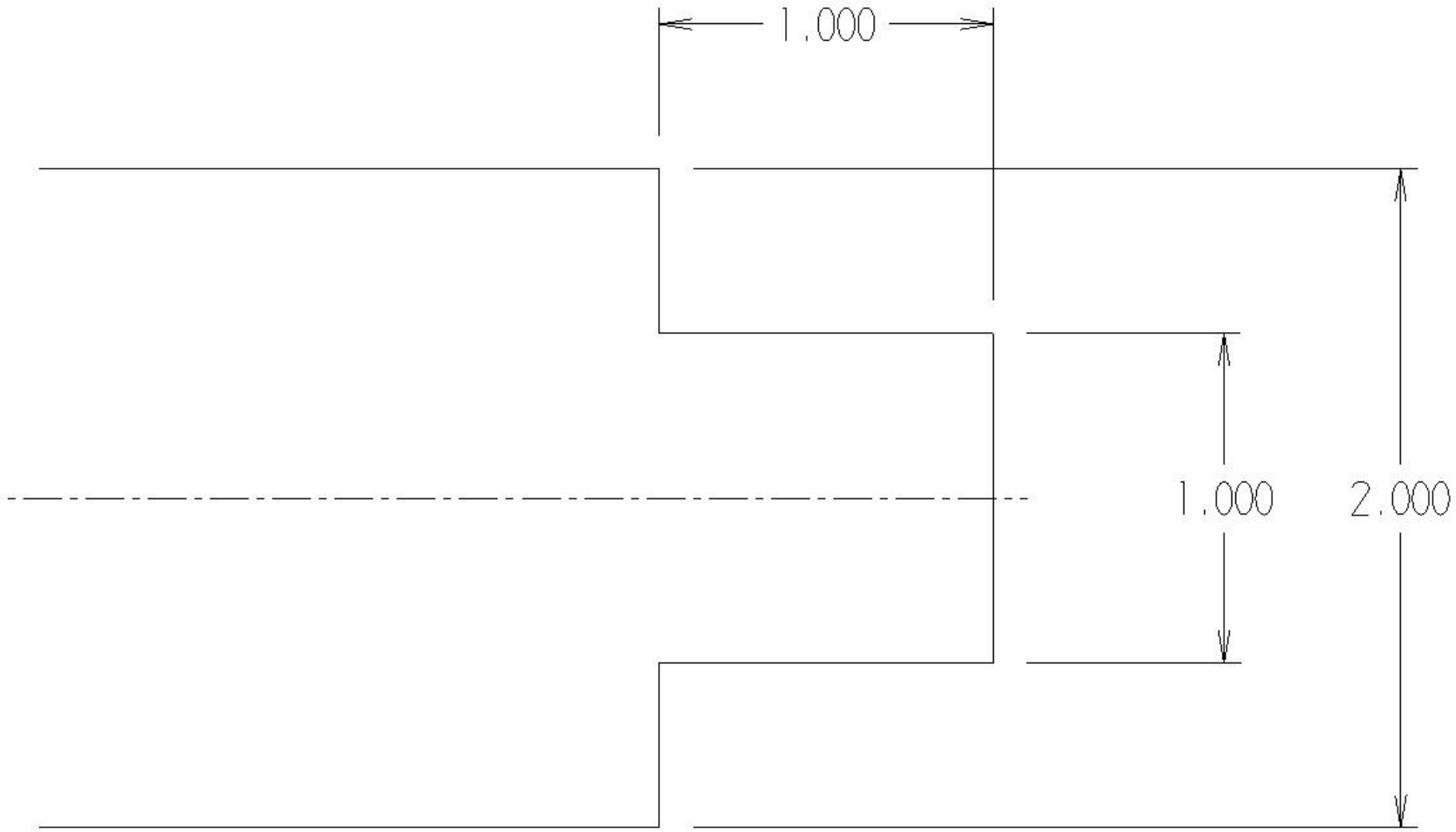

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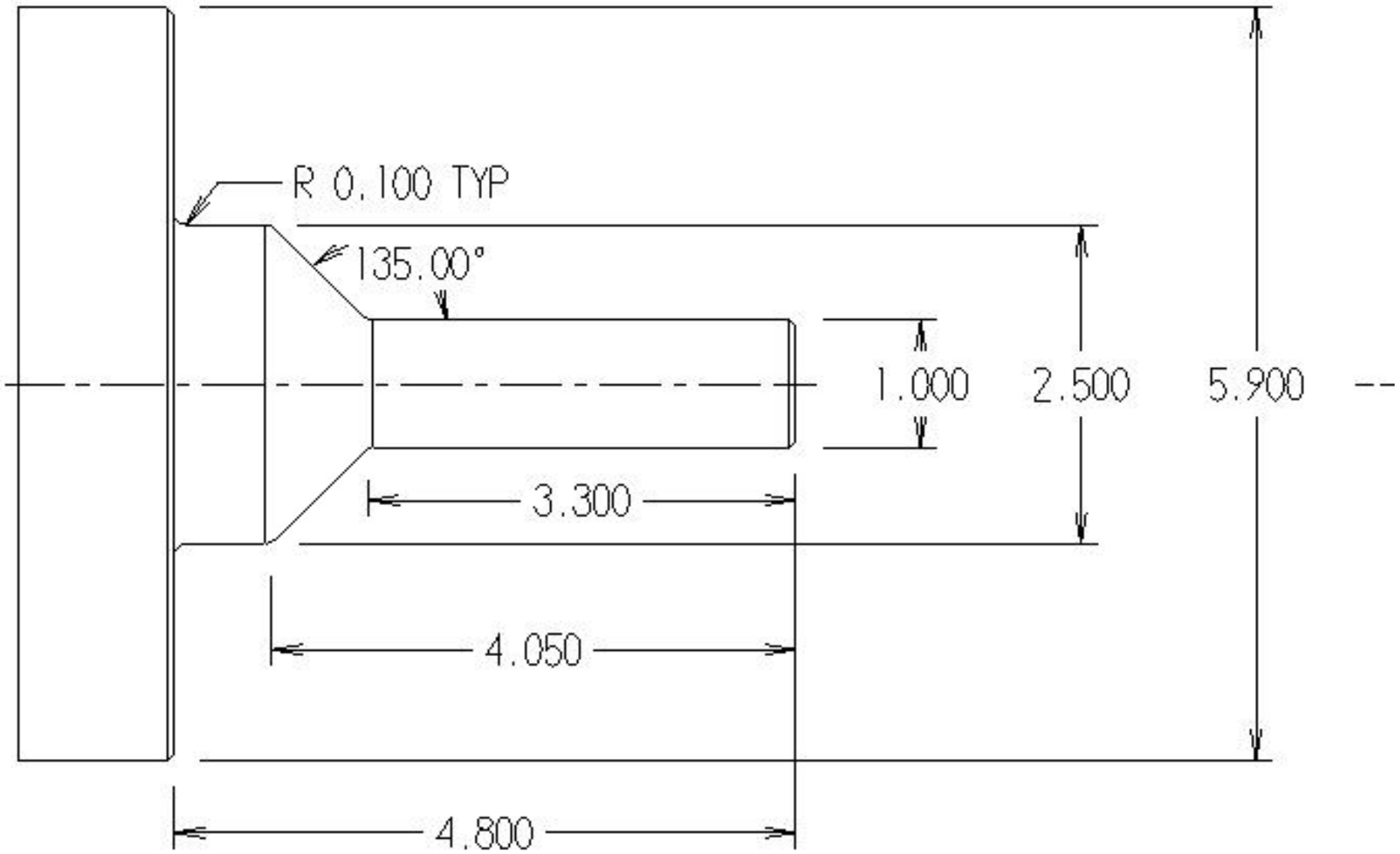

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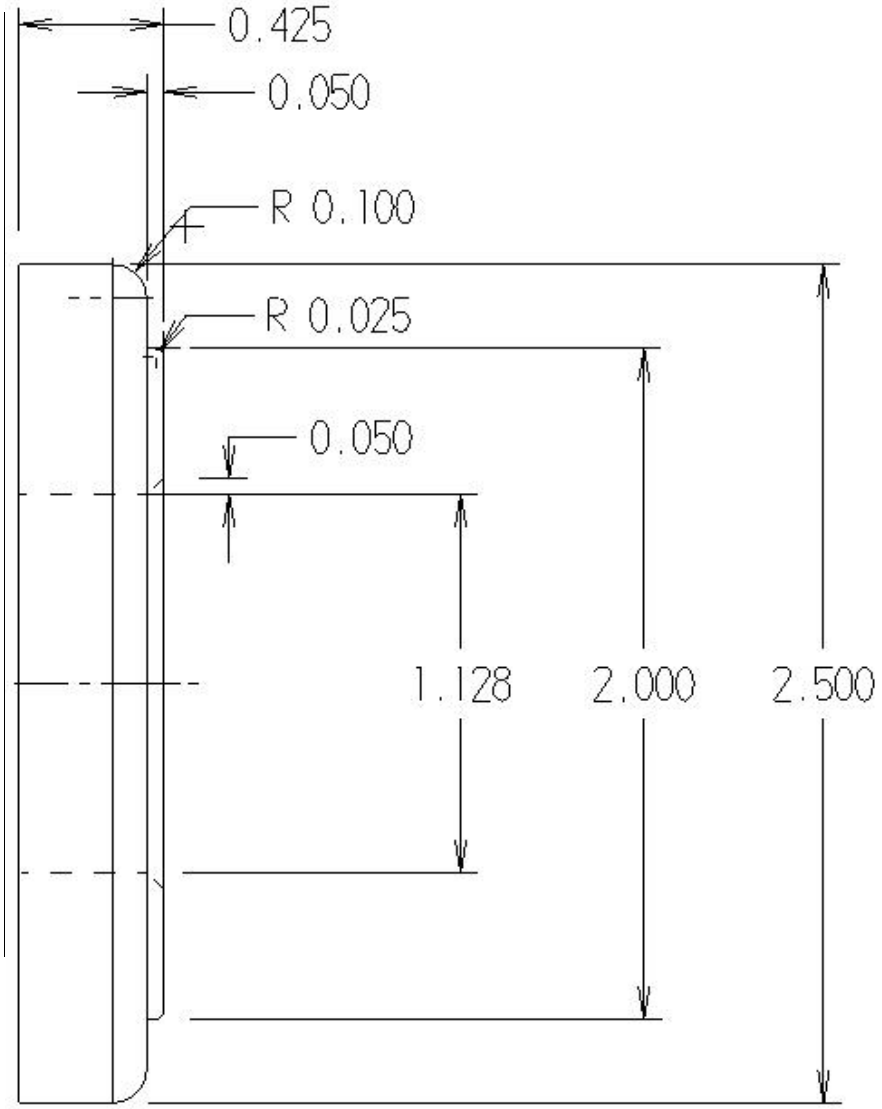

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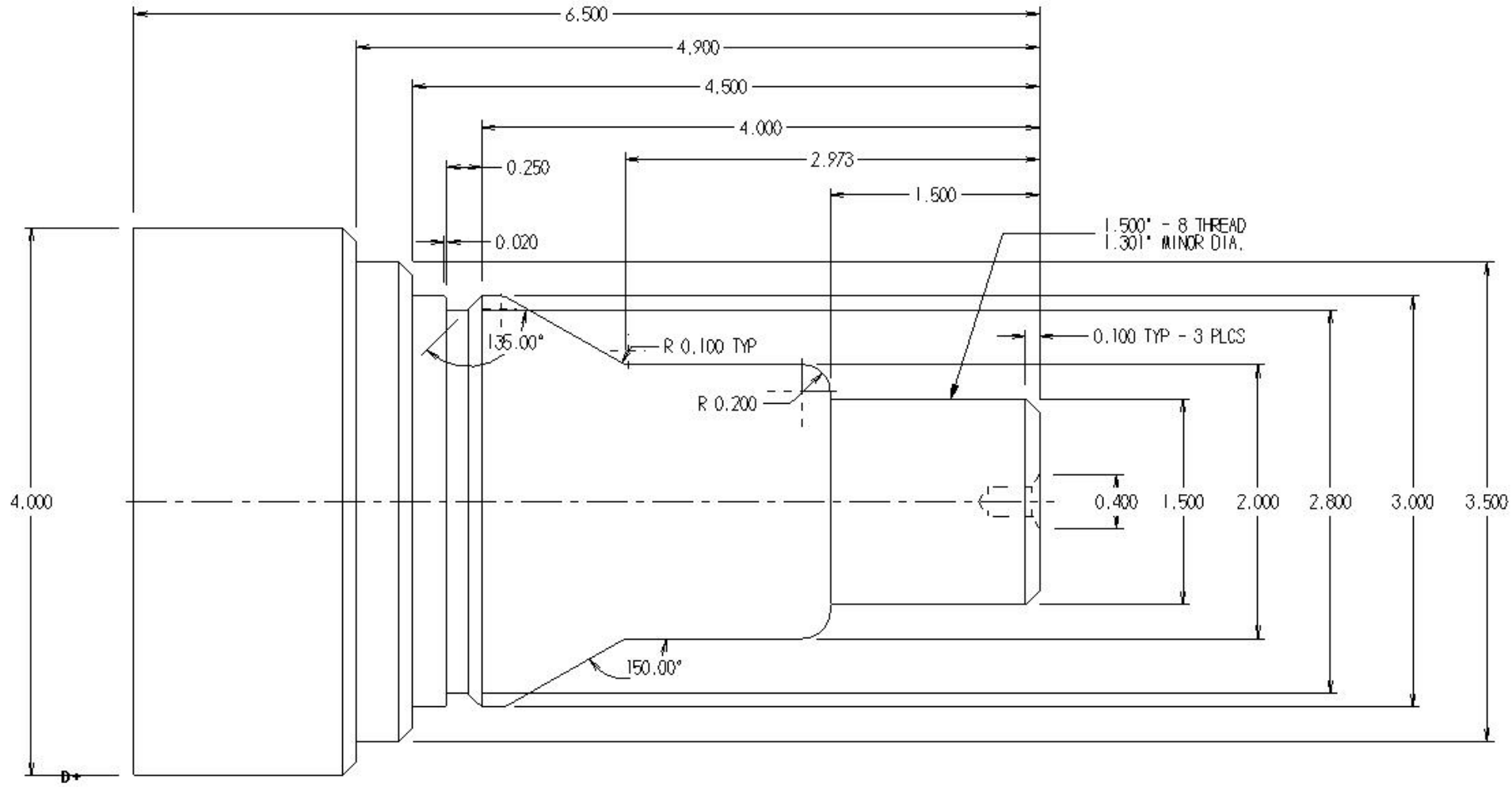
6.500
4.900
4.500
4.000
2.973
1.500
0.250
0.020
1.500" - 8 THREAD
1.301" MINOR DIA.
135.00°
R 0.100 TYP
0.100 TYP - 3 PLCS
R 0.200
4.000
0.400
1.500
2.000
2.800
3.000
3.500
150.00°
D

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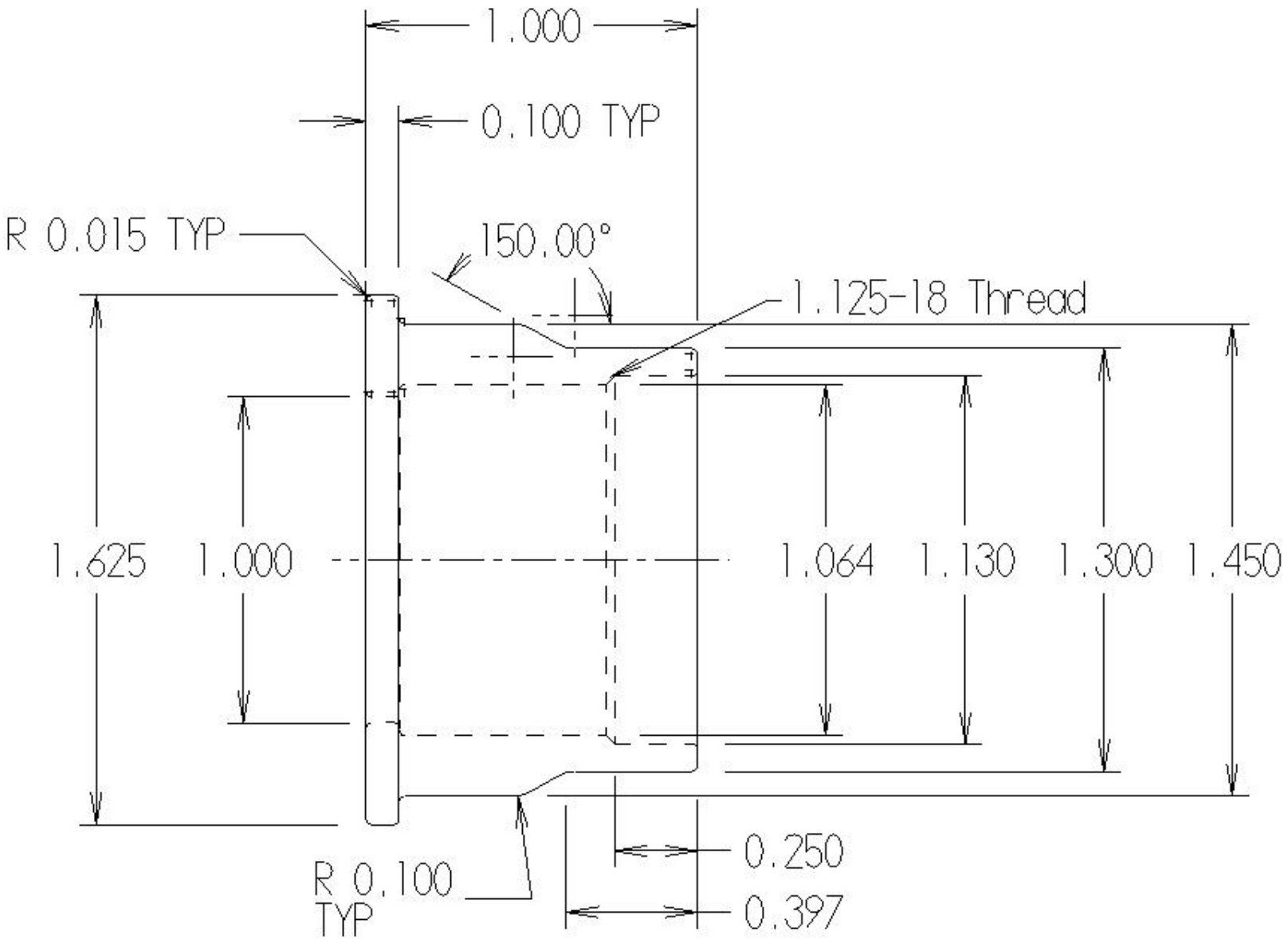
1.000
0.100 TYP
R 0.015 TYP
150.00°
1.125-18 Thread
1.625
1.000
1.064
1.130
1.300
1.450
0.250
0.397
R 0.100
TYP

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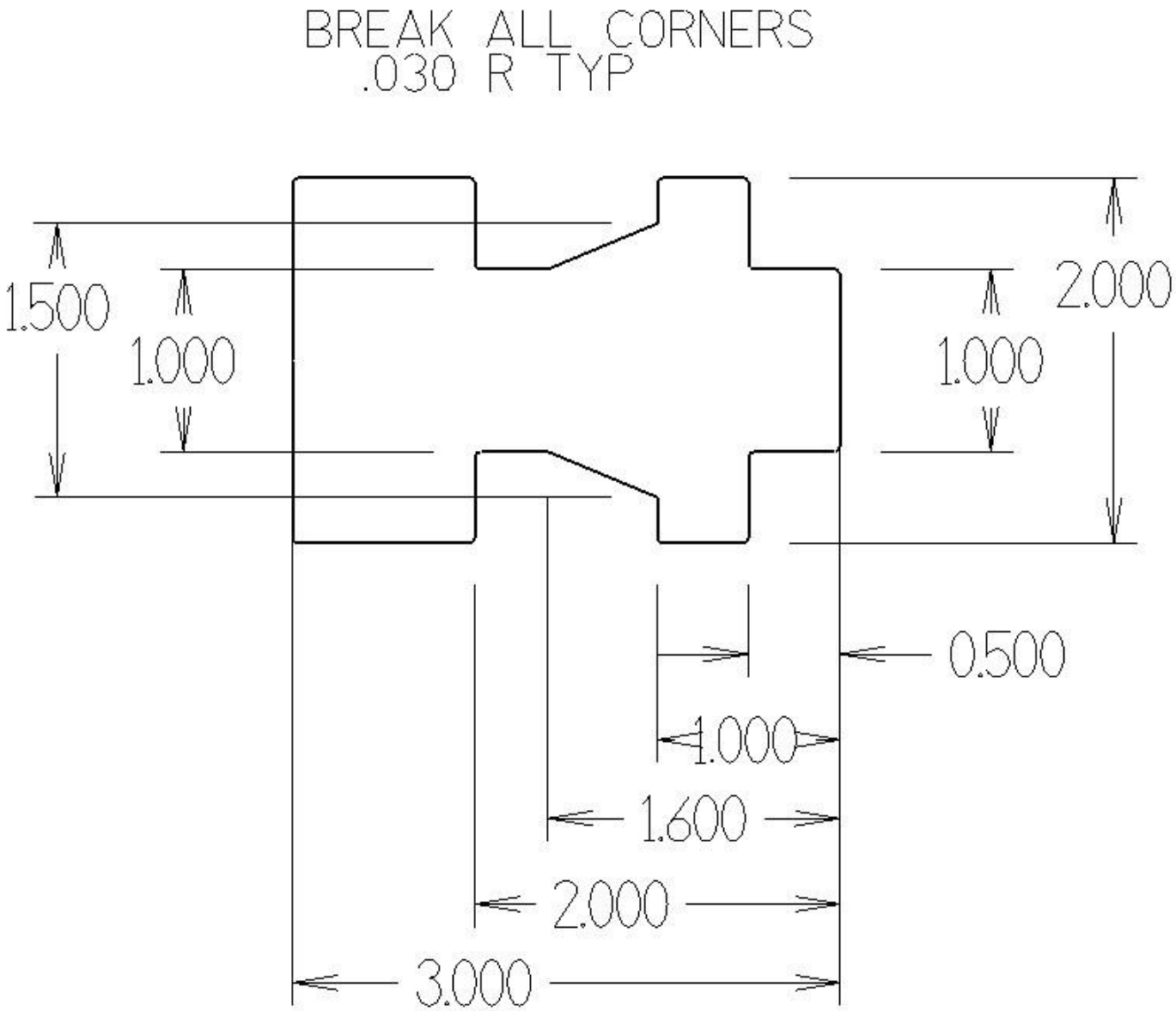
BREAK ALL CORNERS
.030 R TYP
1.500
1.000
1.000
2.000
0.500
1.000
1.600
2.000
3.000

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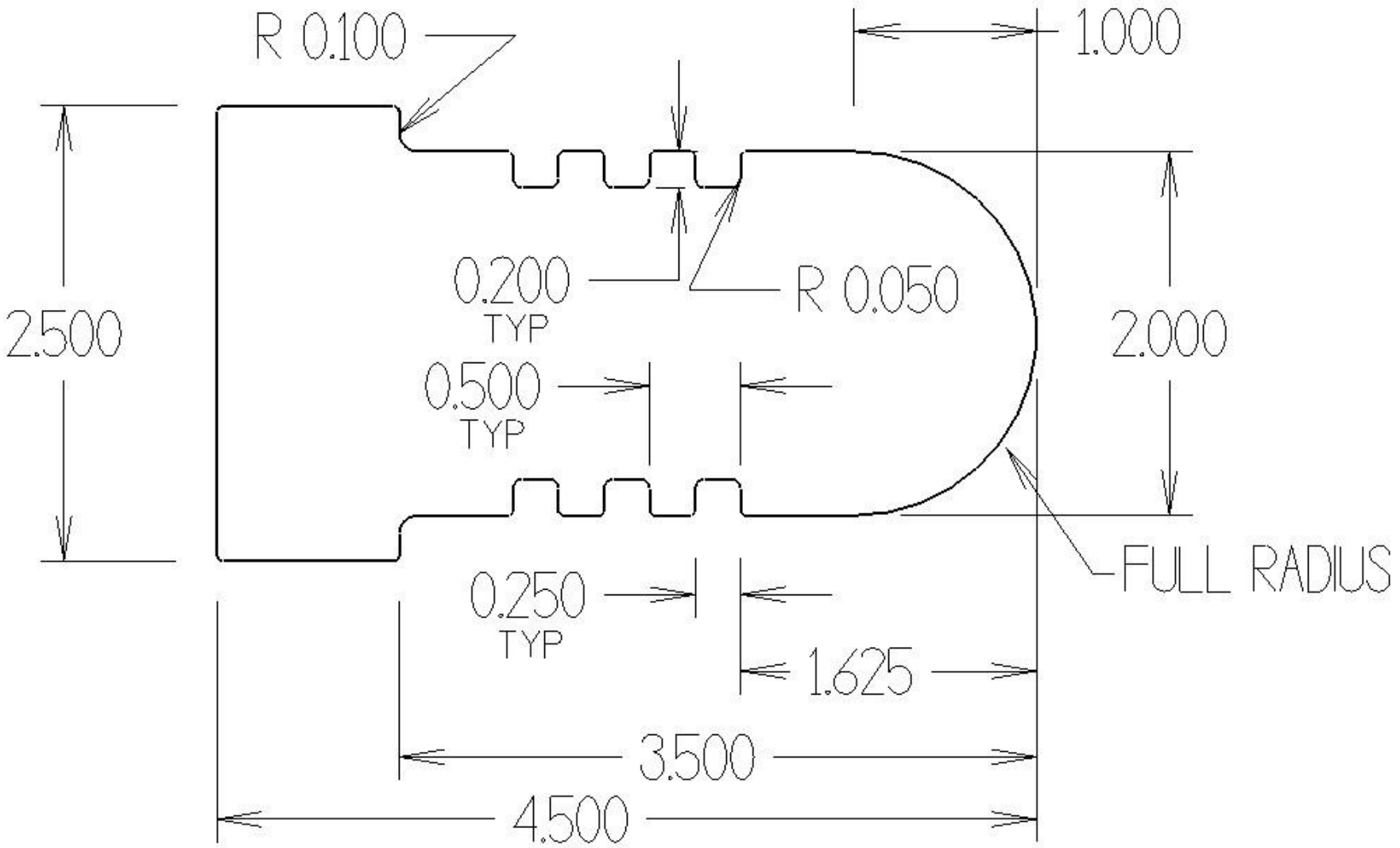

BREAK ALL CORNERS .030 UNLESS SPECIFIED

Cplane:TOP

0.7374
Inch