Instructional Video Series
GenTurn 52CSY2
Video Support Document

Contents

Introduction

The Purpose of this document is to give additional information for the instructional videos. Please click on the Table of Content to jump to the desired information.

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G Code List

G code			FUNCTION EXPLANATION
Type A	Type B	Type C	
G00	G00	G00	Positioning (Rapid traverse)
G01	G01	G01	Linear interpolation (Cutting feed)
G02	G02	G02	Circular interpolation CW
G03	G03	G03	Circular interpolation CCW
G04	G04	G04	Dwell
G04.1	G04.1	G04.1	Waiting (Main and sub spindle program execute)
G17	G17	G17	XY plane selection
G18	G18	G18	ZX plane selection
G19	G19	G19	YZ plane selection
G90	G77	G20	Outer diameter / internal diameter cutting cycle
G92	G78	G21	Thread cutting canned cycle X axis
G21.1	G21.1	G21.1	Thread cutting canned cycle Y axis
G94	G79	G24	Face turning canned cycle
G28	G28	G28	Reference point return
G29	G29	G29	Return from reference point
G30	G30	G30	2nd，3rd，4th reference point return
G32	G33	G33	Thread cutting
G40	G40	G40	Tool nose radius compensation cancel
G41	G41	G41	Tool nose radius compensation left
G42	G42	G42	Tool nose radius compensation right
G43	G43	G43	Tool length compensation (+)

G44	**G44**	**G44**	Tool length compensation (-)
G49	**G49**	**G49**	Tool length compensation cancel
G52	**G52**	**G52**	Local coordinate system setting
G53	**G53**	**G53**	Machine coordinate system setting
G54~G59	**G54~G59**	**G54~G59**	Work coordinate system setting
G65	**G65**	**G65**	Macro call
G66	**G66**	**G66**	Macro Modal call
G67	**G67**	**G67**	Macro modal call cancel
G20	**G20**	**G70**	INCH command
G21	**G21**	**G71**	METRIC command
G70	**G70**	**G72**	Finishing cycle
G71	**G71**	**G73**	Longitudinal turning cycle
G72	**G72**	**G74**	Face turning cycle
G73	**G73**	**G75**	Pattern repeating
G74	**G74**	**G76**	End face peck drilling (Z axis)
G75	**G75**	**G77**	Outer diameter / internal diameter drilling cycle (X、Y axis)
G77.2	**G77.2**	**G77.2**	Outer diameter / internal diameter drilling cycle (Y axis)
G76	**G76**	**G78**	Multiple thread cutting cycle X axis
G78.2	**G78.2**	**G78.2**	Multiple thread cutting cycle Y axis
G80	**G80**	**G80**	Drilling canned cycle cancel
G83	**G83**	**G83**	Drilling canned cycle (Z axis)
G84	**G84**	**G84**	Tapping canned cycle (Z axis)
G85	**G85**	**G85**	Boring canned cycle (Z axis)
G87	**G87**	**G87**	Longitudinal drilling canned cycle (X axis)

G88	**G88**	**G88**	Longitudinal tapping canned cycle (X axis)
G89	**G89**	**G89**	Longitudinal boring canned cycle (X axis)
---	**G90**	**G90**	Absolute programming
---	**G91**	**G91**	Incremental programming
G50	**G92**	**G92**	Coordinate system setting or max spindle speed setting
G98	**G94**	**G94**	Feed per minute (mm/min)
G99	**G95**	**G95**	Feed per revolution (mm/rev)
G96	**G96**	**G96**	Constant surface speed control (m/min)
G97	**G97**	**G97**	Constant surface speed control cancel
---	**G98**	**G98**	Return to initial level
---	**G99**	**G99**	Return to R point level

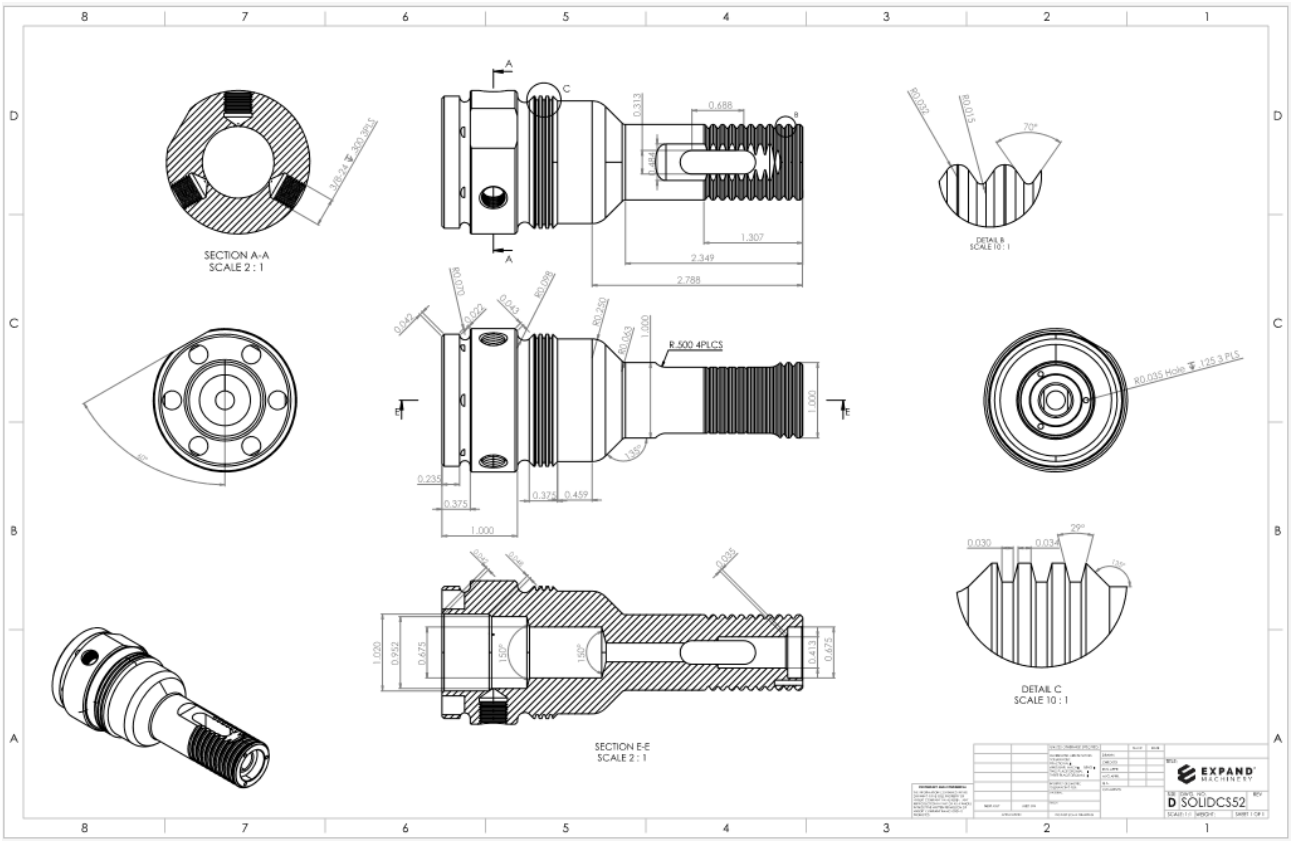
M Codes

M Code	Function Description	
	Main spindle program	**Sub spindle program**
M00	Program Stop	
M01	Optional Program Stop	
M02	Program Stop	
M03	Main Spindle CW (Rigid tapping)	Sub Spindle CW (Rigid tapping)
M04	Main Spindle CCW (Rigid tapping)	Sub Spindle CCW (Rigid tapping)
M05	Main Spindle Stop (Rigid tapping)	Sub Spindle Stop (Rigid tapping)
M08	Coolant ON	
M09	Coolant OFF	

M10	Main Spindle Chuck Close	Sub Spindle Chuck Close
M11	Main Spindle Chuck Open	Sub Spindle Chuck Open
M16	Parts Catcher Forward	
M17	Parts Catcher Backward	
M19	Main Spindle Switch to C Axis	Sub Spindle Switch to C Axis
M20	Main Spindle Switch to C Axis Cancel	Sub Spindle Switch to C Axis Cancel
M28	Coolant 2 ON	
M29	Coolant 2 OFF	
M30	Program End	
M31	Chuck Open Allowed When Main Spindle Rotating (For Bar Change)	Chuck Open Allowed When Sub Spindle Rotating (For Bar Change)
M32	Chuck Open Allowed When Main Spindle Rotating (For Bar Change)Cancel	Chuck Open Allowed When Sub Spindle Rotating (For Bar Change)Cancel
M33	Parts Conveyor ON	
M37	Chip Conveyor ON	
M38	Chip Conveyor OFF	
M47	Air Blowing 2 ON	
M48	Air Blowing 2 OFF	
M51	Bar feeder, bar feeding allow ON	
M52	Bar feeder, bar feeding allow OFF	
M55	Chuck ON (Have Material)	
M56	Chuck OFF (Have Material)	
M59	Sub Spindle Part Ejector with Air Blowing ON	
M60	Sub Spindle Part Ejector with Air Blowing OFF	

M66	After spindle rpm reached and next command Start	
M67	Air Blowing 3 ON	
M68	Air Blowing 3 OFF	
M69	Sub Spindle Part ejector ON	
M70	Sub Spindle Part ejector OFF	
M71	Command Main spindle asmachining spindle	Command Sub spindle asmachining spindle
M72	Command A1 spindle as machining spindle	Command main spindle as machining spindle
M73	Command B1 spindle as machining spindle	Command main spindle as machining spindle
M74	Command Sub spindle as machining spindle	Command Sub spindle as machining spindle
M75	Command B2 spindle as machining spindle	Command B2 spindle as machining spindle
M76	Command main spindle as machining spindle	Command main spindle as machining spindle
M79	Z1 and Z2 Simultaneous ON	
M80	Z1 and Z2 Simultaneous OFF	
M81	Bar feeder Thrust Pause	
M82	Cancel Bar feeder Thrust Pause	
M83	Block Skip ON	

Sample Part



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Sample Program

```
$1

(EXPAND DEMO CS42)
(2/23/2021)
(5:53PM)
(BAR OUT 5.4)
(SST)
G4.1P1
G53Z0
G50S2500
N1 (CCMT3  80 DEG R.03)
G53Z-11.5 (Safe Index)
T0101
G97S1=500M103
G0G99X2.1Y0
/M8
G96S450
Z.005
G1X-.0625F.012
G0X2.1Z.1
G71U.05R.0125
G71P100Q101U0.W0.F.0125
N100G1X.8416Z.0125
X.9215
G3X1.025Z-.0392R.0518
G1Z-2.3804
N101X2.1
G0X2.1
Z-2.2
G71U.05R.0125
G71P200Q201U0.W0.F.0125
N200G1X1.025Z-2.3422
Z-2.3804
G2X1.036Z-2.3936R.0187
G1X1.4779Z-2.6146
G3X1.65Z-2.8223R.2938
G1Z-3.2631
X1.7494Z-3.3128
```

G3X1.775Z-3.3437R.0438
G1Z-3.7695
X1.7775
G3X1.8394Z-3.7823R.0438
G1X1.8994Z-3.8123
G3X1.925Z-3.8432R.0438
G1Z-4.7
N201X2.1
G0X2.1
G0X2.5Z.5
M9
G96S50
G53Z-11.5 (Safe Index)
M1

N2 (PROFILE TOOL 55 DEG R.0315)
G53Z-11.5 (Safe Index)
G50S2500
T0202
G97S1=300M103
G0G99X2.1Y0
/M8
G96S450
Z-.0646
X1.1
(OPERATION 6, TURN CONTOUR)
G1X1.005F.0065
G3X.9489Z-.1184R.0658
G1X.9302Z-.125
X.9489Z-.1316
G3X1.005Z-.1854R.0658
G1Z-.1896
G3X.9489Z-.2434R.0658
G1X.9302Z-.25
X.9489Z-.2566
G3X1.005Z-.3104R.0658
G1Z-.3146
G3X.9489Z-.3684R.0658
G1X.9302Z-.375
X.9489Z-.3816
G3X1.005Z-.4354R.0658
G1Z-.4396
G3X.9489Z-.4934R.0658
G1X.9302Z-.5
X.9489Z-.5066

```
G3X1.005Z-.5604R.0658
G1Z-.5646
G3X.9489Z-.6184R.0658
G1X.9302Z-.625
X.9489Z-.6316
G3X1.005Z-.6854R.0658
G1Z-.6896
G3X.9489Z-.7434R.0658
G1X.9302Z-.75
X.9489Z-.7566
G3X1.005Z-.8104R.0658
G1Z-.8146
G3X.9489Z-.8684R.0658
G1X.9302Z-.875
X.9489Z-.8816
G3X1.005Z-.9354R.0658
G1Z-.9396
G3X.9489Z-.9934R.0658
G1X.9302Z-1.
X.9489Z-1.0066
G3X1.005Z-1.0604R.0658
G1Z-1.0646
G3X.9489Z-1.1184R.0658
G1X.9302Z-1.125
X.9489Z-1.1316
G3X1.005Z-1.1854R.0658
G1Z-1.1896
G3X.9489Z-1.2434R.0658
G1X.9302Z-1.25
X.9489Z-1.2566
G3X1.005Z-1.3104R.0658
G1
G0X1.105
( OPERATION 8, TURN CONTOUR )
Z-.0646
G1X1.
G3X.9461Z-.1164R.0633
G1X.9215Z-.125
X.9461Z-.1336
G3X1.Z-.1854R.0633
G1Z-.1896
G3X.9461Z-.2414R.0633
G1X.9215Z-.25
X.9461Z-.2586
G3X1.Z-.3104R.0633
```

G1Z-.3146
G3X.9461Z-.3664R.0633
G1X.9215Z-.375
X.9461Z-.3836
G3X1.Z-.4354R.0633
G1Z-.4396
G3X.9461Z-.4914R.0633
G1X.9215Z-.5
X.9461Z-.5086
G3X1.Z-.5604R.0633
G1Z-.5646
G3X.9461Z-.6164R.0633
G1X.9215Z-.625
X.9461Z-.6336
G3X1.Z-.6854R.0633
G1Z-.6896
G3X.9461Z-.7414R.0633
G1X.9215Z-.75
X.9461Z-.7586
G3X1.Z-.8104R.0633
G1Z-.8146
G3X.9461Z-.8664R.0633
G1X.9215Z-.875
X.9461Z-.8836
G3X1.Z-.9354R.0633
G1Z-.9396
G3X.9461Z-.9914R.0633
G1X.9215Z-1.
X.9461Z-1.0086
G3X1.Z-1.0604R.0633
G1Z-1.0646
G3X.9461Z-1.1164R.0633
G1X.9215Z-1.125
X.9461Z-1.1336
G3X1.Z-1.1854R.0633
G1Z-1.1896
G3X.9461Z-1.2414R.0633
G1X.9215Z-1.25
X.9461Z-1.2586
G3X1.Z-1.3104R.0633
G1
G0X1.25
Z.55
G96S50
M9

```
G53Z-11.5
M1

N3 (TURN R.0105)
G53Z-11.5 (Safe Index)
G50S2500
T0303
G97S1=500M103
G0G99X.8955Y0
/M8
G96S450
Z.1
G1Z0F.005
G3X.9317Z-.0075R.0256
G1X.985Z-.0341
G3X1.Z-.0523R.0256
G1Z-2.3647
G2X1.0275Z-2.3979R.0469
G1X1.4694Z-2.6189
G3X1.625Z-2.8067R.2656
G1Z-3.2592
X1.7379Z-3.3156
G3X1.75Z-3.3302R.0206
G1Z-3.782
X1.8046
G3X1.8338Z-3.788R.0206
G1X1.8879Z-3.8151
G3X1.9Z-3.8297R.0206
G1Z-4.7
G0X2.1
Z0
X1.1
G1X.2
G0X2.1Z.55
M9
G50S50
G53Z-11.5 (Safe Index)
M1

N4 (OD GROOVE W.098 FULL RADIUS)
G53Z-11.5 (Safe Index)
G50S2500
T0404
G97S1=500M103
G0G99X2.1Y0
```

```
/M8
G96S375
Z-3.8762
G1X1.905F.0045
G0X2.1
Z-3.8397
G1X1.905
G0X2.1
Z-3.8096
G1X1.8448
G0X2.1
Z-3.7795
G1X1.6825
G0X2.1
Z-3.7435
G1X1.5923
G0X2.1
Z-3.7075
G1X1.6056
G0X2.1
Z-3.6702
G1X1.6803
G0X2.1
Z-3.6328
G1X1.755
G0X2.1
Z-3.6099
G1X1.755
G0X2.1
Z-3.595
G1Z-3.587
X1.755
G0X2.05
( OPERATION 9, TURN CONTOUR )
Z-3.861
G1X2.002F.005
X1.902
G2X1.8727Z-3.8256R.05
G1X1.8127Z-3.7956
G2X1.742Z-3.781R.05
G1X1.6825
G3X1.6033Z-3.7066R.0478
G1X1.7227Z-3.6469
G2X1.752Z-3.6115R.05
G1Z-3.5848
```

```
X1.852
G0X2.1
( OPERATION 10, TURN CONTOUR )
Z-3.861
G1X2.F.0025
X1.9
G2X1.8713Z-3.8264R.049
G1X1.8113Z-3.7964
G2X1.742Z-3.782R.049
G1X1.6825
G3X1.6018Z-3.7059R.0488
G1X1.7213Z-3.6461
G2X1.75Z-3.6115R.049
G1Z-3.5848
X1.85
G0X2.1
Z.25
M9
G96S50
G53Z-11.5 (Safe Index)
M1

N5(THREADING ACME 16 STUB)
G53Z-11.5(Safe Index)
G50S2000
T0505
G97S1=1000M103
G0G99X2.0Y0
/M8
Z-3.1875
G76P010029Q.002R.002
G76X1.65Z-3.689P.05Q.01F.0625
G0X2.1
Z.5
M9
M5
G53Z-11.5(Safe Index)
M105
M1

N21 (INSERT DRILL .413)
G53Z-11.5(Safe Index)
T2121
G97S1=1200M103
G0G99X0Y0
```

```
/M8
Z.1
G83Z-1.180Q.05F.0025
G0G80Z.5
M9
G53Z-11.5(Safe Index)
M1

N22 (DRILL .250)
G53Z-11.5(Safe Index)
T2222
G97S1=1800M103
G0G99X0Y0
/M8
Z-.8
G83Z-1.7Q.05F.0035
G0G80Z.5
M9
M105
G53Z-11.5(Safe Index)
M1

N26(3/8 END MILL)
G0G53Z-11.5
G0T2626
M71
G97S1=800M103
S3=800M303
G0G99X.29Y0.
/M8
Z.1
G1Z-.198F.0025
G0Z.55
M9
M305
M105
G53Z-11.5
M1

N23 (BB R.03 ROUGH AND FINSH)
G53Z-11.5(Safe Index)
T4343
G97S1=700M103
G0G99X.7656Y0
/M8
```

```
Z.1
G1Z0F.0035
G2X.7073Z-.0071R.0413
G1X.6892Z-.0162
G2X.665Z-.0453R.0413
G1Z-.195
X.5296
G2X.4713Z-.2071R.0413
G1X.4272Z-.2292
G2X.403Z-.2583R.0413
G1
G0X.4
Z.05
( OPERATION 17, TURN CONTOUR )
X.7656
G1Z0
G2X.7108Z-.0088R.0388
G1X.6927Z-.0179
G2X.67Z-.0453R.0388
G1Z-.1975
X.5296
G2X.4748Z-.2088R.0388
G1X.4307Z-.2309
G2X.408Z-.2583R.0388
G1
G0X.4
Z.05
( OPERATION 18, TURN CONTOUR )
X.7656
G1Z0F.002
G2X.7144Z-.0106R.0363
G1X.6962Z-.0197
G2X.675Z-.0453R.0363
G1Z-.2
X.5296
G2X.4784Z-.2106R.0363
G1X.4342Z-.2327
G2X.413Z-.2583R.0363
G1
G0X.4
Z.55
M105
M9
G53Z-11.5(Safe Index)
M1
```

```
N12(3/8 EM)
M72
G53Z-11.5(Safe Index)
T1212
G19
G97S2=1000M203
G0G98X2.0Y0
/M8
M19
G28C0.
Y1.6Z-.25
X1.3
M40
X1.05
G1X-1.2F30.
G41Y1.25F1.
Z-2.F5.
G40Y1.6
G0X1.3
( OPERATION 21, MILL CONTOUR )
Y-1.6Z-2.
G1X-1.2F30.
G41Y-1.25F1.
Z-.25F5.
G40Y-1.6
G0X2.1
Y0
M41
M205
M9
G53Z-11.5(Safe Index)
M1

N15(5/16 DRILL ,LIVE)
M72
G53Z-11.5(Safe Index)
T1515
G19
G97S2=1832M203
G0G98X2.3Y0
/M8
M19
G28C0.
Y0.Z-4.1C0.
```

```
X2.1
G87C0.X1.05R0.Q.065F3.5
C180.Q.065
G80G0X2.1
Y0
Z.5
M41
M205
M9
G53Z-11.5(Safe Index)
M1

N16(CHAMFER MILL 12MM 45 DEG)
M72
G53Z-11.5(Safe Index)
T1616
G19
G97S2=1200M203
G0G98X2.3Y0
/M8
M19
G28C0.
Y0.Z-4.1C0.
X2.1
G1X1.52F3.5
G4X1.0
G0X2.1
C180.
G1X1.52F3.5
G4X1.0
G0X2.1
Y0
Z.5
M9
M41
M205
G53Z-11.5(Safe Index)
M1

N14(3/8-16 TAP)
M72
G53Z-11.5(Safe Index)
T1414
G19
G97S2=300M203
```

```
G0G99X2.3Y0
/M8
M19
G28C0.
Y0.Z-4.1C0.
X2.1
G88C0.X1.3F.0625
C180.
G80G0X2.1
Y0
Z.5
M41
M205
M9
G53Z-11.5(Safe Index)
M1

N13(END MILL 1/4)
M72
G53Z-11.5(Safe Index)
T1313
G19
G97S2=2290M203
G0G98X2.3Y0
/M8
M19
G28C0.
Y.0608Z-1.1834C90.
M40
X1.1
G1X1.075F1.
X1.0163Y0.Z-1.2969F2.5
X.9563Y.0622Z-1.181
X.8963Y0.Z-1.2969
X.8363Y.0622Z-1.181
X.7763Y0.Z-1.2969
X.7163Y.0622Z-1.181
X.6563Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
```

```
G40Y-.0124
Y.0608Z-1.1834
X.8563F1.
X.7975Y0.Z-1.2969F2.5
X.7375Y.0622Z-1.181
X.6775Y0.Z-1.2969
X.6175Y.0622Z-1.181
X.5575Y0.Z-1.2969
X.4975Y.0622Z-1.181
X.4375Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
Y.0608Z-1.1834
X.6375F1.
X.5788Y0.Z-1.2969F2.5
X.5188Y.0622Z-1.181
X.4588Y0.Z-1.2969
X.3987Y.0622Z-1.181
X.3388Y0.Z-1.2969
X.2788Y.0622Z-1.181
X.2188Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
Y.0608Z-1.1834
X.4188F1.
X.36Y0.Z-1.2969F2.5
X.3Y.0622Z-1.181
X.24Y0.Z-1.2969
X.18Y.0622Z-1.181
X.12Y0.Z-1.2969
X.06Y.0622Z-1.181
X0.Y0.Z-1.2969
Y-.0124
```

```
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
G0X1.3
M41
G0Y.0608Z-1.1834C270.
M40
X1.1
G1X1.075F1.
X1.0163Y0.Z-1.2969F2.5
X.9563Y.0622Z-1.181
X.8963Y0.Z-1.2969
X.8363Y.0622Z-1.181
X.7763Y0.Z-1.2969
X.7163Y.0622Z-1.181
X.6563Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
Y.0608Z-1.1834
X.8563F1.
X.7975Y0.Z-1.2969F2.5
X.7375Y.0622Z-1.181
X.6775Y0.Z-1.2969
X.6175Y.0622Z-1.181
X.5575Y0.Z-1.2969
X.4975Y.0622Z-1.181
X.4375Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
```

```
Y.0608Z-1.1834
X.6375F1.
X.5788Y0.Z-1.2969F2.5
X.5188Y.0622Z-1.181
X.4588Y0.Z-1.2969
X.3987Y.0622Z-1.181
X.3388Y0.Z-1.2969
X.2788Y.0622Z-1.181
X.2188Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
Y.0608Z-1.1834
X.4188F1.
X.36Y0.Z-1.2969F2.5
X.3Y.0622Z-1.181
X.24Y0.Z-1.2969
X.18Y.0622Z-1.181
X.12Y0.Z-1.2969
X.06Y.0622Z-1.181
X0.Y0.Z-1.2969
Y-.0124
G41Y-.0624
Z-1.4687F6.5
G3Y.0626R.0313
G1Z-.7812
G3Y-.0624R.0313
G1Z-1.2969
G40Y-.0124
G0X1.3
M41
(FINSH PASS)
G0Y-.001Z-1.475C270.
M40
X1.05
G1X0.F20.
G42Y-.0048Z-1.4999F1.
G2Y-.0624Z-1.4687R.0313F3.5
G1Z-.7812
G2Y.0626R.0313
```

```
G1Z-1.4687
G2Y-.0048Z-1.4999R.0313
G40G1Y-.001Z-1.475
G0X1.3
M41
G0Y-.001Z-1.475C90.
M40
X1.05
G1X0.F20.
G42Y-.0048Z-1.4999F1.
G2Y-.0624Z-1.4687R.0313F3.5
G1Z-.7812
G2Y.0626R.0313
G1Z-1.4687
G2Y-.0048Z-1.4999R.0313
G40G1Y-.001Z-1.475
G0X1.3
M41
Z.55
M205
M9
G53Z-11.5
M1

N166(12MM CHAMFER MILL)
M72
G53Z-11.5(Safe Index)
T1616
G19
G97S2=1250M203
G0G98X2.3Y0
/M8
M19
G28C0.

G0G98Y-.0154Z-1.5672C90.
M40
X1.3
G1X.75F5.
G42Y-.0192Z-1.5921
G2Y-.2474Z-1.4687R.1238F6.5
G1Z-.7812
G2Y.2476R.1238
G1Z-1.4687
G2Y-.0192Z-1.5921R.1238
```

```
G40G1Y-.0154Z-1.5672
G0X2.
M41

G0G98Y-.0154Z-1.5672C270.
M40
X1.3
G1X.75F5.
G42Y-.0192Z-1.5921
G2Y-.2474Z-1.4687R.1238F6.5
G1Z-.7812
G2Y.2476R.1238
G1Z-1.4687
G2Y-.0192Z-1.5921R.1238
G40G1Y-.0154Z-1.5672
G0X2.
M41
Z.5
M205
M9
G53Z-11.5
M1

N28(.070 DRILL)
G53Z-11.5
( OPERATION 29, MILL HOLES )
G0T2828
M19
G97S3=1000M303
G17
M73
G0G98X.8Y0.C0.
/M8
Z.1
X.8
G83X.8Y0.C0.Z-.125R.1Q.02F1.
C120.Q.02
C240.Q.02
G80G0Z.55
M9
M305
M20
G0G53Z-11.25
M71
M1
```

```
N27(.236 CHAMFER MILL)
G53Z-11.5
G0T2727
M19
G97S3=1000M303
G17
M73
G0G98X.8Y0C0.
/M8
Z.1
X.8
G83X.8Y0.C0.Z-.0425R.1Q.1425F1.
C120.Q.1425
C240.Q.1425
G80G0Z.55
M9
M305
M20
M71
M1

N11(BALL END MILL 3/16)
M72
G53Z-11.5
T1111
G19
G97S2=1200M203
G0G98X2.3Y0
/M8
M19
G28C0.
G0G98X2.1Y0.Z.5C0.
Z-3.0386
X1.725
G07.1C.8125
G1Z-3.0386C-21.977F200.
X1.6175F3.
C-28.57F25.
C-21.977
X1.61F3.
C-28.57F25.
X2.5F200.
G07.1C0.
G0X1.75
```

```
( OPERATION 45, MILL CONTOUR )
Y0.Z-2.911C0.
G07.1C.8125
G1Z-2.911C-21.268F200.
X1.6175F3.
C-28.57F25.
Z-3.1607
C-21.335
Z-2.911C-21.268
X1.61F3.
C-28.57F25.
Z-3.1607
C-21.335
X2.5F200.
G07.1C0.
G0X1.75
( OPERATION 46, MILL CONTOUR )
Y0.Z-2.911C0.
G07.1C.8125
G1Z-2.911C-12.63F200.
X1.6175F3.
Z-3.1607C-6.189F25.
Z-2.911C-12.63
X1.61F3.
Z-3.1607C-6.189F25.
X2.5F200.
G07.1C0.
G0X1.75
( OPERATION 47, MILL CONTOUR )
Y0.C0.
G07.1C.8125
G1Z-3.1607C-12.522F200.
X1.6175F3.
Z-2.911C-6.051F25.
Z-3.1607C-12.522
X1.61F3.
Z-2.911C-6.051F25.
X2.5F200.
G07.1C0.
G0X1.75
( OPERATION 48, MILL CONTOUR )
Y0.Z-3.0175C0.
G07.1C.8125
G1Z-3.0175C2.625F200.
X1.6175F3.
```

```
C7.432F25.
G2Z-3.0325C8.489R.015
G1Z-3.1457
G2Z-3.1607C7.432R.015
G1C2.625
Z-2.911
Z-3.0175
X1.61F3.
C7.432F25.
G2Z-3.0325C8.489R.015
G1Z-3.1457
G2Z-3.1607C7.432R.015
G1C2.625
Z-2.911
X2.5F200.
G07.1C0.
G0X1.75
( OPERATION 49, MILL CONTOUR )
G0G98Y0.C0.
G07.1C.8125
G1Z-2.911C17.301F200.
X1.6175F3.
Z-3.1607C20.715F25.
C20.841
Z-2.911C24.223
C17.301
X1.61F3.
Z-3.1607C20.715F25.
C20.841
Z-2.911C24.223
X2.5F200.
G07.1C0.
G0X1.75
( OPERATION 50, MILL CONTOUR )
Y0.Z-2.9744C0.
G07.1C.8125
G1Z-2.9744C23.364F200.
X1.6175F3.
C18.169F25.
C23.364
X1.61F3.
C18.169F25.
X2.5F200.
G07.1C0.
G0X1.75
```

```
( OPERATION 51, MILL CONTOUR )
Y0.Z-2.911C33.04
G07.1C.8125
G1Z-2.911C33.04F200.
X1.6175F3.
Z-3.1607F25.
Z-2.911C39.656
Z-3.1607
Z-2.911C33.04
X1.61F3.
Z-3.1607F25.
Z-2.911C39.656
Z-3.1607
X2.5F200.
G07.1C0.
G0X1.75
( OPERATION 52, MILL CONTOUR )
Y0.Z-3.0439C48.47
G07.1C.8125
G1Z-3.0439C48.47F200.
X1.6175F3.
Z-3.1607F25.
C52.141
G3Z-3.1257C54.609R.035
G1Z-2.962
G3Z-2.927C52.141R.035
G1C48.47
Z-3.0439
X1.61F3.
Z-3.1607F25.
C52.141
G3Z-3.1257C54.609R.035
G1Z-2.962
G3Z-2.927C52.141R.035
G1C48.47
Z-3.0439
X2.5F200.
G07.1C0.
G0X2.1
Y0
( OPERATION 53, MILL CONTOUR )
Y0.Z-1.57C0.
X1.1
G07.1C.5
G1Z-1.57C-29.794F200.
```

```
X1.3
X.96F1.
Z-2.09C29.794F5.
X1.1F200.
G07.1C0.
G0X1.1
G0Y0Z-1.57C180.
G07.1C.5
G1Z-1.57C209.794F200.
X1.1
X.96F1.
Z-2.09C150.206F5.
X1.3F200.
G07.1C0.
G0X2.1
G0C0.
G50C-180.
M9
M205
G53Z-11.5
G18
M1

G04.1P4
M1
N95
G04.1P7
M19
G0G28C0.
G0C0.
N6M71(CUT OFF W.08 SANDVIK)
T0606;
G0G53Z0
G0X4.0Y0
G0Z-4.78
(M00 PARKED POSITION)
(M00)
G04.1P8
G04.1P9
M11
G4X.5
G1G98W3.0F30.
M10
G4X.5
G04.1P100
```

```
G04.1P101
G99S1=800M103
(G0W0)
G0X2.1
/M8
G1X-.02F.0015
G1X2.25F.025
G0X4.0
G04.1P102
G04.1P103
G28W0
M9
G04.1P20
M99;

$2

N1001
G4.1P1
G53Z0 (Safe Index)

N82
G53Z0 (Safe Index)
M31
M74
T8282(TURNING TOOL R.015 )
G97S4=1000M403
G0G99X2.1Y0
/M28
Z.005
G1X.3F.005
G0Z.1

X2.05
G1X1.98Z.0105F.0085
Z-.9856
X2.05
G0Z.0101
G1X1.98
X1.91
Z-.3904
G3X1.92Z-.4056R.0256
G1Z-.9856
X1.98
G0Z.0101
```

```
G1X1.91
X1.84
Z-.365
G3X1.875Z-.3725R.0256
G1X1.905Z-.3875
X1.91Z-.3904
G0Z.0101
G1X1.84
X1.77
Z-.365
X1.8388
X1.84
G0Z.0101
G1X1.77
X1.7
Z0.
X1.755Z-.0275
G3X1.77Z-.0456R.0256
G0Z.0101
G1X1.7
X1.6321
Z.01
X1.6588
G3X1.695Z.0025R.0256
G1X1.7Z0.
G0X2.05
Z.1
( OPERATION 29, TURN CONTOUR )
X1.2
G1Z0.
X1.6588
G3X1.6808Z-.0046R.0156
G1X1.7408Z-.0346
G3X1.75Z-.0456R.0156
G1Z-.375
X1.8388
G3X1.8608Z-.3796R.0156
G1X1.8908Z-.3946
G3X1.9Z-.4056R.0156
G1Z-.9856
G0X2.
Z0
X1.8
G1X.8
G0X2.2
```

```
Z.1
M29
M405
G53Z0 (Safe Index)
M1

N83
G53Z0
M74
T8383(OD GROOVE W.098 )
G97S4=500M403
G0G99X2.1Y0
/M8
Z-.4026
G1X1.8748F.0025
X1.8448Z-.3876
G2X1.772Z-.3725R.0515
G1X1.642
G3Z-.3355R.0185
G1X1.652
G2X1.755Z-.284R.0515
G1
G0X2.
Z-.4044
G1X1.8713
X1.8413Z-.3894
G2X1.772Z-.375R.049
G1X1.642
G3Z-.333R.021
G1X1.652
G2X1.75Z-.284R.049
G1
G0X2.5Z.1
M405
G53Z0
M1

N32
G53Z0 (Safe Index)
M74
T3232(INSERT DRILL 5/8 )
G97S4=700M403
G0G99X0Y0
/M28
Z.25
```

G83Z-2.0Q.05F.003
G0G80Z.1
M29
G53Z0 (Safe Index)
M1

N86
G53Z0 (Safe Index)
M74
T8686(BORING ROUGH R.03)
G97S4=1000M403
G0G99X-.625Y0
/M29
Z.1
G1Z.0051F.0065
G1X-.695
Z-1.1634
G3X-.665Z-1.1921R.035
G1Z-1.3518
X-.625
G0Z.0051
G1X-.695
X-.765
Z-1.1519
X-.7169Z-1.1583
G3X-.695Z-1.1634R.035
G0Z.0051
G1X-.765
X-.835
Z-1.1425
X-.765Z-1.1519
G0Z.0051
G1X-.835
X-.905
Z-1.1331
X-.835Z-1.1425
G0Z.0051
G1X-.905
X-.975
Z-.658
X-.9625Z-.6643
G3X-.942Z-.689R.035
G1Z-1.1281
X-.905Z-1.1331
G0Z.0051

G1X-.975
X-1.045
Z-.028
X-1.0305Z-.0353
G3X-1.01Z-.06R.035
G1Z-.6405
X-.975Z-.658
G0Z.0051
G1X-1.045
X-1.115
Z.0027
G3X-1.0905Z-.0053R.035
G1X-1.045Z-.028
G0Z.0051
G1X-1.115
X-1.185
Z.005
X-1.14
G3X-1.115Z.0027R.035
G0Z.0051
G1X-1.185
X-1.255
Z.005
X-1.185
G0Z.0051
G1X-1.255
X-1.325
Z.005
X-1.255
G0Z.0051
G1X-1.325
X-1.3648
Z.005
X-1.325
G0X-.625
Z.15
M29
M405
G53Z0 (Safe Index)
M1

N87
G53Z0
M74
T8787(BORING FINSH R.03)

```
G97S4=700M403
G0G99X1.14Y0
/M28
Z.1
G1Z0F.0025
G2X1.0976Z-.0088R.03
G1X1.0376Z-.0388
G2X1.02Z-.06R.03
G1Z-.6426
X.9696Z-.6678
G2X.952Z-.689R.03
G1Z-1.155
G0X.9
Z.5
M405
M29
G53Z0
M1

N88
G53Z0
M74
T8888(EXTERNAL THREADING)
G97S4=1000M404
G0G99X-1.9Y0
/M28
Z.15
G92X-1.75Z-.350F.0625
X-1.74
X-1.735
X-1.73
X-1.725
X-1.72
X-1.715
X-1.71
X-1.705
X-1.70
X-1.695
X-1.69
X-1.685
X-1.68
X-1.675
X-1.67
X-1.67
G0Z.5
```

```
M405
M29
G53Z0
M1

N89
G53Z0
M74
T8989(INTERNAL THREADING)
G97S4=1000M403
G0G99X.9Y0
/M28
Z.15
G92X1.03Z-.62F.0625
X1.034
X1.040
X1.045
X1.050
X1.055
X1.060
X1.065
X1.070
X1.075
X1.080
X1.085
X1.090
X1.095
X1.100
X1.100
G0Z.5
M405
M29
G53Z0
M1

N35 (1/2 END MILL)
G0T3535
G53Z0
M19
G97S5=1000M503
G17
M75
/M28
G0G98X2.5773Y0C0.
/M28
```

```
Z.1
G12.1
G1X1.225C.4F200.
Z.1
Z-1.F20.
G42X1.175F11.
C-.4
G40X1.225
Z.1F200.
G13.1
G0Z.25

C180.
G0X2.5773
Z.1

G12.1
G1X1.225C.4F200.
Z.1
Z-1.F20.
G42X1.175F11.
C-.4
G40X1.225
Z.1F200.
G13.1
G0Z.25

(FINSH PASS)
C0.
X2.5298
G12.1
G1X1.2C.4F200.
Z.1
Z-1.F20.
G42X1.15F11.
C-.4
G40X1.2
C.4
G42X1.15
C-.4
G40X1.2
Z.1F200.
G13.1
G0Z.25
```

```
C180.
X2.5298
G12.1
G1X1.2C.4F200.
Z.1
Z-1.F20.
G42X1.15F11.
C-.4
G40X1.2
C.4
G42X1.15
C-.4
G40X1.2
Z.1F200.
G13.1
G0Z.25
G0Z.5

(CURT OUTS)

X2.Y0C157.5
Z.1
G83X2.C157.5Z-.3R.1Q.4F2.
G80G0Z.1
C337.5
Z.1
G83C337.5Z-.3R.1Q.4F2.
G80G0Z.1
M29
M505
M20
M29
G53Z0
M1

N36 (DRILL 1/4)
G0T3636
G53Z0
M19
G97S5=1650M503
G17
M75
/M28
G0G98X1.4Y0C180.
C0.
```

```
C180.
Z.1
G83X1.4C180.Z-.25Q.075F3.
G80G0Z.1
C120.
Z.1
G83C120.Z-.25Q.075F3.
G80G0Z.1
C60.
Z.1
G83C60.Z-.25Q.075F3.
G80G0Z.1
C0.
Z.1
G83C0.Z-.25Q.075F3.
G80G0Z.1
C300.
Z.1
G83C300.Z-.25Q.075F3.
G80G0Z.1
C240.
Z.1
G83C240.Z-.25Q.075F3.
G80G0Z.1
Z.5
M29
M505
M20
G53Z0
M1

N37 (12 CHAMFER MILL )
G0T3737
G53Z0
M19
G97S5=2500M503
G17
M75
/M28
G0G98X1.624Y0C0.
C0.
Z.1
G12.1
G1X.8119C-.0114F200.
Z.1
```

```
Z-.025F20.
G3X.7114C.1119R.1125F11.
X.5881C.0114R.1125
X.6886C-.1119R.1125
X.8119C-.0114R.1125
G1Z.1F200.
G13.1
G0Z.1

G0X1.624C60.
G12.1
G1X.8119C-.0114F200.
Z.1
Z-.025F20.
G3X.7114C.1119R.1125F11.
X.5881C.0114R.1125
X.6886C-.1119R.1125
X.8119C-.0114R.1125
G1Z.1F200.
G13.1
G0Z.1

G0X1.624C120.
G12.1
G1X.8119C-.0114F200.
Z.1
Z-.025F20.
G3X.7114C.1119R.1125F11.
X.5881C.0114R.1125
X.6886C-.1119R.1125
X.8119C-.0114R.1125
G1Z.1F200.
G13.1
G0Z.1

G0X1.624C180.
G12.1
G1X.8119C-.0114F200.
Z.1
Z-.025F20.
G3X.7114C.1119R.1125F11.
X.5881C.0114R.1125
X.6886C-.1119R.1125
X.8119C-.0114R.1125
G1Z.1F200.
```

```
G13.1
G0Z.1

G0X1.624C240.
G12.1
G1X.8119C-.0114F200.
Z.1
Z-.025F20.
G3X.7114C.1119R.1125F11.
X.5881C.0114R.1125
X.6886C-.1119R.1125
X.8119C-.0114R.1125
G1Z.1F200.
G13.1
G0Z.1

G0X1.624C300.
G12.1
G1X.8119C-.0114F200.
Z.1
Z-.025F20.
G3X.7114C.1119R.1125F11.
X.5881C.0114R.1125
X.6886C-.1119R.1125
X.8119C-.0114R.1125
G1Z.1F200.
G13.1
Z.5
M29
M29
M505
M20
G53Z0
G18
M1

N822(RE-CYCLE)
G53Z0
M74
T8282(TURNING TOOL R.015 )
G97S4=1000M403
G0G99X2.1Y0
G18
/M28
X1.6588
```

```
Z.05
G1Z0.F.0035
G3X1.6808Z-.0046R.0156
G1X1.7408Z-.0346
G3X1.75Z-.0456R.0156
G1Z-.375
X1.8388
G3X1.8608Z-.3796R.0156
G1X1.8908Z-.3946
G3X1.9Z-.4056R.0156
G1Z-.9856
G0X2.
Z0
X1.8
G1X.8
G0X2.2
Z.1
M29
M405
G53Z0 (Safe Index)
M1

N833 (RE-CYCLE)
G53Z0
M74
T8383(OD GROOVE W.098 )
G97S4=1000M403
G0G99X2.1Y0
/M8
Z-.4044
G1X1.8713F.0035
X1.8413Z-.3894
G2X1.772Z-.375R.049
G1X1.642
G3Z-.333R.021
G1X1.652
G2X1.75Z-.284R.049
G1
G0X2.5Z.1
M405
G53Z0
M1

(Part Eject)
N39
```

G53Z0 (Safe Index)
T3939 (part catcher)
G97S4=50M403
G53Z0
X0
M31
G1G98Z0F5.
M11 (open collet)
G4X1. (dwell)
M69
G4X1. (dwell)
M57 (air blow on)
G4X1. (Dwell)
M58 (air blow off)
G4X.5
M70
G4X.5 (dwell)
M405
M32
G53Z0 (Safe Index)
G53X0
M33
G4X3.0
M1

G04.1P4
M1
G0G28U0.
N95
G0G53Z0
G0G53X0
G04.1P7
M19
G0G28C0
G0C0.
G04.1P8
N30(PICK-OFF)
T3030
G0Z.1
G1G98Z-2.2F15.
M10
G4X.5

G04.1P9
G04.1P100

M77
(M79)
G04.1P101
G04.1P102
M78
(M80)
G04.1P103
G0G28W0.
M29
G04.1P20
M99
END PROGRAM

Tool Layout

Job Number: DEMO CS52

Tool#	Tool Description
1	TURN R.03 rough od
2	PROFILE TOOL URNING TOOL R.03
3	35 DEG R.015 FINSH OD
4	OD GROOVE W.098 FULL RADIUS
5	EXTERNAL ACME THREAD 16 LEAD
21	INSERT DRILL .413
22	CARBIDE DRILL .250
26	3/8 END MILL LIVETOOL
23	BORING BAR R.030 OFFSET 43
12	3/8 END MILL
15	5/16 DRILL FOR TAP
16	CHAMFER 12MM 45 DEG
14	3/8-16 TAP
13	END MILL 1/4
28	DRILL .07 CARBIDE
27	CHAMFER MILL 6MM 45 DEG
11	BALL END MILL 3/16
6	CUT OFF TOOL
	SUB SPINDLE
82	TURN 35 DEG R.015
83	OD GROOVE W.098 FULL RADIUS
32	INSERT DRILL 5/8
86	BB R.03 ROUGH
87	BB R.03 FINISH
88	EXTERNAL THREADING
89	INTERNAL THREADING
35	1/2 END MILL LIVE
36	1/4 CARBIDE DRILL LIVE
37	6MM CHAMFER MILL 45 DEG LIVE

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How to Take Offsets

The offsets on the 32CS are the distance from machine zero to the part zero for each tool in each axis. Since the machine does not have a turret it has to use the offsets to determine where each tool is in relation to the part.
To move a tool to the part we simply activate the offsets using a "T" command and call out a position we would like to the tool to move.
Caution!!! Be aware that moving a tool in position may cause another tool to move into the part. It is always a safe practice to use the Z axis to move the part out of the way before using MDI to position the tool in the X and Y axis.

Some offsets are set by the factory and will remain constant unless the machine zero or tooling plate is changed.
It is highly recommended that these offsets be recorded so they can be restored if lost or changed.

These offsets are:

Tools #1 - #6	Y
Tools #11 - #14	Y
Tools #21 - #28	X&Y
Tools #31 - #34	X2

Tools #1 thru #6 Turning Tool Offsets:
Tools 1 - 6 "Y" axis offset should be set as a constant with a new machine. Tools 1-6 "Y" offset will change if the tooling plate is changed from 1/2" to 5/8" shank tooling.

How To Call up the Tools 1-6 using MDI

1. Manually move the Z axis to a position where all tools will clear the material.
2. In MDI execute the command "G0 T101 Y0". This will bring tool #1 into position to make a turning cut.

To set the X offset Tools 1 - 6

1. Turn the spindle on in MDI and use X and Z in manual operation to turn a diameter on the material in the spindle. In MDI execute the command "M103 S1=1000". This will turn the spindle on at 1000 RPM.
2. Move the tool to a position in Z away from the part.
3. Press the "POS" button to go to the position page.
4. Press "F2" Clear X Relative (Note that the "Relative Register" X value is "0".
5. Use the hand wheel to move the X axis to 7.000". This will give you enough room to measure the part.
6. Measure the diameter of the cut (Example: .995").
7. Press "MON" to go to the Monitor page.

8. Press “F5 - Tool Setting” to go to the tool offset page.
9. Press “F2” “Tool Len”
10. Place cursor on the tool offset #1.
11. Press “X7.995” “Enter”
12. The correct offset for the tool should be entered in the offset value.

To set the Z offset Tools 1 - 6

1. Call up the tool (shown above).
2. Move the tool to a known position in relation to the Z0 (face of part) using a gauge pin/block or just use the tool to cut a face. (Example: touch face of part with .250” gauge pin.
3. Press monitor
4. Press “F5” Tool Setting (Under Screen)
5. Press “F2” “Tool Len”
6. Place cursor on the tool #1 offset.
7. Press “Z.250” “Enter” (enter Z0 if you have just cut the face)
8. The correct offset for the tool should be entered in the offset value.

Tools #11 thru #14 Radial Driven Tool Offsets:
Tools 11-14 are radial driven tools used to do Milling type work on the side of the part. The “Y” axis on these tools will be a constant. It is recommended to write down these values and keep them in a safe place in case they are lost.

How To Call up the Tools 1-6 using MDI

1. Manually move the Z axis to a position where all tools will clear the material.
2. In MDI execute the command “G0 T1111 Y0”. This will bring tool #11 into position to make a turning cut.

How To set the X offset Tools 1 - 6

1. Turn the spindle on in MDI and use X and Z in manual operation to touch or create a diameter on the material in the spindle. In MDI execute the command “M303 S3=1000”. This will turn the spindle on at 1000 RPM.
2. Move the tool to a position in Z away from the part.
3. Press the “POS” button to go to the position page.
4. Press “F2” Clear X Relative (Note that the “Relative Register” X value is “0”.
5. Use the hand wheel to move the X axis to 7.000”. This will give you enough room to measure the part.
6. Measure the diameter of the cut (Example: .995”).
7. Press “MON” to go to the Monitor page.
8. Press “F5 - Tool Setting” to go to the tool offset page.
9. Press “F2” “Tool Len”
10. Place cursor on the desired tool offset.
11. Press “X7.995” “Enter”.
12. The correct offset for the tool should be entered in the offset value.

How To set the Z offset Tools 1 - 6

1. Call up the tool (shown above).
2. Move the tool to a known position in relation to the Z0 (face of part) using a gauge pin/block or just use the tool to cut a face. (Example: touch face of part with .250" gauge pin.
3. Press monitor.
4. Press "F5" Tool Setting (Under Screen)
5. Press "F2" "Tool Len"
6. Place cursor on the tool #1 offset.
7. Add the gauge pin to the radius of the tool. Example 3/8" End Mill radius=.1875 (Add .25 + .1875=.4375)
8. Press "Z.4375" "Enter" (enter "Z.1875" if you have just cut the face with the tool)
9. The correct offset for the tool should be entered in the offset value.

Tools #21 (Fixed) thru #28 (Axial Driven) Tool Offsets:

How To Set the X and Z offset Tools 21-25

Tools 21-25 are fixed bushing holders. They may be used for Drilling or Boring operations.

Drilling

When using Tools 21-25 for drilling operations the Z axis is the only axis offset you need to get.
You can use the same procedure used on tools 1-6.

Boring

When you use tools 21-25 in a boring operation you can set the X and Z offsets using the same procedure as tools 1-6.

Notes on taking offsets:

When you enter an axis letter in the “offset input line” Example “X.995” the offset will be calculated using the value in the “Machine Register”.
When you enter a number in the “offset input line” without an axis letter Example “.995” the value will be input to the offset selected according to the setting of the “INPUT MODE” in the upper left corner of the screen. To change this mode input “I” for incremental input or “A” for absolute input of the number. The active mode will be displayed to the right.
(Absolute mode shown below)

Input Mode (A:ABS I:INC) ABS

Absolute Input Mode will enter the number into the offset.
Incremental Input Mode will add the number to the existing offset. (If a negative value the sign must be included)

Special Tool Numbers T3030 and T3939

Tool Offset #30 is used for the “Face of the sub spindle collet” to the “Face of the part when Z1 is at the transfer position”.

Tool Offset #39 is used for the position of the sub spindle over the part catcher when extended.