

Programming Basics

...learning the rules

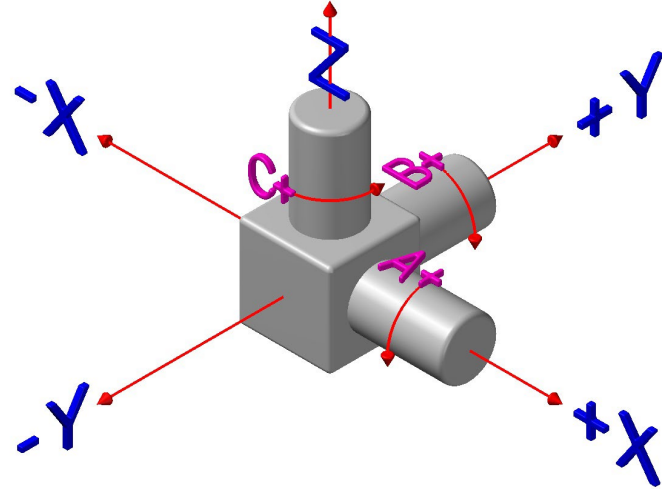
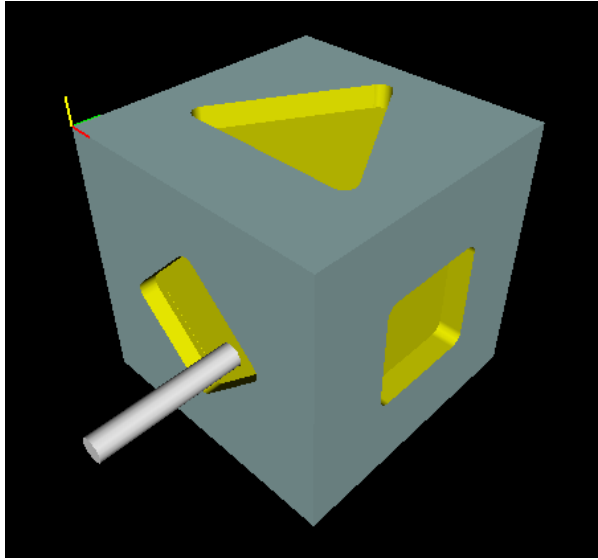
Universal Rotary

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 it has available.

Universal Rotary

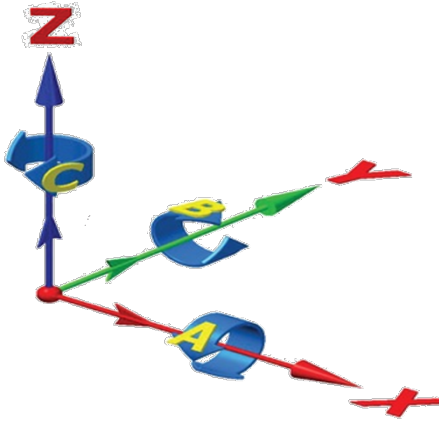


Simply program the tool as it would move around the part. DO NOT think about which axis would move on the machine.

Rotation Directions

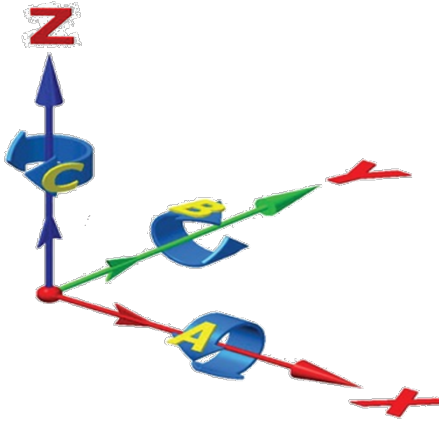
...ISO standard & the right hand rule

ISO vs. Non-ISO Rotary



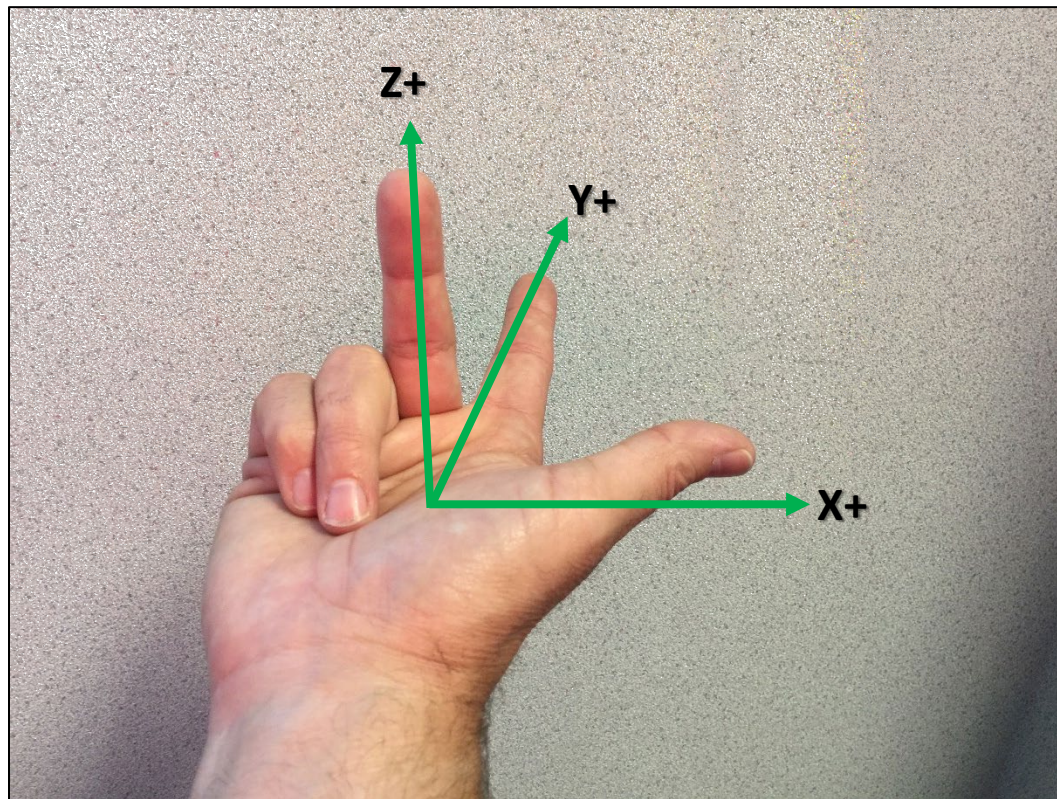
- There are two expressions that determine positive and negative rotations when programming rotary movements: ISO Standard & Non-ISO
- ISO is an Acronym for the International Organization for Standardization (ISO 841:2001)
- Non-ISO is the exact opposite
- Programming rotations are always ISO standard – regardless of machine setting

ISO vs. Non-ISO Rotary



- There are two expressions that determine positive and negative rotations when programming rotary movements: ISO Standard & Non-ISO
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- Programming rotations are always ISO standard – regardless of machine setting

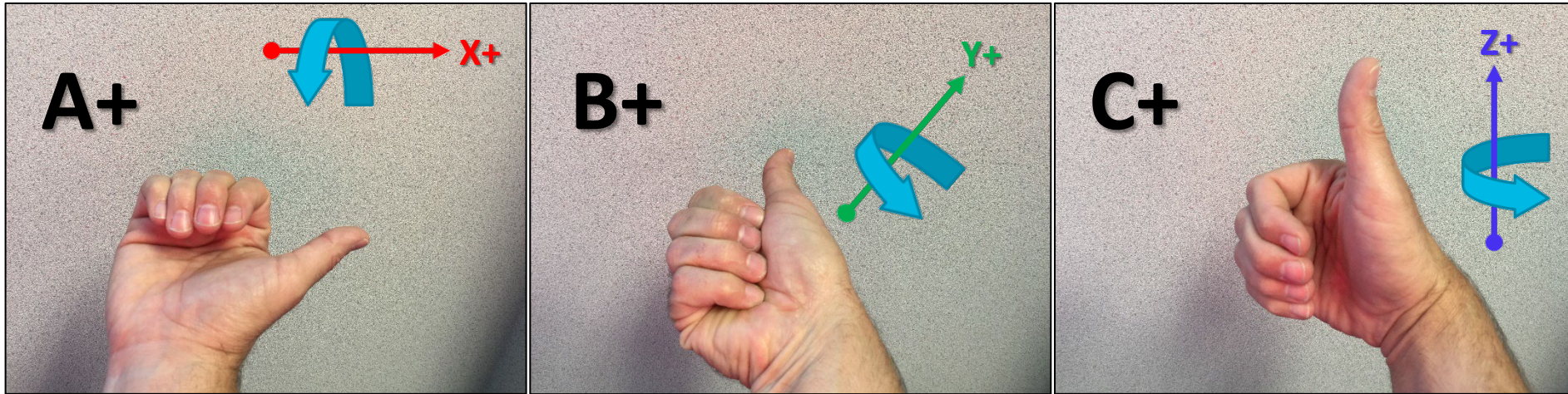
The Right Hand Rule



The Right Hand Rule

Lay the thumb along the positive direction of the linear axis, and the fingers wrap in the positive direction of rotation of the tool.

The right hand rule always describes the ISO Standard rotary direction



Thank You !

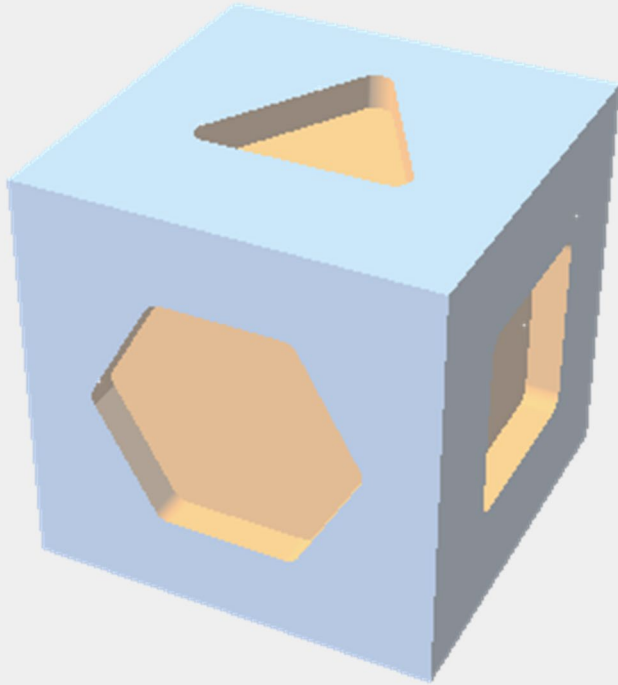


Programming *5-sided*

...how easy is it? ...can I do it?

...It's as easy as 1-2-3

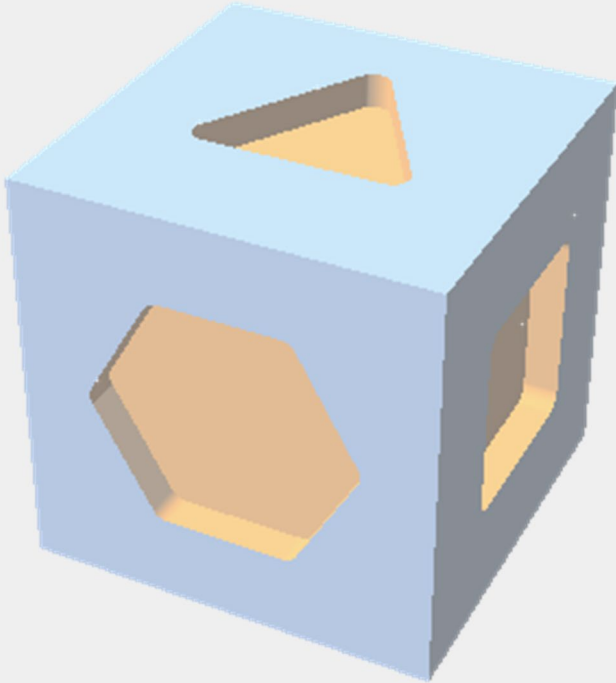
6" x 6" x 6" Cube



Right Side

...It's as easy as 1-2-3

6" x 6" x 6" Cube

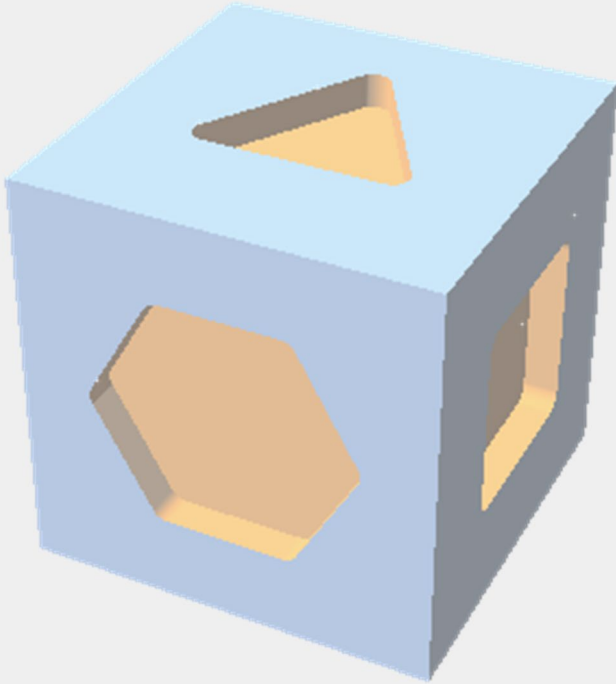


Right Side

1. Move the origin point

...It's as easy as 1-2-3

6" x 6" x 6" Cube

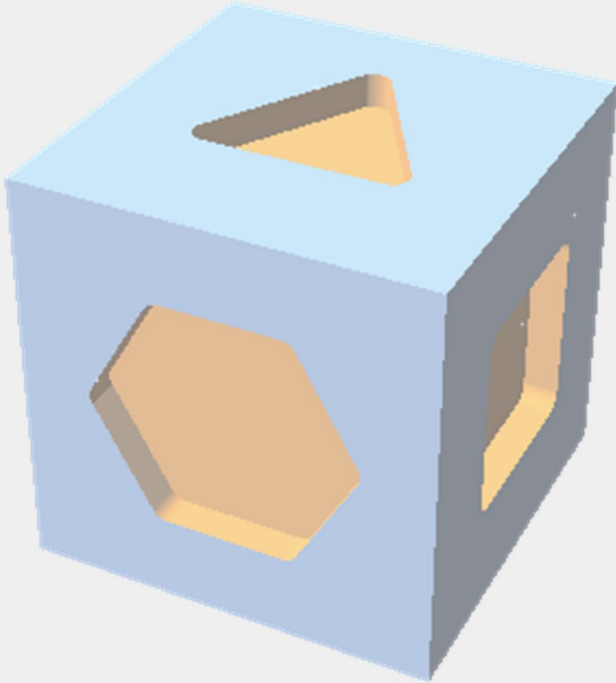


Right Side

1. Move the origin point
2. Rotate the workplane

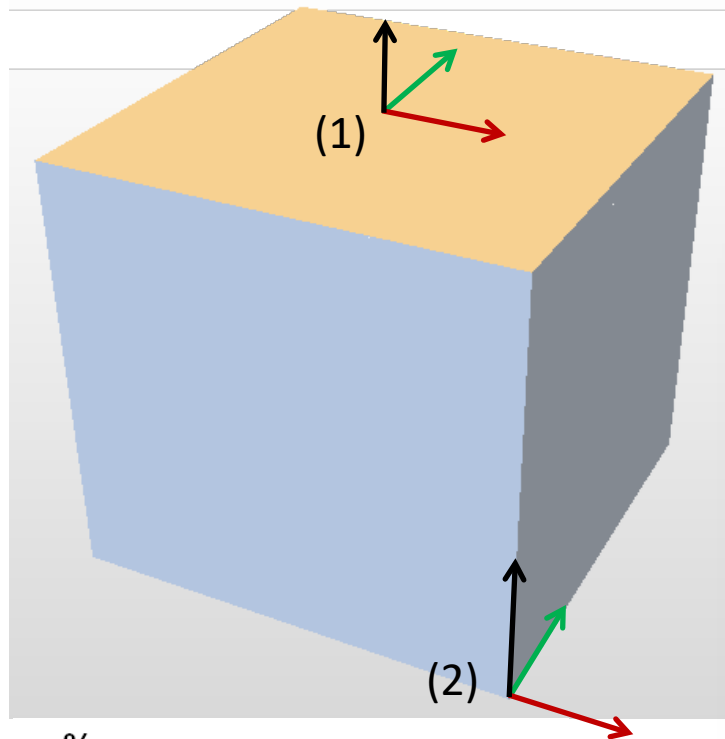
...It's as easy as 1-2-3

6" x 6" x 6" Cube



Right Side

1. Move the origin point
2. Rotate the workplane
3. Program 3-axis features



%

T1M6

G68.2 X3.0 Y-3.0 Z-6.0 B90

G0 X2.566 Y1.3582

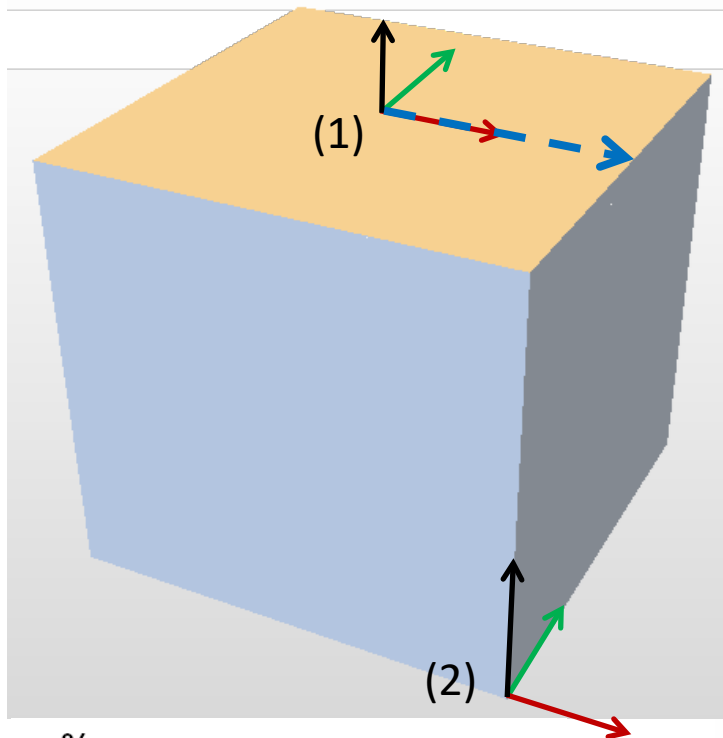
Right Side

1. Move the origin point

BLOCK	3	TRANSFORM PLANE
ORIENT METHOD	ANGLES	
ORIGIN POINT		
X	3.0000	
Y	-3.0000	
Z	-6.0000	
ROTATION ANGLES		
R(X)	0.000	
R(Y)	90.000	
R(Z)	0.000	

Right Side

1. Move the origin point



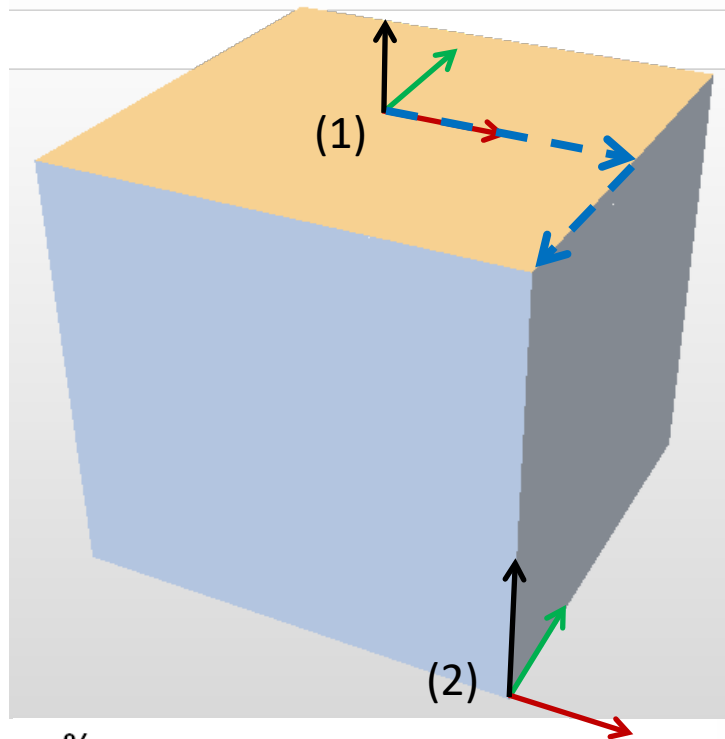
BLOCK	3	TRANSFORM PLANE
ORIENT METHOD	ANGLES	
ORIGIN POINT		
X	3.0000	
Y	-3.0000	
Z	-6.0000	
ROTATION ANGLES		
R(X)	0.000	
R(Y)	90.000	
R(Z)	0.000	

%

T1M6

G68.2 X3.0 Y-3.0 Z-6.0 B90

G0 X2.566 Y1.3582



%

T1M6

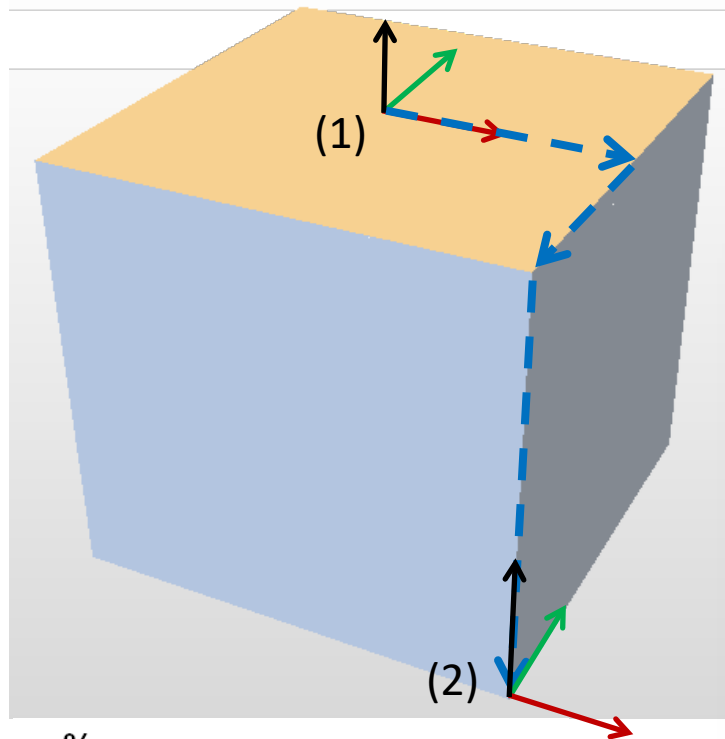
G68.2 X3.0 Y-3.0 Z-6.0 B90

G0 X2.566 Y1.3582

Right Side

1. Move the origin point

BLOCK	3	TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT		ROTATION ANGLES	
X	3.0000	R(X)	0.000
Y	-3.0000	R(Y)	90.000
Z	-6.0000	R(Z)	0.000



%

T1M6

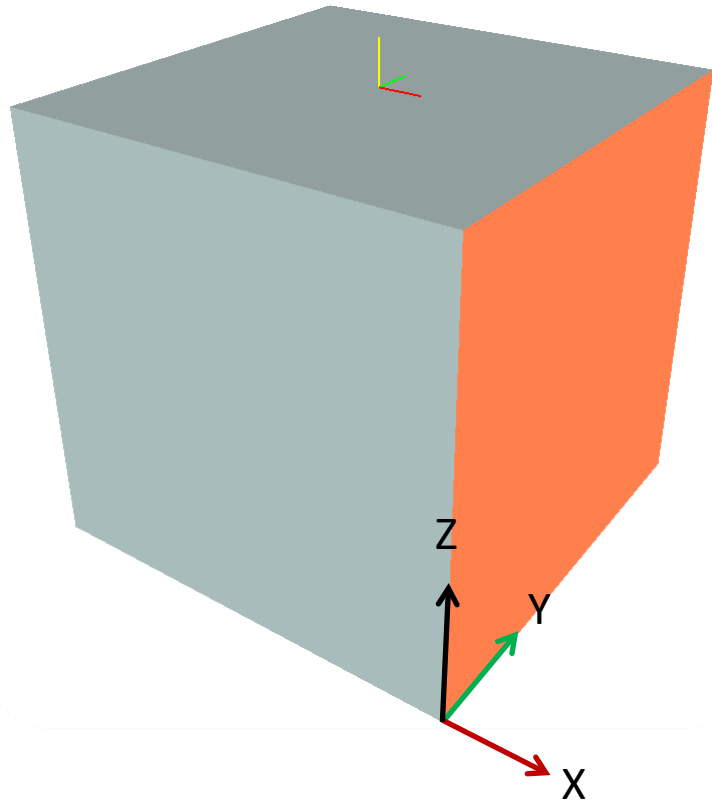
G68.2 X3.0 Y-3.0 Z-6.0 B90

G0 X2.566 Y1.3582

Right Side

1. Move the origin point

BLOCK	3	TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT		ROTATION ANGLES	
X	3.0000	R(X)	0.000
Y	-3.0000	R(Y)	90.000
Z	-6.0000	R(Z)	0.000



Right Side

2. Rotate the workplane

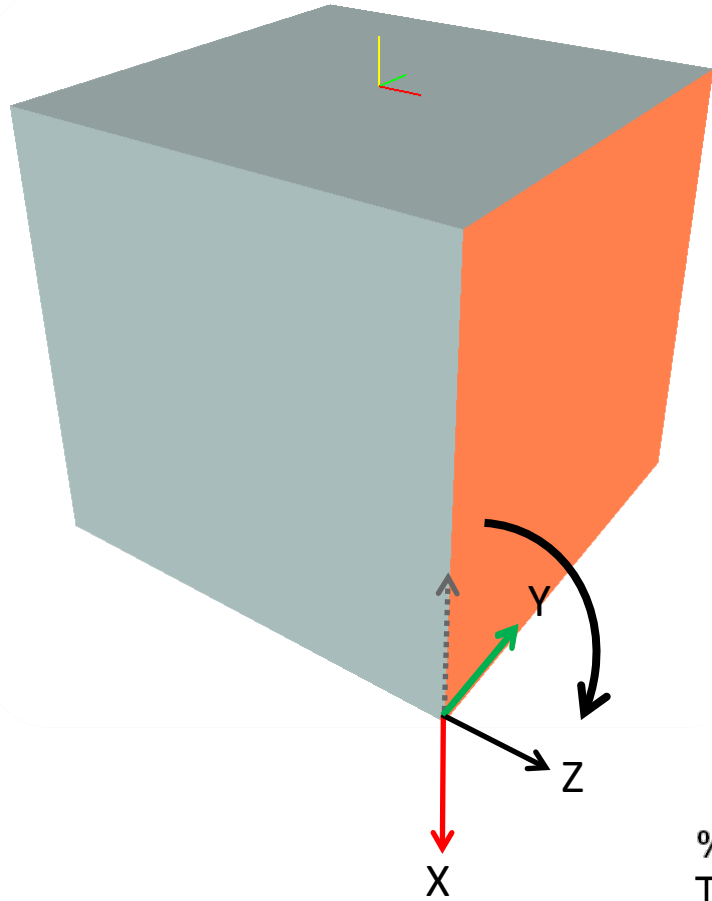
BLOCK	3	TRANSFORM PLANE	
ORIENT METHOD		ANGLES ▾	
ORIGIN POINT			
X	3.0000		
Y	-3.0000		
Z	-6.0000		
ROTATION ANGLES			
R(X)	0.000		
R(Y)	90.000		
R(Z)	0.000		

%

T1M6

G68.2 X3.0 Y-3.0 Z-6.0 B90

G0 X2.566 Y1.3582



Right Side

2. Rotate the workplane

BLOCK		3		TRANSFORM PLANE	
ORIENT METHOD		ANGLES			
ORIGIN POINT					
X		3.0000			
Y		-3.0000			
Z		-6.0000			
ROTATION ANGLES					
R(X)		0.000			
R(Y)		90.000			
R(Z)		0.000			

%

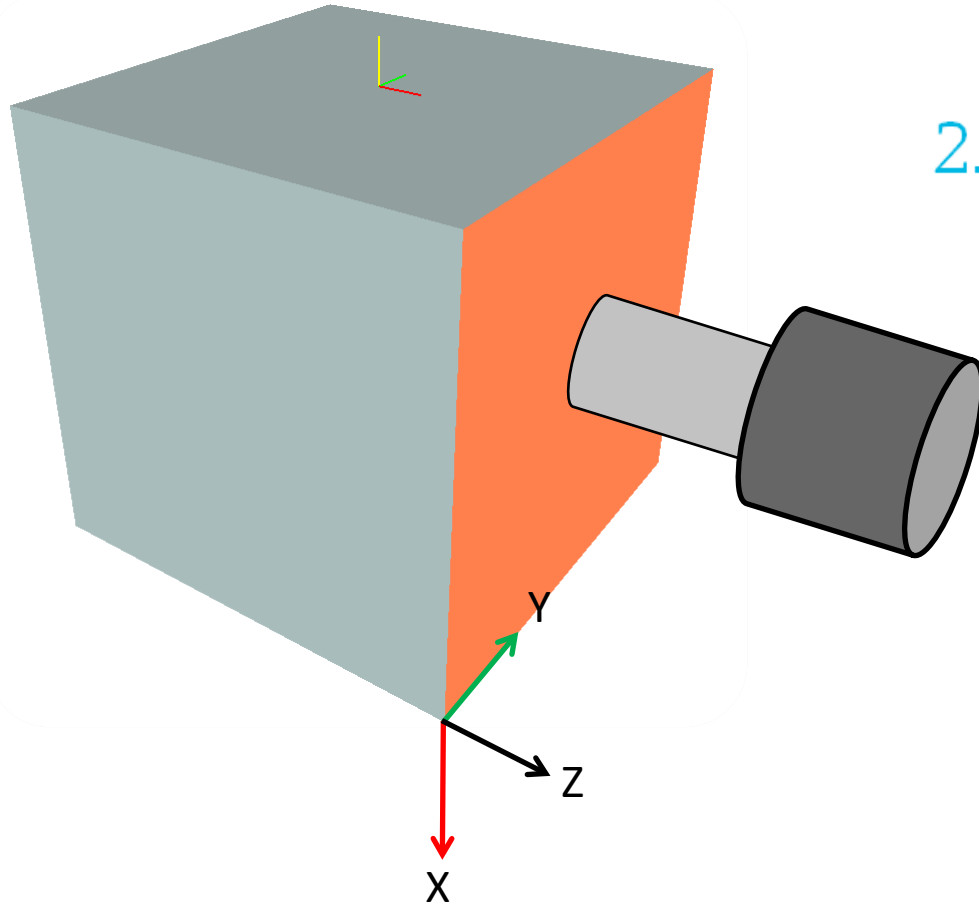
T1M6

G68.2 X3.0 Y-3.0 Z-6.0 B90

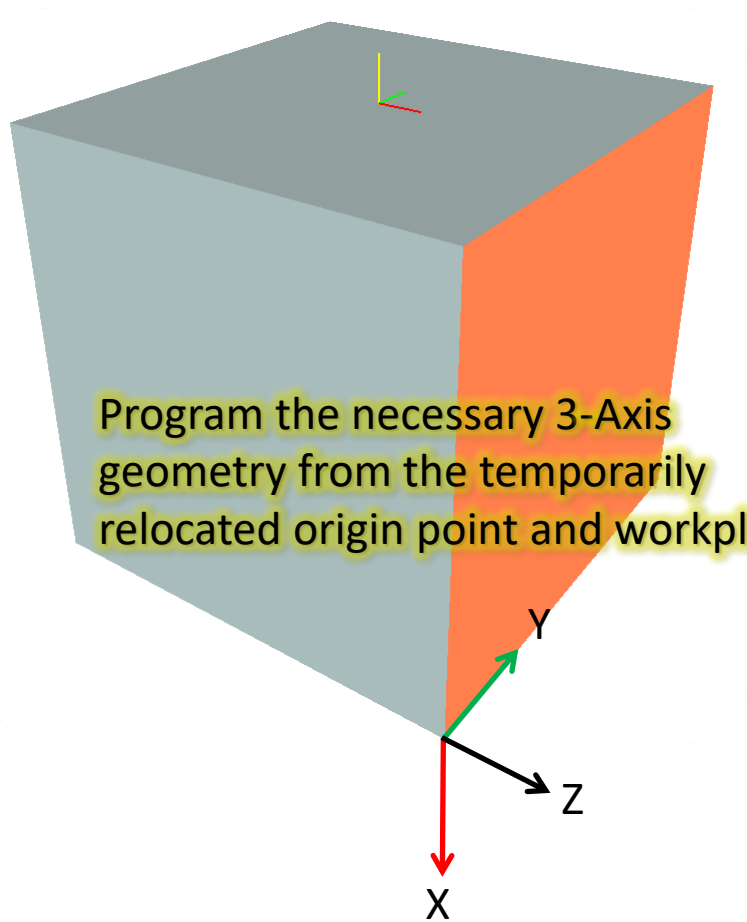
G0 X2.566 Y1.3582

Right Side

2. Rotate the workplane



The tool axis is now perpendicular to the newly created workplane



Right Side

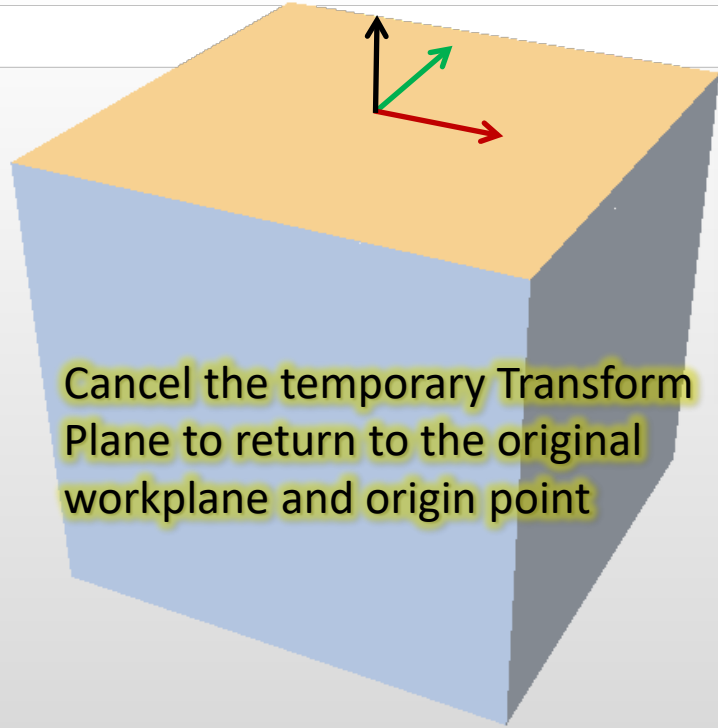
3. Program 3-axis features

BLOCK	5	MILL CIRCLE	
X CENTER	-3.0000	Z START	0.1000
Y CENTER	3.0000	Z BOTTOM	-0.5000
RADIUS	2.5000		

Conversational - OR – G Code

```
%
O2012(HURCO ENGRAVE)
(MATERIAL - ALUMINUM INCH - 2024)
(T1000 | 1/8 BALL ENDMILL)
N100 G20
N102 G0 G17 G40 G49 G80 G90
N104 T1000 M6
```

Right Side



Cancel the temporary Transform Plane to return to the original workplane and origin point

PROGRAM REVIEW SCREEN

DATA BLOCKS

1. TRANSFORM PLANE
 2. MILL CIRCLE (POCKET BOUNDARY)
 3. TRANSFORM PLANE END
- END OF PROGRAM

SUB BLOCKS

Conversational - OR – G Code

X1.56 Y2.1224

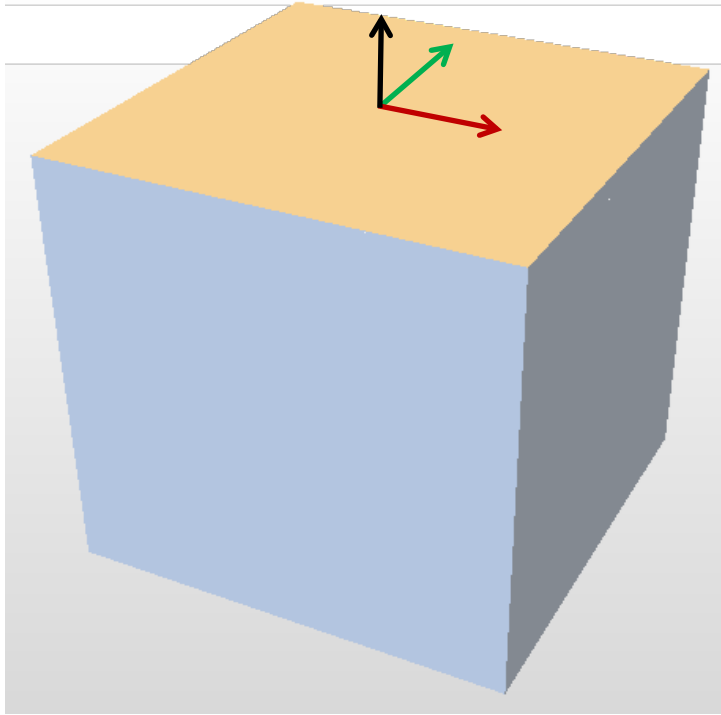
G53 Z0

G69

G0 A0 B0

M30

...It's as easy as 1-2-3



Repeat...

Repeat...

Repeat...

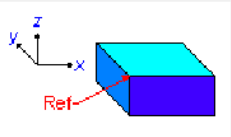
Thank You !



Let's Program Together
...do it by the numbers

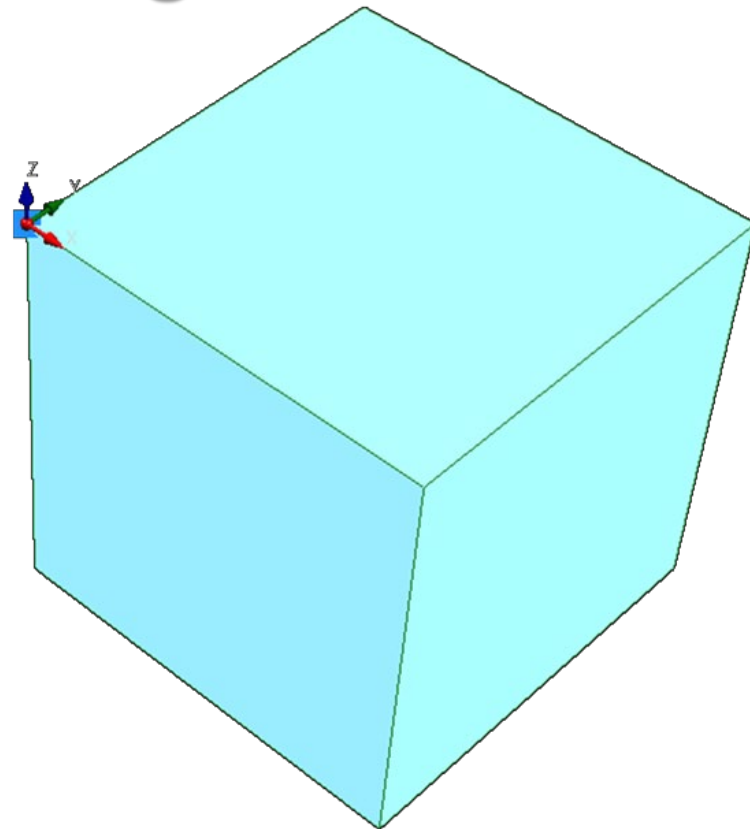
Let's Program Together

STOCK GEOMETRY	
MANUAL STOCK SIZING	<input type="button" value="YES"/>
ZERO REF	<input type="button" value="PART ZERO"/>
X REF POSITION	<input type="text" value="0.0000"/>
Y REF POSITION	<input type="text" value="0.0000"/>
Z REF POSITION	<input type="text" value="0.0000"/>
STOCK TYPE	<input type="button" value="BOX"/>
X LENGTH	<input type="text" value="6.0000"/>
Y LENGTH	<input type="text" value="6.0000"/>
Z LENGTH	<input type="text" value="6.0000"/>



A small diagram showing a 3D box with a coordinate system (X, Y, Z) and a red arrow pointing to a corner labeled 'Ref'.

PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
1. ROTARY POSITION	
END OF PROGRAM	



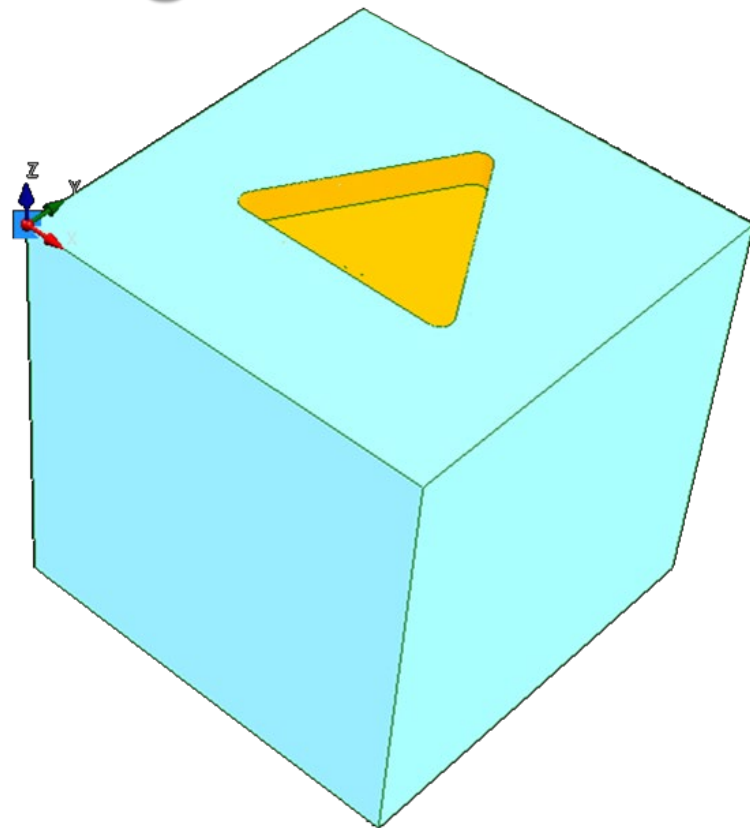
Let's Program Together

BLOCK	1	ROTARY POSITION	
RESET ROTARY ENCODERS	NO	STOP	NO
FIRST MOVE (Z RETRACT)			
RETRACT TYPE	Z HOME	Z POSITION	0.0000
SECOND MOVE			
ENABLE	NO	X POSITION	0.0000
		Y POSITION	0.0000
THIRD MOVE (END POSITION)			
X POSITION	FIRST		0.0000
Y POSITION	FIRST		0.0000
IV ANGLE	FIRST		0.000
V ANGLE	FIRST		0.000

- Start every program with a Rotary Position Block
- Ensures that the tilting and rotary axes are at a known location before starting the program
- Almost always leave the data to the default values

Let's Program Together

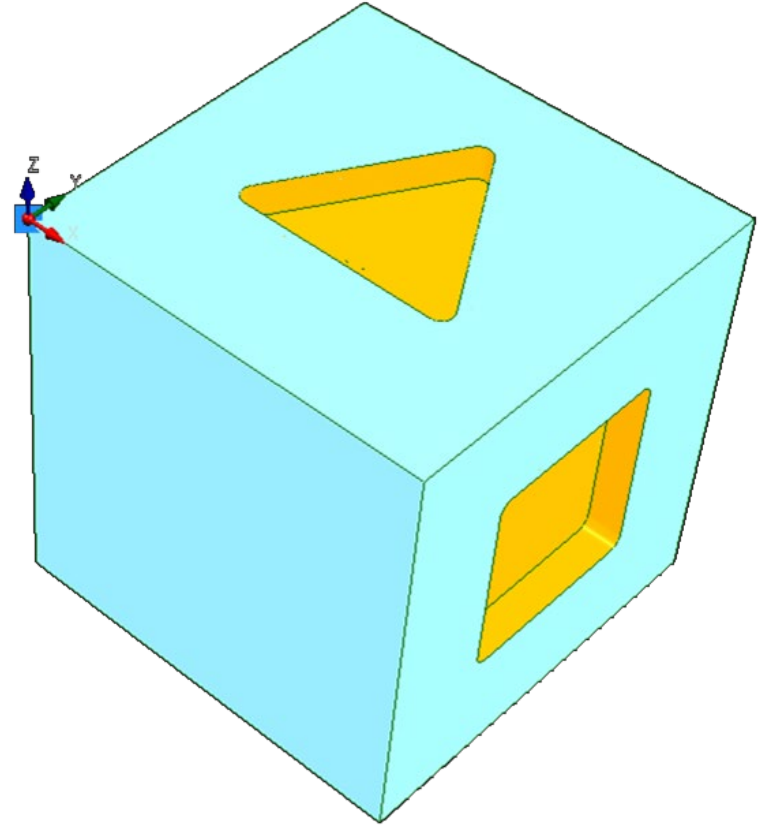
BLOCK	2	MILL POLYGON	
NUMBER OF SIDES	3	Z START	0.1000
X CENTER	3.0000	Z BOTTOM	-0.5000
Y CENTER	3.0000	CORNER RADIUS	0.0000
SIZING METHOD	OUTER DIAMETER ▾		
SIZING DIAMETER	4.0000		
ORIENTATION ANGLE	0.000		
<div>ROUGHING FINISHING SFQ</div>			
TOOL	1 END MILL, dia. 0.5000		
MILLING TYPE	POCKET BOUNDARY ▾		
POCKET TYPE	OUTWARD ▾	POCKET OVERLAP (%)	50
MILL FEED	91.7	PECK DEPTH	0.1000
SPEED (RPM)	9167	PLUNGE FEED	20.0



Let's Program Together

BLOCK	3	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES ▾		
ORIGIN POINT		AXIS ANGLES	
X	6.0000	R(X)	0.000
Y	0.0000	R(Y)	90.000
Z	0.0000	R(Z)	0.000

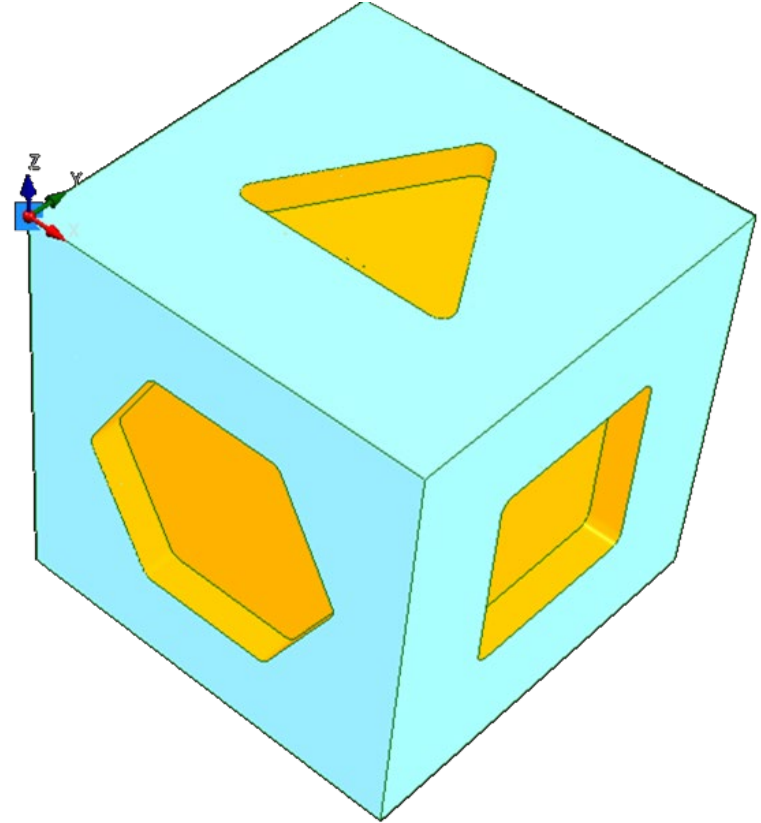
PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
1. ROTARY POSITION	
2. MILL POLYGON (POCKET BOUNDARY)	
3. TRANSFORM PLANE	
4. MILL POLYGON (POCKET BOUNDARY)	
5. TRANSFORM PLANE END	
END OF PROGRAM	



Let's Program Together

BLOCK	6	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES ▾		
ORIGIN POINT		AXIS ANGLES	
X	0.0000	R(X)	90.000
Y	0.0000	R(Y)	0.000
Z	-6.0000	R(Z)	0.000

PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
3. TRANSFORM PLANE	
4. MILL POLYGON (POCKET BOUNDARY)	
5. TRANSFORM PLANE END	
6. TRANSFORM PLANE	
7. MILL POLYGON (POCKET BOUNDARY)	
8. TRANSFORM PLANE END	
END OF PROGRAM	



Thank You !



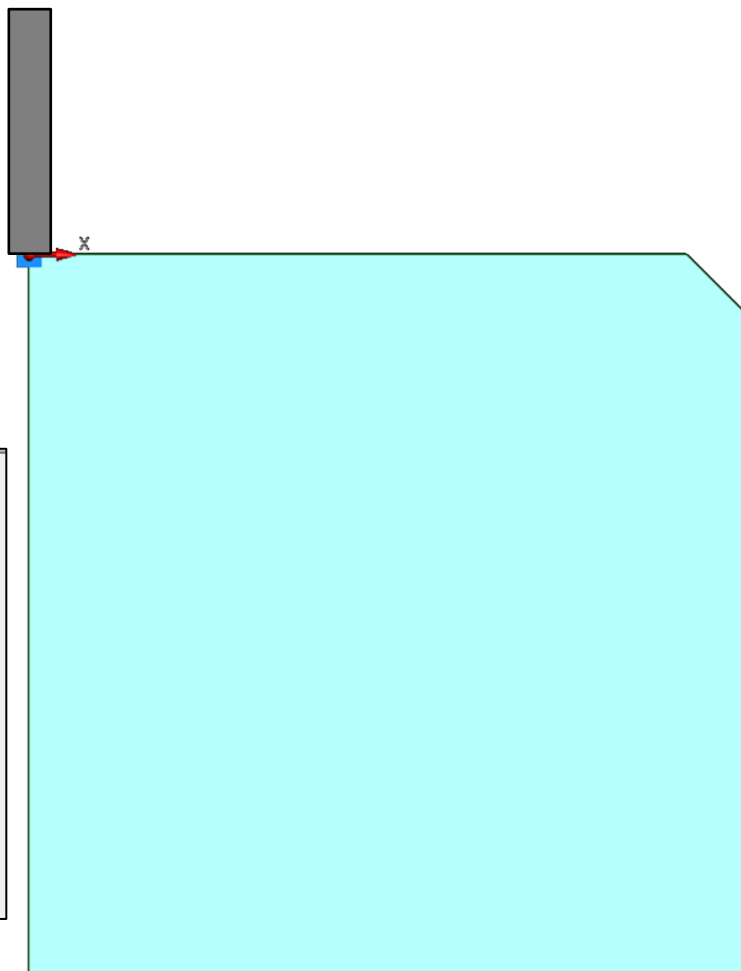
Controlling the Direction

...chamfer with end and side of endmill

BLOCK TRANSFORM PLANE

ORIENT METHOD

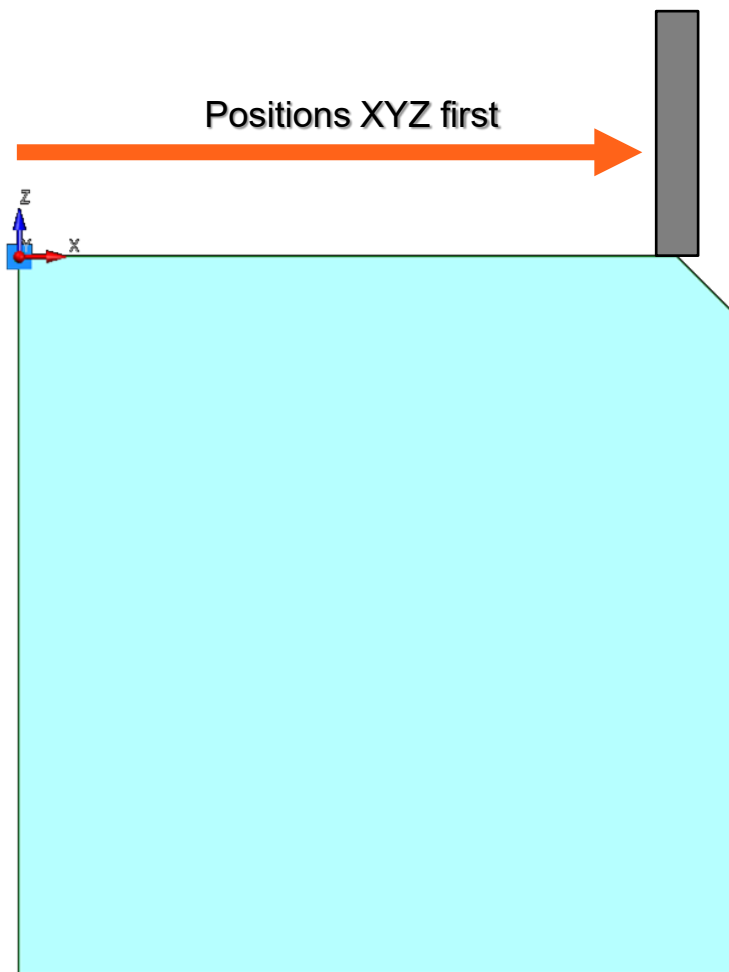
ORIGIN POINT		ROTATION ANGLES	
X	<input type="text" value="5.5000"/>	R(X)	<input type="text" value="0.000"/>
Y	<input type="text" value="0.0000"/>	R(Y)	<input type="text" value="0.000"/>
Z	<input type="text" value="0.0000"/>	R(Z)	<input type="text" value="0.000"/>



BLOCK **1** TRANSFORM PLANE

ORIENT METHOD **ANGLES**

ORIGIN POINT		ROTATION ANGLES	
X	5.5000	R(X)	0.000
Y	0.0000	R(Y)	0.000
Z	0.0000	R(Z)	0.000



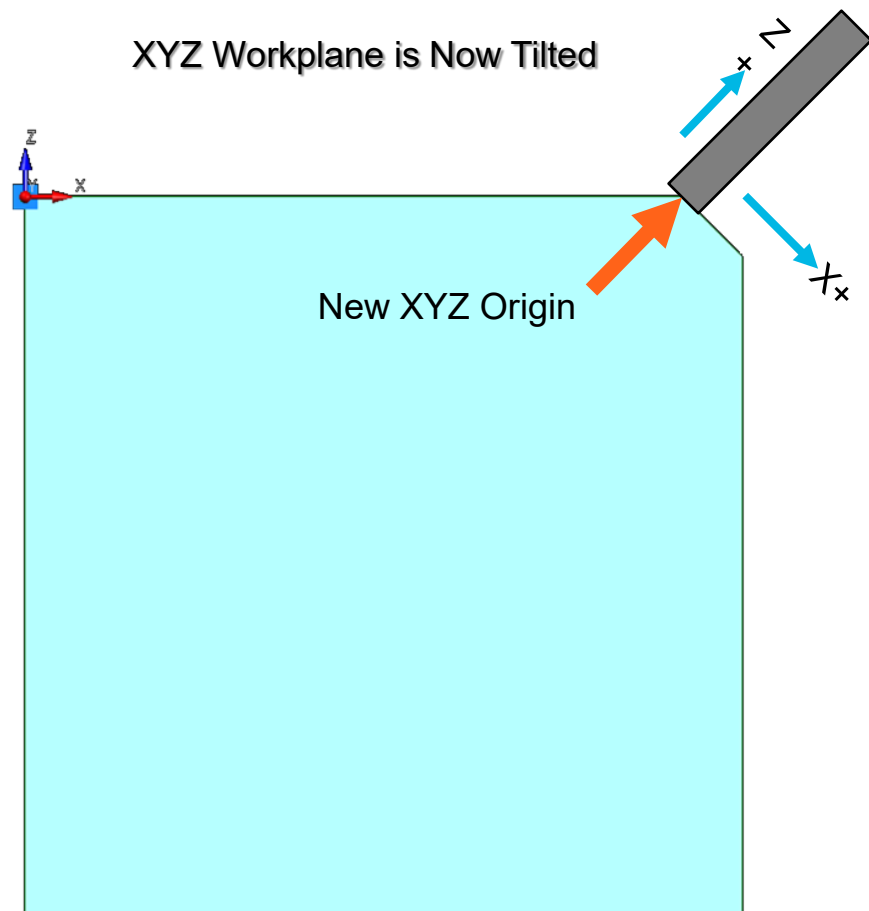
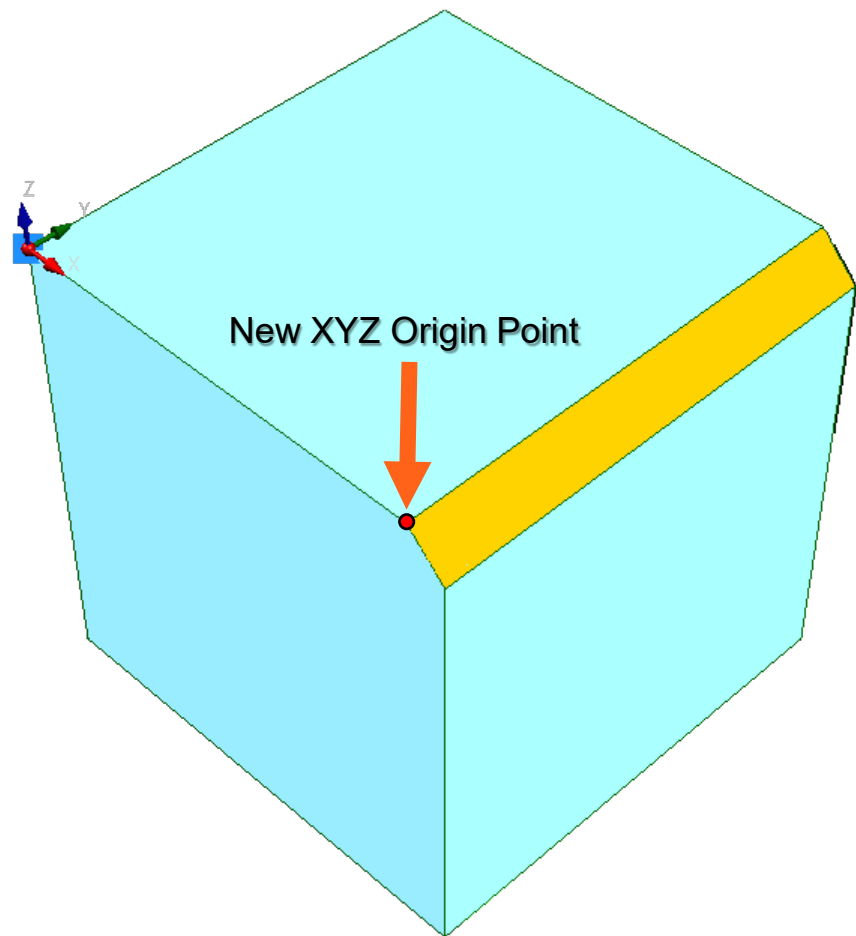
Rotation Happens at XYZ Point

Rotation Point

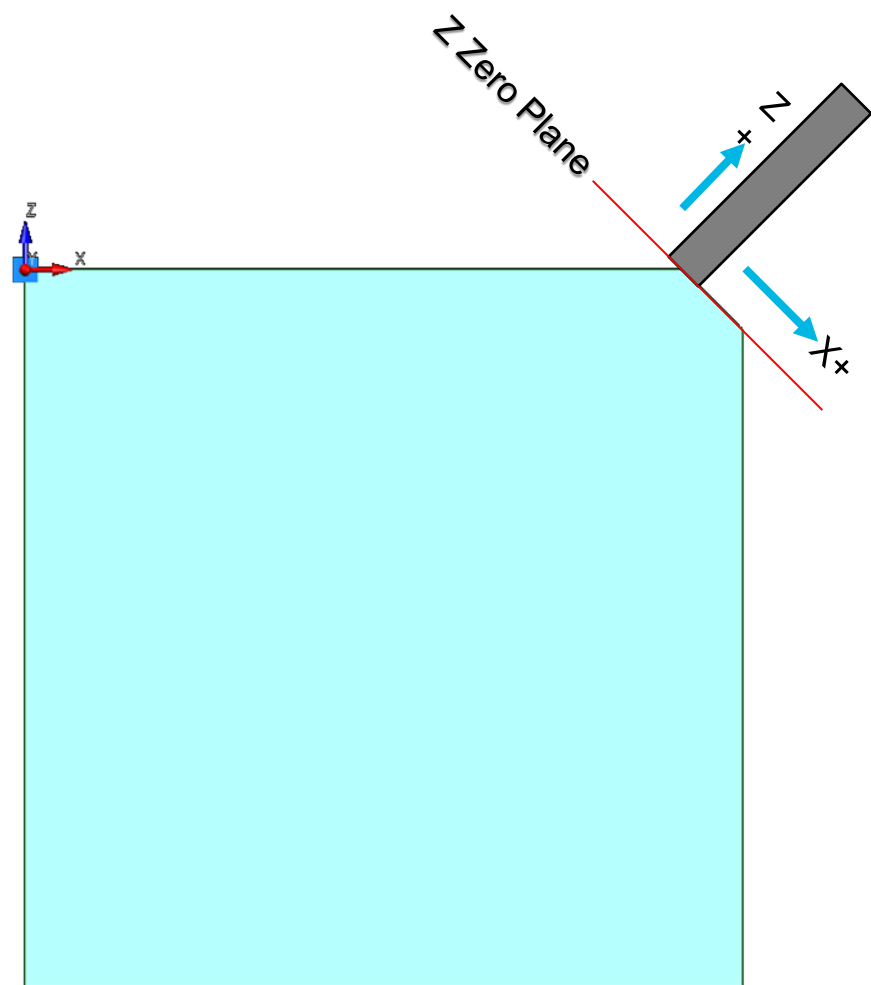
BLOCK **1** TRANSFORM PLANE

ORIENT METHOD **ANGLES**

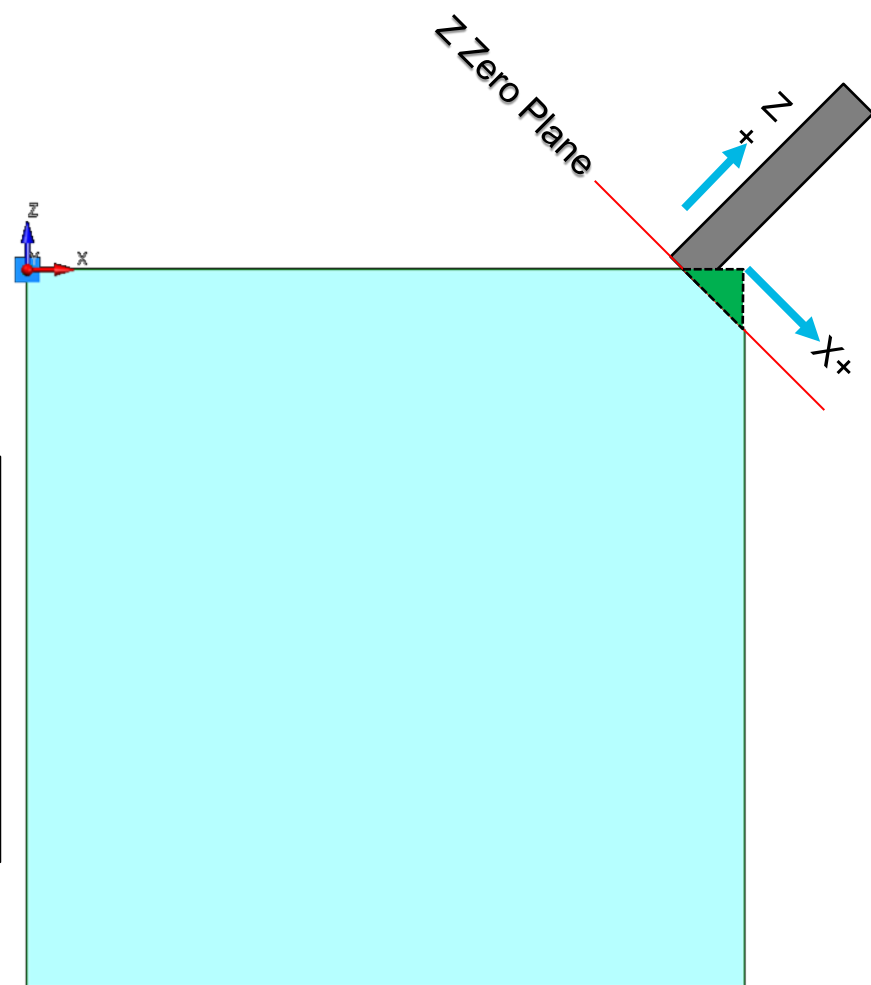
ORIGIN POINT		ROTATION ANGLES	
X	5.5000	R(X)	0.000
Y	0.0000	R(Y)	45.000
Z	0.0000	R(Z)	0.000



BLOCK	2	MILL FRAME	
GEOMETRY		CORNERS	
X CORNER	-0.2500	Z START	0.5000
Y CORNER	-0.2500	Z BOTTOM	0.0000
X LENGTH	1.0000	CORNER RADIUS	0.0000
Y LENGTH	6.5000		



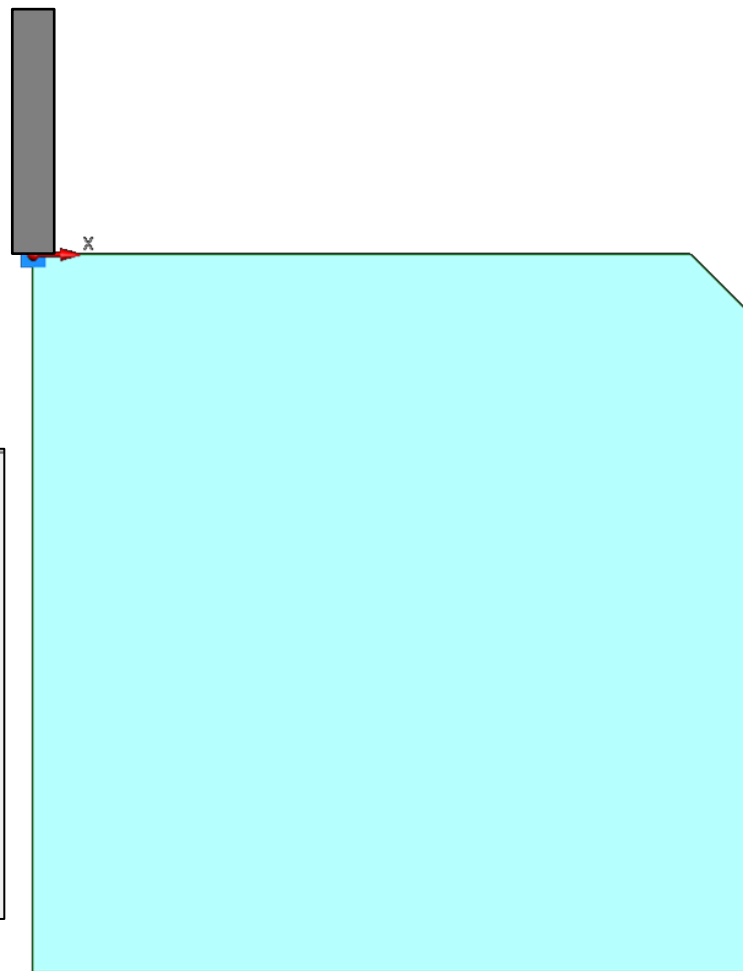
BLOCK	2	MILL FRAME	
GEOMETRY		CORNERS	
X CORNER	-0.2500	Z START	0.5000
Y CORNER	-0.2500	Z BOTTOM	0.0000
X LENGTH	1.0000	CORNER RADIUS	0.0000
Y LENGTH	6.5000		



BLOCK TRANSFORM PLANE

ORIENT METHOD

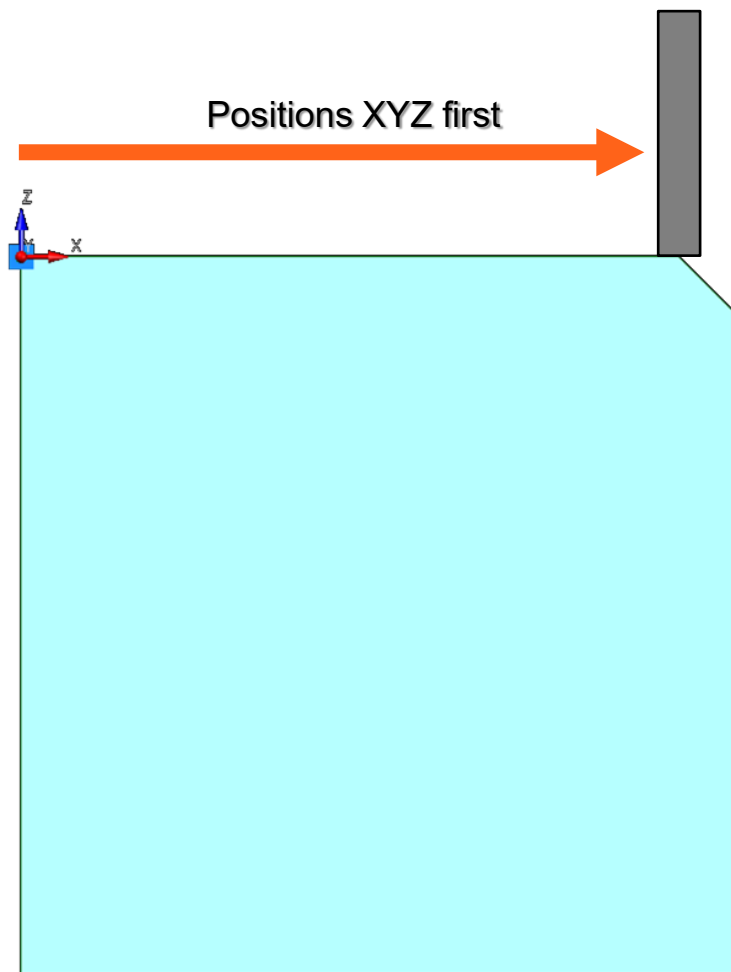
ORIGIN POINT		ROTATION ANGLES	
X	<input type="text" value="5.5000"/>	R(X)	<input type="text" value="0.000"/>
Y	<input type="text" value="0.0000"/>	R(Y)	<input type="text" value="0.000"/>
Z	<input type="text" value="0.0000"/>	R(Z)	<input type="text" value="0.000"/>



BLOCK TRANSFORM PLANE

ORIENT METHOD

ORIGIN POINT		ROTATION ANGLES	
X	<input type="text" value="5.5000"/>	R(X)	<input type="text" value="0.000"/>
Y	<input type="text" value="0.0000"/>	R(Y)	<input type="text" value="0.000"/>
Z	<input type="text" value="0.0000"/>	R(Z)	<input type="text" value="0.000"/>

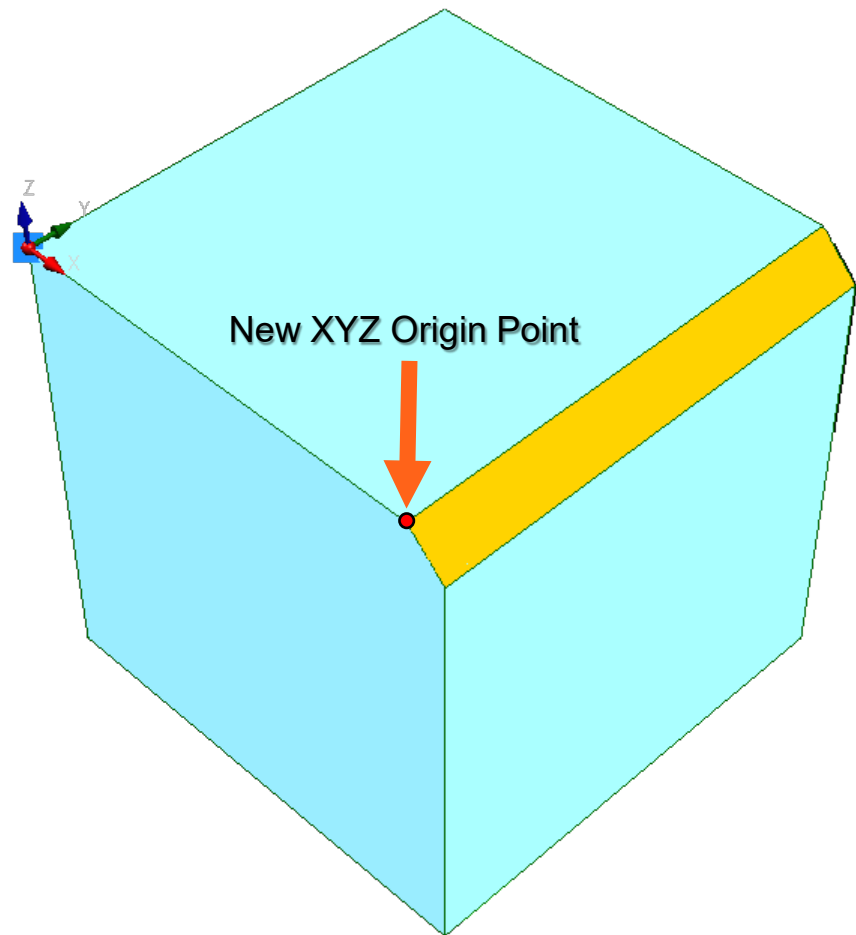


Rotation Happens at XYZ Point

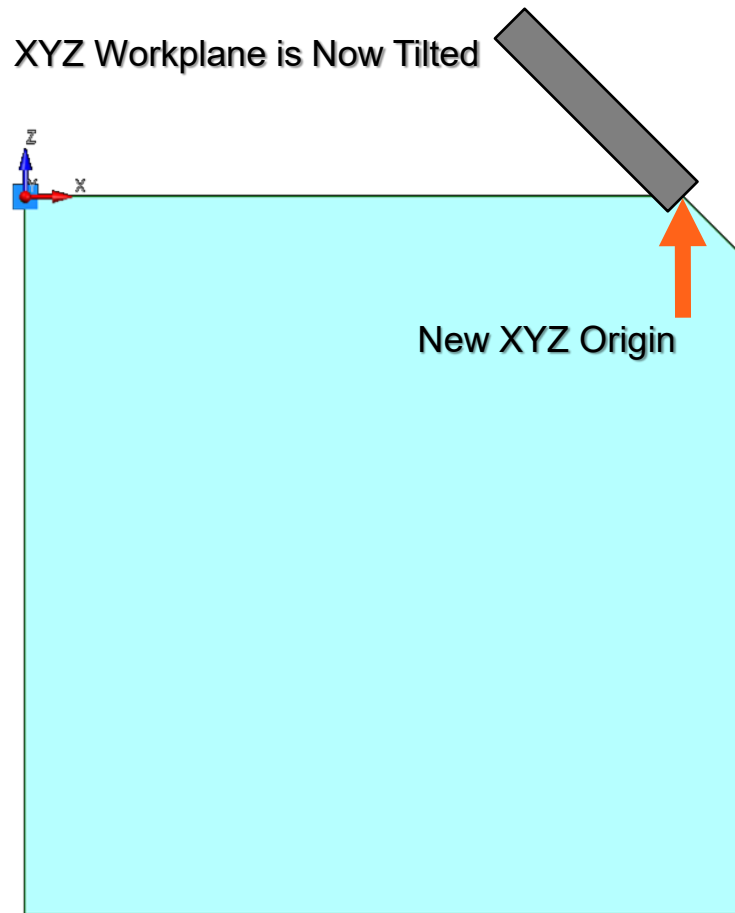


Rotation Point

BLOCK 1		TRANSFORM PLANE	
ORIENT METHOD ANGLES			
ORIGIN POINT		ROTATION ANGLES	
X	5.5000	R(X)	0.000
Y	0.0000	R(Y)	-45.000
Z	0.0000	R(Z)	0.000

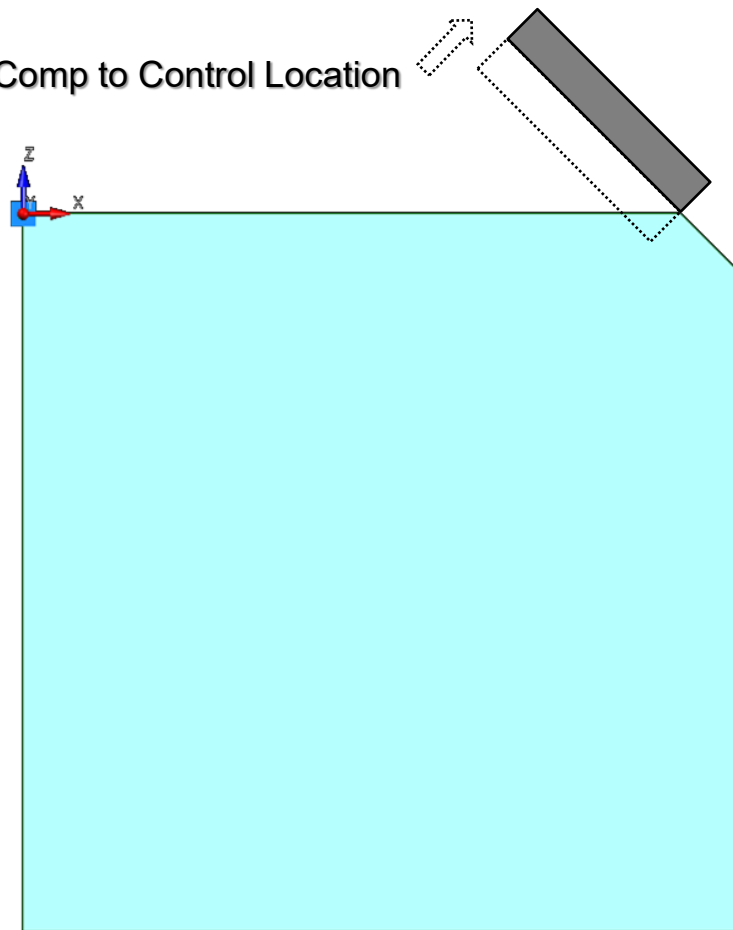


XYZ Workplane is Now Tilted



Cutter Comp to Control Location

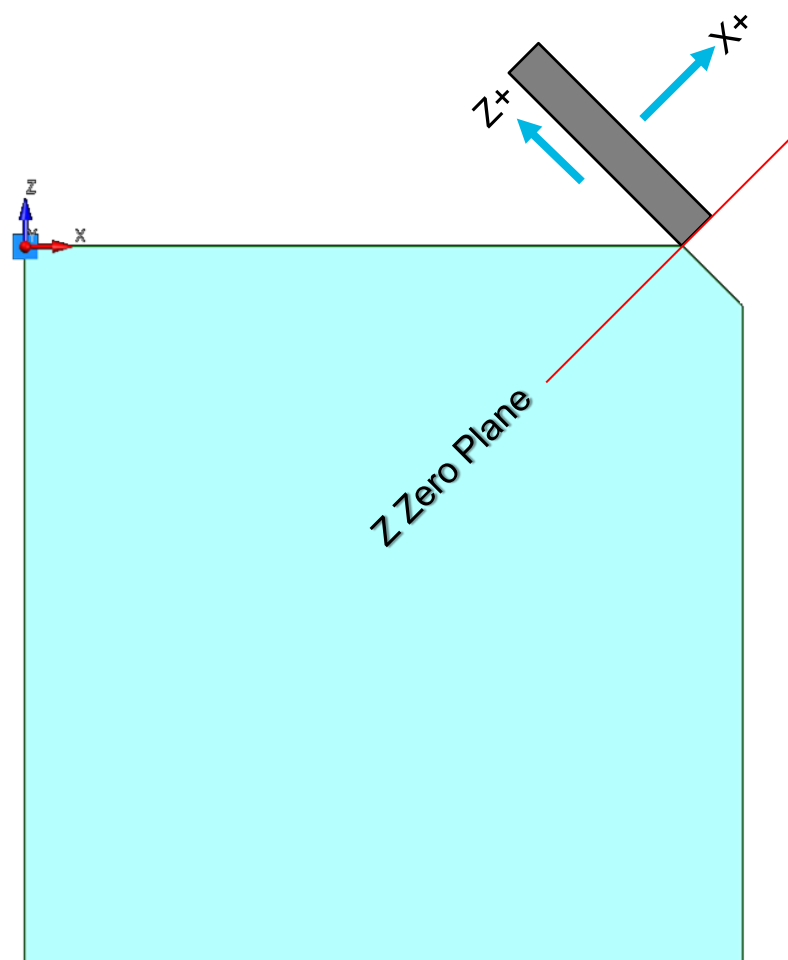
BLOCK	4	MILL CONTOUR	
SEGMENT	0	START	
X START	0.0000	Z START	0.1000
Y START	0.0000	Z BOTTOM	-1.0000
ROUGHING		FINISHING	SFQ
TOOL		73 END MILL, dia. 0.5000	
MILLING TYPE		RIGHT	
ENABLE BLEND MOVES		YES	
MILL FEED		85.0	PECK DEPTH
SPEED (RPM)		5000	PLUNGE FEED
			0.0



BLOCK	4	MILL CONTOUR	
SEGMENT	0	START	
X START	0.0000	Z START	0.1000
Y START	0.0000	Z BOTTOM	-1.0000

ROUGHING	FINISHING	SFQ	ALLOWANCES
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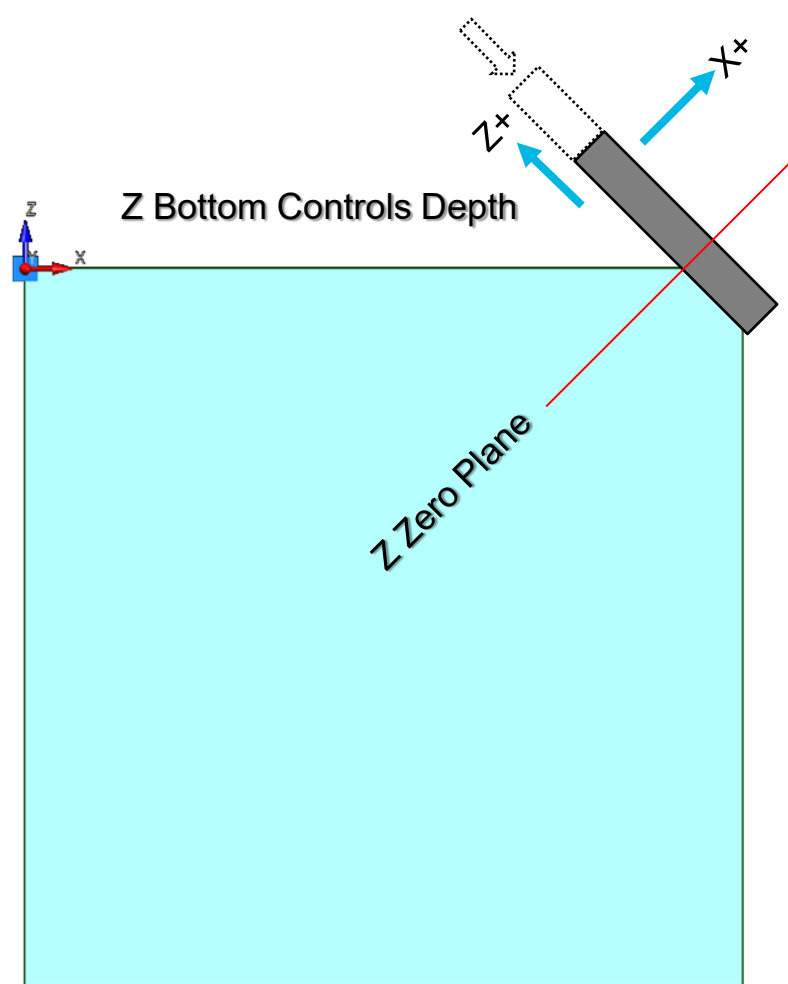
TOOL	73 END MILL, dia. 0.5000		
MILLING TYPE	RIGHT		
ENABLE BLEND MOVES	YES		
MILL FEED	85.0	PECK DEPTH	0.0000
SPEED (RPM)	5000	PLUNGE FEED	0.0



BLOCK	4	MILL CONTOUR	
SEGMENT	0	START	
X START	0.0000	Z START	0.1000
Y START	0.0000	Z BOTTOM	-1.0000

ROUGHING	FINISHING	SFQ	ALLOWANCES
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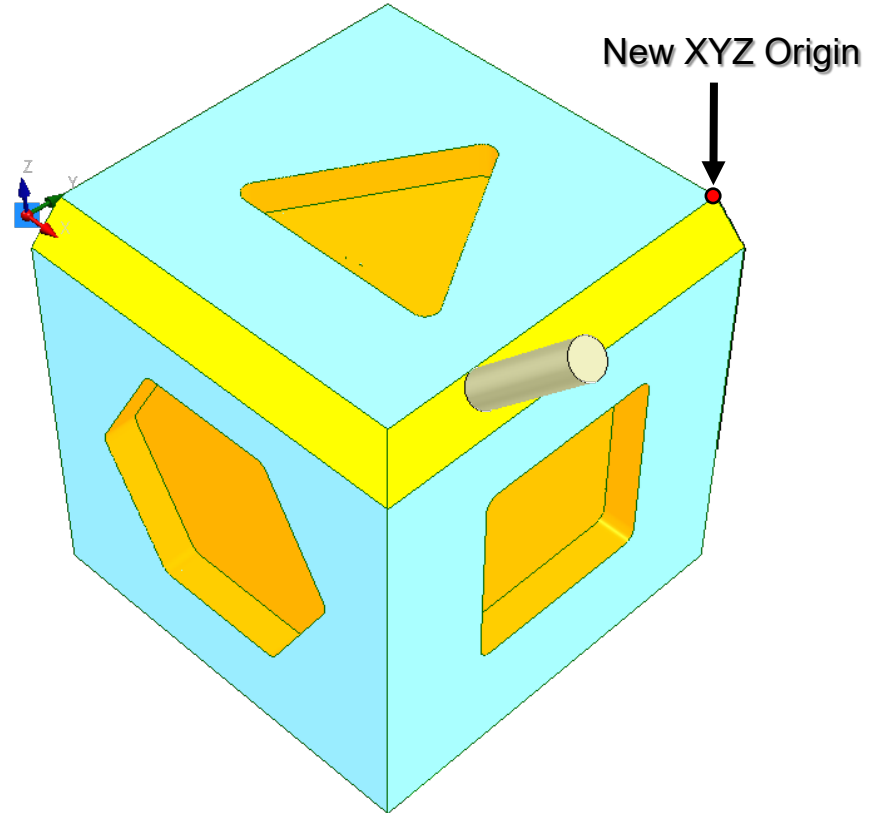
TOOL	73 END MILL, dia. 0.5000		
MILLING TYPE	RIGHT		
ENABLE BLEND MOVES	YES		
MILL FEED	85.0	PECK DEPTH	0.0000
SPEED (RPM)	5000	PLUNGE FEED	0.0



Let's Program Together

BLOCK	9	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT			
X	5.7500	R(X) 0.000	
Y	6.0000	R(Y) 45.000	
Z	0.000	R(Z) 0.000	

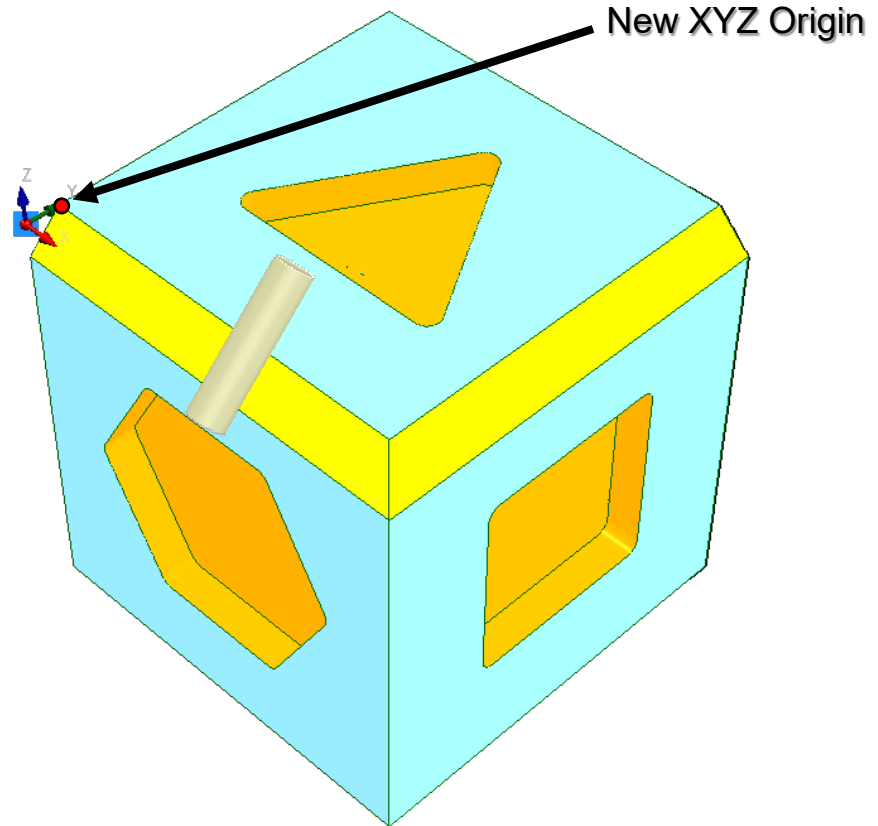
PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
6. TRANSFORM PLANE	
7. MILL POLYGON (POCKET BOUNDARY)	
8. TRANSFORM PLANE END	
9. TRANSFORM PLANE	
10. MILL FRAME (POCKET BOUNDARY)	
11. TRANSFORM PLANE END	
END OF PROGRAM	



Let's Program Together

BLOCK	12	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT			
X	0.0000		
Y	0.5000		
Z	0.0000		
AXIS ANGLES			
R(X)	-45.000		
R(Y)	0.000		
R(Z)	0.000		

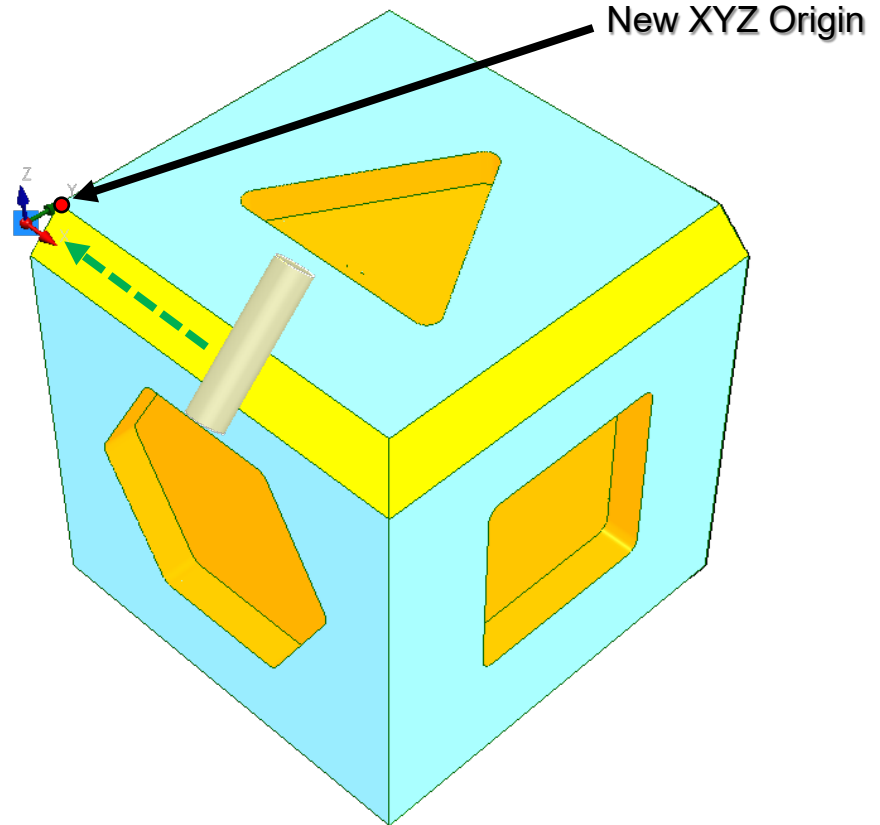
PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
9. TRANSFORM PLANE	START OF CONTOUR
10. MILL FRAME (POCKET BOUNDARY)	1. LINE
11. TRANSFORM PLANE END	END OF CONTOUR
12. TRANSFORM PLANE	
13. MILL CONTOUR (LEFT)	
14. TRANSFORM PLANE END	
END OF PROGRAM	



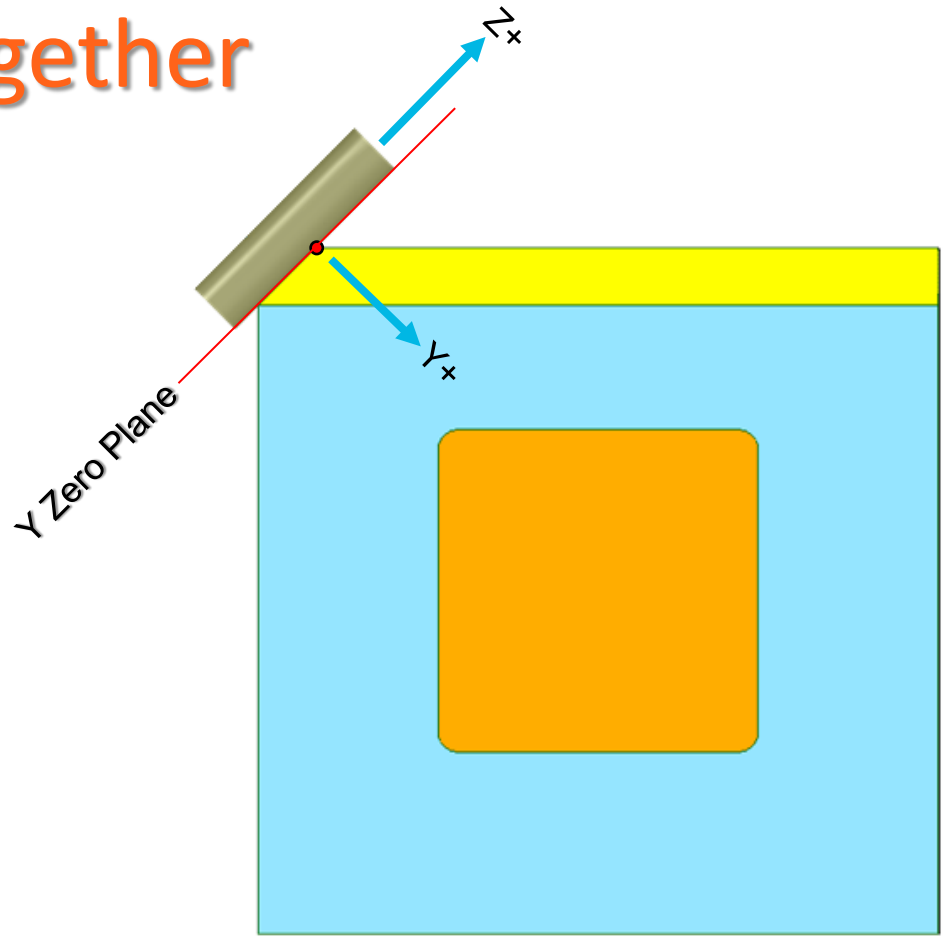
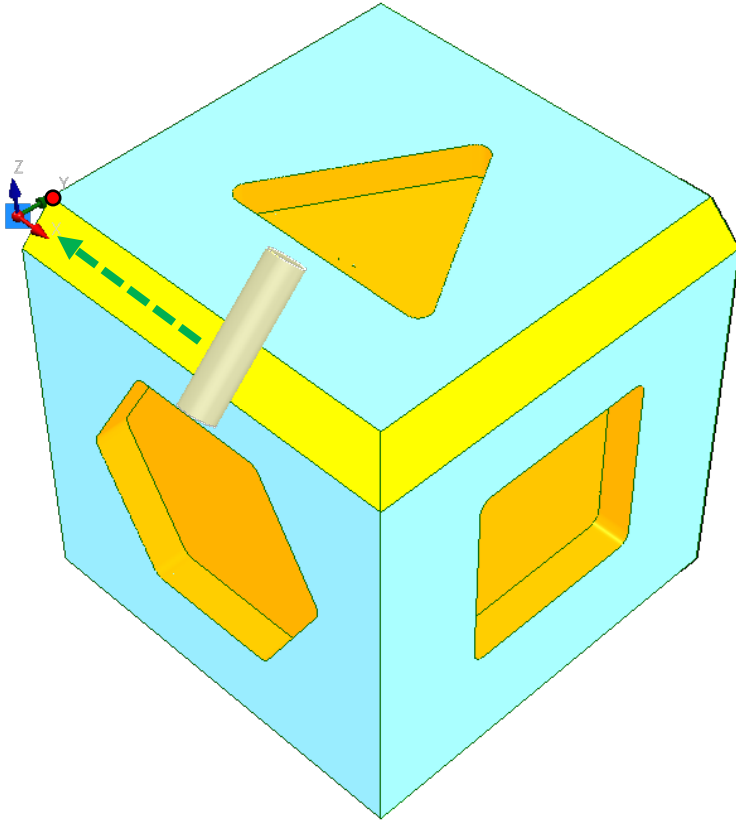
Let's Program Together

BLOCK	12	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT			
X	0.0000		
Y	0.5000		
Z	0.0000		
AXIS ANGLES			
R(X)	-45.000		
R(Y)	0.000		
R(Z)	0.000		

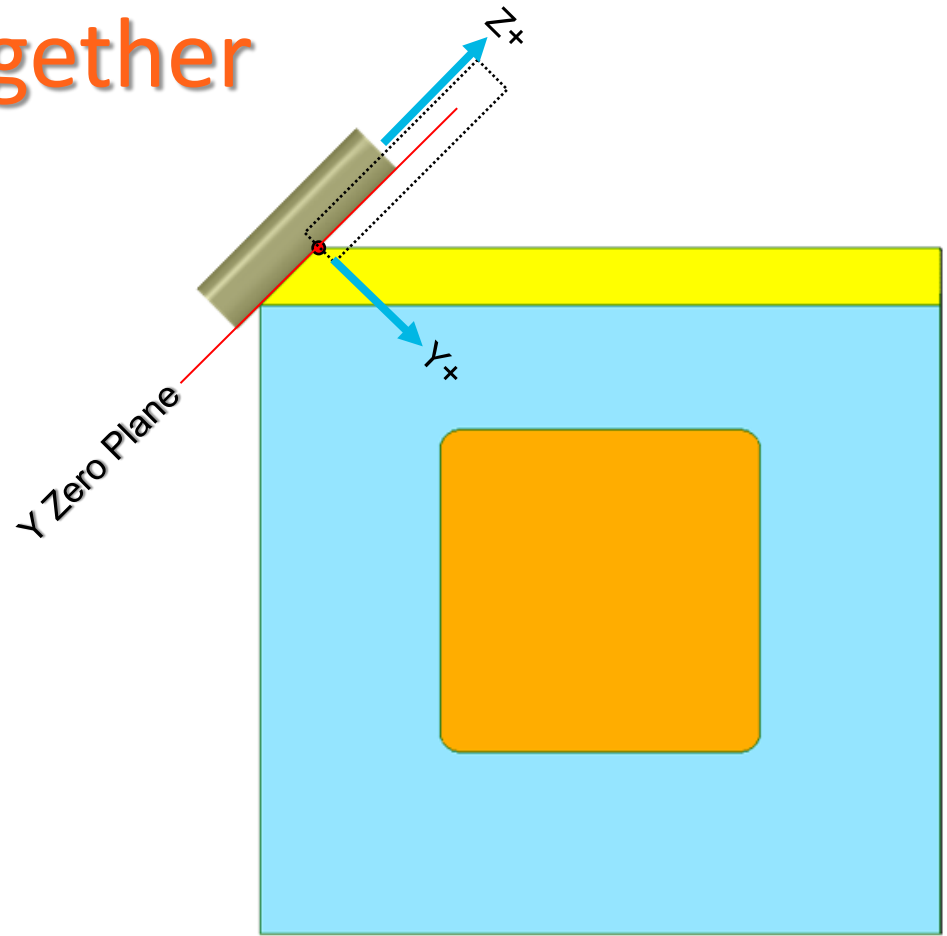
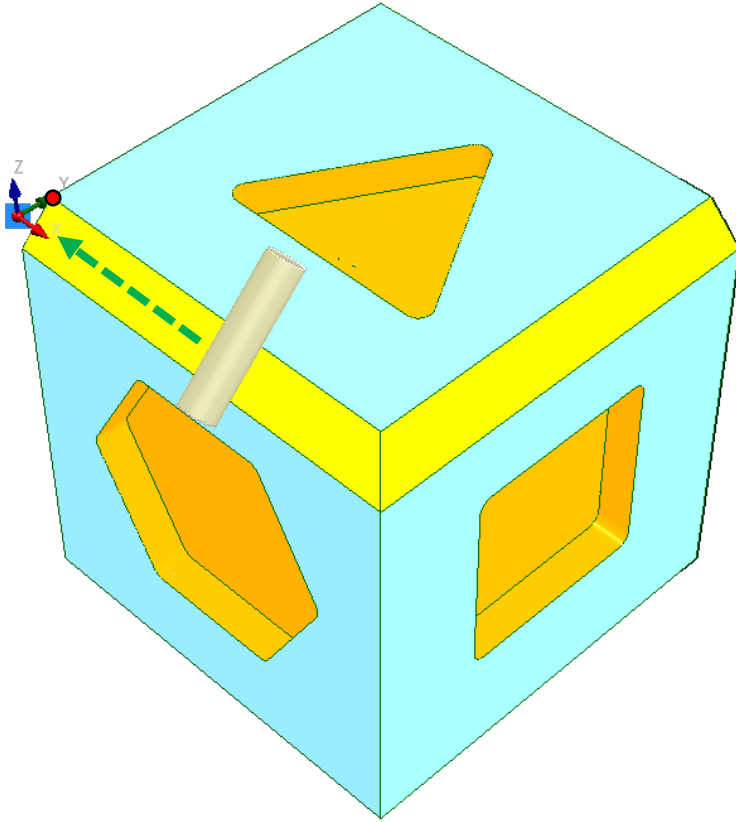
PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
9. TRANSFORM PLANE	START OF CONTOUR
10. MILL FRAME (POCKET BOUNDARY)	1. LINE
11. TRANSFORM PLANE END	END OF CONTOUR
12. TRANSFORM PLANE	
13. MILL CONTOUR (LEFT)	
14. TRANSFORM PLANE END	
END OF PROGRAM	



Let's Program Together



Let's Program Together



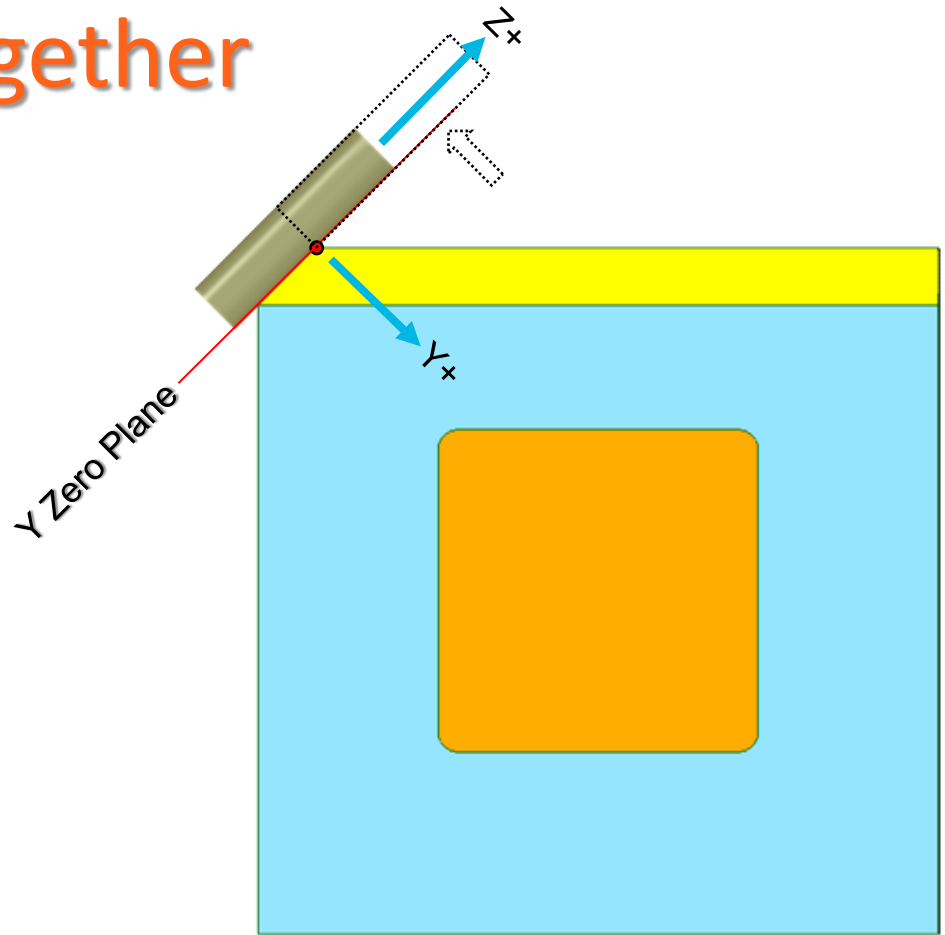
Let's Program Together

Cutter Comp to Control Location

BLOCK	13	MILL CONTOUR	
SEGMENT	0	START	
X START	6.5000	Z START	0.1000
Y START	0.0000	Z BOTTOM	-1.0000

ROUGHING	FINISHING	SFQ	ALLOWANCES
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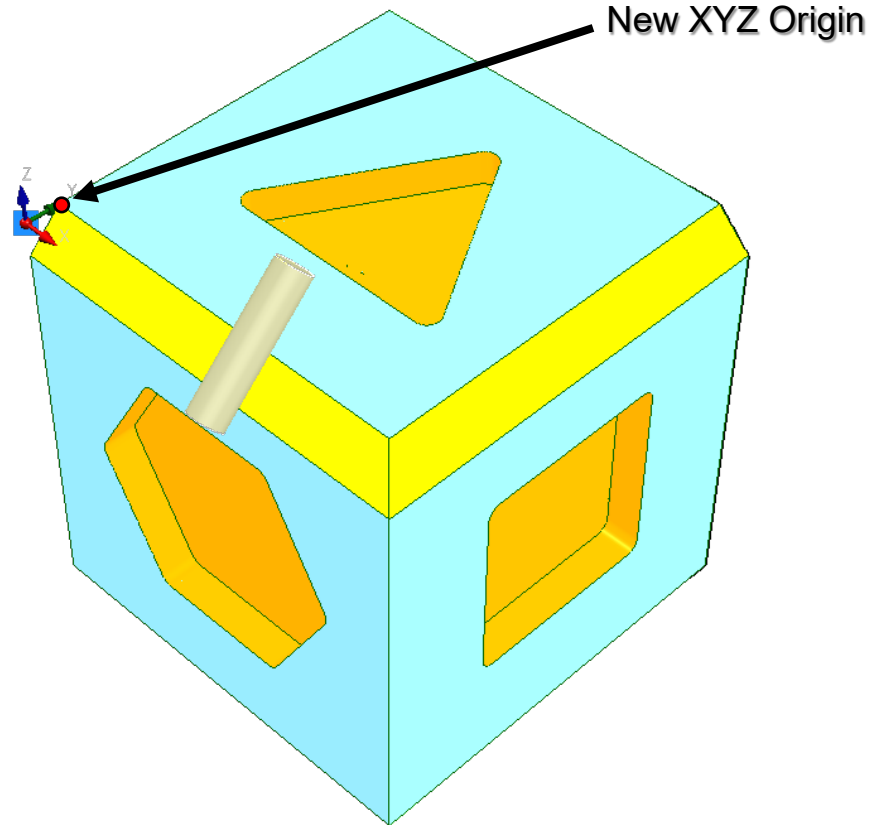
TOOL	73 END MILL, dia. 0.5000		
MILLING TYPE	LEFT		
ENABLE BLEND MOVES	YES		
MILL FEED	150.0	PECK DEPTH	0.0000
SPEED (RPM)	8000	PLUNGE FEED	15.0



Let's Program Together

BLOCK	12	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT			
X	0.0000		
Y	0.5000		
Z	0.0000		
AXIS ANGLES			
R(X)	-45.000		
R(Y)	0.000		
R(Z)	0.000		

PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
9. TRANSFORM PLANE	START OF CONTOUR
10. MILL FRAME (POCKET BOUNDARY)	1. LINE
11. TRANSFORM PLANE END	END OF CONTOUR
12. TRANSFORM PLANE	
13. MILL CONTOUR (LEFT)	
14. TRANSFORM PLANE END	
END OF PROGRAM	



Thank You !

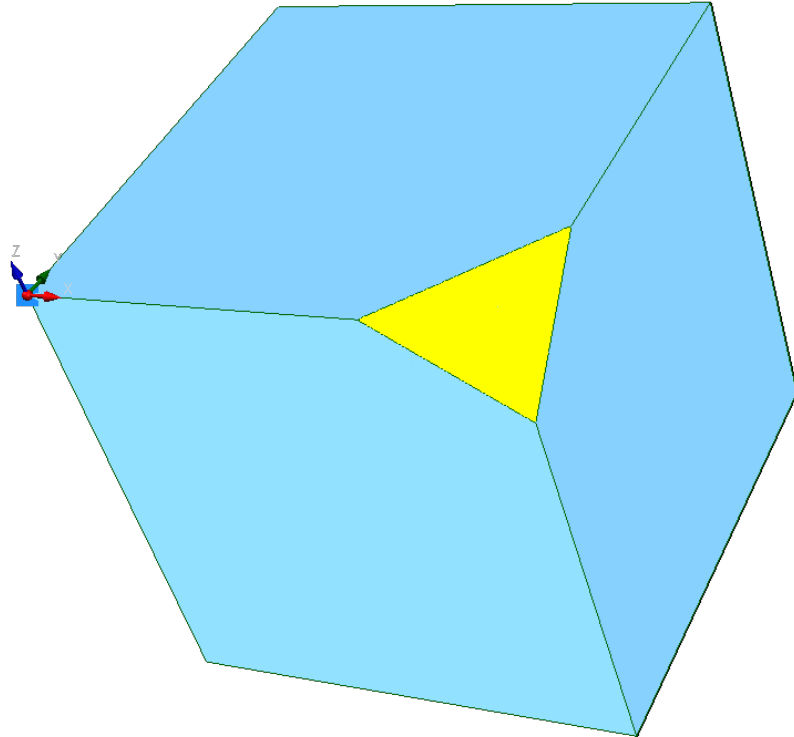


Let's Program Together
...when it's not at 90°

Let's Program Together

BLOCK	2	UNIVERSAL ROTARY TRANSFORM PLANE	
ORIENT METHOD	ANGLES ▾		
ORIGIN POINT		AXIS ANGLES	
X	5.5000	R(X)	0.000
Y	0.5000	R(Y)	45.000
Z	-0.5000	R(Z)	-45.000

PROGRAM REVIEW SCREEN	
DATA BLOCKS	SUB BLOCKS
1. ROTARY POSITION	
2. TRANSFORM PLANE	
3. MILL CIRCLE (POCKET BOUNDARY)	
4. HOLES	
5. TRANSFORM PLANE END	
END OF PROGRAM	

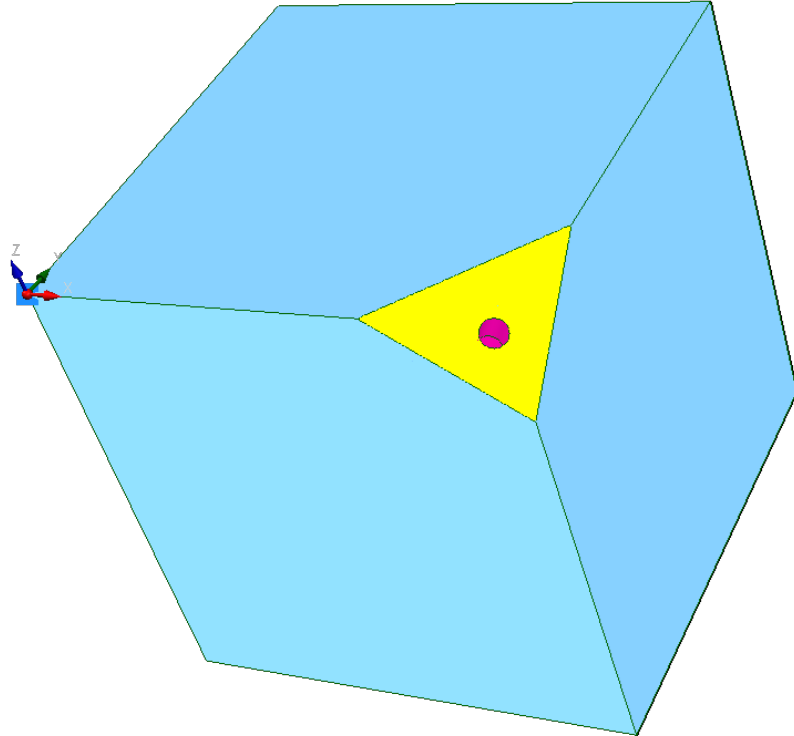


Let's Program Together

BLOCK	3	MILL CIRCLE	
X CENTER	0.0000	Z START	0.1000
Y CENTER	0.0000	Z BOTTOM	0.0000
RADIUS	1.5000		

BLOCK	4	HOLES	
OPERATION	1	DRILL	
Z START	0.1000	OPERATION	
Z BOTTOM	-1.0000	>>>> 1. DRILL	
		2. LOCATIONS (1)	
		HOLES END	

BLOCK	4	HOLES	
OPERATION	2	LOCATIONS	
		X	Y
1		0.0000	0.0000
2			
3			
4			



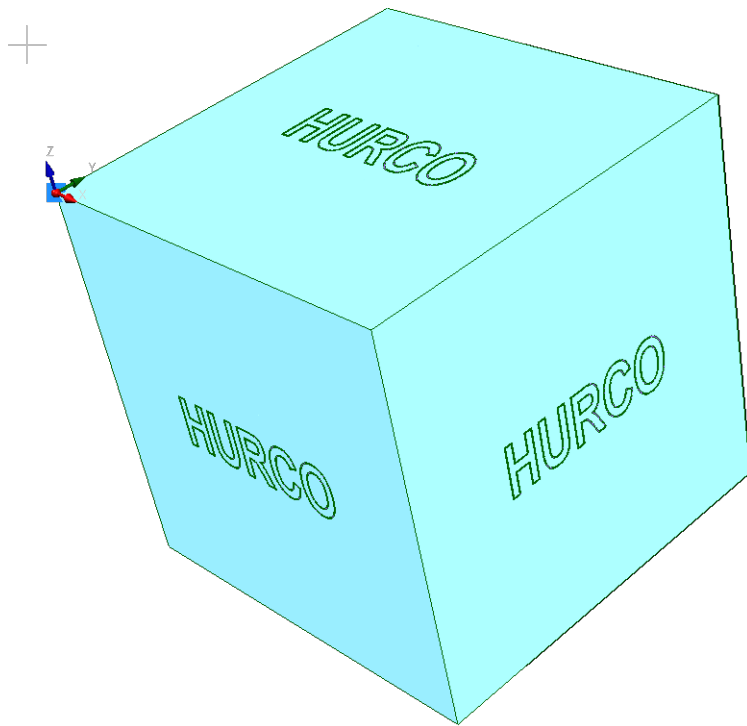
Thank You !



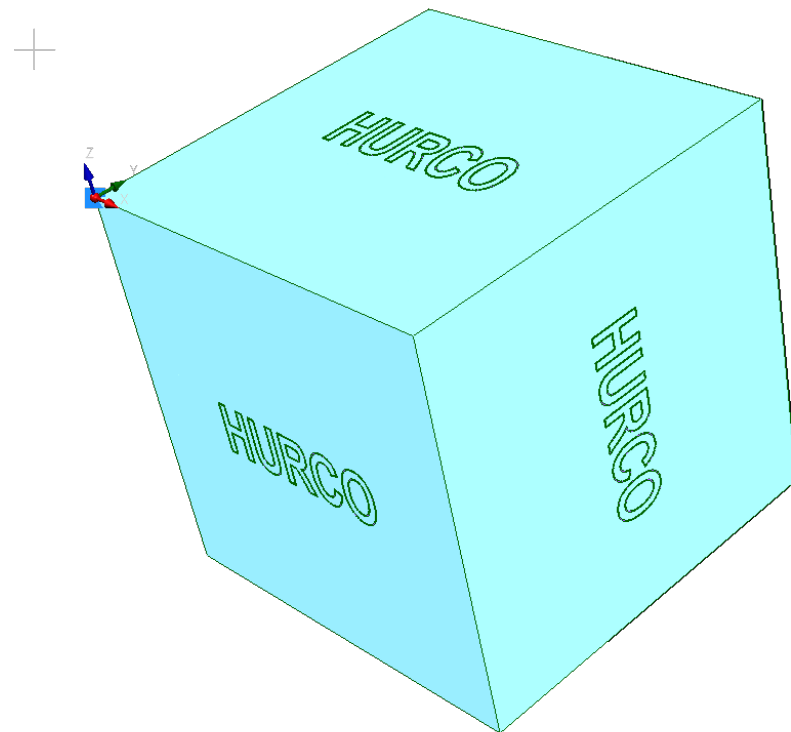
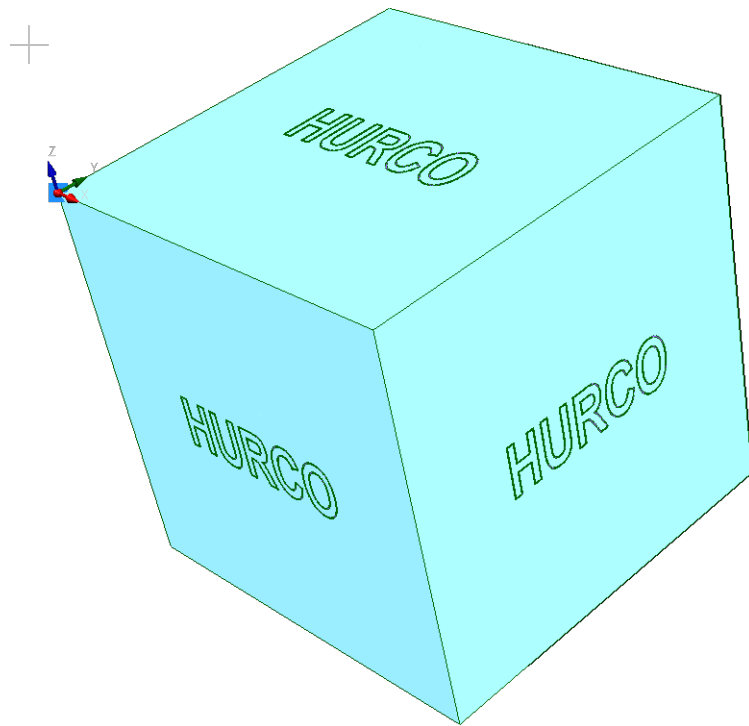
Let's Program Together

...controlling orientation

Let's Program Together



Let's Program Together

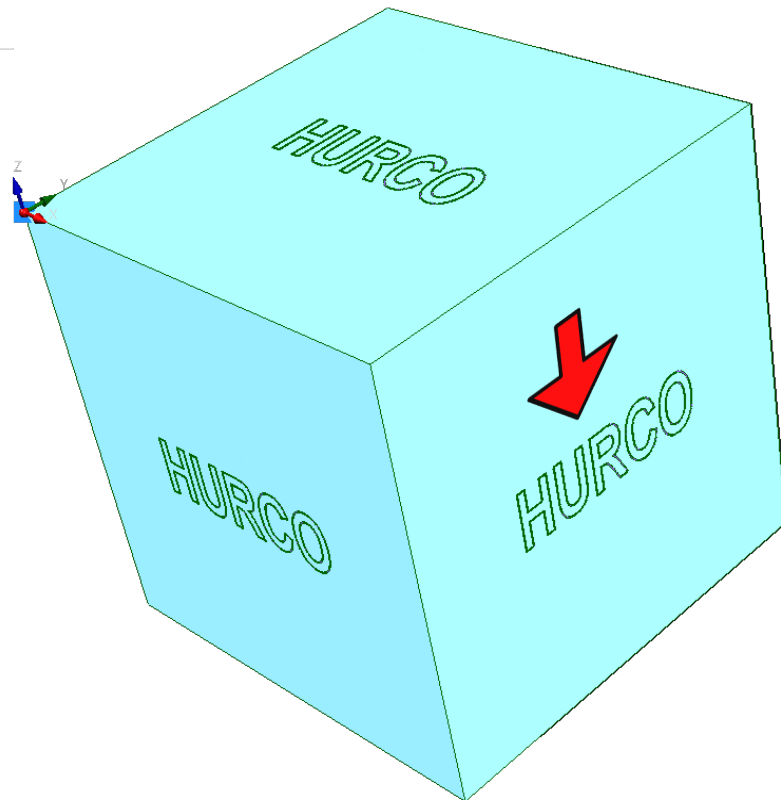


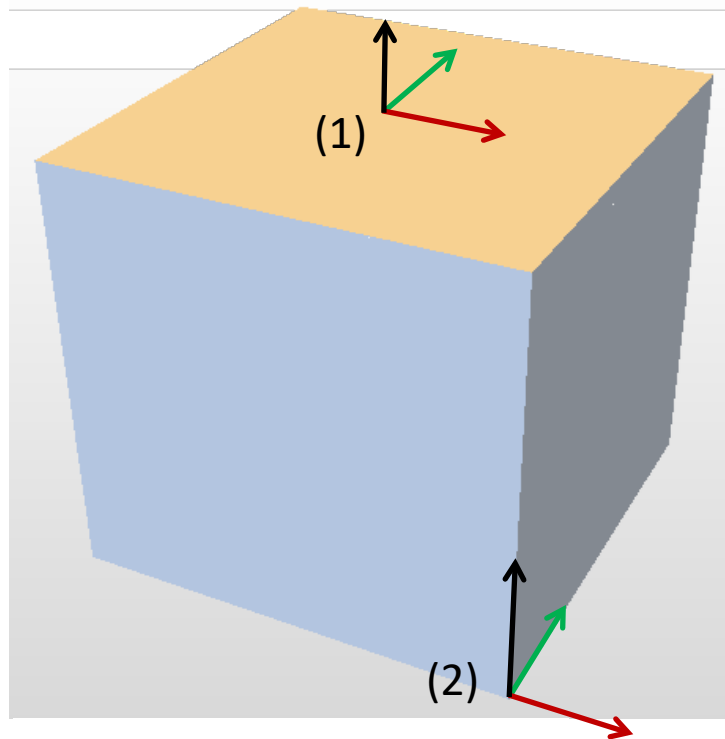
Let's Program Together

BLOCK	4	MILL TRUE-TYPE LETTERING	
X REFERENCE	-3.0000	Z START	0.1000
Y REFERENCE	3.0000	Z BOTTOM	-0.0100
TEXT WIDTH	3.0000	ORIENTATION	90.000
TEXT HEIGHT	0.7500	MAPPING	BODY ONLY
WIDTH REF LOC	CENTER		
HEIGHT REF LOC	CENTER	FONT	Arial
TEXT	HURCO		

...either way

BLOCK	3	TRANSFORM PLANE	
ORIENT METHOD	ANGLES		
ORIGIN POINT		ROTATION ANGLES	
X	6.0000	R(X)	90.000
Y	0.0000	R(Y)	0.000
Z	0.0000	R(Z)	90.000

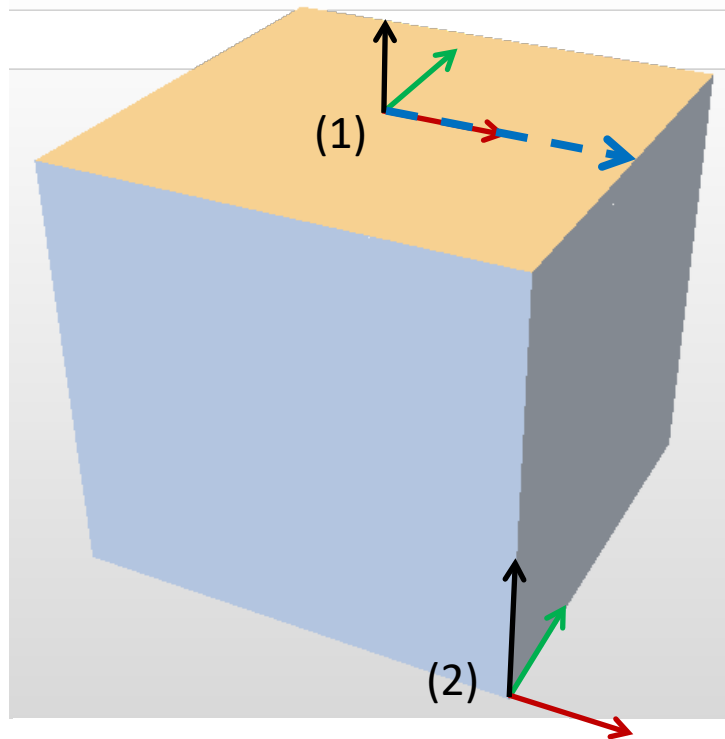




Right Side

1. Move the origin point

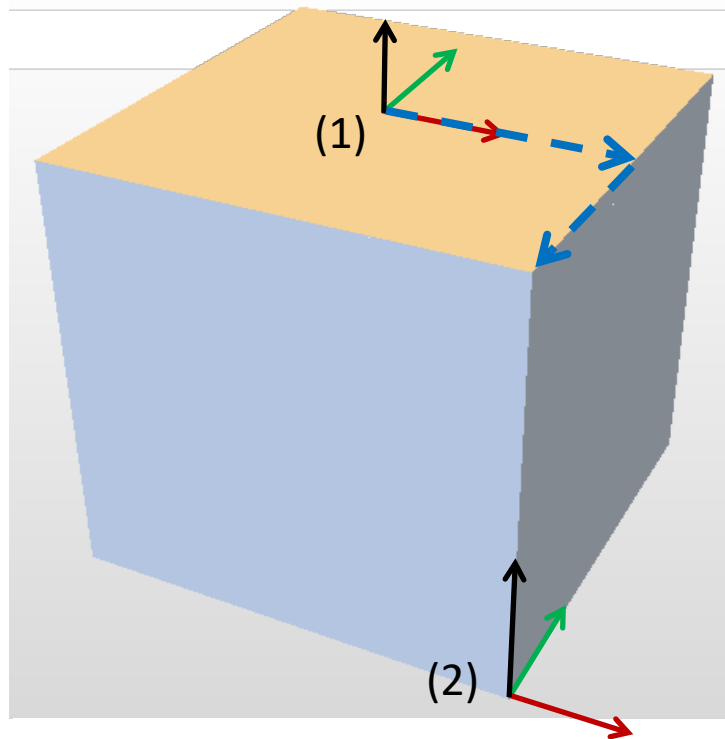
BLOCK	<input type="text" value="3"/>	TRANSFORM PLANE	
ORIENT METHOD		<input type="text" value="ANGLES"/>	
ORIGIN POINT			
X	<input type="text" value="3.0000"/>	ROTATION ANGLES	
Y	<input type="text" value="-3.0000"/>	R(X)	<input type="text" value="90.000"/>
Z	<input type="text" value="-6.0000"/>	R(Y)	<input type="text" value="0.000"/>
		R(Z)	<input type="text" value="90.000"/>



Right Side

1. Move the origin point

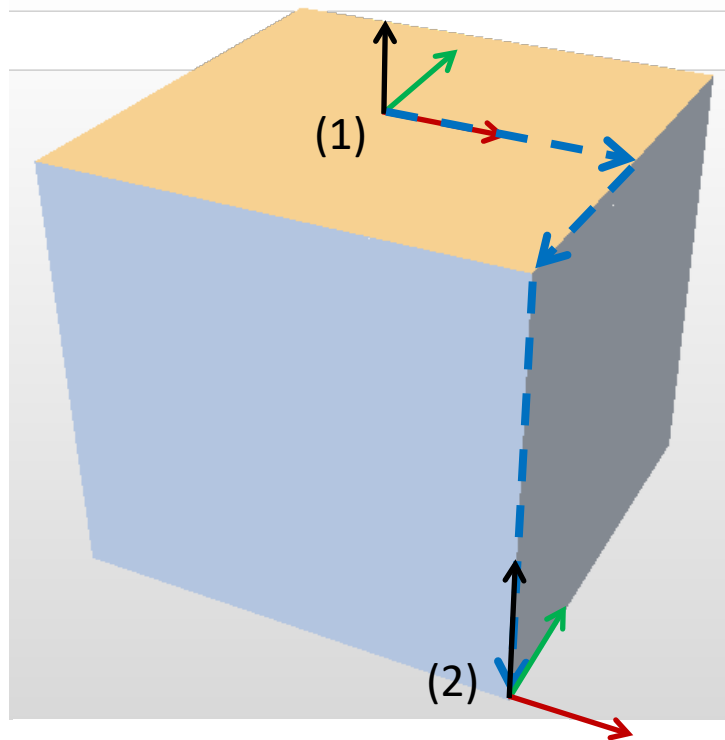
BLOCK	<input type="text" value="3"/>	TRANSFORM PLANE	
ORIENT METHOD	<input type="text" value="ANGLES"/>		
ORIGIN POINT		ROTATION ANGLES	
X	<input type="text" value="3.0000"/>	R(X)	<input type="text" value="90.000"/>
Y	<input type="text" value="-3.0000"/>	R(Y)	<input type="text" value="0.000"/>
Z	<input type="text" value="-6.0000"/>	R(Z)	<input type="text" value="90.000"/>



Right Side

1. Move the origin point

BLOCK	<input type="text" value="3"/>	TRANSFORM PLANE	
ORIENT METHOD	<input type="text" value="ANGLES"/>		
ORIGIN POINT		ROTATION ANGLES	
X	<input type="text" value="3.0000"/>	R(X)	<input type="text" value="90.000"/>
Y	<input type="text" value="-3.0000"/>	R(Y)	<input type="text" value="0.000"/>
Z	<input type="text" value="-6.0000"/>	R(Z)	<input type="text" value="90.000"/>



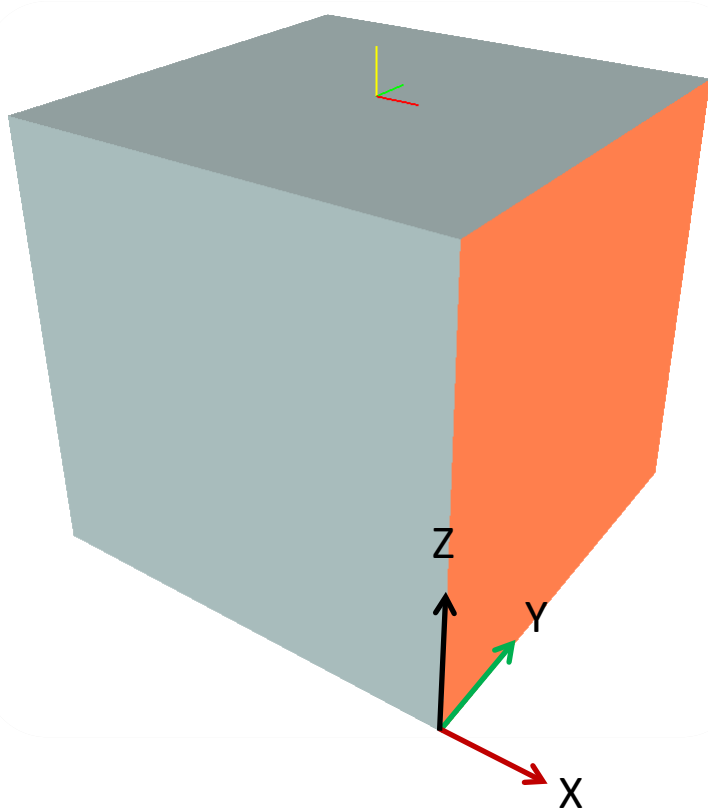
Right Side

1. Move the origin point

BLOCK	<input type="text" value="3"/>	TRANSFORM PLANE
ORIENT METHOD	<input type="text" value="ANGLES"/>	
ORIGIN POINT		ROTATION ANGLES
X	<input type="text" value="3.0000"/>	R(X) <input type="text" value="90.000"/>
Y	<input type="text" value="-3.0000"/>	R(Y) <input type="text" value="0.000"/>
Z	<input type="text" value="-6.0000"/>	R(Z) <input type="text" value="90.000"/>

Right Side

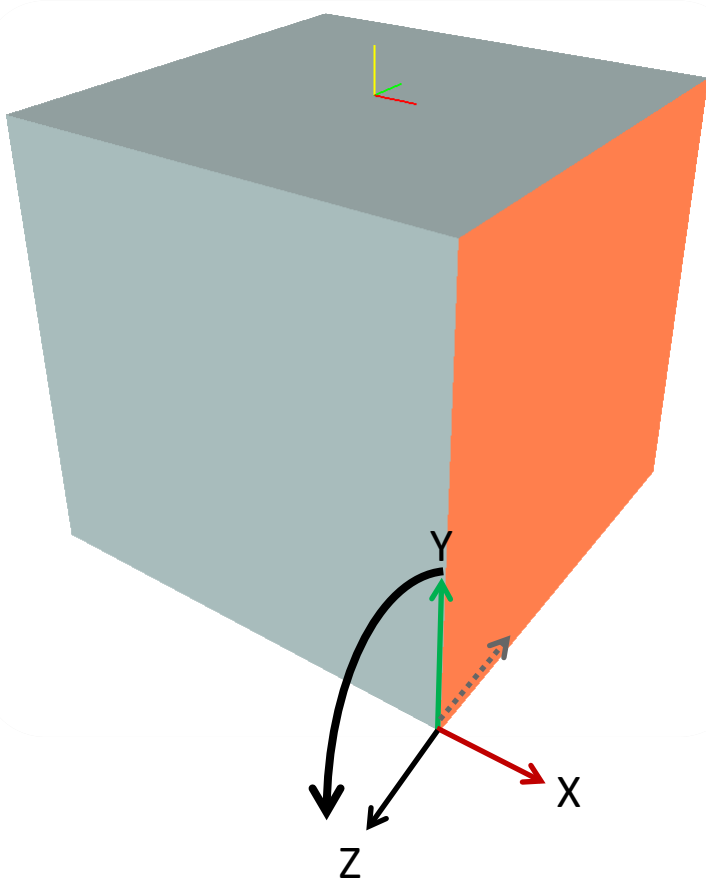
2. Rotate the workplane



BLOCK		β		TRANSFORM PLANE	
ORIENT METHOD		ANGLES			
ORIGIN POINT				ROTATION ANGLES	
X		3.0000	R(X)		90.000
Y		-3.0000	R(Y)		0.000
Z		-6.0000	R(Z)		90.000

Right Side

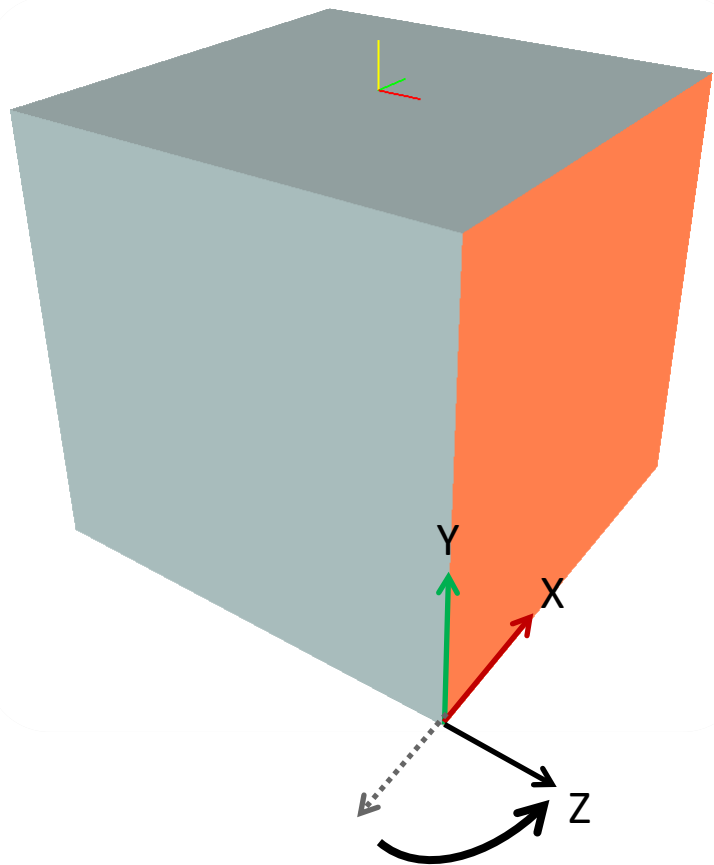
2. Rotate the workplane



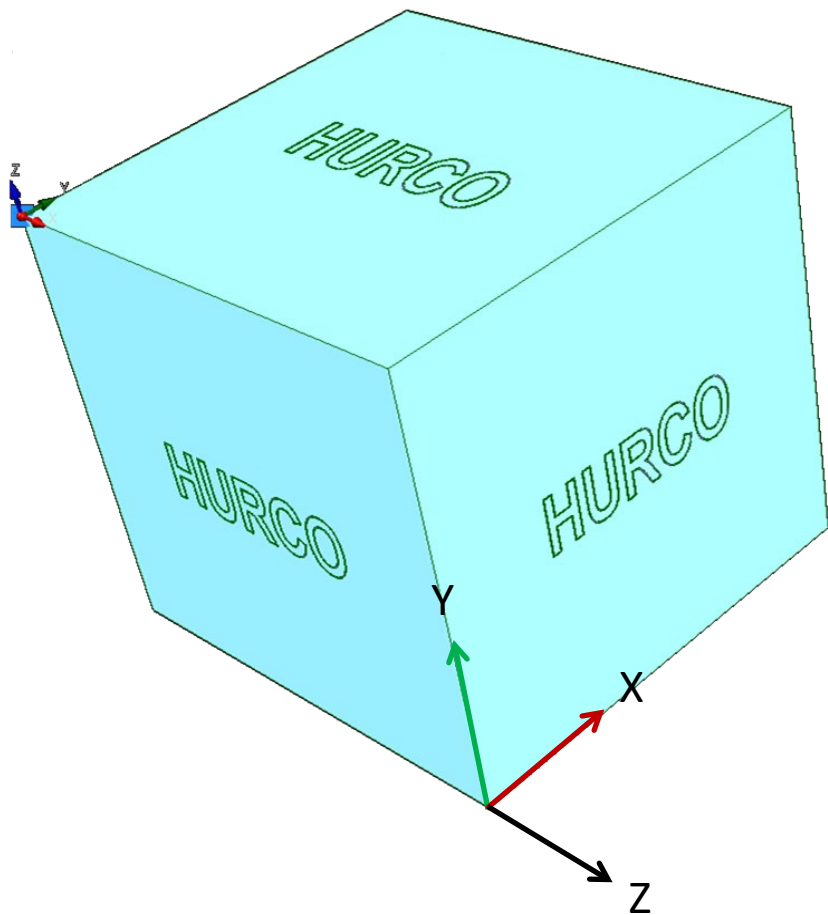
BLOCK		3		TRANSFORM PLANE	
ORIENT METHOD		ANGLES			
ORIGIN POINT					
X		3.0000			
Y		-3.0000			
Z		-6.0000			
ROTATION ANGLES					
R(X)		90.000			
R(Y)		0.000			
R(Z)		90.000			

Right Side

2. Rotate the workplane



BLOCK		β		TRANSFORM PLANE	
ORIENT METHOD		ANGLES			
ORIGIN POINT					
X		3.0000			
Y		-3.0000			
Z		-6.0000			
ROTATION ANGLES					
R(X)		90.000			
R(Y)		0.000			
R(Z)		90.000			



BLOCK	7	MILL TRUE-TYPE LETTERING	
X REFERENCE	3.0000	Z START	0.1000
Y REFERENCE	3.0000	Z BOTTOM	-0.0150
TEXT WIDTH	5.0000	ORIENTATION	0.000
TEXT HEIGHT	1.1250	MAPPING	BODY ONLY ▾
WIDTH REF LOC	CENTER ▾	FONT	Arial
HEIGHT REF LOC	CENTER ▾	TEXT	HURCO
ROUGHING		FINISHING	SFQ
TOOL		3 END MILL, dia. 0.0620	
MILLING TYPE		ON ▾	
MILL FEED	0.0	PECK DEPTH	0.0000
SPEED (RPM)	0	PLUNGE FEED	0.0
ALLOWANCES			

Thank You !

