Rotary Programming

…with Universal Rotary

HURCO®

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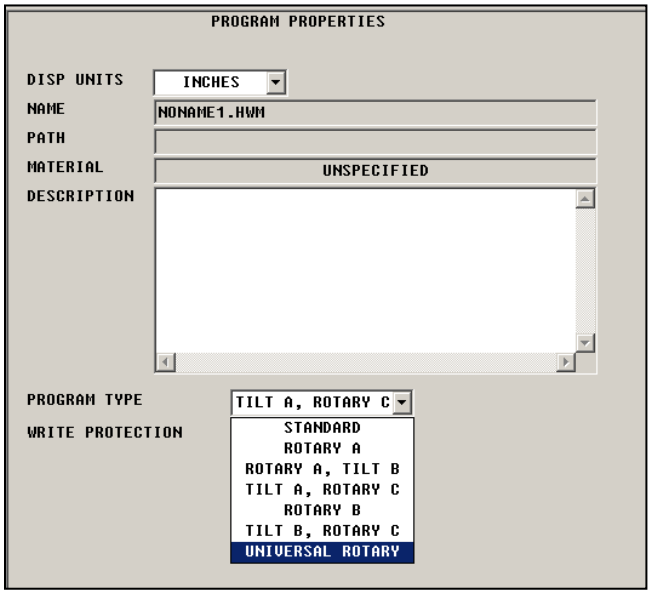
What is Universal Rotary?

The Universal Rotary program type is designed to operate on any 4- or 5-axis Hurco machine - regardless of the axis configuration.

The control will make the necessary movements based on the axes that it has available.

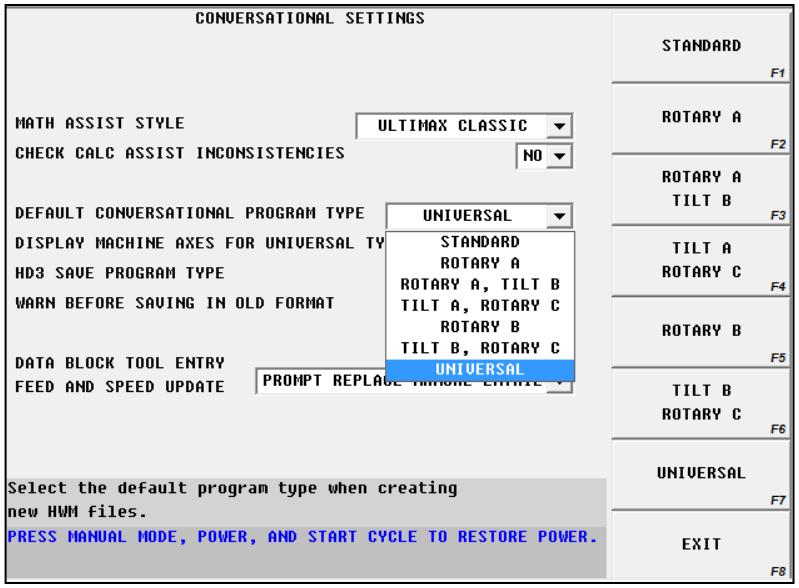
This means that Universal Rotary programs can be shared between many machines in the shop, and allows the operator to use whichever machine is available at the time…not just the machine that the program was run on previously.

Programming with Universal Rotary



Make sure the program type is set to Universal Rotary in Program Properties

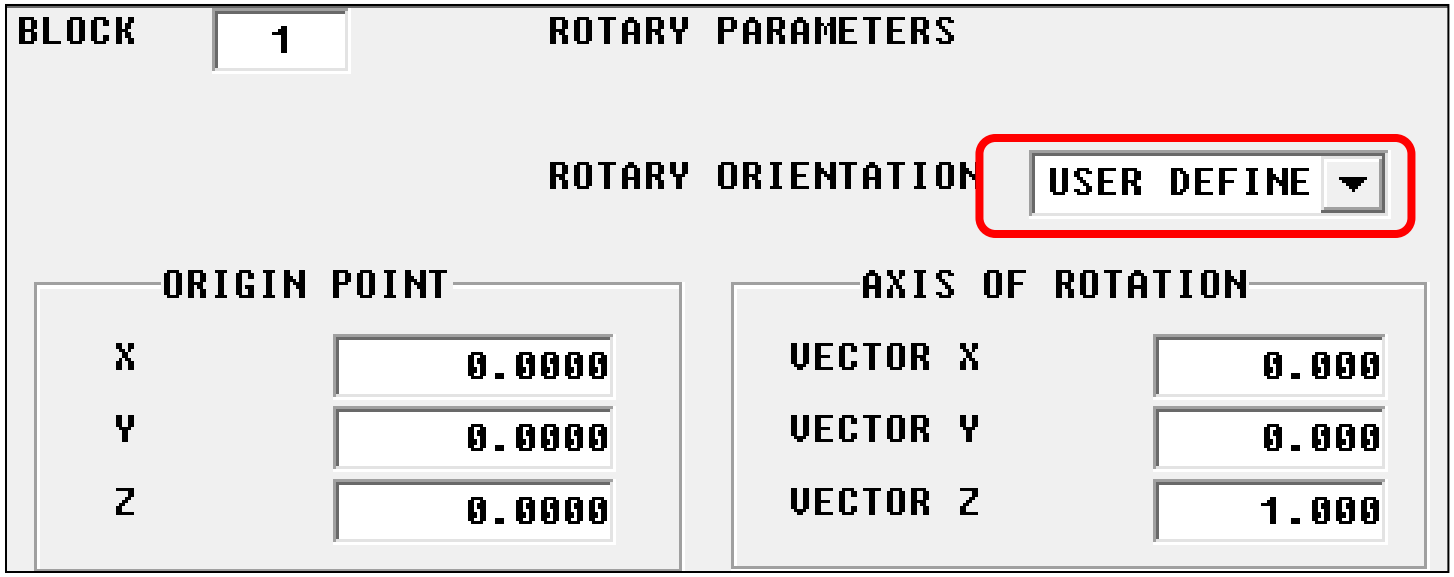
- INPUT
- PROGRAM MANAGER
- PROGRAM PROPERTIES



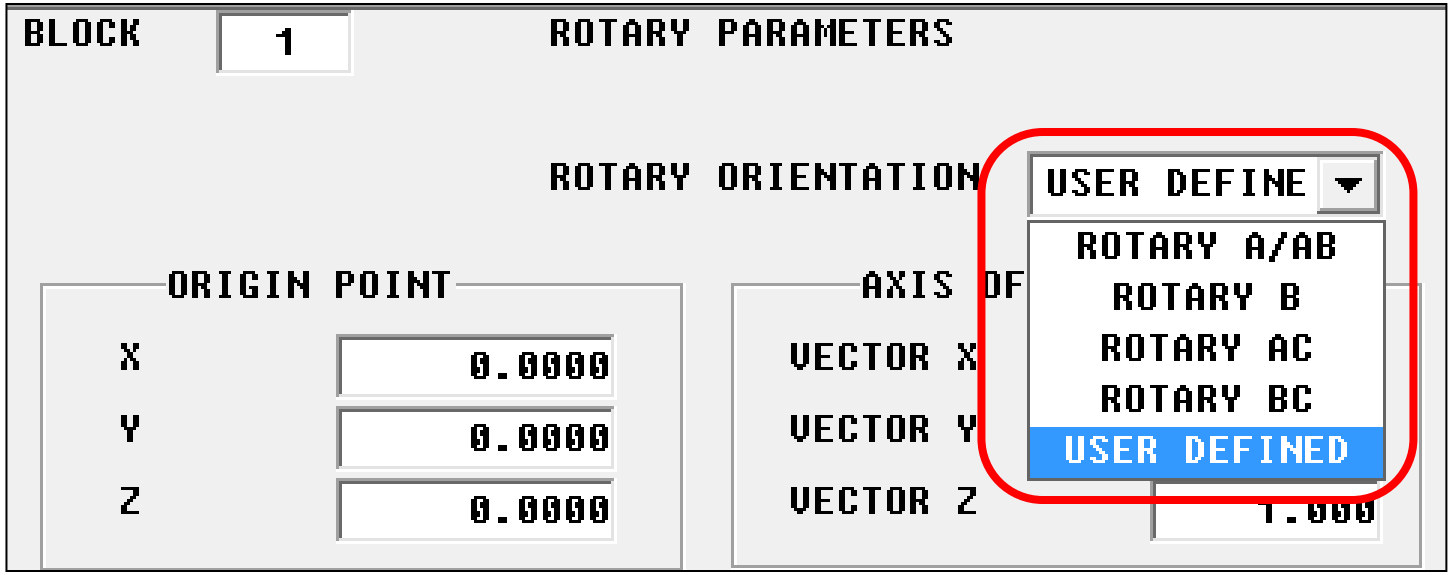
Also, make Universal Rotary the default programming type in User Preferences

- AUXILLIARY
- UTILITY SCREEN
- USER PREFERENCES
- CONVERSATIONAL SETTINGS
- SET DEFAULT TO UNIVERSAL

Rotary Orientation Settings

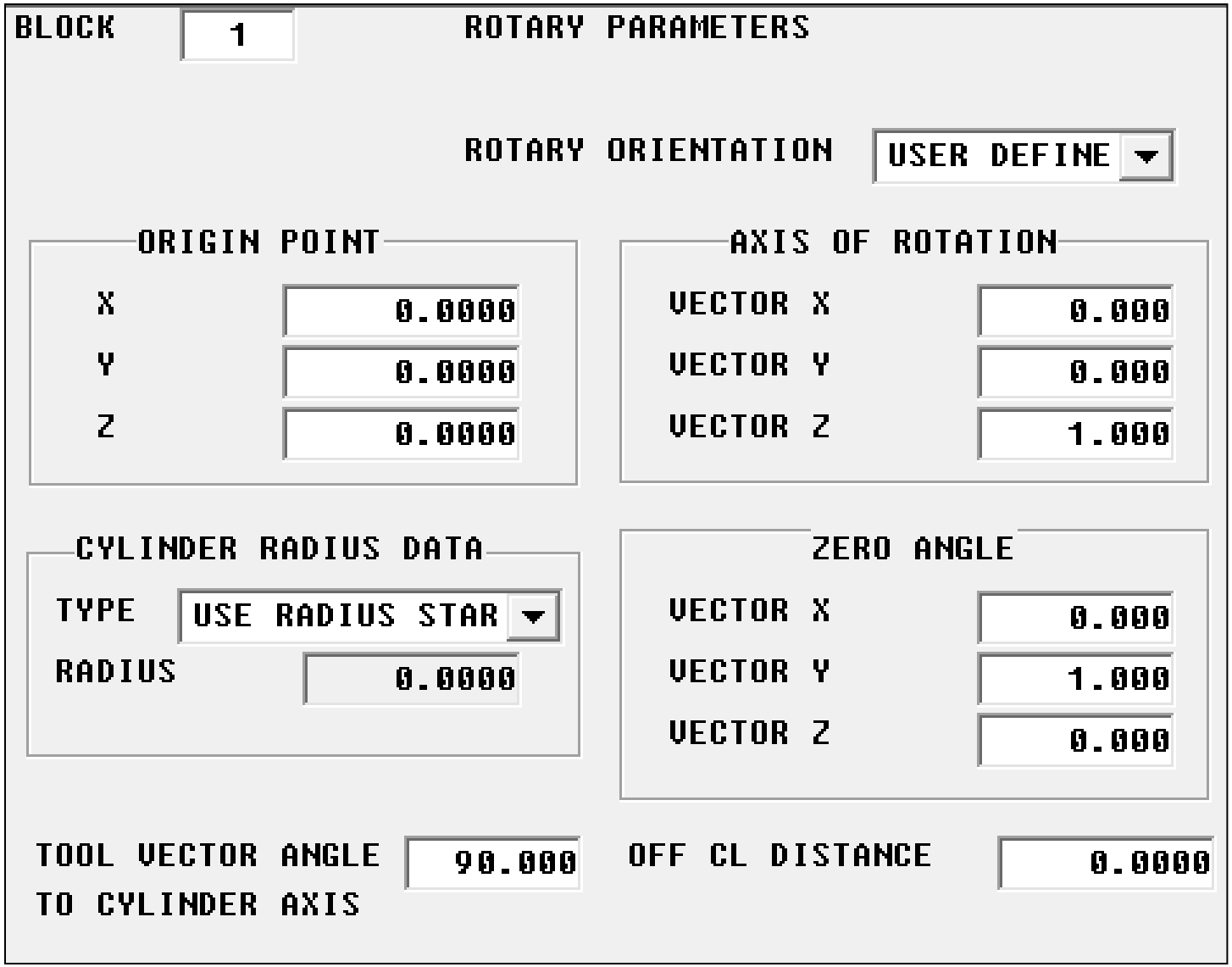


This tutorial explains each of the settings for the USER DEFINED rotary orientation

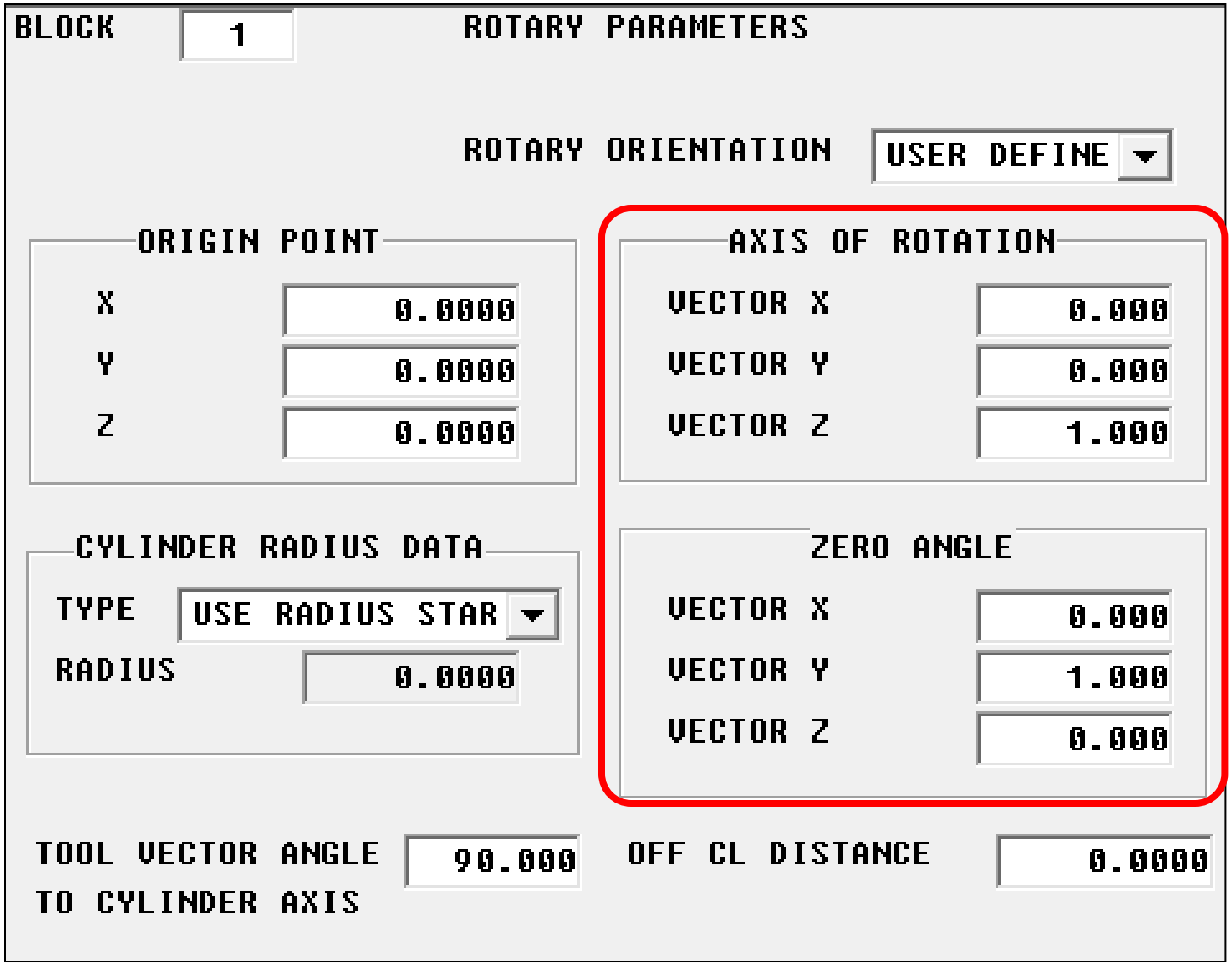


You can also select a specific machine configuration from the menu.
NOTE: some AXIS dimensions (+/-) values may be reversed if this method is used.

Rotary Parameters are used to orient the cylinder



Rotary Parameters are used to orient the cylinder

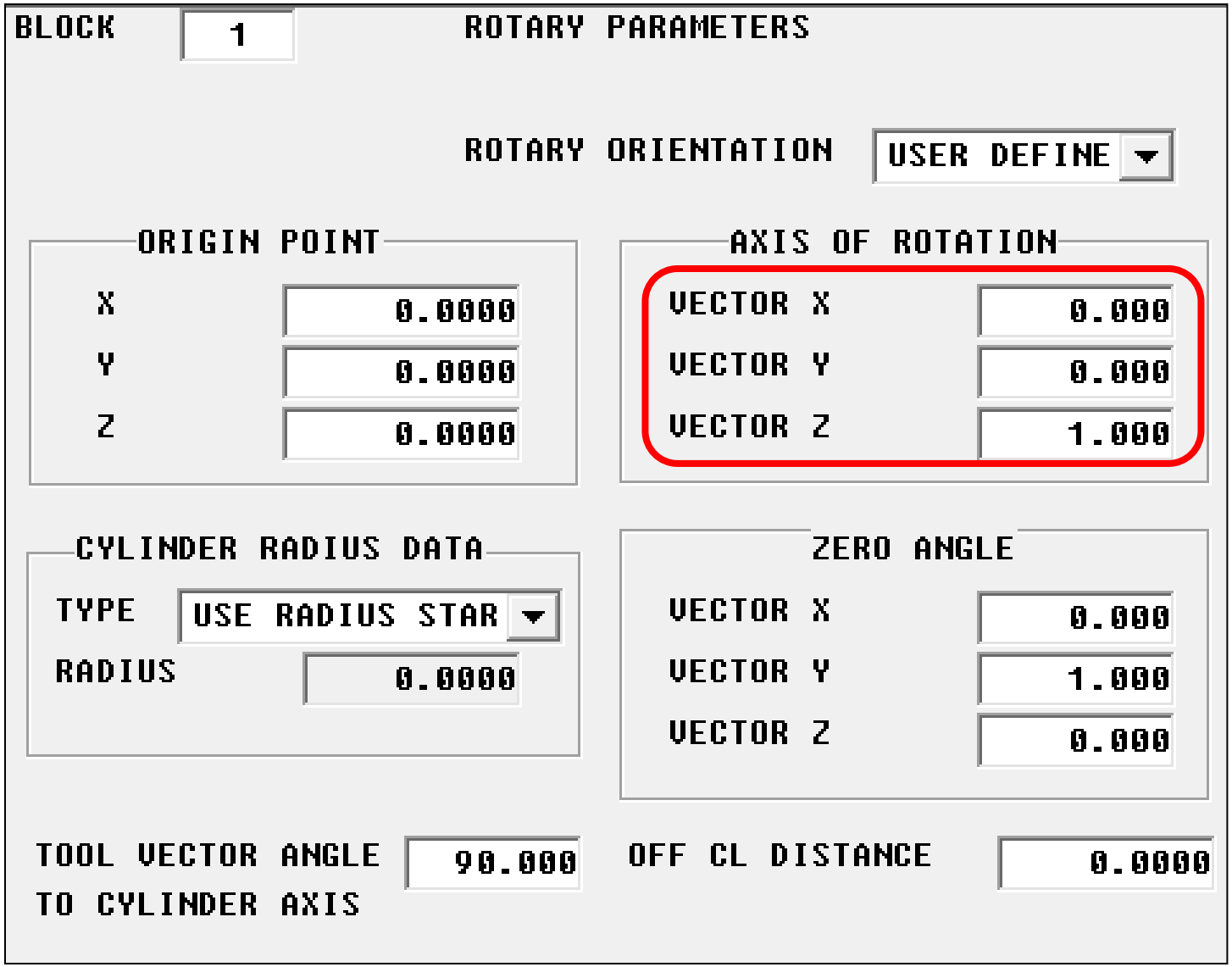


Use a value of 1.000 for all settings in the six outlined fields (inside RED box).

Think of these settings as turning on a control BIT:
1 = ON
0 = OFF

Only one of each set of three fields should have a value of 1.000…the other two of each group should remain 0.000.

Axis of Rotation Settings

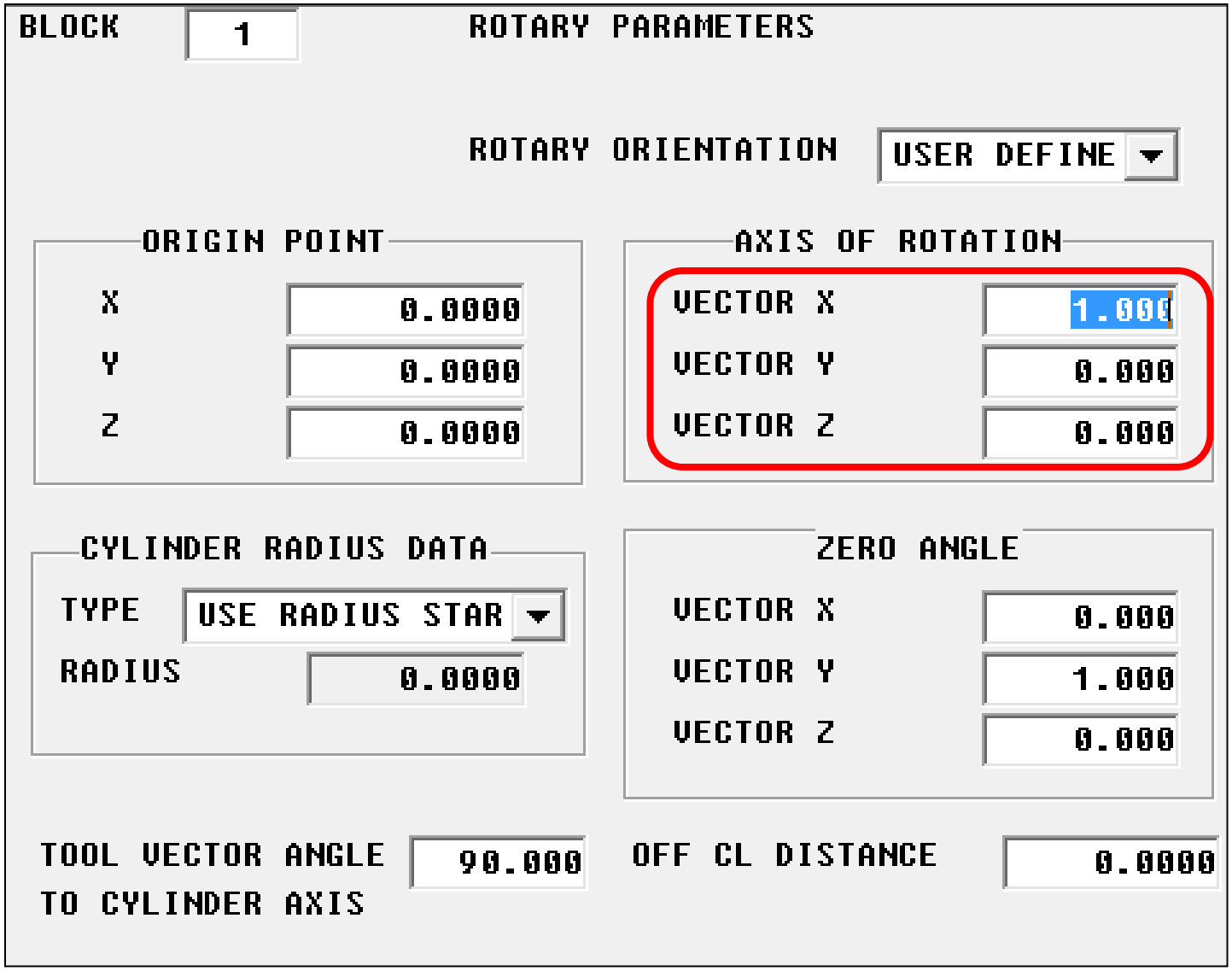


The AXIS OF ROTATION settings are used to dictate the orientation of the cylinder for rotary programming on a particular machine (A-axis, C-axis, B-axis)

Place a value of 1.000 in the field for the axis that the rotary axis rotates around.

Rotary C-axis is shown in the example.

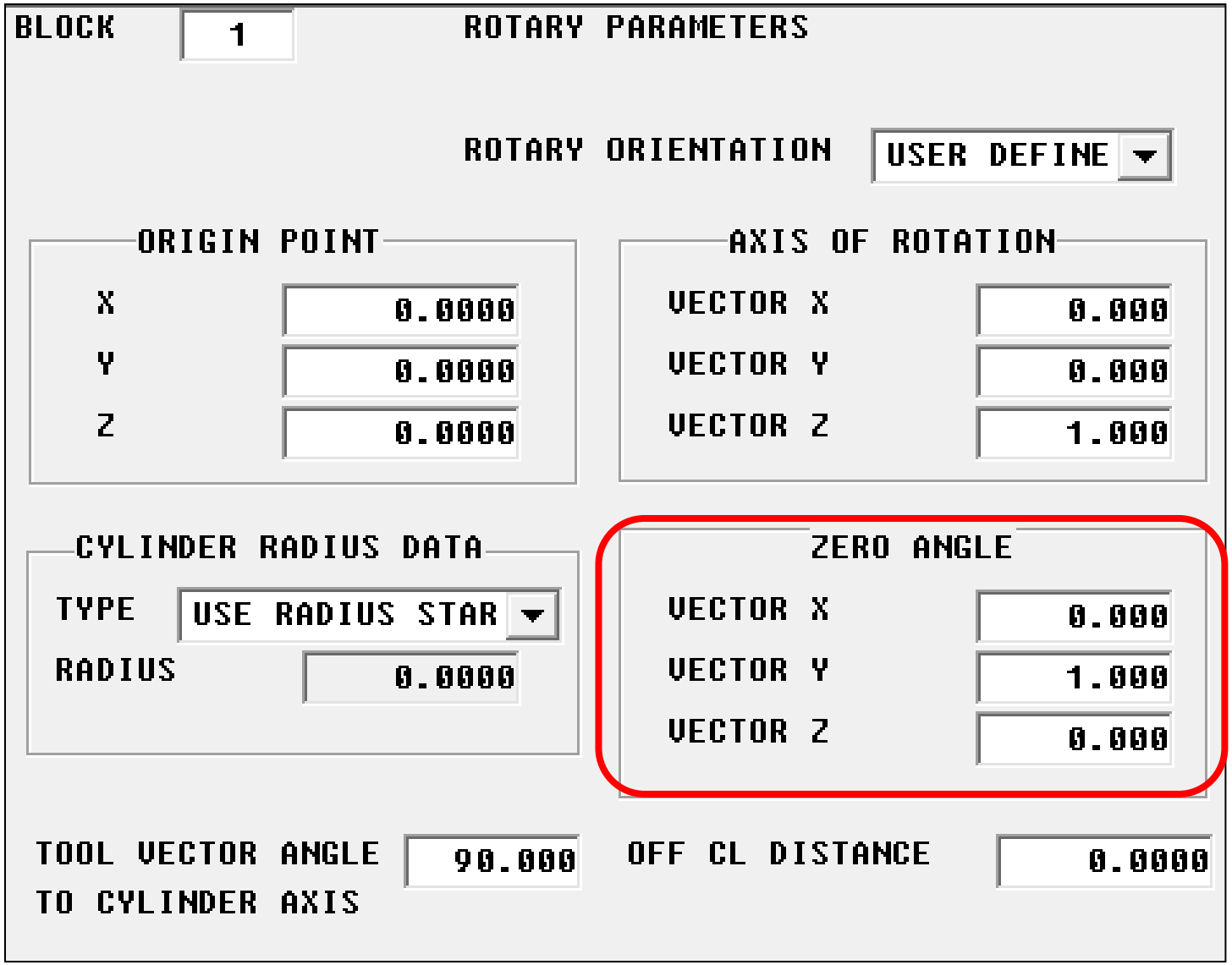
Axis of Rotation Settings



Since UNIVERSAL ROTARY programs are designed to run on ANY machine configuration, this setting must be changed if the machine configuration changes.

For example: the previous slide showed a C-axis machine configuration. This slide shows an A-axis machine configuration.

Zero Angle Settings



The ZERO ANGLE settings are used to determine where 0° is located on the cylinder.

In this C-axis machine example, the 0° location is at the 12 o'clock position…because from the center of the cylinder, the 0° is located in the positive Y-axis direction on the cylinder.

See following slides for diagram

Zero Angle Settings

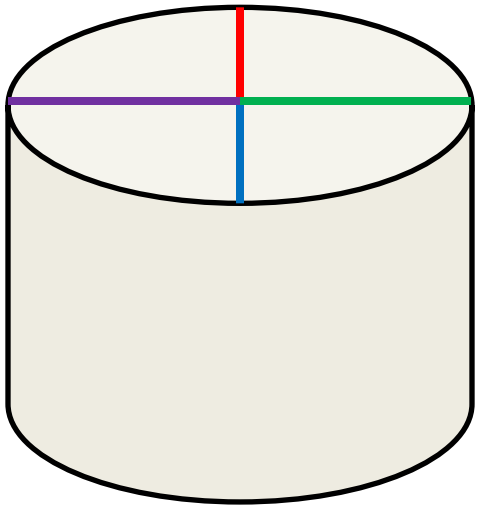
C-Axis

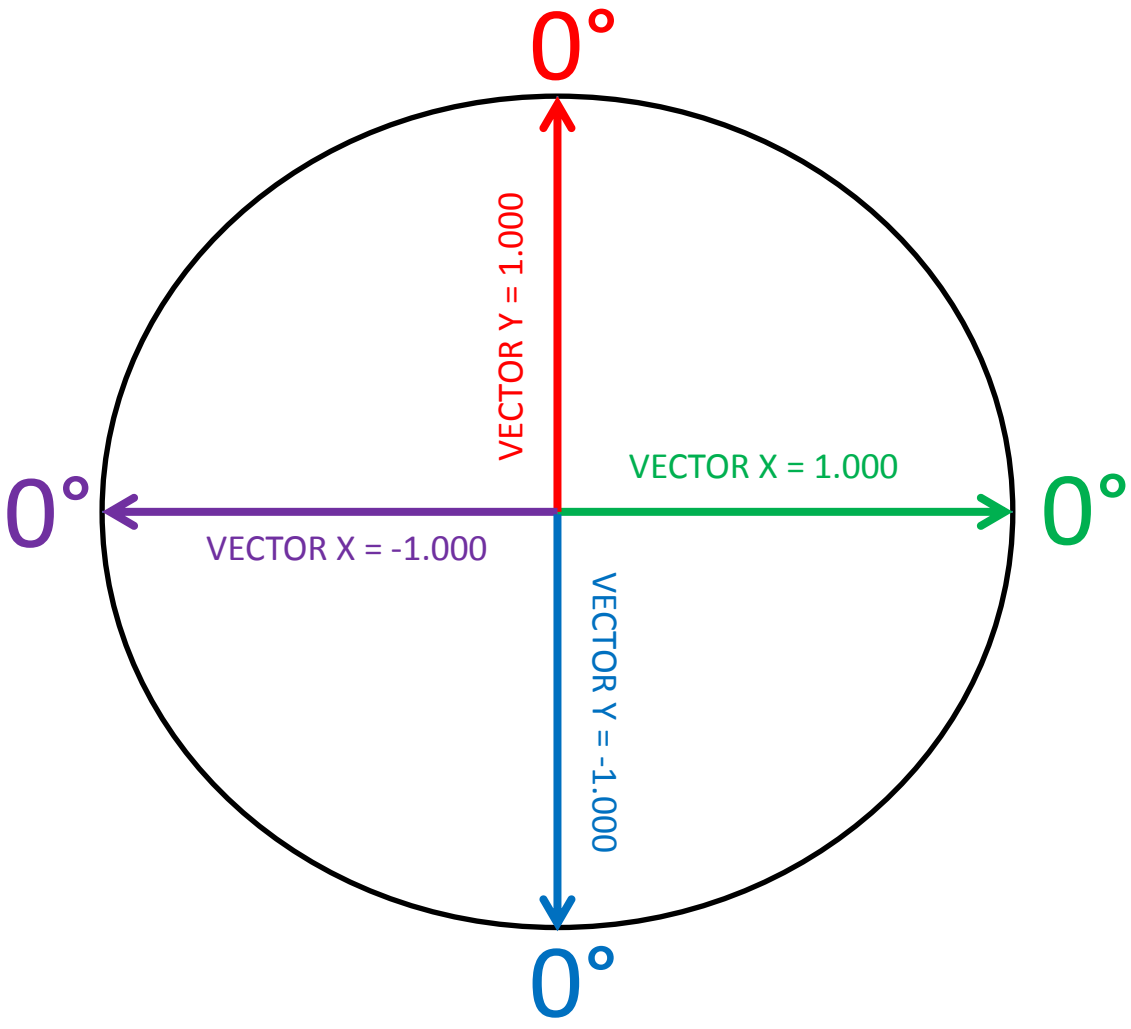
VECTOR X = 1.000

VECTOR X = -1.000

VECTOR Y = 1.000

VECTOR Y = -1.000





Zero Angle Settings

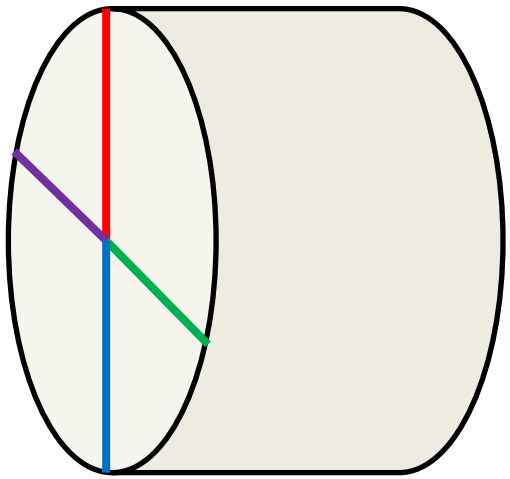
A-Axis

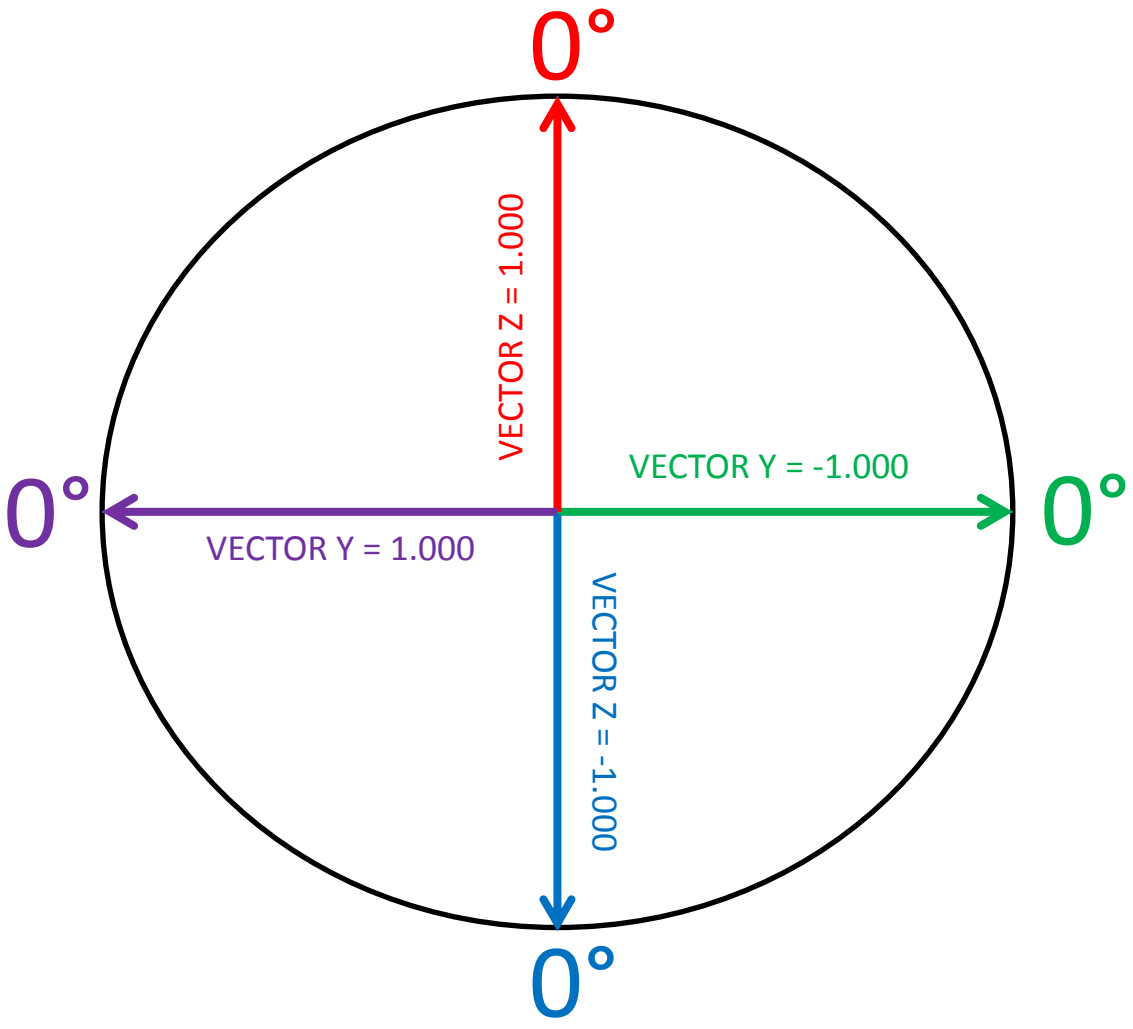
VECTOR Y = -1.000

VECTOR Y = 1.000

VECTOR Z = 1.000

VECTOR Z = -1.000





Zero Angle Settings

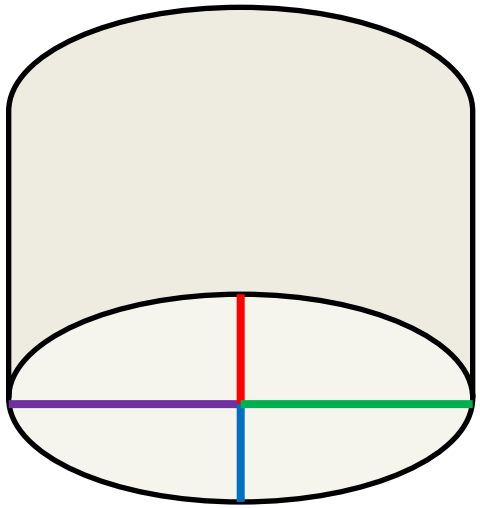
B-Axis

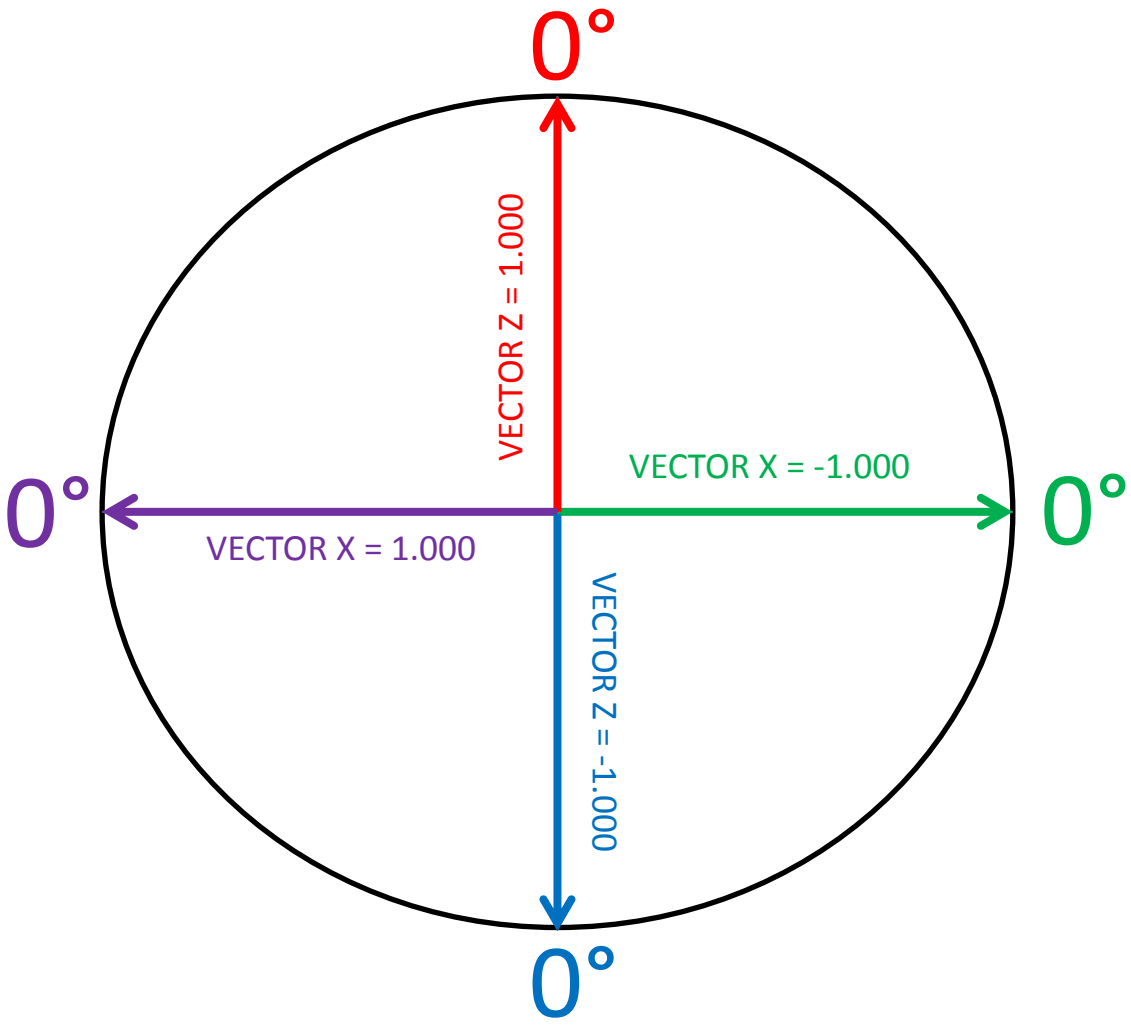
VECTOR X = -1.000

VECTOR X = 1.000

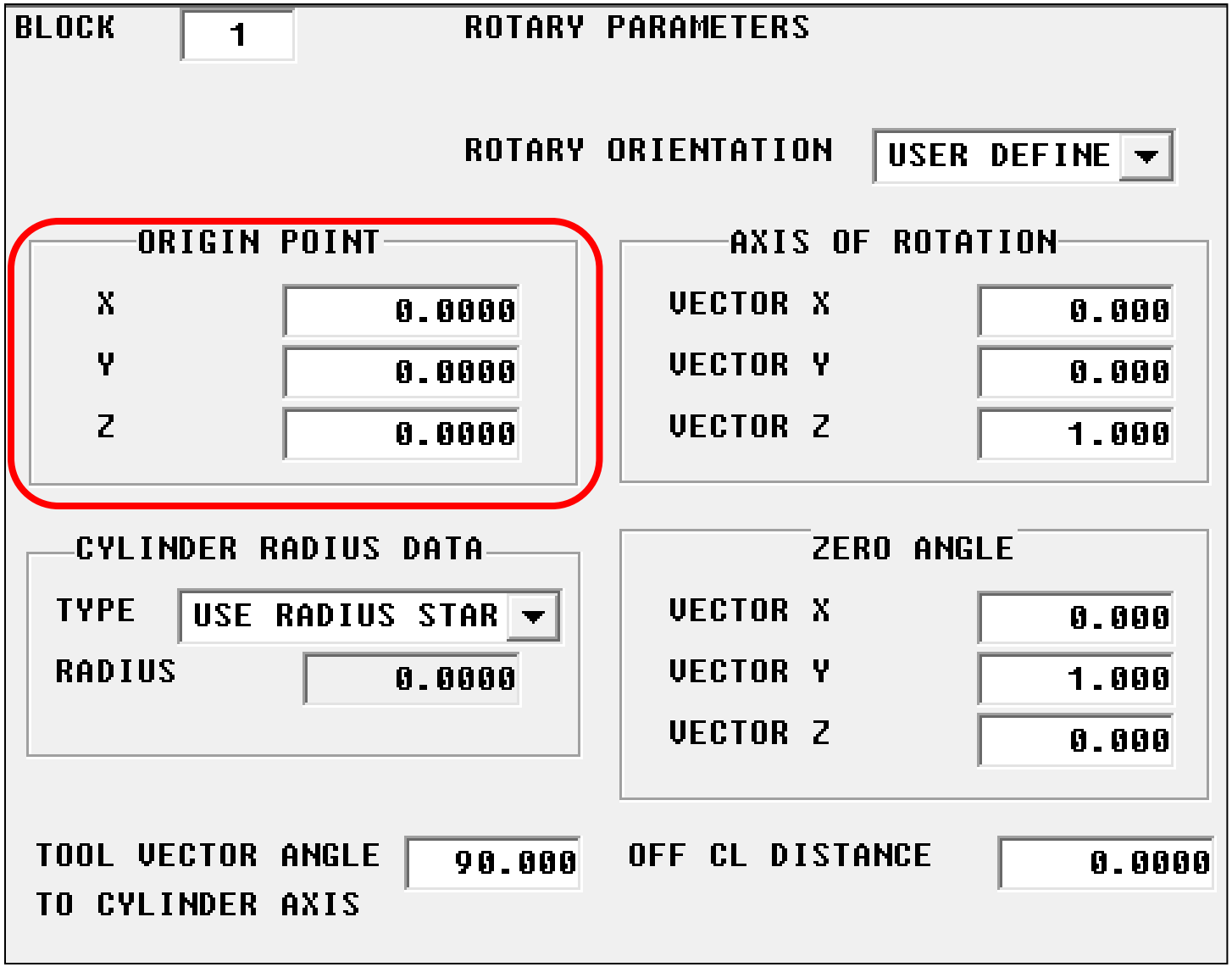
VECTOR Z = 1.000

VECTOR Z = -1.000





Cylinder Origin Point Settings

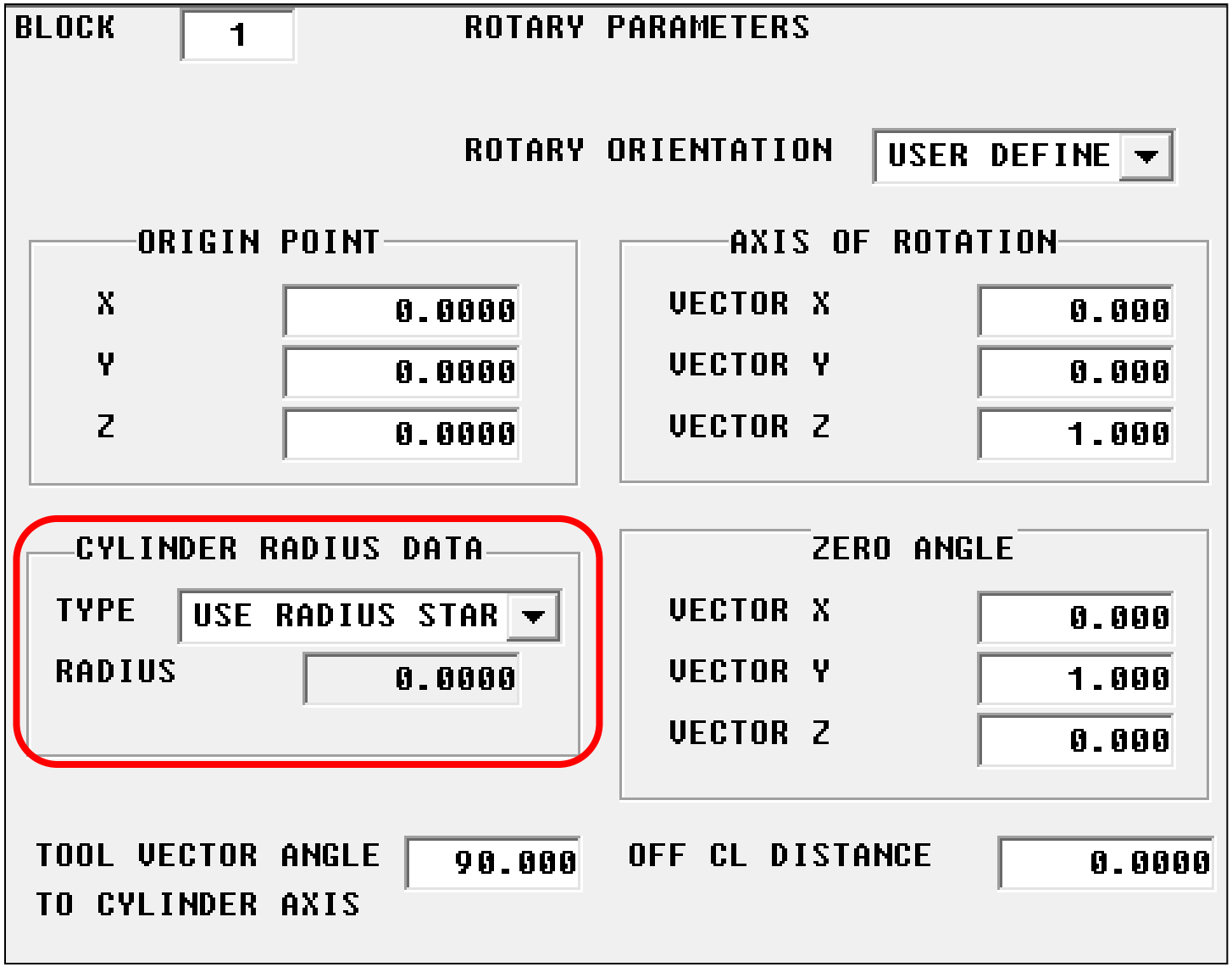


The ORIGIN POINT is used to define the center of the cylinder, if the center is not the part zero location.

Enter absolute values into the field to define the exact XYZ center point of the cylinder that the rotary features are to be machined on.

The cylinder does NOT need to be located on the centerline of the axis.

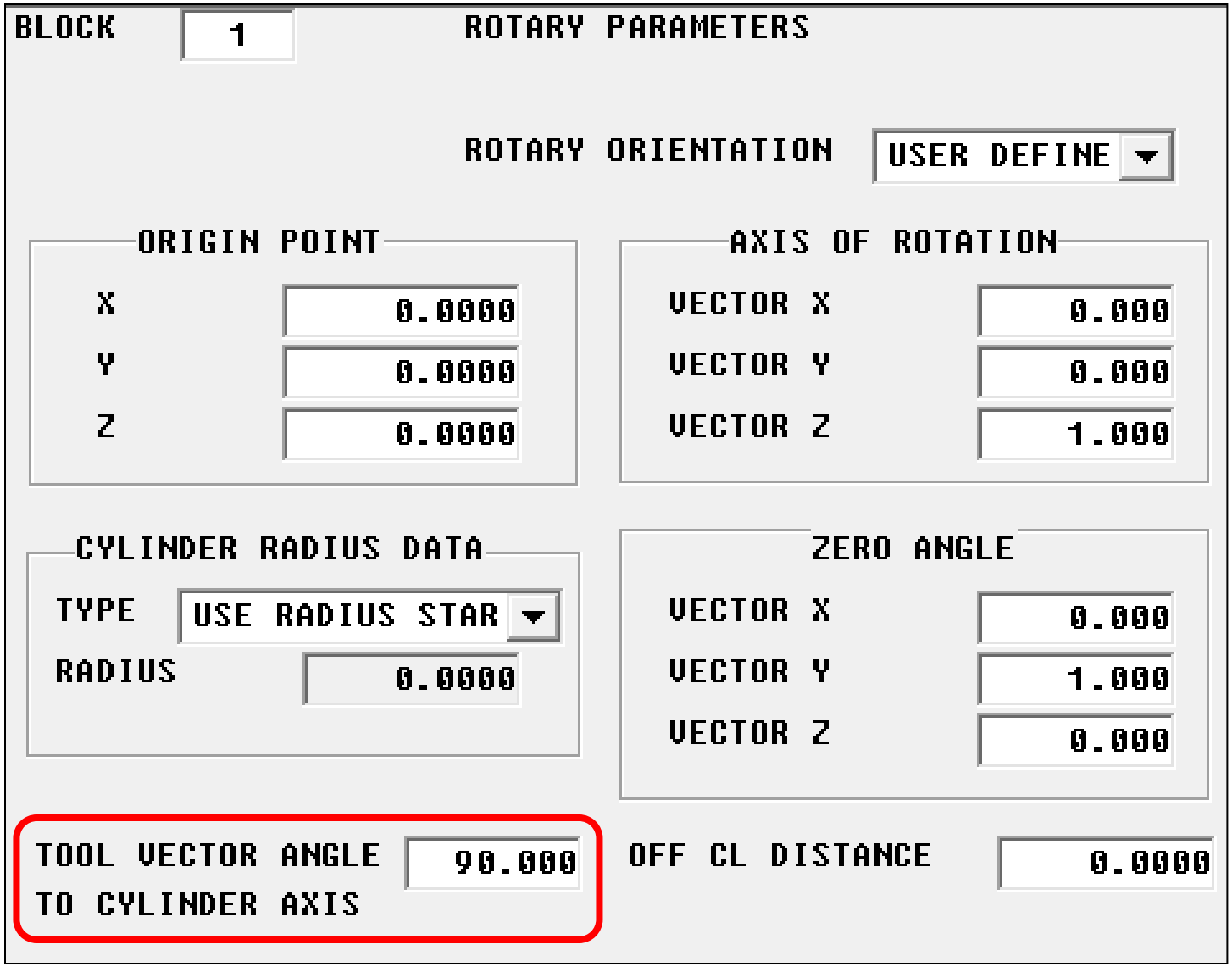
Cylinder Radius Data Settings



The CYLINDER RADIUS DATA settings are used to determine the Z-axis start point for each block. If the default setting is used, the RADIUS START location in each block will be used.

If USER DEFINED is used, then the operator will be allowed to enter a value in the RADIUS field…and that will be used for each feature machined.

Tool Vector Angle Settings

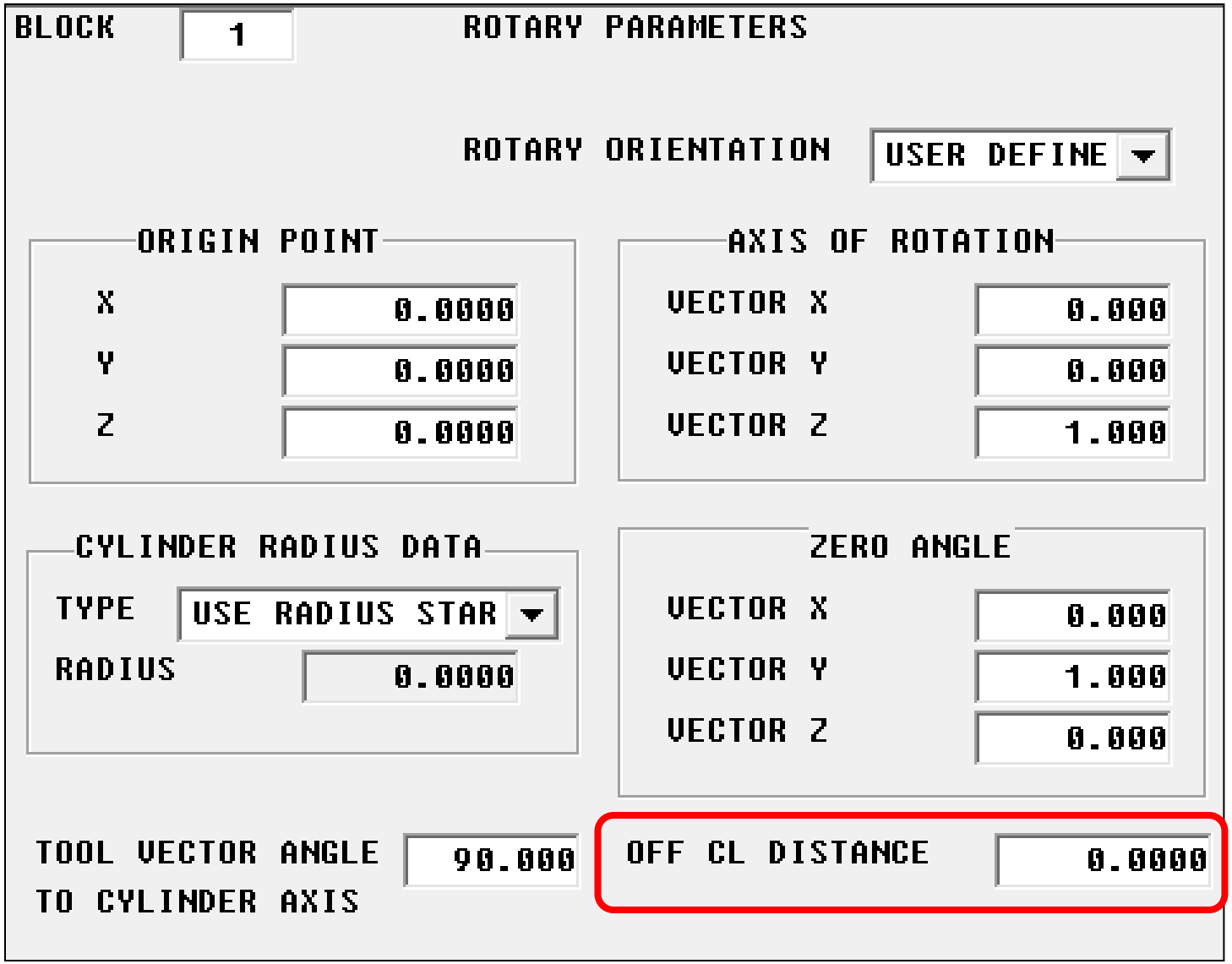


The TOOL VECTOR ANGLE field is used to position the tool to the correct orientation for machining.

For most needs, the tool should be perpendicular (or oriented 90° to the cylinder).

When programming ROTARY MILLING functions, this positioning will happen automatically - NO ROTARY POSITION block is necessary.

Off Centerline Distance Settings

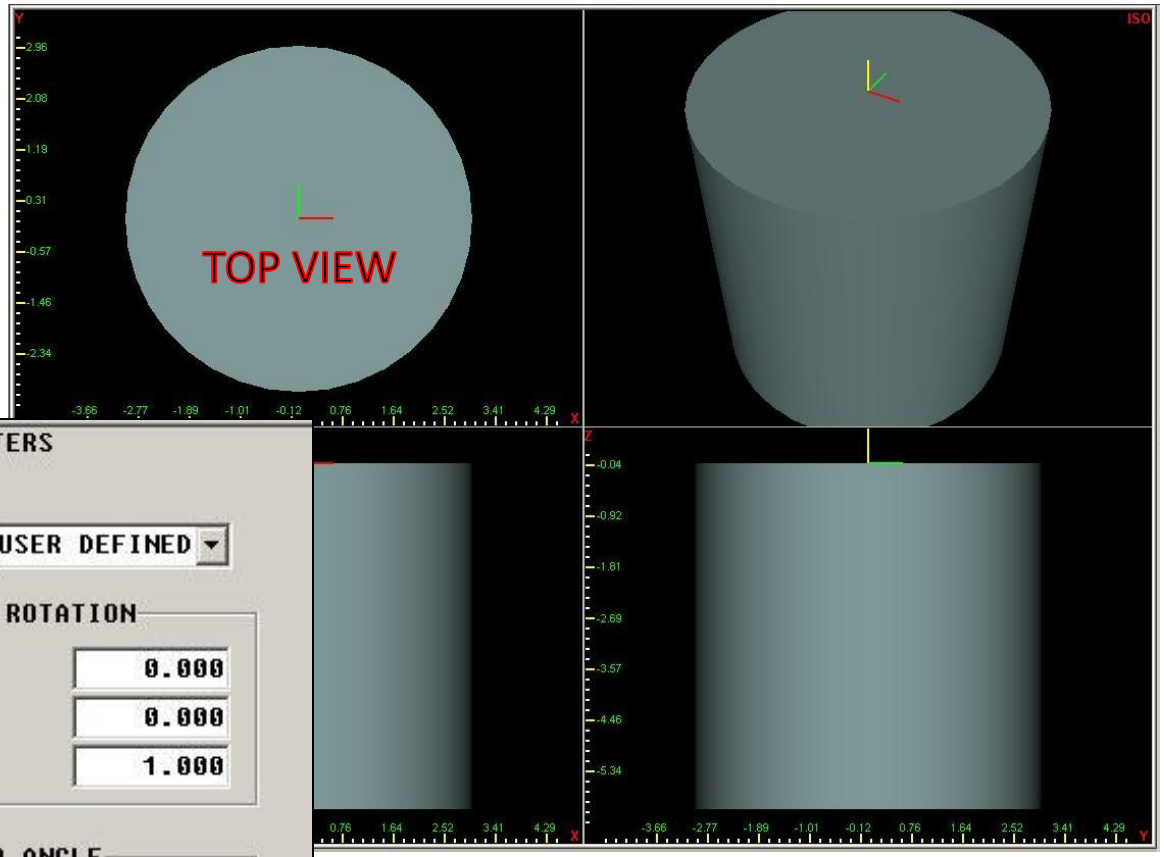


The OFF CL DISTANCE field can be used to pull the tool off of the centerline of the cylinder when machining.

A positive or negative value can be used, depending on needs.

Machine Configuration Settings

- *Typical C-Axis Machine Configuration*
- *0° is at 3 O'clock Position*



BLOCK 1 UNIVERSAL ROTARY PARAMETERS

ROTARY ORIENTATION USER DEFINED

ORIGIN POINT

X	0.0000
Y	0.0000
Z	0.0000

AXIS OF ROTATION

VECTOR X	0.000
VECTOR Y	0.000
VECTOR Z	1.000

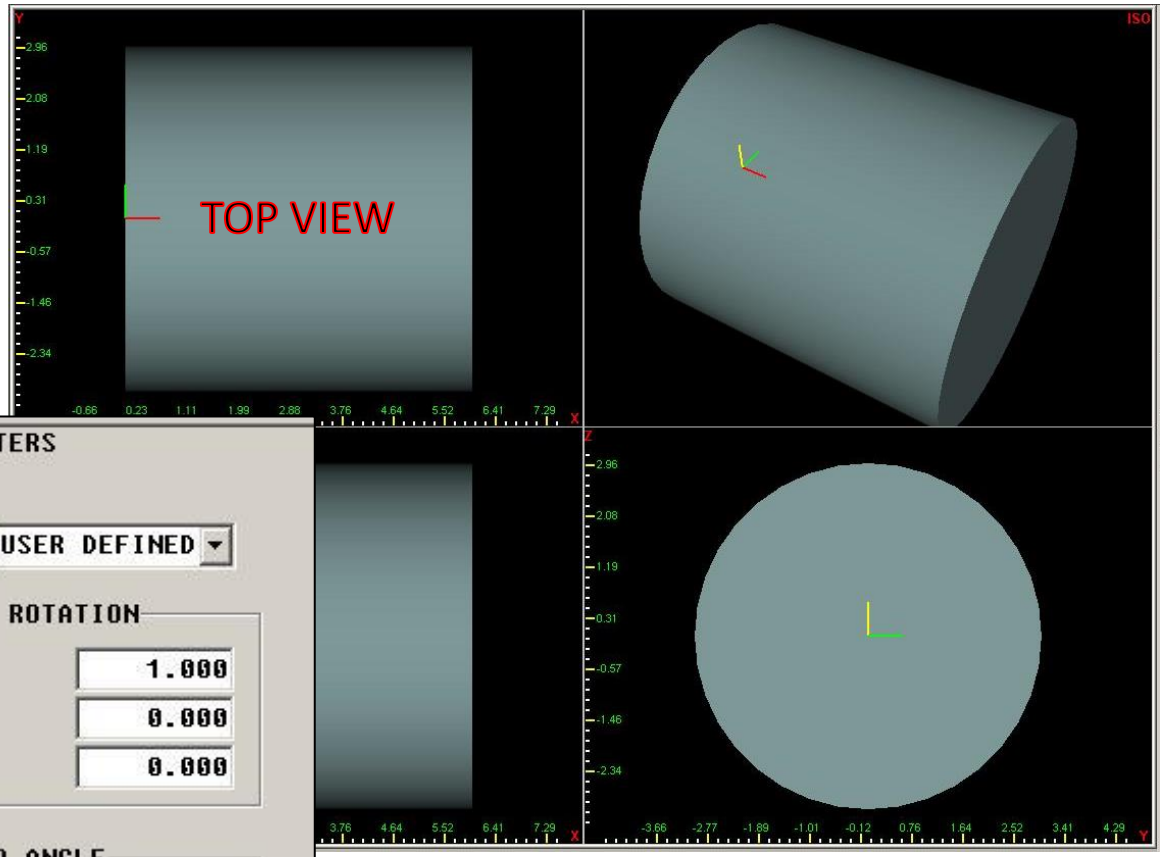
ZERO ANGLE

VECTOR X	1.000
VECTOR Y	0.000
VECTOR Z	0.000

OFF CL DISTANCE 0.0000

Machine Configuration Settings

- *Typical A-Axis Machine Configuration*
- *0° is at 12 O'clock – top of cylinder*



BLOCK 1 UNIVERSAL ROTARY PARAMETERS

ROTARY ORIENTATION USER DEFINED

ORIGIN POINT

X	0.0000
Y	0.0000
Z	0.0000

AXIS OF ROTATION

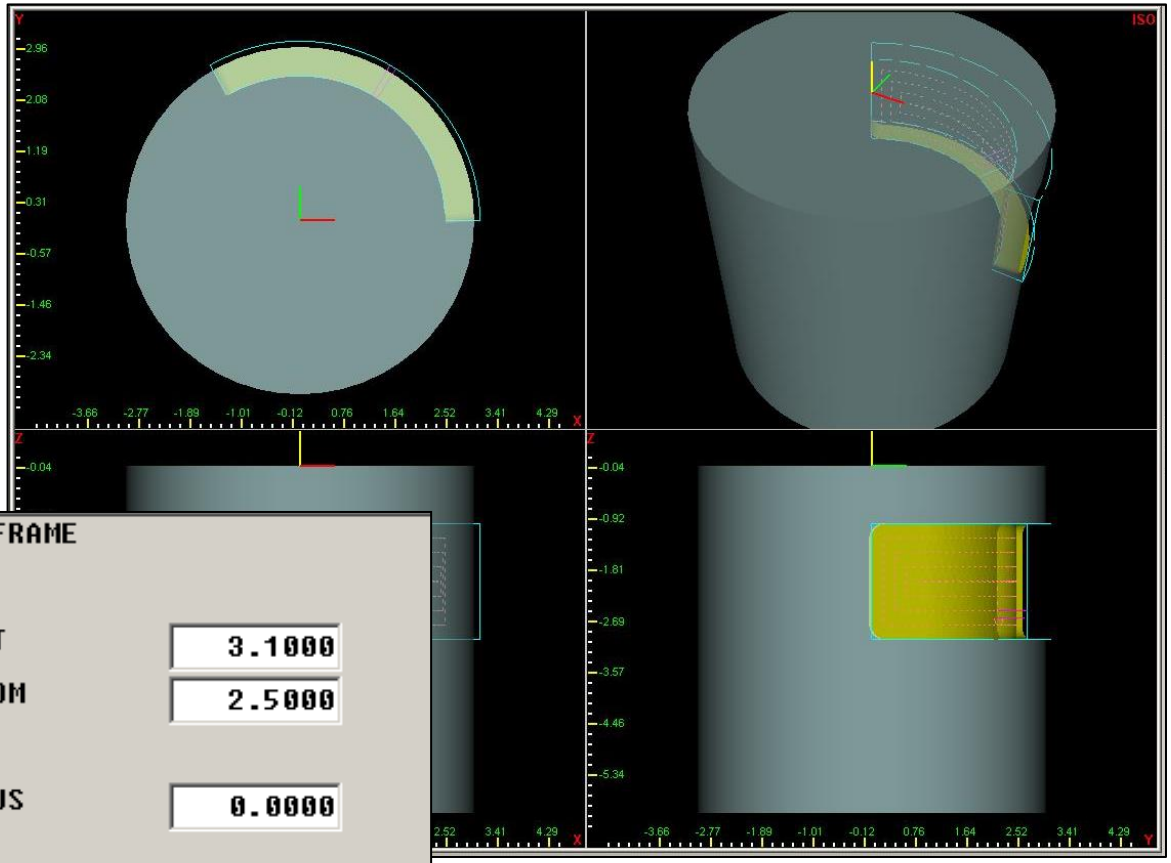
VECTOR X	1.000
VECTOR Y	0.000
VECTOR Z	0.000

ZERO ANGLE

VECTOR X	0.000
VECTOR Y	0.000
VECTOR Z	1.000

OFF CL DISTANCE 0.0000

Typical C-Axis Machine Configuration



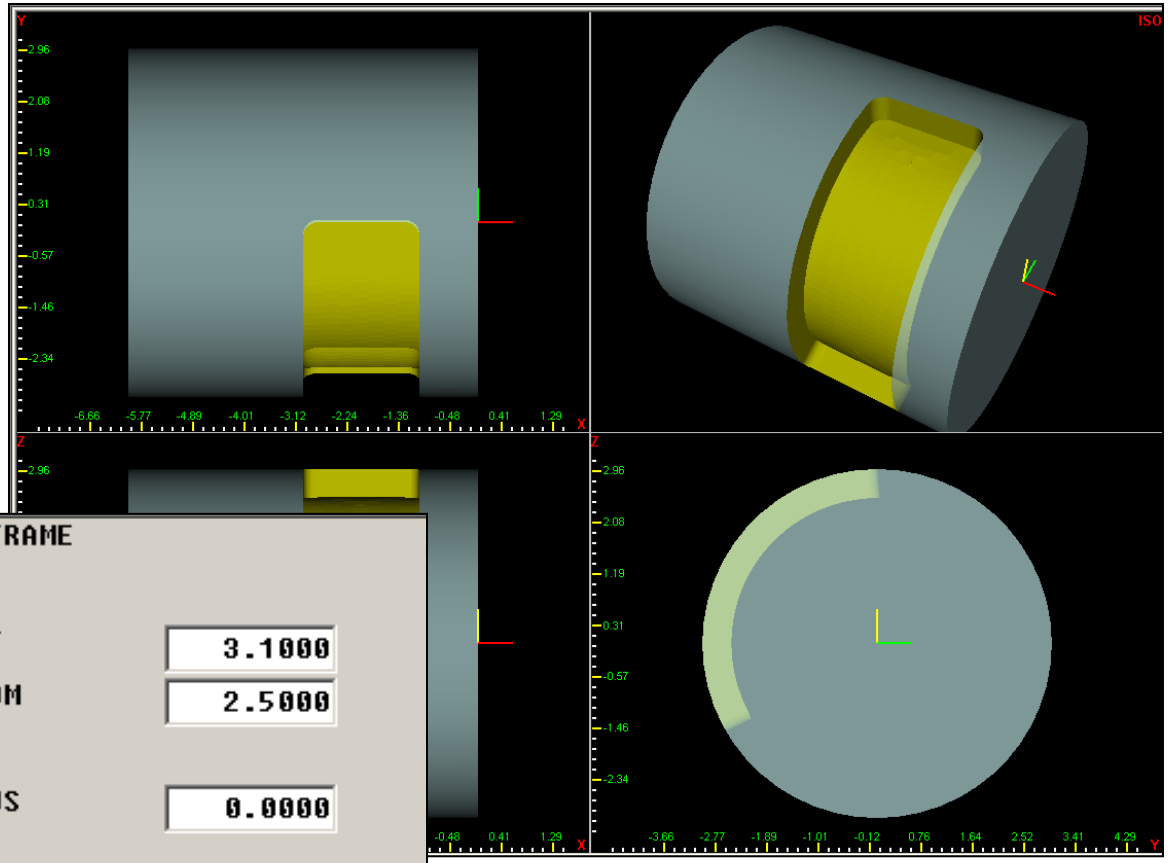
BLOCK 1 UNIVERSAL ROTARY MILL FRAME

AXIS START	-1.0000	RADIUS START	3.1000
ANGLE START	0.000	RADIUS BOTTOM	2.5000
AXIS LENGTH	-2.0000		
ANGLE LENGTH	120.000	CORNER RADIUS	0.0000

ROUGHING | FINISHING | SFQ

TOOL	1 END MILL, dia. 0.5000		
MILLING TYPE	POCKET BOUNDARY		
POCKET TYPE	OUTWARD	POCKET OVERLAP (%)	50
MILL FEED	110.0	PECK DEPTH	0.1000
SPEED (RPM)	9167	PLUNGE FEED	20.0

Typical Rotary A-Axis Machine Configuration



BLOCK 1 UNIVERSAL ROTARY MILL FRAME

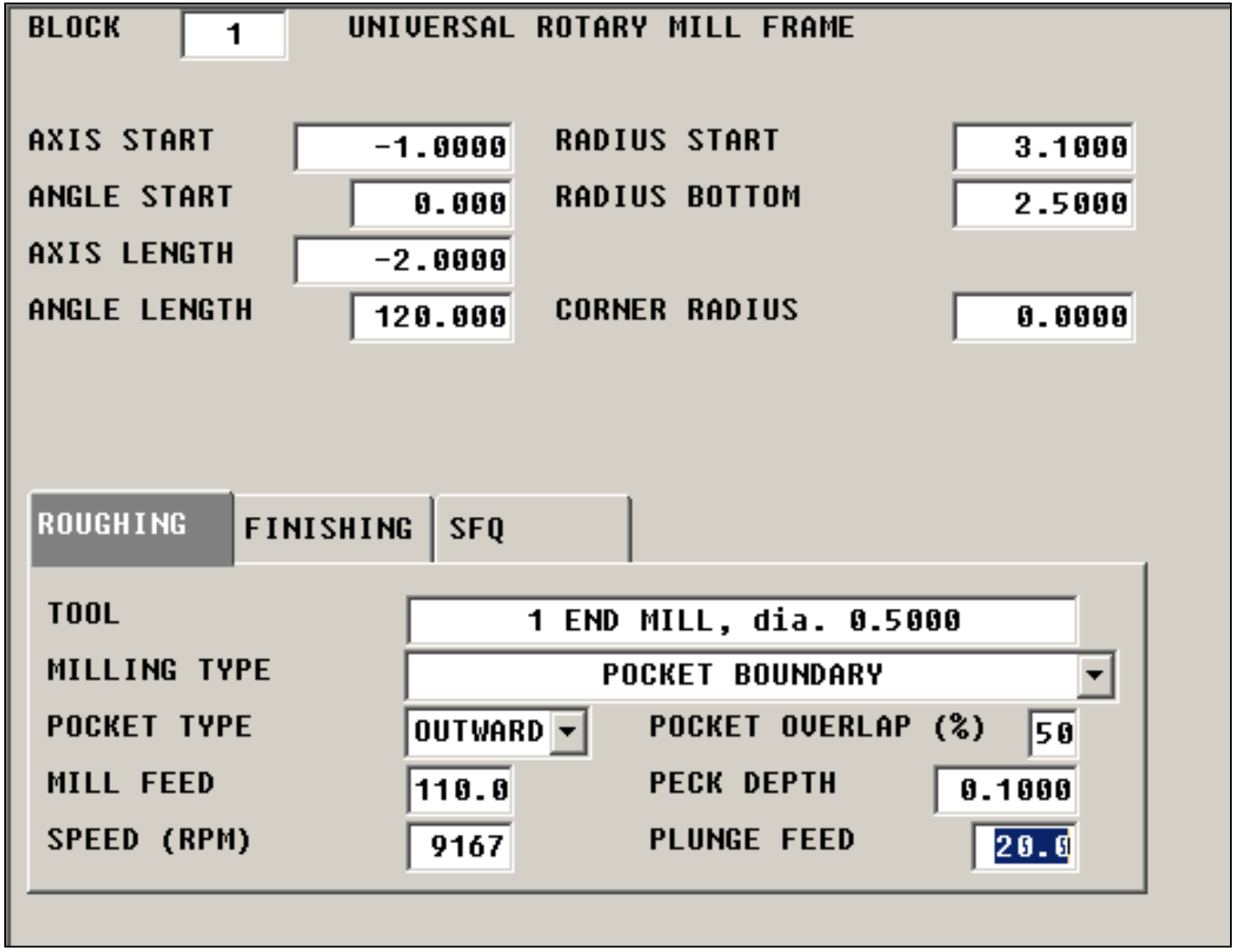
AXIS START	-1.0000	RADIUS START	3.1000
ANGLE START	0.000	RADIUS BOTTOM	2.5000
AXIS LENGTH	-2.0000		
ANGLE LENGTH	120.000	CORNER RADIUS	0.0000

ROUGHING | FINISHING | SFQ

TOOL	1 END MILL, dia. 0.5000		
MILLING TYPE	POCKET BOUNDARY		
POCKET TYPE	OUTWARD	POCKET OVERLAP (%)	50
MILL FEED	110.0	PECK DEPTH	0.1000
SPEED (RPM)	9167	PLUNGE FEED	20.0

Just by changing the cylinder orientation in Rotary Parameters - the same program will run

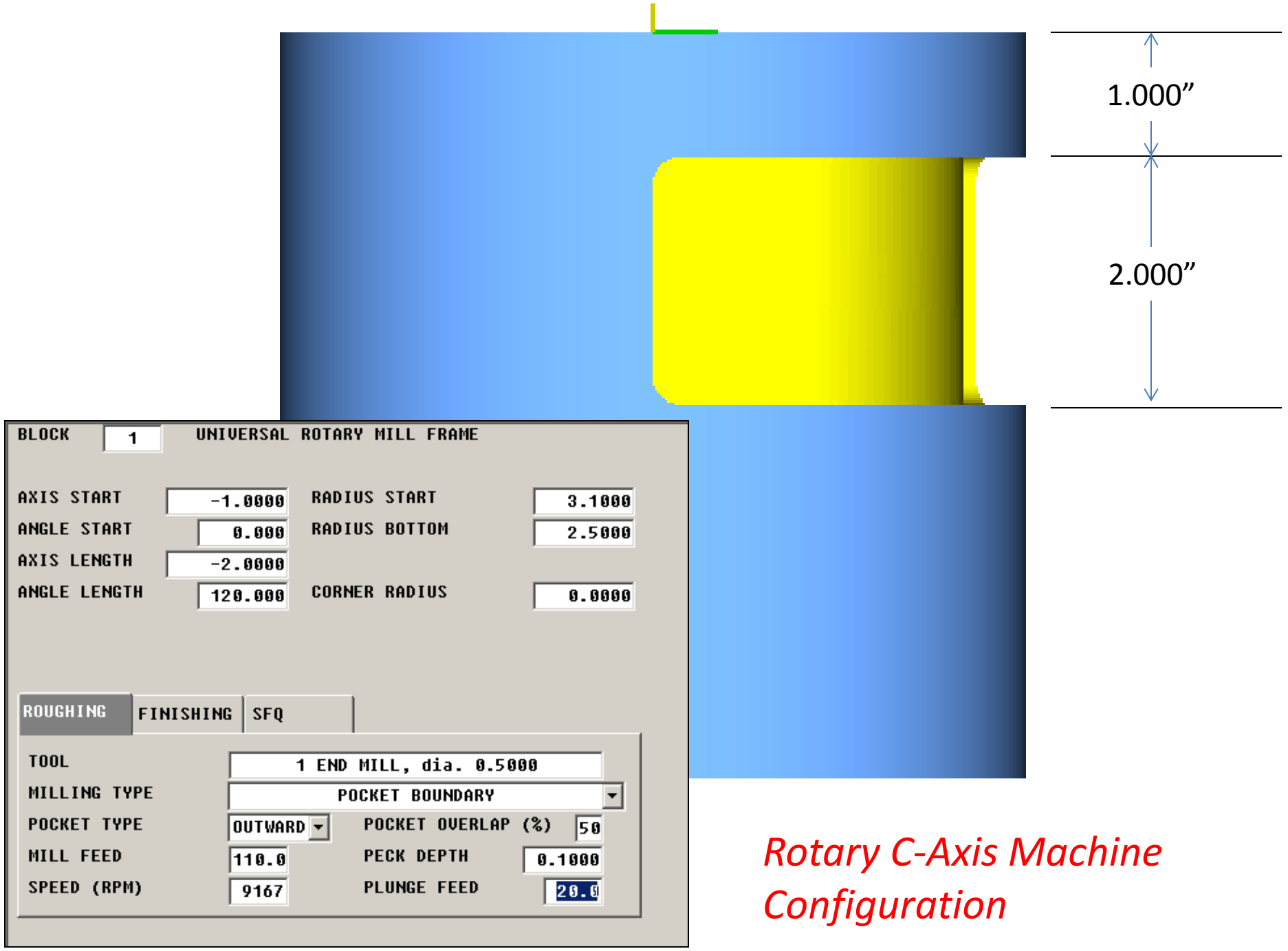
Tool Vector Angle Settings



AXIS fields are distances along the cylinder length where features are located.

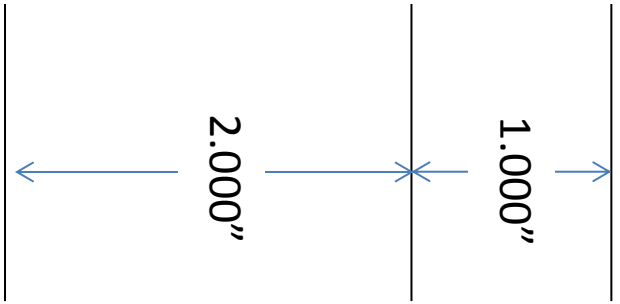
ANGLE fields are degrees around the circumference of the part – where does a feature start, and how far and what direction does it wrap.

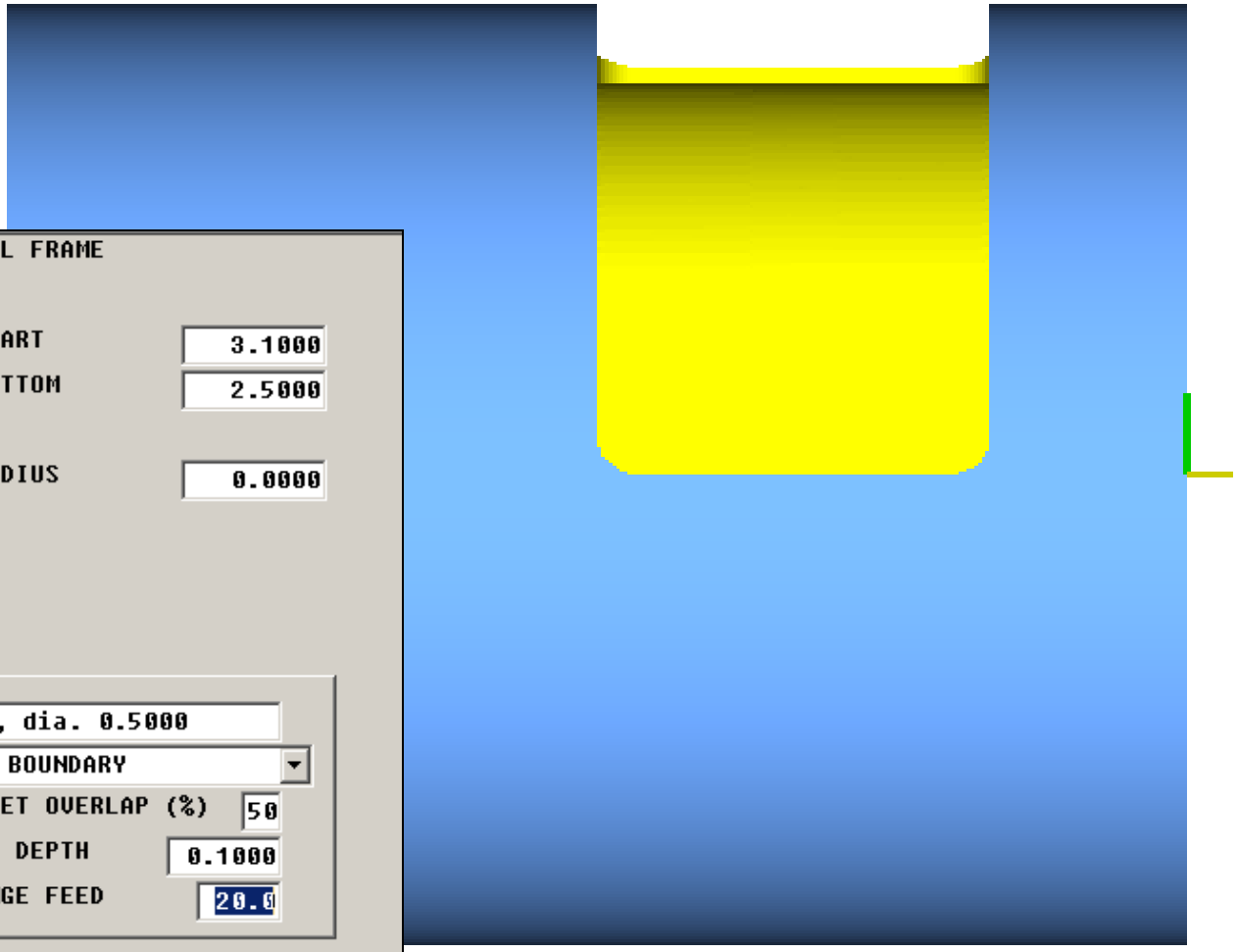
RADIUS START & BOTTOM are distances programmed from the center of the cylinder.



Rotary C-Axis Machine Configuration

Rotary A-Axis Machine Configuration





BLOCK 1 UNIVERSAL ROTARY MILL FRAME

AXIS START	-1.0000	RADIUS START	3.1000
ANGLE START	0.000	RADIUS BOTTOM	2.5000
AXIS LENGTH	-2.0000		
ANGLE LENGTH	120.000	CORNER RADIUS	0.0000

ROUGHING | FINISHING | SFQ

TOOL	1 END MILL, dia. 0.5000		
MILLING TYPE	POCKET BOUNDARY		
POCKET TYPE	OUTWARD	POCKET OVERLAP (%)	50
MILL FEED	110.0	PECK DEPTH	0.1000
SPEED (RPM)	9167	PLUNGE FEED	20.0