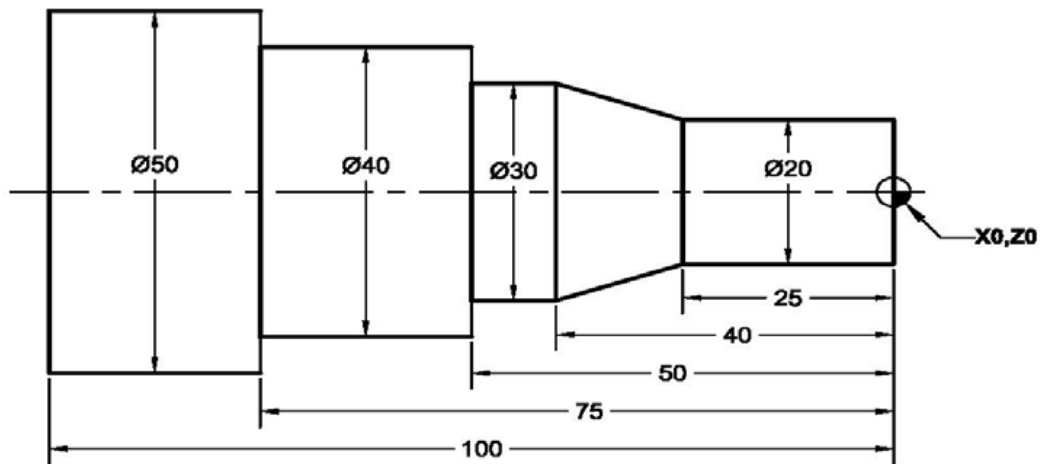


### Exercise 1:



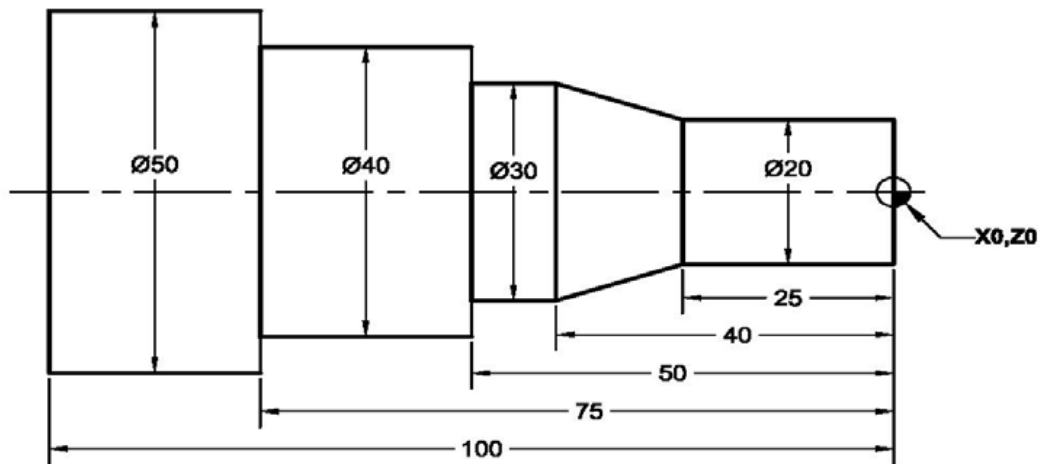
### Ordinary Cycle

```
O1234
G21
G99
G28 U0 W0
M06 T0101
M03 S1200
G00 X55 Z5
Z0
G01 X-1 F.1
G01 Z1
G00 X50
G01 Z-100 F.1
G01 X51 Z-100
G00 Z1
G00 X48
G01 Z-75 F.1
G01 X49 Z-75
G00 Z1
G00 X46
G01 Z-75 F.1
G01 X47 Z-75
G00 Z1
G00 X44
G01 Z-75 F.1
G01 X45 Z-75
G00 Z1
G00 X42
G01 Z-75 F.1
G01 X43 Z-75
```

G00 Z1  
G00 X40  
G01 Z-75 F.1  
G01 X41 Z-75  
G00 Z1  
G00 X38  
G01 Z-50 F.1  
G01 X39 Z-50  
G00 Z1  
G00 X36  
G01 Z-50 F.1  
G01 X37 Z-50  
G00 Z1  
G00 X34  
G01 Z-50 F.1  
G01 X35 Z-50  
G00 Z1  
G00 X32  
G01 Z-50 F.1  
G01 X33 Z-50  
G00 Z1  
G00 X30  
G01 Z-50 F.1  
G01 X31 Z-50  
G00 Z1  
G00 X28  
G01 Z-25 F.1  
G01 X29 Z-25  
G00 Z1  
G00 X26  
G01 Z-25 F.1  
G01 X27 Z-25  
G00 Z1  
G00 X24  
G01 Z-25 F.1  
G01 X25 Z-25  
G00 Z1  
G00 X22  
G01 Z-25 F.1  
G01 X23 Z-25  
G00 Z1  
G00 X20  
G01 Z-25 F.1  
G01 X21 Z-25  
G00 Z1  
G00 X28 Z-24

G01 X30 Z-40 F.1  
G01 X31 Z-40  
G00 Z-24  
G00 X26  
G01 X30 Z-40 F.1  
G01 X31 Z-40  
G00 Z-24  
G00 X24  
G01 X30 Z-40 F.1  
G01 X31 Z-40  
G00 Z-24  
G00 X22  
G01 X30 Z-40 F.1  
G01 X31 Z-40  
G00 Z-24  
G00 X20  
G01 X30 Z-40F.1  
G01 X31 Z-40  
G00 Z-24  
G00 Z1  
G28 U0 W0  
M05  
M30

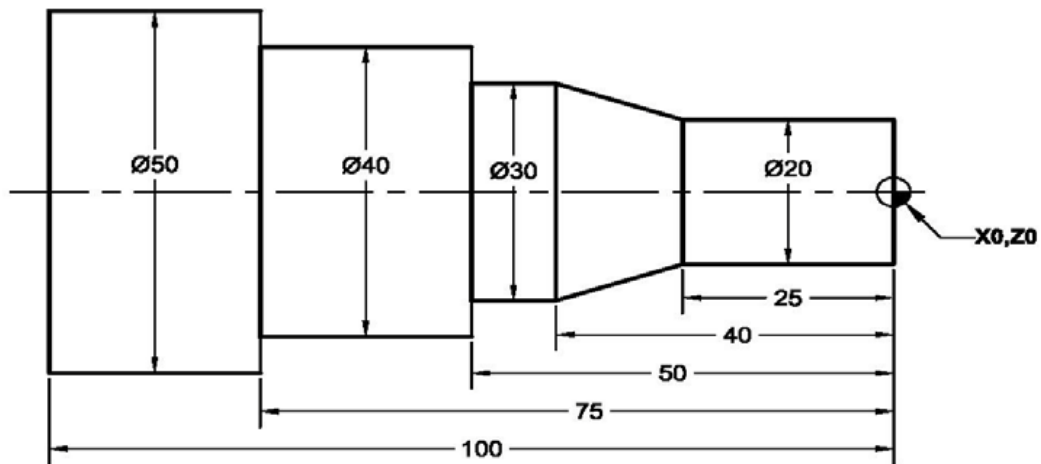
## Exercise 2:



### **G71 Canned Cycle**

```
O1234
G21
G99
G28 U0 W0
M06 T0101
M03 S1200
G00 X55 Z5
Z0
G01 X-1 F.1
G01 Z1
G00 X52
G71 U0.5 R1
G71 P10 Q20 U.1 W.1 F.1
N10 G01 X20 Z0 F.1
Z-25
X30 Z-40
Z-50
X40
Z-75
X50
Z-100
X55
N20 G00 Z5
G70 P10 Q20 F0.05
G28 U0 W0
M05
M30
```

### Exercise 3:

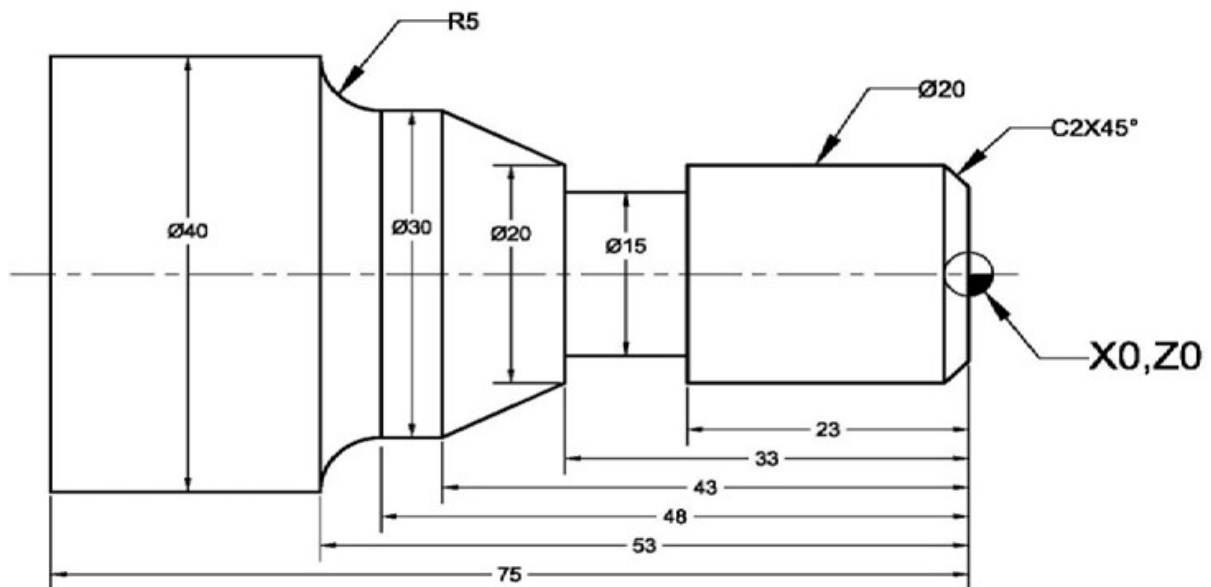


#### **G72 Canned Cycle**

```
O1234
G21
G99
G28 U0 W0
M06 T0101
M03 S1200
G00 X55 Z5
Z0
G01 X-1 F.1
G01 Z1
G00 X55
G72 W0.5 R1
G72 P10 Q20 U.1 W.1 F.1
N10 G01 X50 Z-100 F.1
Z-75
X40
Z-50
X30
Z-40
X20 Z-25
Z0
Z5
N20 G00 X55
G70 P10 Q20 F0.05
G28 U0 W0
M05
M30
```

#### Exercise 4:

#### RADIAL GROOVING



O1234  
G21  
G99  
G28 U0 W0  
M06 T0101  
M03 S1200  
G00 X45 Z5  
Z0  
G01 X-1 F0.1  
Z2  
G00 X42  
G71 U0.5 R1  
G71 P10 Q20 U0.2 W0.2 F0.1  
N10 G01 X16 Z0  
X20 Z-2  
Z-33  
X30 Z-43  
Z-48  
G02 X40 Z-53 R5  
G01 Z-75  
G01 X45  
N20 Z2  
G28 U0 W0  
M05  
M06 T0202  
M03 S2000  
G00 X42 Z2  
G70 P10 Q20 F0.1

G28 U0 W0

M05

M06 T0303

M03 S800

G00 X21 Z-33

G75 R1

G75 X15 Z-26 P1000 Q500 R0 F0.1

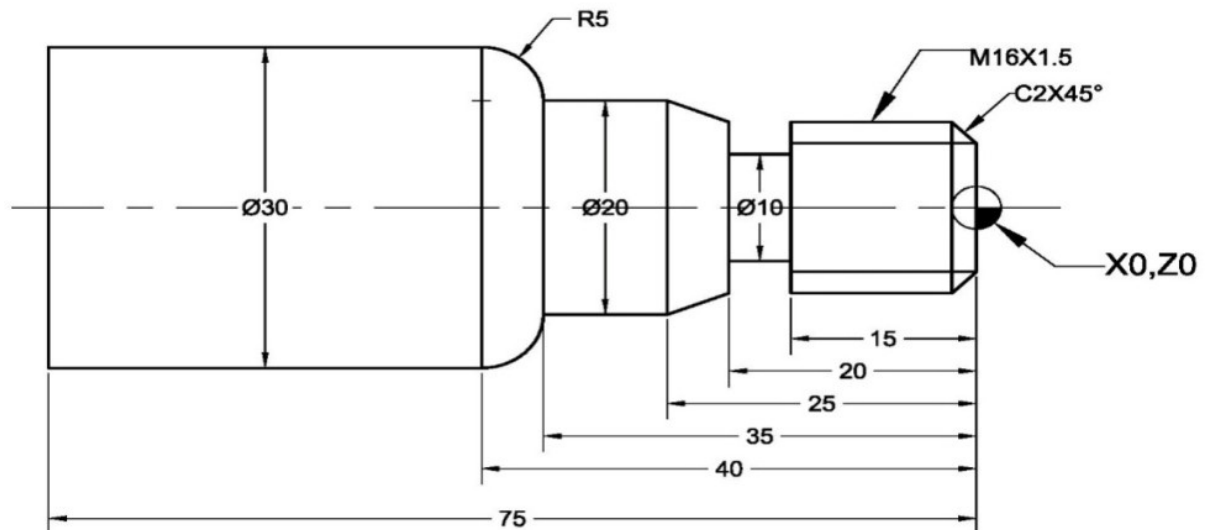
G28 U0 W0

M05

M30

### Exercise 5:

## THREADING OPERATION



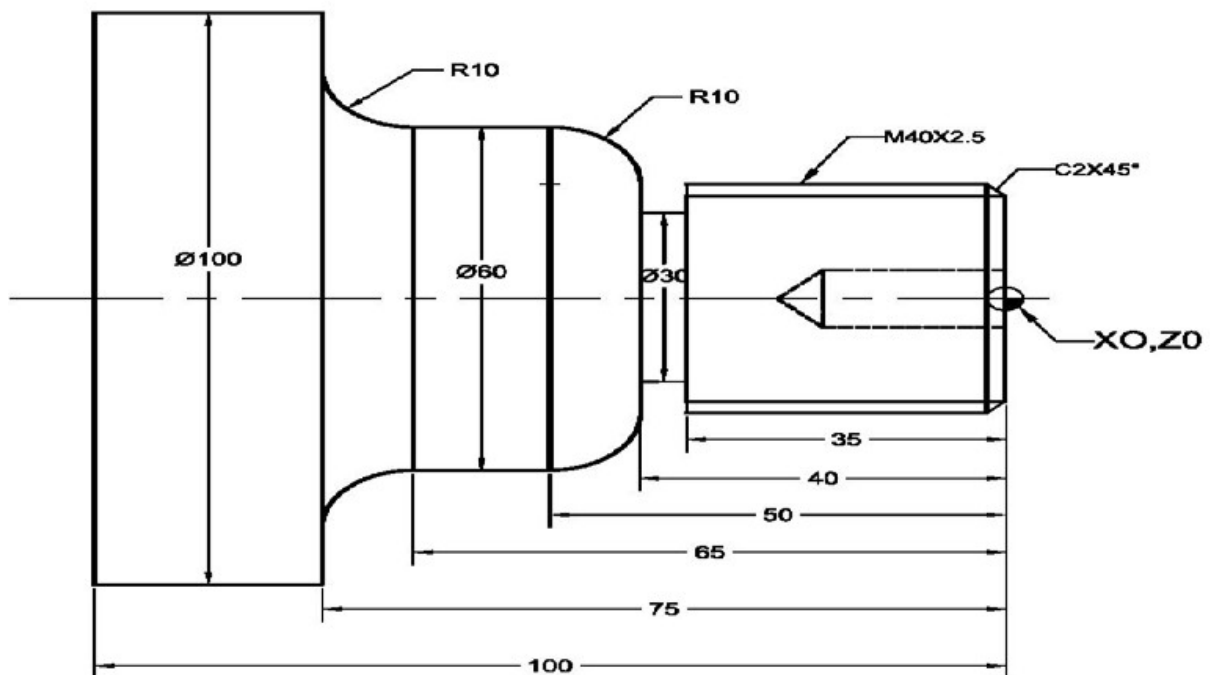
```
O1234
G21
G99
G28 U0 W0
M06 T0101
M03 S1200
G00 X35 Z5
Z0
G01 X-1 F0.1
Z2
G00 X35
G71 U0.5 R1.0
G71 P10 Q20 U0.2 W0.2 F0.1
N10 G01 X14 Z0
X16 Z-2
Z-20
X20 Z-25
Z-35
G03 X30 Z-40 R5
G01 Z-75
N20 G01 X35
G28 U0 W0
M05
M06 T0202
M03 S2000
G00 X35 Z2
G70 P10 Q20 F0.05
G00 X35
```



G28 U0 W0  
M05  
M06 T0303  
M03 S800  
G00 X35 Z-20  
X17  
G75 R1.0  
G75 X10 Z-18 P1000 Q500 F0.1  
G00 X35  
G28 U0 W0  
M05  
M06 T0404  
M03 S500  
G00 X16 Z5  
G76 P030060 Q100 R0.1  
G76 X14.16 Z-17 P920 Q200 R0 F1.5  
G00 X17  
G28 U0 W0  
M05  
M30

## Exercise 6:

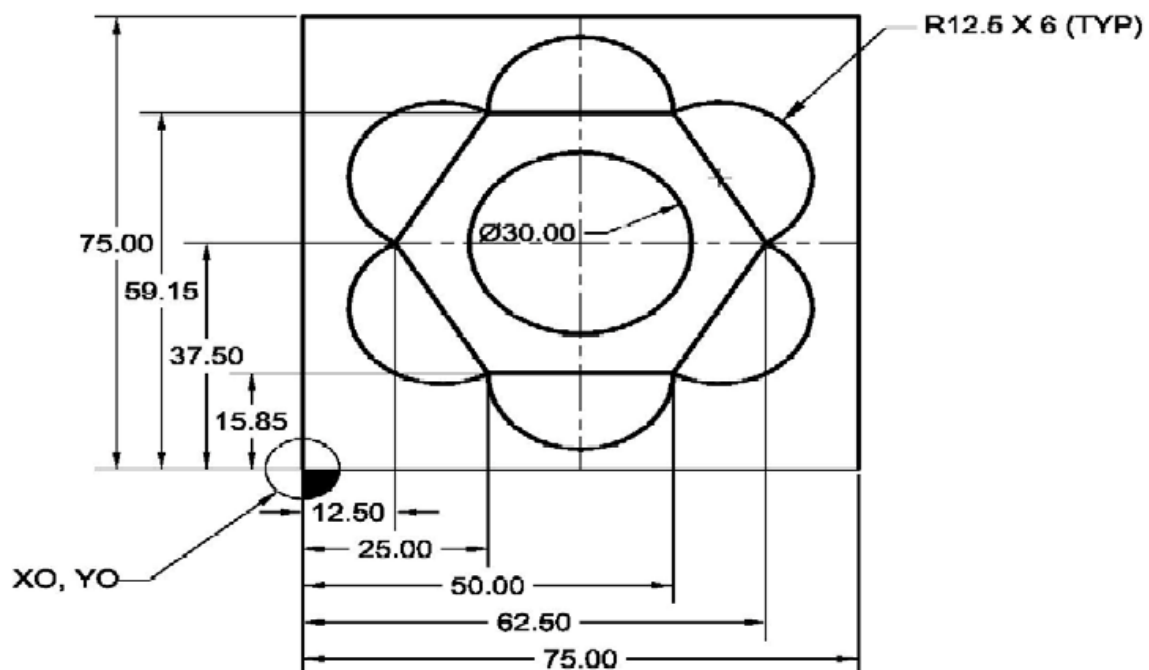
### AXIAL DRILLING OPERATION



```
O1238
G21
G99
G28 U0 W0
M06 T0101
M03 S1200
G00 X105 Z5
Z0
G01 X-1 F0.1
Z2
G00 X105
G71 U0.5 R1.0
G71 P10 Q20 U0.1 W0.1 F0.1
N10 G01 X36 Z0
X40 Z-2
Z-40
G03 X60 Z-50 R10
G01 Z-65
G02 X80 Z-75 R10
G01 X100
Z-100
N20 X105
G28 U0 W0
M05
```

M06 T0202  
M03 S2000  
G00 X105 Z5  
G70 P10 Q20 F0.05  
G00 X105  
G28 U0 W0  
M05  
M06 T0303  
M03 S800  
G00 X105 Z-40  
G00 X41  
G75 R1  
G75 X30 Z-38 P1000 Q500 R0 F0.1  
G00 X105  
G28 U0 W0  
M05  
M06 T0404  
M03 S500  
G00 X40 Z50  
G00 Z2  
G76 P030060 Q100 R0.1  
G76 X36.93 Z-37 P1533 Q200 F2.5  
G00 X105  
G28 U0 W0  
M05  
M06 T0505  
M03 S700  
G00 X0 Z50  
Z2  
G74 R1.0  
G74 Z-30 Q1000 F0.1  
G01 Z2  
G28 U0 W0  
M05  
M30

## SURFACE MILLING



BLANKSIZE:75X75X15

ALL DIMENSIONS ARE IN MM

Depth of cut:2

O1234

G21

G98

G91 G28 Z0

G91 G28 X0 Y0

M06 T01

M03 S1200

G00 G55 G90 X0 Y0

G43 H1 Z13

Z2

G40 G00 X25 Y15.85

G01 Z-2.0 F20

G01 X12.5 Y37.5 F100

G01 X25.0 Y59.15

G01 X50.0 Y59.15

G01 X62.25 Y37.5

G01 X50.0 Y15.85

G01 X25.0 Y15.85

G02 X12.5 Y37.5 R12.5

G02 X25.0 Y59.15 R12.5

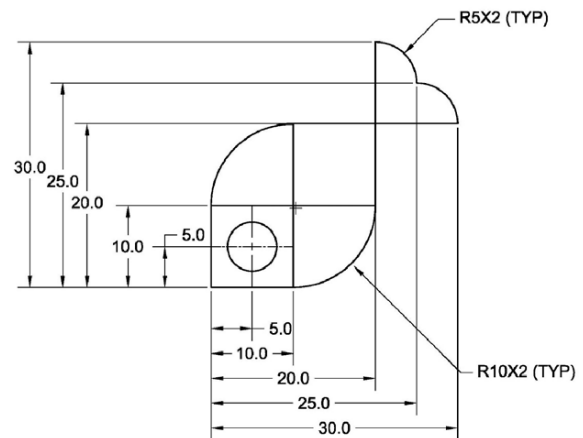
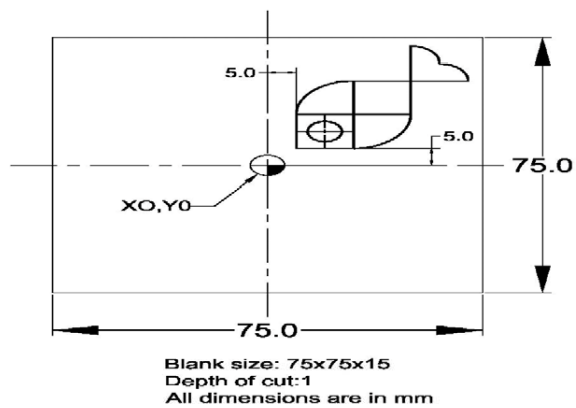
G02 X50.0 Y59.15 R12.5

G02 X62.5 Y37.5 R12.5

G02 X50.0 Y15.85 R12.5  
G02 X25.0 Y15.85 R12.5  
G01 Z2  
G00 X22.5 Y37.5  
G01 Z-2 F20  
G02 X22.5 Y37.5 I15 J0  
G01 Z2  
G00 Z100  
G91 G28 Z0  
G91 G28 X0 Y0  
M05  
M30

## Exercise 8:

### MIRRORING



O1234

G21

G98

G00 G91 G28 Z0

G00 G91 G28 X0 Y0

M06 T01

G00 G90 G55 X0 Y0

G43 H1 Z13

M03 S1500

Z5

G01 Z0.0 F100

M98P0014000

M70

M98P0014000

M80

M71

M98P0014000

M81

M70

M71

M98P0014000

M80

M81

G00 G90 Z5

G00 G91 G28 Z0

G00 G91 G28 X0 Y0

M05

M30

O4000

G00 G90 X5 Y5

G01 G91 Z-0.5 F100

G01 G90 X5 Y15

G02 X15 Y25 R10

G01 X35

G03 X30 Y30 R5  
G03 X25 Y35 R5  
G01 Y15  
G02 X15 Y5 R10  
G01 X5 Y5  
G01 X15 Y5  
G01 Y15  
G01 X5  
G00 Z0  
G00 X10 Y10  
G01 G91 Z-0.5 F100  
G00 G90 Z0  
M99