

Examples Manual

Mill model

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WARNING



The cutting speeds and feedrates appearing in this manual are only approximate, they may vary depending on the material of the part and the tools used. When machining one of the parts of these examples, use the speeds recommended by the tool manufacturer.

The tool number will also be different depending on the machine.

===== 0 =====

The information described in this manual may be subject to variations due to technical modifications.

FAGOR AUTOMATION, S.Coop. Ltda. reserves the right to modify the contents of the manual without prior notice.

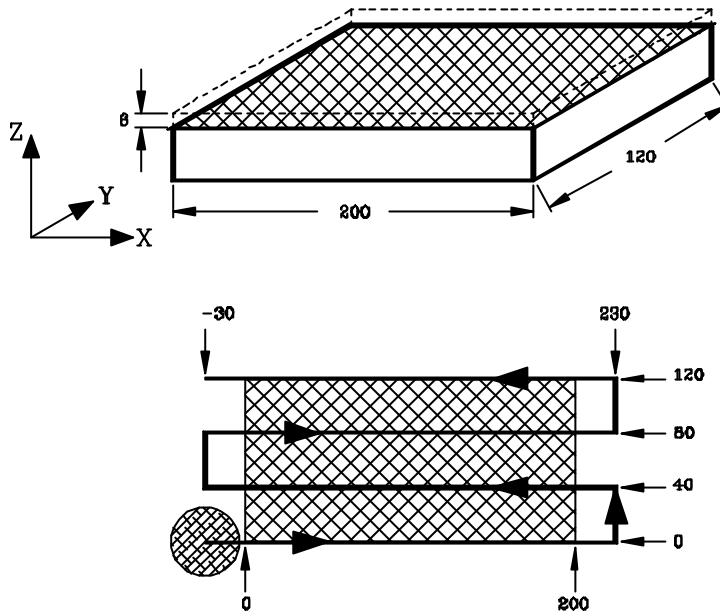
8040M

8055M

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Programming examples: General examples

Surface milling.



Mill an XY surface down 6mm with a $\varnothing 50$ mm endmill.

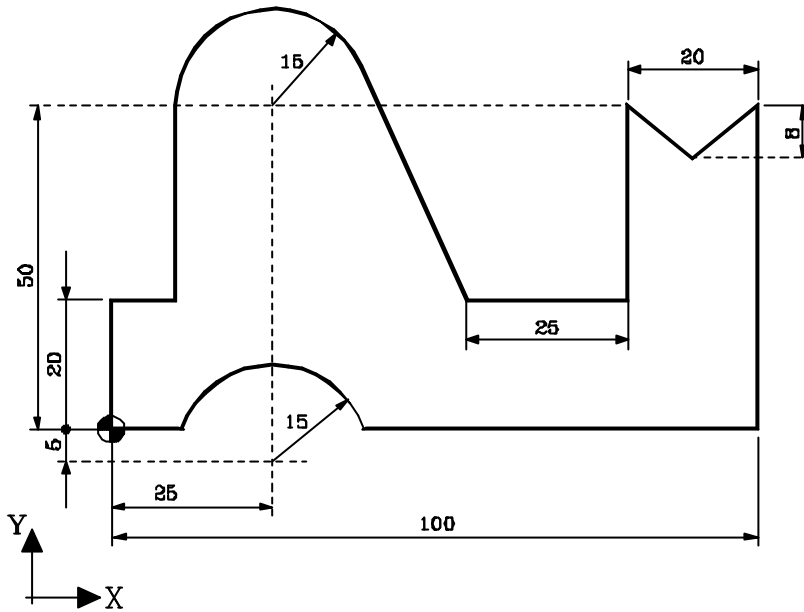
Absolute coordinates (G90)

```
T1 D1
F200 S800 M3 M41
G0 G90 X-50 Y0 Z25
G1 Z6 F200
N10 G1 G90 X-30 Y0 F250
G91 G1 Z-2 F200
G90 G1 X230 F250
G0 Y40
G1 X-30
G0 Y80
G1 X230
G0 Y120
N20 G1 X-30
(RPT N10, N20) N2
G1 Z20
G0 X-50
M30
```

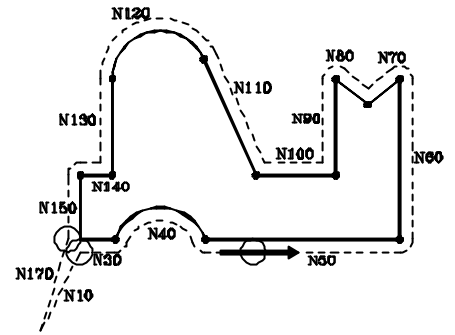
Incremental coordinates (G91)

```
T1 D1 (Tool and tool offset.)
F200 S800 M3 M41 (Cutting conditions.)
G0 G90 X-50 Y0 Z25 (Approach.)
G1 Z6 F200 (Positioning.)
N10 G1 G90 X-30 Y0 F250 (Start milling.)
G91 G1 Z-2 F200
N20 G1 X260 F250
G0 Y40
N30 G1 X-260
G0 Y40
N40 (RPT N20, N30)
(RPT N10, N40) N2
;
;
G1 G90 Z20 (Withdraw the tool.)
G0 X-50
M30 (End of program.)
```

Profile definition with tool radius compensation (G40/G41/G42).



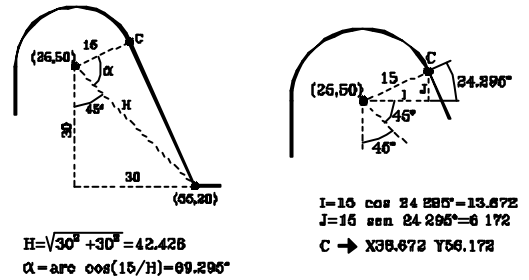
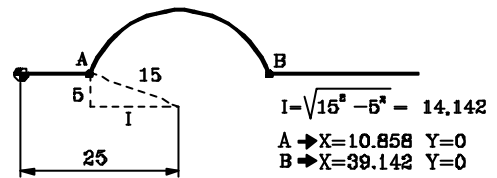
This example is carried out with clockwise tool radius compensation (G42).



```

N5 T2 D2
N10 G0 G90 G42 X0 Y0 Z5 S1000 M3 M41
N20 G94 G1 Z-5 F150
N30 X10.858 F200 ..... Start machining the profile.
N40 G2 X39.142 I14.142 J-5 .....
N50 G1 X100
N60 Y50
N70 X90 Y42
N80 X80 Y50
N90 Y20
N100 X55
N110 X38.672 Y56.172 .....

```

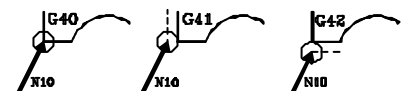


```

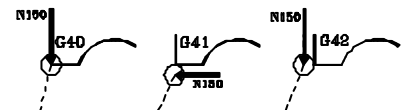
N120 G3 X10 Y50 I-13.672 J-6.172
N130 G1 X10 Y20
N140 X0
N150 Y0 ..... Finish machining the profile.
N160 G1 Z5
N170 G0 G40 X-30 Y-30 Z20 M30

```

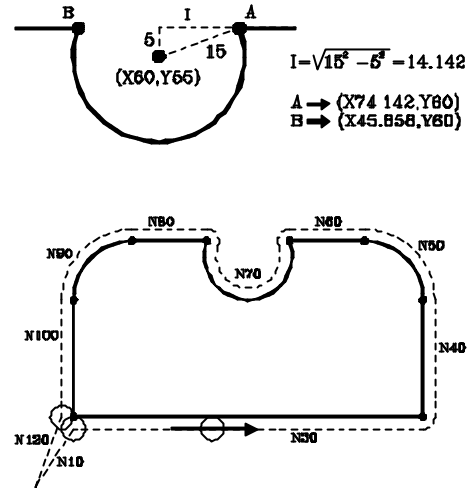
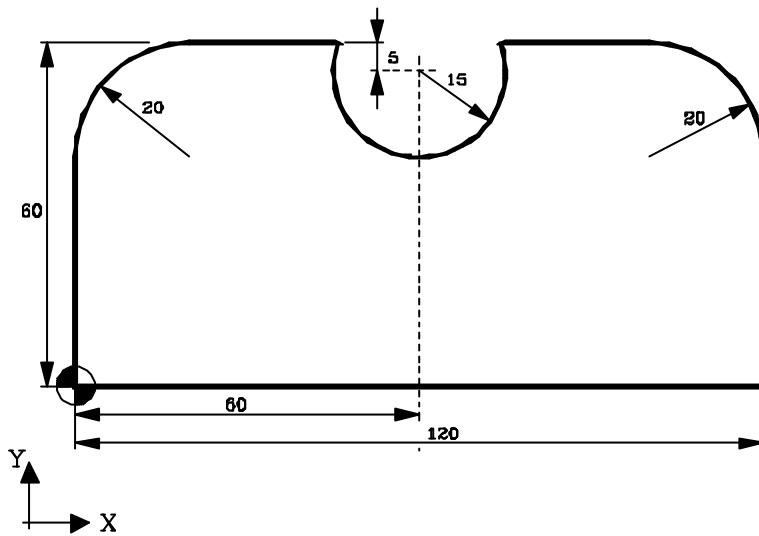
When starting machining (N10), the tool is placed in front of the programmed point and perpendicular to the first path.



When done machining (N150), the tool is placed in front of the programmed point and perpendicular to the last path.



Arc programming (G02/G03).



By programming the arc center

Absolute Coordinates (G90)

```

N10 G90 S1000 T2 D2 M3 M41
N20 G0 G42 X0 Y0 Z5
N30 G94 G1 Z-5 F150
N40 X120 F250
N50 Y40
N60 G3 X100 Y60 I-20 J0
N70 G1 X74.142
N80 G2 X45.858 I-14.142 J-5
N90 G1 X20
N100 G3 X0 Y40 I0 J-20
N110 G1 Y0
N120 G1 Z5
N130 G0 G40 X-30 Y-30 Z20 M30
    
```

Incremental Coordinates (G91)

```

N10 G90 S1000 T2 D2 M3 M41
N20 G0 G42 X0 Y0 Z5
N30 G94 G1 Z-5 F150
N40 G91 X120 F250
N50 Y40
N60 G3 X-20 Y20 I-20 J0
N70 G1 X-25.858
N80 G2 X-28.284 I-14.142 J-5
N90 G1 X-25.858
N100 G3 X-20 Y-20 I0 J-20
N110 G1 Y-40
N120 G90 G1 Z5
N130 G0 G40 X-30 Y-30 Z20 M30
    
```

By programming the arc radius

Absolute Coordinates (G90)

```

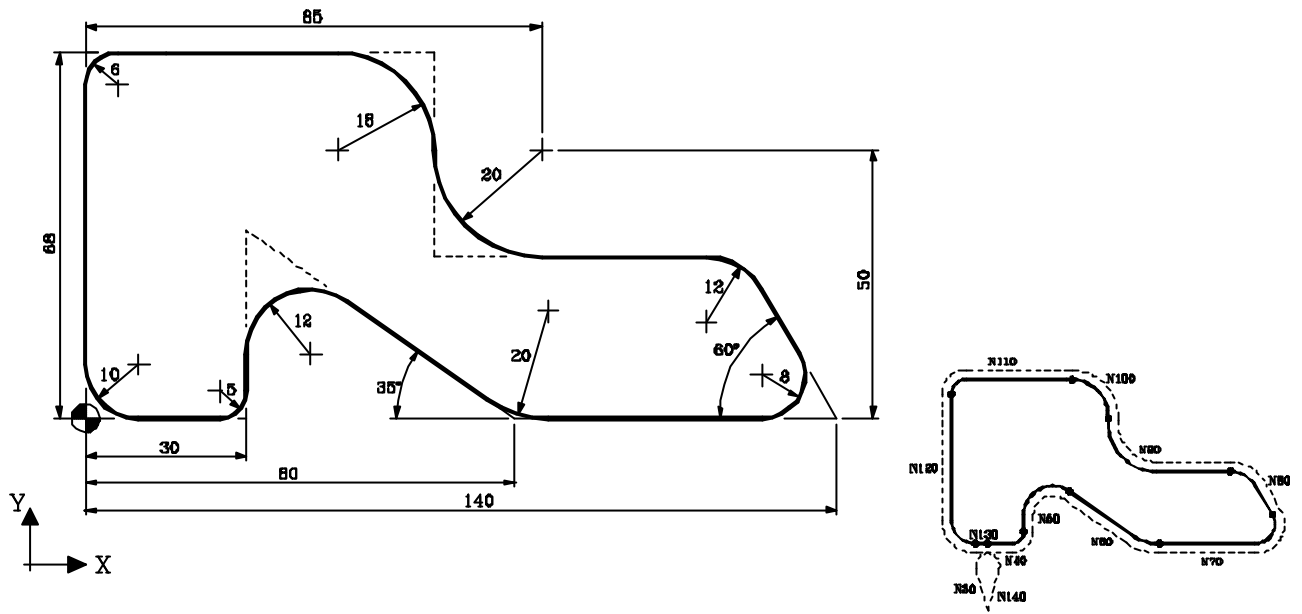
N10 G90 S1000 T2 D2 M3 M41
N20 G0 G42 X0 Y0 Z5
N30 G94 G1 Z-5 F150
N40 X120 F250
N50 Y40
N60 G3 X100 Y60 R20
N70 G1 X74.142
N80 G2 X45.858 R-15
N90 G1 X20
N100 G3 X0 Y40 R20
N110 G1 Y0
N120 G1 Z5
N130 G0 G40 X-30 Y-30 Z20 M30
    
```

Incremental Coordinates (G91)

```

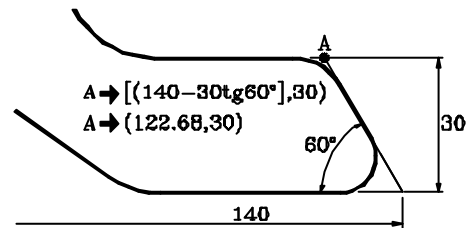
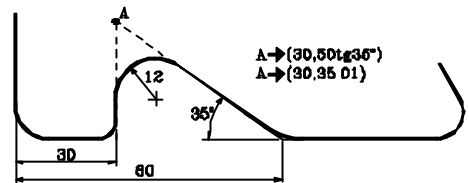
N10 G90 S1000 T2 D2 M3 M41
N20 G0 G42 X0 Y0 Z5
N30 G94 G1 Z-5 F150
N40 G91 X120 F250
N50 Y40
N60 G3 X-20 Y20 R20
N70 G1 X-25.858
N80 G2 X-28.282 R-15
N90 G1 X-25.858
N100 G3 X-20 Y-20 R20
N110 G1 Y-40
N120 G90 G1 Z5
N130 G0 G40 X-30 Y-30 Z20 M30
    
```

Tangential entry/exit (G37/G38) and corner rounding (G36).

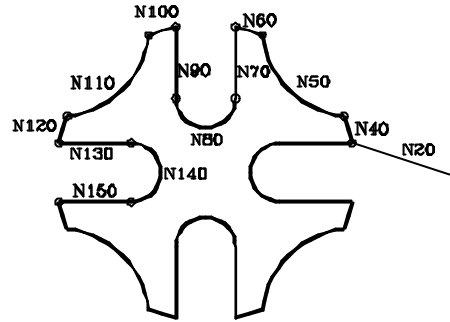
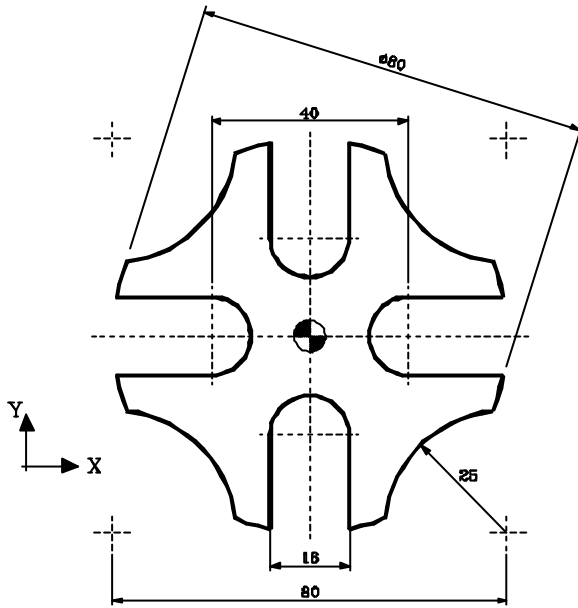


```

N10 G0 X15 Y-50 Z5 S1000 T2 D2 M3 M41
N20 G1 Z-5 F150
N30 G42 G37 R10 Y0 F250
N40 G36 R5 X30
N50 G36 R12 Y35.01 .....
N60 G36 R20 X80 Y0
N70 G36 R8 X140
N80 G36 R12 X122.68 Y30 .....
N90 G36 R20 X65
N100 G36 R18 Y68
N110 G36 R6 X0
N120 G36 R10 Y0
N130 G38 R10 X15
N140 G40 Y-50
N150 G0 X-50 Y-50 Z30 M30
    
```

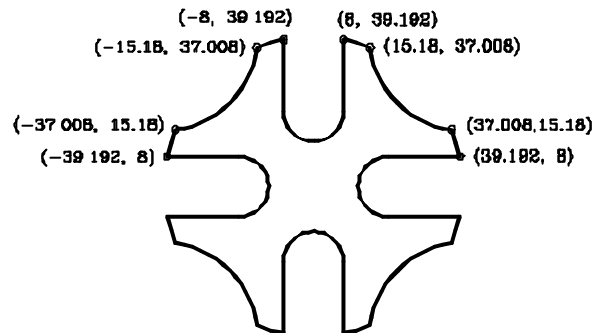


Mirror image (G10/G11/G12/G13).



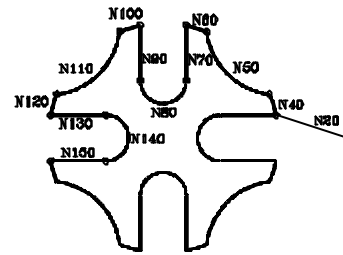
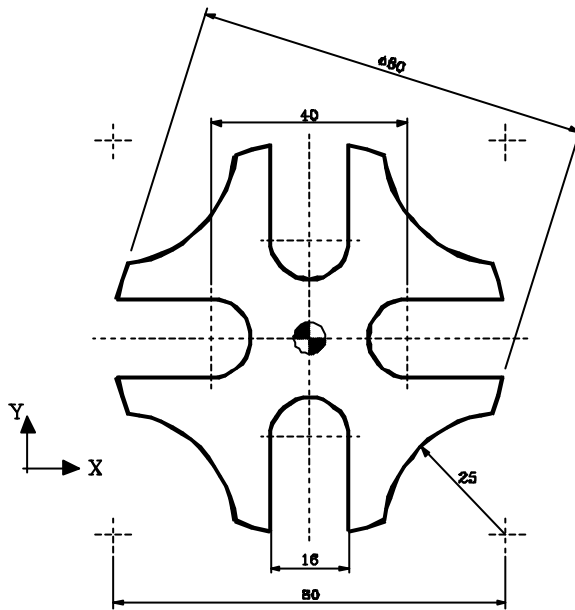
```

N10 G0 X50 Y0 Z10 S1000 T2 D2 M3
N20 G42 X39.192 Y8
N30 G1 Z-5 F200
N40 G90 G3 G6 X37.008 Y15.18 I0 J0 F250 ..... Beginning of the profile.
N50 G2 G6 X15.18 Y37.008 I40 J40
N60 G3 G6 X8 Y39.192 I0 J0
N70 G1 Y20
N80 G2 X-8 I-8 J0
N90 G1 Y39.192
N100 G3 G6 X-15.18 Y37.008 I0 J0
N110 G2 G6 X-37.008 Y15.18 I-40 J40
N120 G3 G6 X-39.192 Y8 I0 J0
N130 G1 X-20
N140 G2 Y-8 I0 J-8
N150 G1 X-39.192 ..... End of profile
N200 G11 G12
N210 (RPT N40, N150)
N220 G10
N230 G1 Z10
N240 G0 G40 X50 Y0 Z30
N250 M30
    
```



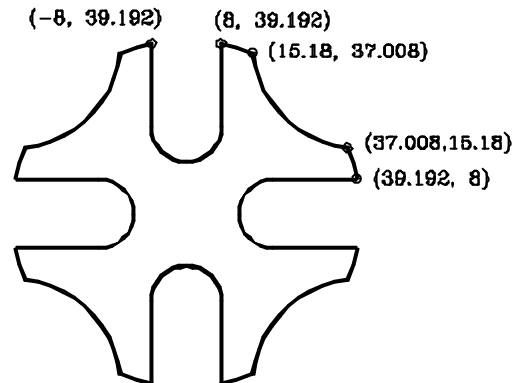
NOTE: When operating with «mirror image» or «pattern rotation», the movement after these functions must be programmed in absolute coordinates (G90) and, if the movement is an arc, its center must be programmed in absolute coordinates (G06).

Pattern rotation (G73).



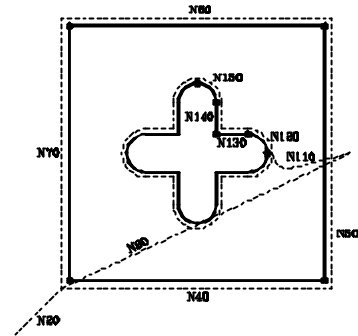
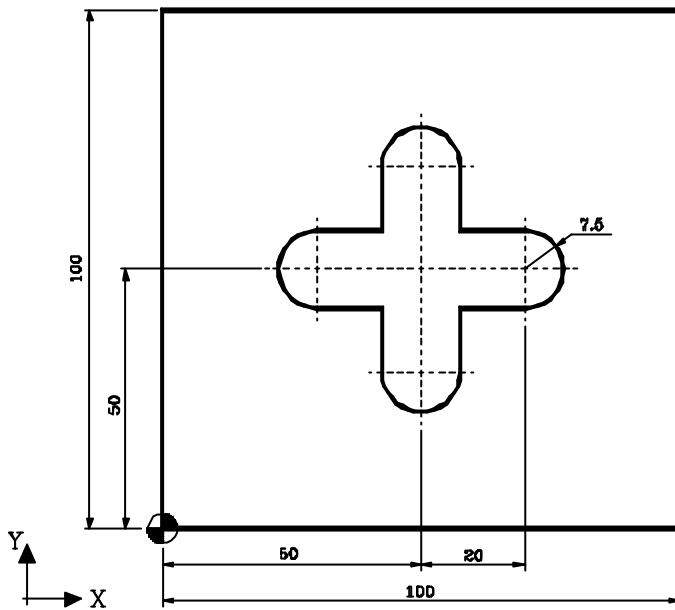
```

N10 G0 X50 Y0 Z10 S1000 T2 D2 M3
N20 G42 X39.192 Y8
N30 G1 Z-5 F200
N40 G90 G3 G6 X37.008 Y15.18 I0 J0 F250
N50 G2 G6 X15.18 Y37.008 I40 J40
N60 G3 G6 X8 Y39.192 I0 J0
N70 G1 Y20
N80 G2 X-8 I-8 J0
N90 G1 Y39.192
N200 G73 Q90
N210 (RPT N40, N200) N3
N220 G73
N230 G1 Z10
N240 G0 G40 X50 Y0 Z30
N250 M30
    
```



NOTE: When operating with «mirror image» or «pattern rotation», the movement after these functions must be programmed in absolute coordinates (G90) and, if the movement is an arc, its center must be programmed in absolute coordinates (G06).

Pattern rotation (Center of rotation other than part zero).



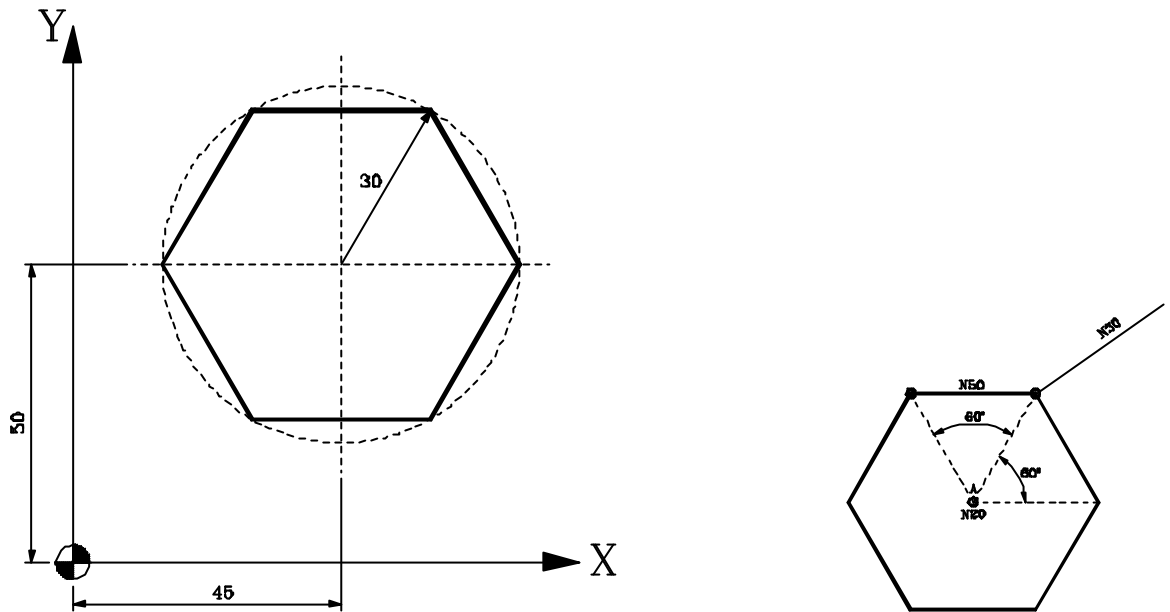
The inside machining is done with tool T2 (diameter: 10 mm). It is machined in two passes, the first one with tool offset D21 (radius: 5.5mm) to leave a finishing stock and the second pass with tool offset D20 (radius: 5 mm).

```

N10 G0 G90 X-30 Y-30 Z10 S1000 T2 D21 M3 M41
N20 G42 X0 Y0
N30 G1 Z-5 F200
N40 X100 F250..... Beginning of outside profile.
N50 Y100
N60 X0
N70 Y0
N80 G40 G0 Z10..... End of outside profile.
N90 X110 Y50 T2 D21
N100 G1 Z0 F200
N110 G42 G5 G37 R6 X77.5 F250..... First pass of inside profile.
N120 G91 G3 X-7.5 Y7.5 I-7.5 J0
N130 G1 X-12.5
N140 Y12.5
N150 G3X-7.5 Y7.5 I-7.5 J0
N160 G73 Q90 I50 J50..... Pattern rotation (G73), the center being at 50, 50
N170 G1 G90 X77.5 Y50..... Necessary positioning due to the next block
(RPT), because the first block of the basic
section (N120) is an arc which does not use
function G6 and the end point (X, Y) is
programmed in incremental coordinates (G91).

N180 (RPT N120, N170) N3
N190 G73
N200 G90 G40 G1 X110..... End of the first pass of the inside profile.
N210 D20
N220 (RPT N110, N200)..... Second pass of the inside profile.
N230 G90 G0 Z10
N240 X-30 Y-30
M30
    
```

Selection of the polar origin (G93).



```

N10 G0 G90 X100 Y100 Z10 S1000 T2 D2 M3 M41
N20 G93 I45 J50 ..... Selection of point A as polar origin.
N30 G42 R30 Q60
N40 G1 Z-5 F200
N50 G91 Q60 ..... Basic machining (one side)
N60 (RPT N50, N50) N5 ..... Machining of the other sides.
N70 G0 G90 G40 Z10
N80 X100 Y100
N90 M30
    
```

To cancel the polar origin, the program may be changed using one of the following options:

First option:

```

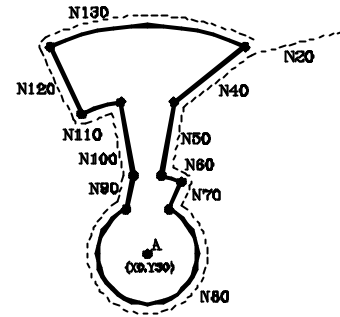
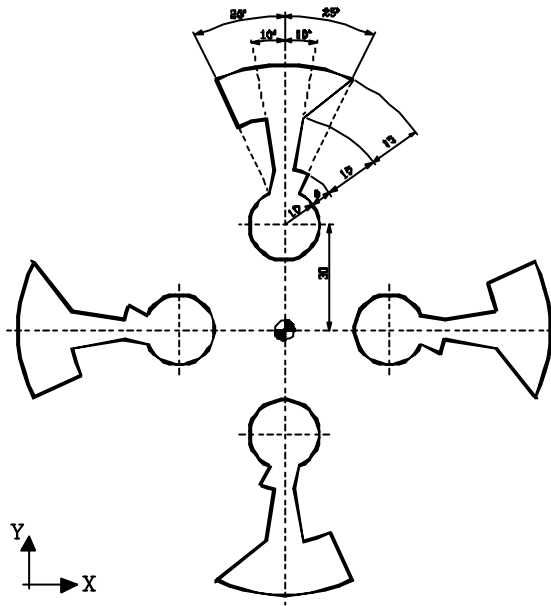
N80 X0 Y0 ..... Positioning at the point which will be the new polar origin.
N90 G93 ..... Presetting the current point as the new polar origin.
N100 X100 Y100
N110 M30 ..... End of program.
    
```

Second option:

```

N80 G93 I0 J0 ..... Presetting point X0 Y0 as the new polar origin.
N90 X100 Y100
N100 M30 ..... End of program.
    
```

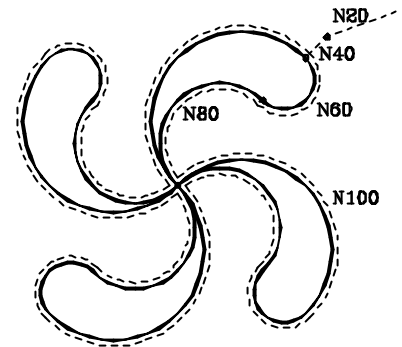
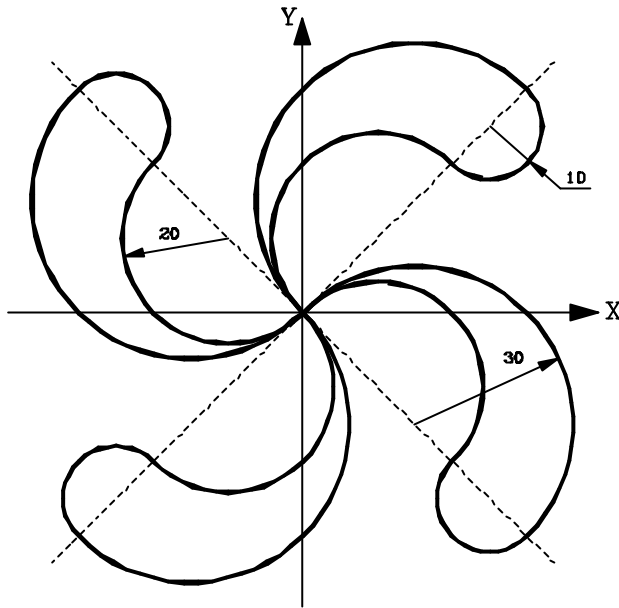
Programming in polar coordinates. (I)



```

N10 G93 I0 J30 ..... Sets point A as polar origin.
N20 G0 G90 G41 R46 Q65 Z10 S1000 T2 D2 M3 M41... Beginning of the profile.
N30 G1 Z-5 F200
N40 G91 R-15 Q15
N50 R-15
N60 G2 Q-15
N70 G1 R-6
N80 G2 Q50
N90 G1 R6 Q-15
N100 R15
N110 Q15
N120 G1 R15
N130 G2 Q-50 ..... End of one profile.
N140 G40 G90 G1 Z10
N150 G73 Q-90 I0 J0 ..... Pattern rotation.
N160 (RPT N10, N150) N3 ..... Executes the other 3 profiles.
N170 G73 ..... Cancels pattern rotation.
N180 G90 X0 Y-30 M30
    
```

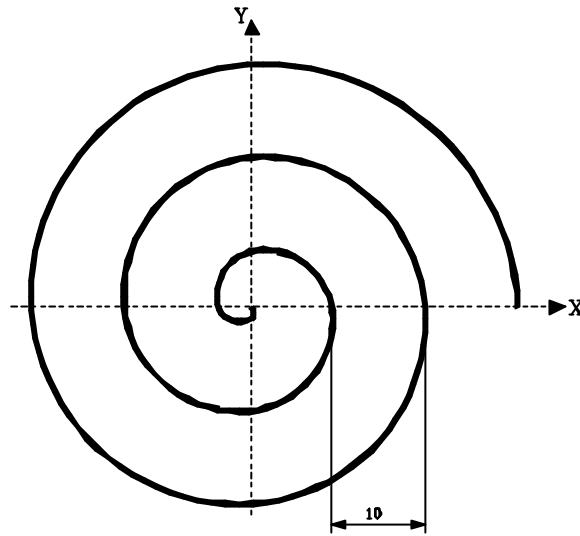
Programming in polar coordinates. (II)



```

N10 G93 I0 J0 ..... Sets point X0 Y0 as polar origin.
N20 G0 G90 R70 Q45 Z10 S1000 T2 D2 M3 M41
N30 G1 Z-5 F200
N40 G90 G1 G41 R60 Q45 ..... Beginning of profile.
N50 G93 I35.35534 J35.35534
N60 G2 G91 Q180
N70 G93 I14.14214 J14.14214
N80 G3 Q180
N90 G93 I21.2132 J-21.2132
N100 G2 Q180 ..... End of profile.
N110 G93 I0 J0 ..... Cancels polar origin.
N120 G73 Q-90 ..... Pattern rotation.
N130 (RPT N40, N120) N3 ..... Executes the other 3 profiles.
N140 G73 ..... Cancels pattern rotation.
N150 G90 G40 G1 R70
N160 G0 Z10
N170 R80 Z50 M30
    
```

Programming in polar coordinates. (Archimedes' Spiral).



The spiral increases 10 mm every 360°.

- The first option considers increments of 0.36°, thus, to each angular increment corresponds a radial increment of 0.01 mm.
The number of passes necessary to make the spindle is: $30\text{mm} / 0.01\text{mm} = 3,000$ increments
- The second option considers increments of 0.036°, thus, to each angular increment corresponds a radial increment of 0.001 mm.
The number of passes necessary to make the spindle is: $30\text{mm} / 0.001\text{mm} = 30,000$ increments
Since the CNC allows repeating a block up to 9999 times, the spiral will have to be made in three blocks.
The basic (first increment)
Repeat the first increment 9999 times (total accumulated: 10000)
Repeat the previous 2 steps (10,000 times repetition) twice, thus completing the 30000 times.

First option:

```

N10 G0 G90 X0 Y0 Z10 S1000 T5 D5 M3
N20 G1 G5 Z-5 F200
N30 G91 R0.01 Q-0.36 F100 .....First increment
N40 (RPT N30, N30) N2999 .....Rest of increments
N50 G0 G90 G7 Z10 M30
    
```

Second option:

```

N10 G0 G90 X0 Y0 Z10 S1000 T5 D5 M3
N20 G1 G5 Z-5 F200
N30 G91 R0.001 Q-0.036 F100 .....First increment
N40 (RPT N30, N30) N9999 .....Repeats first increment 9999 times (total accumulated: 10000
                                times)
N50 (RPT N30, N40) N2 .....Repeats previous 2 steps (10,000 times repetition) twice,
                                thus completing 30,000 times.
N60 G0 G90 G7 Z10 M30
    
```

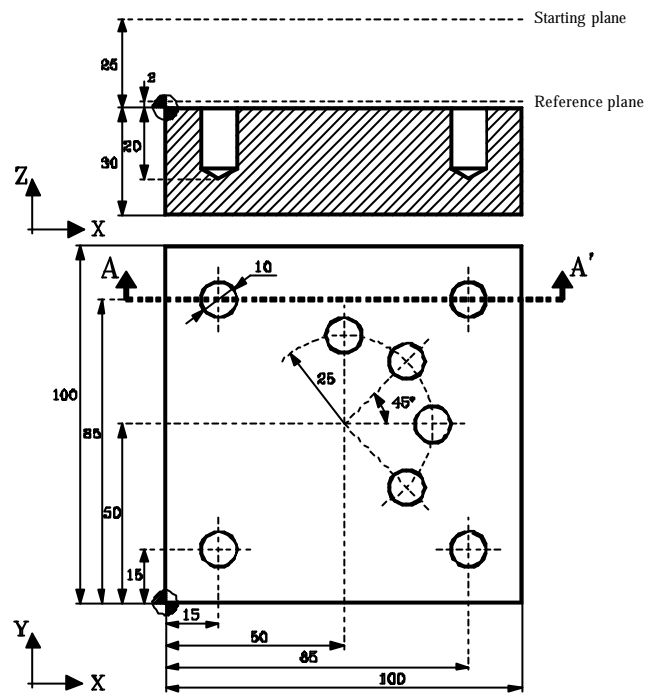
8040M

8055M

Drilling canned cycle (G81).	14
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Programming examples: Canned cycles

Drilling canned cycle (G81).



Definition of the drilling points in:

Absolute Cartesian coordinates

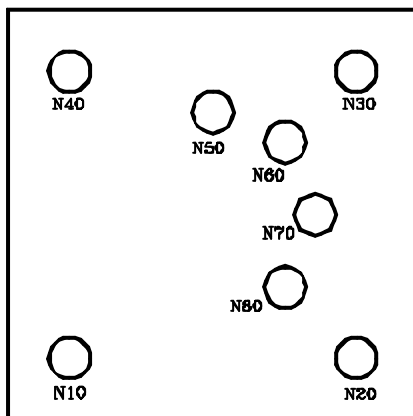
Incremental polar coordinates with repetition.

Tool: Ø10mm drill bit.

Cutting conditions:

- S=1000 rpm.

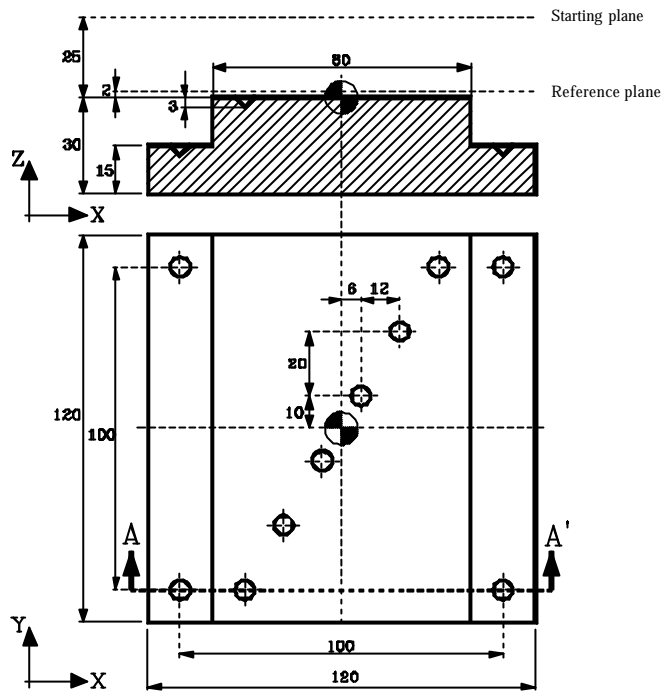
- Feedrate: 200 mm/min.



```

T10 D10
G0 G90 G43 Z25 S1000 M3 M8 M41
N10 G81 G98 X15 Y15 Z2 I-20 F200
N20 X85
N30 Y85
N40 X15
N50 X50 Y75
G93 I50 J50
N60 G91 Q-45 N3
G80
G0 G90 G44 Z30
M30
    
```


Center punching using the drilling canned cycle with dwell (G82).



Definition of the drilling points in:

Absolute Cartesian coordinates

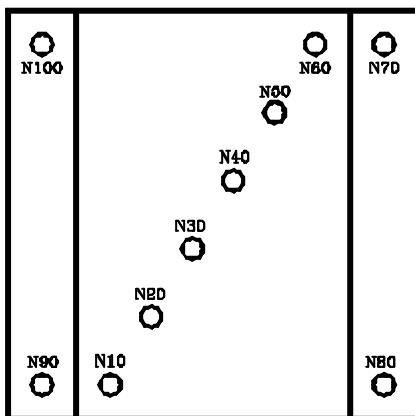
Incremental polar coordinates with repetition.

Tool: 45° center punch.

Cutting conditions:

- S=1800 rpm.

- Feedrate: 200 mm/min.



T6 D6

G0 G90 G43 Z25 S1800 M3 M8 M41

N10 G82 G99 X-30 Y-50 Z2 I-3 K150 F200

N20 G91 X12 Y20 N5

N70 G90 G82 G99 X50 Y50 Z-13 I-18 K150

N80 G98 Y-50

N90 G99 X-50

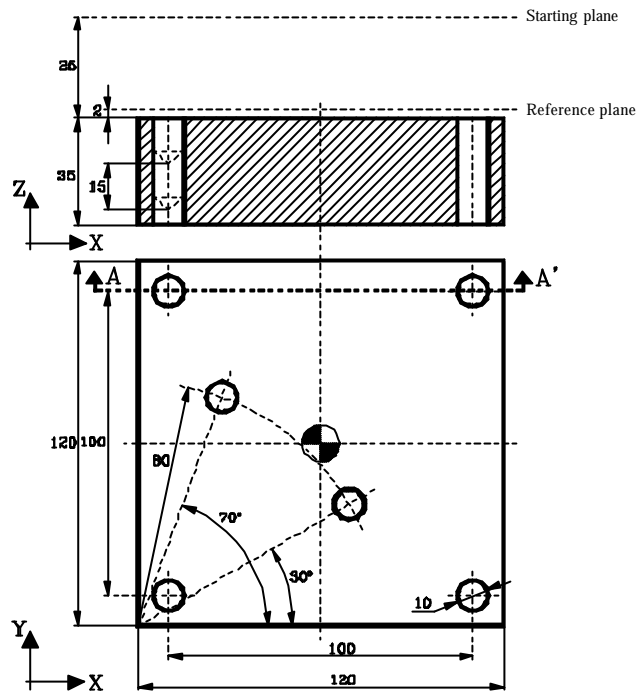
N100 G98 Y50

G80

G0 G90 G44 Z30

M30

Deep hole drilling cycle with constant peck (G83).



Definition of the drilling points in:

Absolute Cartesian coordinates.

Absolute polar coordinates.

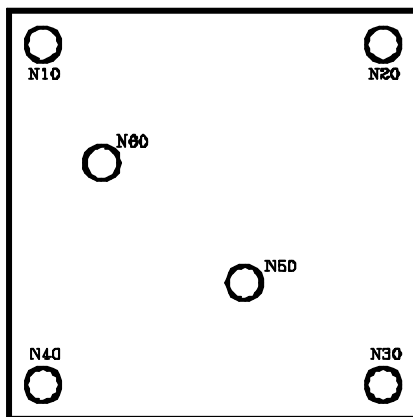
Change of polar origin.

Tool: Ø10mm helical drill bit.

Cutting conditions:

- S=1000 rpm.

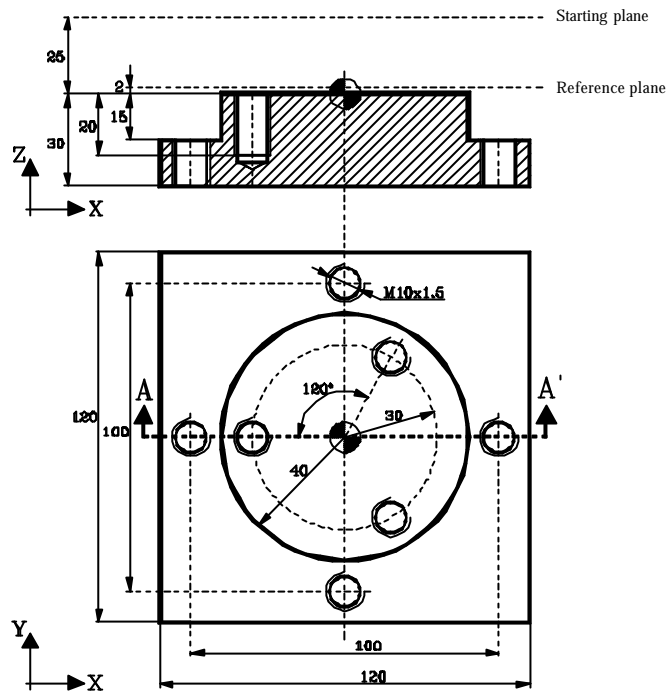
- Feedrate: 200 mm/min.



```

T10 D10
G0 G90 G43 Z25 S1000 M3 M41
N10 G83 G99 X-50 Y50 Z2 I-15 J3 F200
N20 X50
N30 Y-50
N40 X-50
      G93 I-60 J-60
N50 R80 Q30
N60 Q70
      G80
      G0 G90 G44 Z30
      M30
    
```

Tapping canned cycle (G84).



Based on a previously drilled part.

Definition of the tapping points:

Absolute Cartesian coordinates

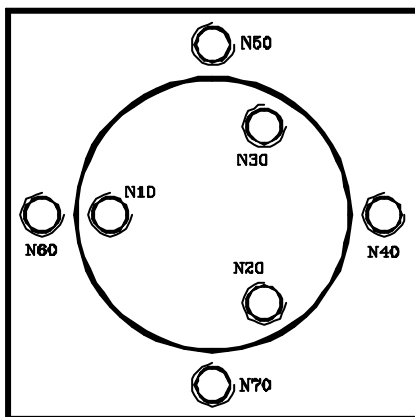
Incremental polar coordinates with repetition.

Tool: M-10x1.5 tap.

Cutting conditions:

- S=300 rpm.

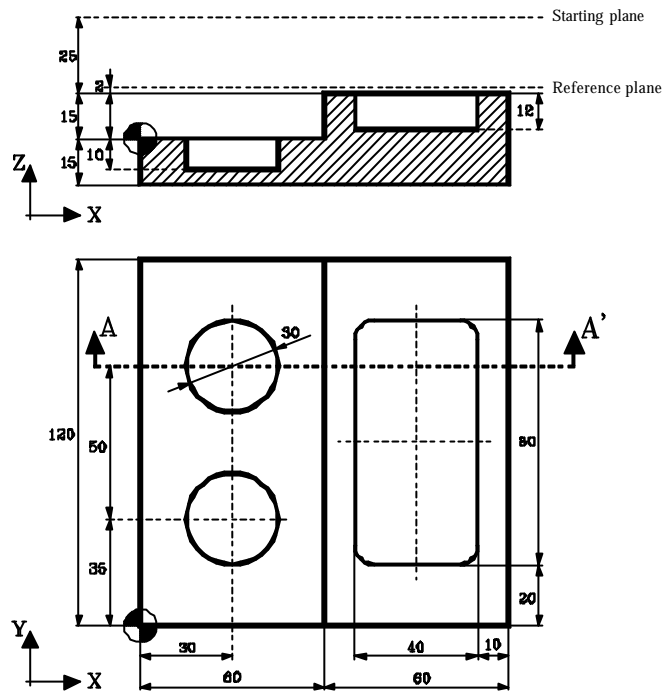
- Feedrate: $S \times \text{pitch} = 300 \times 1,5 = 450 \text{ mm/min.}$



```

T12 D12
G0 G90 G43 Z25 S300 M3 M8 M41
G93 I0 J0
N10 G84 G99 R30 Q180 Z10 I-20 K150 F450
N20 G91 Q120 N2
N40 G90 G98 G84 X50 Y0 Z-5 I-35 K150
N50 X0 Y50
N60 X-50 Y0
N70 X0 Y-50
G80
G0 G90 G44 Z30
M30
    
```

Canned cycles for rectangular pocket (G87) and circular pocket (G88).

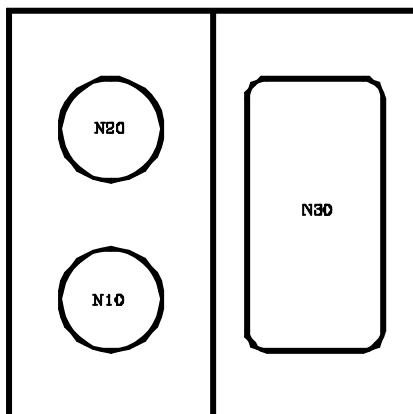


Definition of the rectangular and circular pocket.

Tool: Ø10mm Endmill

Cutting conditions:

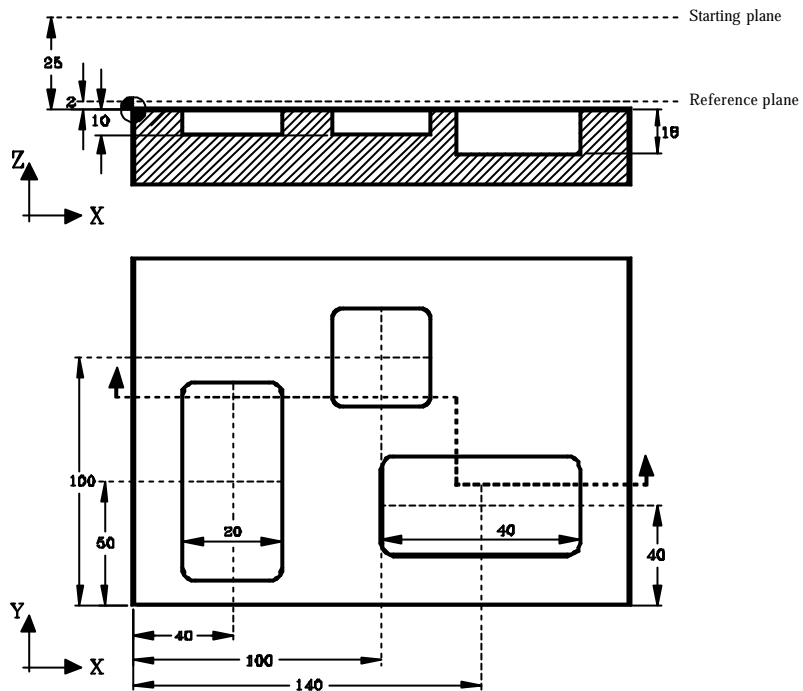
- S=1600 rpm.
- Roughing feedrate: 300mm/min.
- Finishing feedrate: 200mm/min.



```

T2 D2
G0 G90 G43 Z25 S1600 M3 M42
N10 G88 G99 X30 Y35 Z2 I-10 J-15 B5 C6 D2 H200 L1 F300
N20 G98 Y85
N30 G87 G98 X90 Y60 Z17 I3 J-20 K40 B4 C6 D2 H200 L1
G80
G0 G90 G44 Z30
M30
    
```

Modification of the canned cycle parameters (G79).



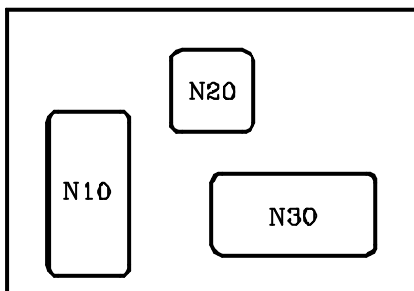
Definition of the rectangular pocket.

Modification of the dimensions and depth of the pockets

Tool: Ø10mm Endmill

Cutting conditions:

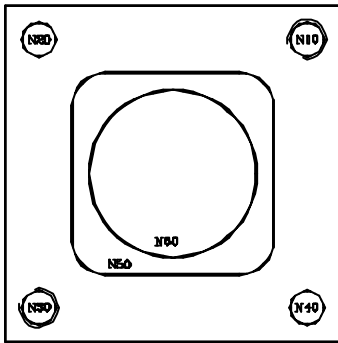
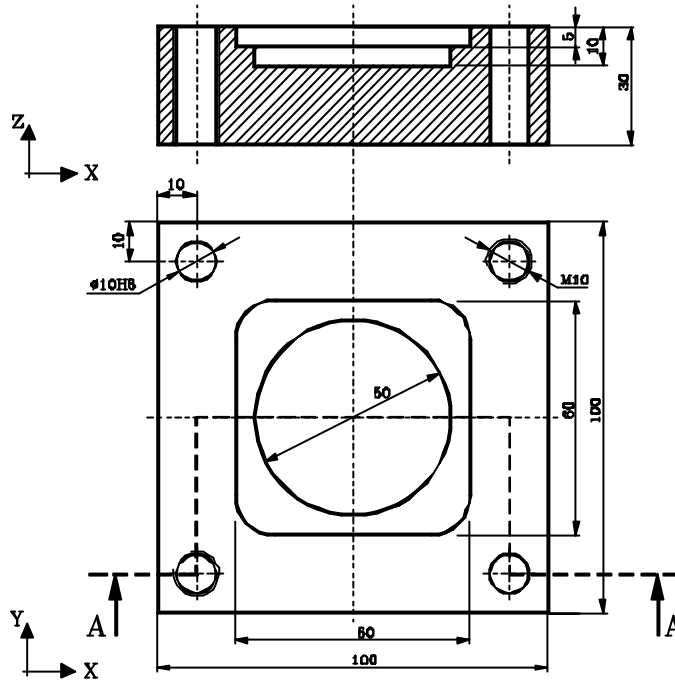
- S=1600 rpm.
- Roughing feedrate: 300mm/min.
- Finishing feedrate: 200mm/min.



```

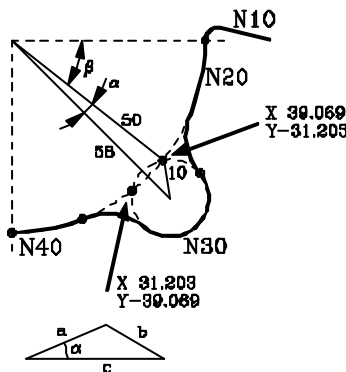
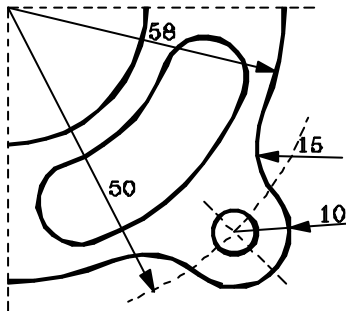
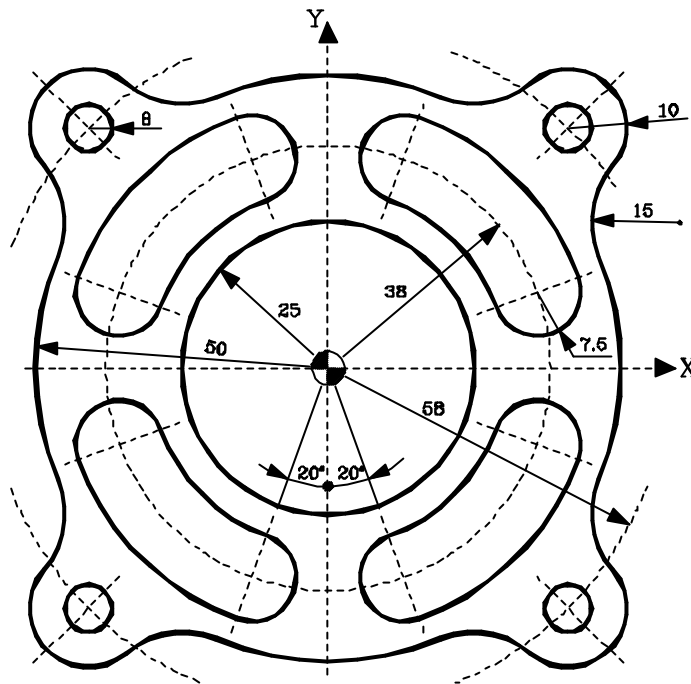
T2 D2
G0 G90 G43 Z25 S1600 M3 M42
N10 G87 G99 X40 Y50 Z2 I-10 J20 K40 B4 C6 D2 H200 L1 F300
G79 J20 K20
N20 X100 Y100
G79 I-18 J40 K20
N30 X140 Y40
G80
N70 G0 G90 G44 Z30
M30
    
```

Part example 1.



T6 D6 Center punch.
G0 G90 G43 Z20 F200 S1800 M4 M8 M42
G82 G99 X40 Y40 Z2 I-5 K300
N10
N20 X-40
N30 Y-40
N40 X40
G80
G0 G44 Z100
T9 D9 Drill bit.
G0 G90 G43 Z20 F200 S1050 M4 M42
G81 G99 X40 Y40 Z2 I-35
X-40 Y-40
G0 G44 Z100
T8 D8 Drill bit.
G0 G90 G43 Z20 F200 S950 M4 M41
G81 G99 X-40 Y40 Z2 I-35
G0 X40 Y-40
G0 G44 Z100
T13 D13 Reamer.
G0 G90 G43 Z20 F100 S500 M4 M41
G85 G99 X-40 Y40 Z2 I-30 K200
X40 Y-40
G80
G0 G44 Z100
T12 D12 Tap
G0 G90 G43 Z20 F450 S300 M4 M41
G84 G99 X40 Y40 Z2 I-35 K200
X-40 Y-40
G80
G0 G44 Z100
T2 D2 Endmill for pockets.
G0 G90 G43 Z20 F250 S1600 M4 M42
N50 G87 G98 X0 Y0 Z2 I-5 J-30 K30 B5 D2 H200 L-1
N60 G88 G98 X0 Y0 Z-3 I-10 J-25 B5 D2 H200 L1
G80
G0 G44 Z100
M30

Part example 2.



$$b^2 = a^2 + c^2 - 2ac \cos \alpha$$

$$10^2 = 50^2 + 58^2 - 2 \times 50 \times 58 \cos \alpha$$

$$\alpha = 6.387^\circ$$

$$\beta = 45^\circ - 6.387^\circ = 38.613^\circ$$

$$X_a = 50 \cos 38.613^\circ = 39.069$$

$$Y_a = 50 \sin 38.613^\circ = 31.203$$

$$X_b = 50 \cos 51.387^\circ = 31.203$$

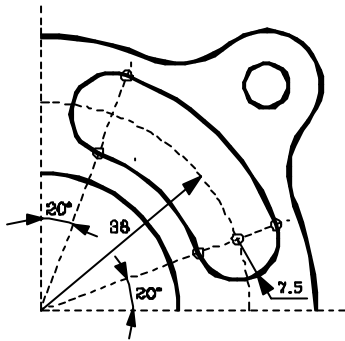
$$Y_b = 50 \sin 51.387^\circ = 39.069$$

Initial positioning

```
G0 G90 G43 X60 Y0 Z5 T2 D2
G1 Z0 F250
```

Outside profile machining

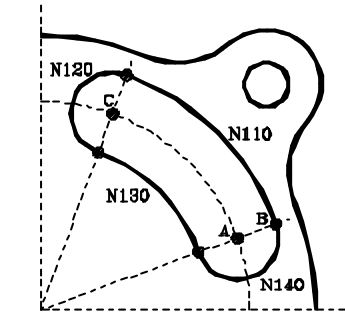
```
N0 G1 G91 Z-2 F250 S1600 M3 M8
N10 G90 G5 G1 G41 G37 R6 X50
N20 G2 G6 G36 R15 X39.069 Y-31.203 I0 J0
N30 G6 G36 R15 X31.203 Y-39.069 I41.012 J-41.012
N40 G6 X0 Y-50 I0 J0
N50 G73 Q-90..... Pattern rotation of -90°.
(RPT N20, N50) N2..... Machines 3rd and 2nd quadrants.
(RPT N20, N30)..... Machines 1st quadrant.
G73..... Cancels pattern rotation.
G6 G38 R6 X50 Y0 I0 J0
N60 G1 G40 G7 X60
(RPT N0, N60) N4..... Repeat four times:
"Penetration + Outside milling"
F200 S1800 D11..... Offset and finishing conditions
(RPT N10, N60)
G0 Z10
```



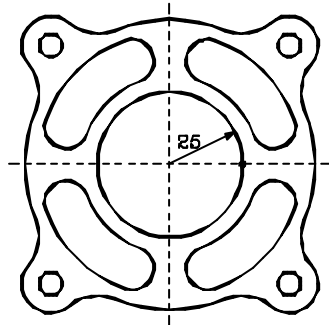
Slot milling

```

S1600 T2 D2 M3 M8 M42
N100 G0 G90 R38 Q20 Z5 ..... Approach to point "A"
      G1 Z0 F150
N102 G91 Z-2
N105 G90 G41 G5 R45.5 F250 ..... Section A-B
N110 G3 Q70
      G93 I12.9967 J35.7083 ..... New polar origin: Point "C".
N120 G91 G3 Q180
      G93 I0 J0 ..... New polar origin: Point X0 Y0.
N130 G2 G90 Q20
      G93 I35.7083 J12.9967 ..... New polar origin: Point "A".
N140 G3 G91 Q180
      G93 I0 J0 ..... New polar origin: Point X0 Y0.
N150 G1 G40 G7 G90 R38 Q20 ..... Section B-A
      (RPT N102, N150) N4 ..... Repeat 4 times:
                                     "Penetration + Milling"
      F200 S1800 D21
      (RPT N105, N150) ..... Finishing pass
N160 G0 G90 Z5
      G11
      (RPT N100, N160) ..... Milling the slot of the 4th quadrant
      G12
      (RPT N100, N160) ..... Milling the slot of the 3rd quadrant
      G10 G12
      (RPT N100, N160) ..... Milling the slot of the 2nd quadrant
      G10
    
```



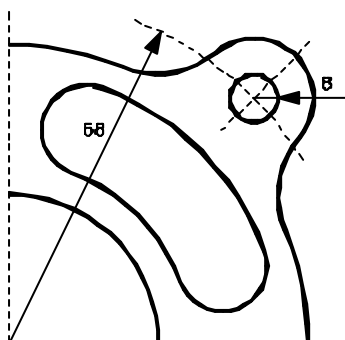
Center hole milling



```


S1400 T2 D2 M3 M8 M42
G0 G90 X0 Y0 Z5
G1 Z0
N200 G1 G91 Z-2 F150
N210 G90 G37 R10 G41 G5 X25 F250
      G3 G38 R10 X25 Y0 I-25 J0
N220 G1 G7 G40 X0
      (RPT N200, N220) N4
      F200 S1600 D21
      (RPT N210, N220)
      G0 G90 Z50
    
```

Center punching and hole drilling



```

G99 G81 R58 Q45 Z5 I-5 F200 S1800 T6 D6 M3 M8 M41
G0 Q135
Q225
Q315
G99 G81 R58 Q45 Z5 I-20 F200 S900 T14 D14
G91 Q90 N3
G90 G80 Z100
M30
    
```

8040M 8055M

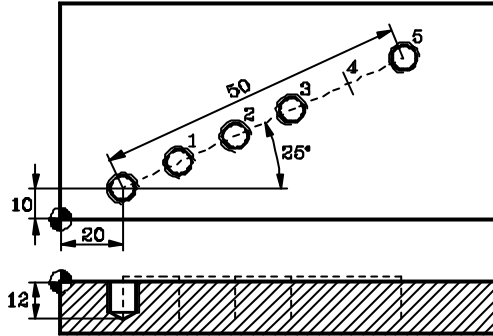
Multiple machining in a straight line (drilling and tapping).	24
Multiple machining in a parallelogram pattern (drilling and reaming).	25
Multiple machining in a grid pattern (drilling and reaming).	26
Bolt-hole pattern machining (drilling).	27
Multiple machining in an arc.	28

Programming examples: Multiple machining



Multiple machining in a straight line (drilling and tapping).

Multiple machinings in a straight line may be defined as follows::



Option 1: By defining the length of the path and the number of holes.

```
G0 G43 G90 X0 Y0 Z20 F200 S1500 T7 D7 M3 M41
G81 G99 X20 Y10 Z2 I-12 K50
G60 A25 X50 K6 P4
G80
G0 G90 X0 Y0 Z20 F300 S300 T11 D11
G84 G98 X20 Y10 Z2 I-12 K10 R0
G60 A25 X50 K6 P4
G80 G90 X0 Y0
M30
```

Option 2: By defining the length of the path and the step between holes

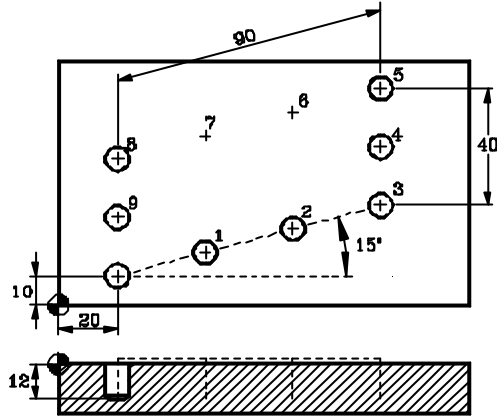
```
G0 G43 G90 X0 Y0 Z20 F200 S1500 T7 D7 M3 M41
G81 G99 X20 Y10 Z2 I-12 K50
→ G60 A25 X50 I10 P4
G80
G0 G90 X0 Y0 Z20 F300 S300 T11 D11
G84 G98 X20 Y10 Z2 I-12 K10 R0
→ G60 A25 X50 I10 P4
G80 G90 X0 Y0
M30
```

Option 3: By defining the number of holes and the step between them.

```
G0 G43 G90 X0 Y0 Z20 F200 S1500 T7 D7 M3 M41
G81 G99 X20 Y10 Z2 I-12 K50
→ G60 A25 I10 K6 P4
G80
G0 G90 X0 Y0 Z20 F300 S300 T11 D11
G84 G98 X20 Y10 Z2 I-12 K10 R0
→ G60 A25 I10 K6 P4
G80 G90 X0 Y0
M30
```

Multiple machining in a parallelogram pattern (drilling and reaming).

A parallelogram pattern multiple machining may be defined as follows:



Option 1: By defining the length of the path and the number of holes.

```
G0 G90 X0 Y0 Z20 F200 S950 T8 D8 M3 M41
G81 G99 X20 Y10 Z2 I-12 K100
G61 A15 B75 X90 K4 Y40 D3 P6.007
G80
G0 G90 X0 Y0 Z20 F100 S500 T13 D13 M3 M41
G85 G99 X20 Y10 Z2 I-12 K50
G61 A15 B75 X90 K4 Y40 D3 P6.007
G80 G90 X0 Y0
M30
```

Option 2: By defining the length of the path and the step between holes.

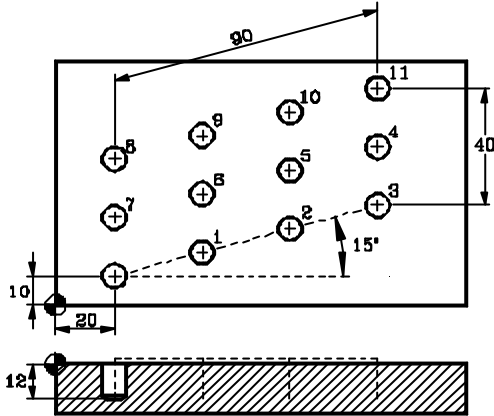
```
G0 G90 X0 Y0 Z20 F200 S950 T8 D8 M3 M41
G81 G99 X20 Y10 Z2 I-12 K100
→ G61 A15 B75 X90 I30 Y40 J20 P6.007
G80
G0 G90 X0 Y0 Z20 F100 S500 T13 D13 M3 M41
G84 G98 X20 Y10 Z2 I-12 K10 R0
→ G61 A15 B75 X90 I30 Y40 J20 P6.007
G80 G90 X0 Y0
M30
```

Option 3: By defining the number of holes and the step between them.

```
G0 G90 X0 Y0 Z20 F200 S950 T8 D8 M3 M41
G81 G99 X20 Y10 Z2 I-12 K100
→ G61 A15 B75 I30 K4 J20 D3 P6.007
G80
G0 G90 X0 Y0 Z20 F100 S500 T13 D13 M3 M41
G84 G98 X20 Y10 Z2 I-12 K10 R0
→ G61 A15 B75 I30 K4 J20 D3 P6.007
G80 G90 X0 Y0
M30
```

Multiple machining in a grid pattern (drilling and reaming).

A grid pattern multiple machining may be defined as follows:



Option 1: By defining the length of the path and the number of holes.

```
G0 G90 X0 Y0 Z20 F200 S950 T8 D8 M3 M41
G81 G99 X20 Y10 Z2 I-12 K100
G62 A15 B75 X90 K4 Y40 D3
G80
G0 G90 X0 Y0 Z20 F100 S500 T13 D13 M3 M41
G85 G98 X20 Y10 Z2 I-12 K50
G62 A15 B75 X90 K4 Y40 D3
G80 G90 X0 Y0
M30
```

Option 2: By defining the length of the path and the step between holes.

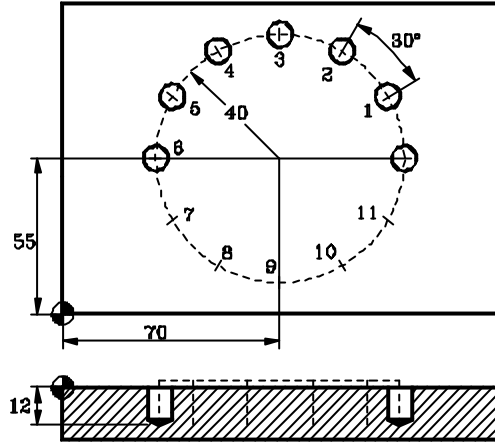
```
G0 G90 X0 Y0 Z20 F200 S950 T8 D8 M3 M41
G81 G99 X20 Y10 Z2 I-12 K100
→ G62 A15 B75 X90 I30 Y40 J20
G80
G0 G90 X0 Y0 Z20 F100 S500 T13 D13 M3 M41
G85 G98 X20 Y10 Z2 I-12 K50
→ G62 A15 B75 X90 I30 Y40 J20
G80 G90 X0 Y0
M30
```

Option 3: By defining the number of holes and the step between them.

```
G0 G90 X0 Y0 Z20 F200 S950 T8 D8 M3 M41
G81 G99 X20 Y10 Z2 I-12 K100
→ G62 A15 B75 I30 K4 J20 D3
G80
G0 G90 X0 Y0 Z20 F100 S500 T13 D13 M3 M41
G85 G98 X20 Y10 Z2 I-12 K50
→ G62 A15 B75 I30 K4 J20 D3
G80 G90 X0 Y0
M30
```

Bolt-hole pattern machining (drilling).

A bolt-hole pattern machining may be defined as follows:



Option 1: By defining the number of holes.

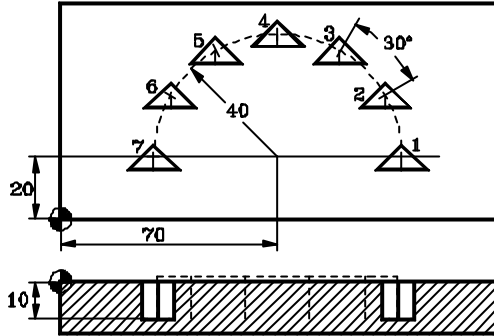
```
G0 G90 X70 Y55 Z20 F200 S1500 T7 D7 M3 M41
G81 G99 X110 Y55 Z2 I-12 K50
G63 X-40 Y0 K12 C3 F300 P7.011
M30
```

Option 2: By defining the steps between holes.

```
G0 G90 X70 Y55 Z20 F200 S1500 T7 D7 M3 M41
G81 G99 X110 Y55 Z2 I-12 K50
→ G63 X-40 Y0 I30 C3 F300 P7.011
M30
```

Multiple machining in an arc.

Multiple machining in an arc may be defined as follows:



Option 1: By Defining the number of operations.

```
G0 G90 X110 Y20 Z20 F100 S1500 T5 D5 M3 M41
(MCALL 10)
G64 X-40 Y0 B180 K7 C3 F300
M30
```

```
(SUB 10)
G90 G1 Z-10 F100
G91 Y-4
X8
X-8 Y8
X-8 Y-8
X8
Y4
G90 Z20
(RET)
```

Option 2: By defining the step between operations.

```
G0 G90 X110 Y20 Z20 F100 S1500 T5 D5 M3 M41
(MCALL 10)
→ G64 X-40 Y0 B180 I30 C3 F300
M30
```

```
(SUB 10)
G90 G1 Z-10 F100
G91 Y-4
X8
X-8 Y8
X-8 Y-8
X8
Y4
G90 Z20
(RET)
```

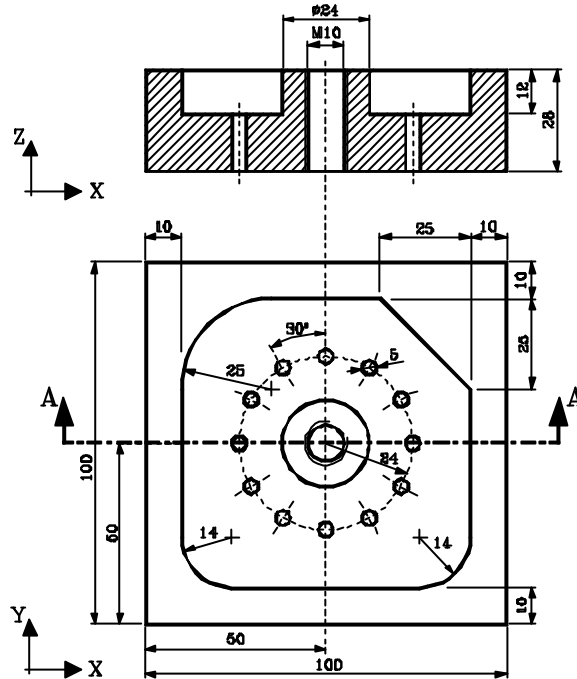
8040M

8055M

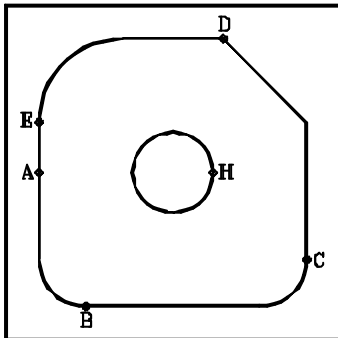
Example 1 of an irregular pocket with islands. 30
Example 2 of an irregular pocket with islands. 31

**Programming examples:
Irregular pockets with islands**

Example 1 of an irregular pocket with islands.



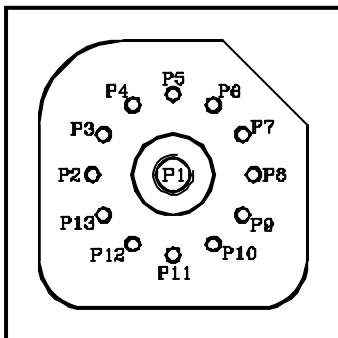
Irregular pocket with islands



```

T2 D2 ..... Endmill.
G0 G90 G43 X0 Y0 Z10 F250 S1600 M3 M42
G66 R100 F200 S300 E400
G0 G44 X-70 Y0 Z100
(GOTO N500) ..... Jump to block N500.
N100 G67 A0 B6 C0 I-12 R3 T2 D2 ..... Roughing operation.
N200 G68 B0 L-1 T2 D2 ..... Finishing operation.
N300 G1 X-40 Y0 Z0 ..... Point "A".
G36 R14 Y-40 ..... Section A-B.
G36 R14 X40 ..... Section B-C.
G39 R25 Y40 ..... Section C-D.
G36 R25 X-40 ..... Section D-E.
Y0 ..... Section E-A.
G0 X12 Y0 ..... Point "H".
N400 G2 G6 I0 J0 ..... Circle H-H.
    
```

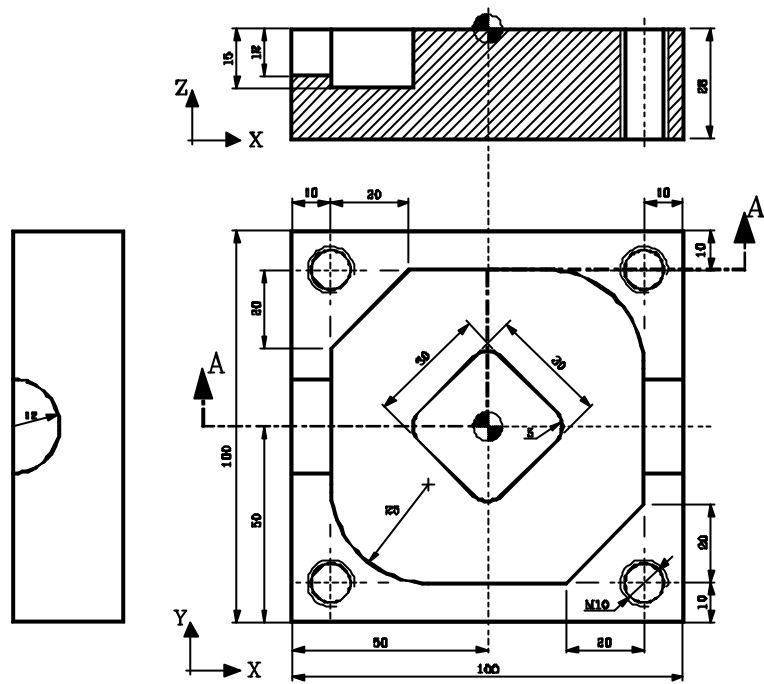
Drilling and Tapping



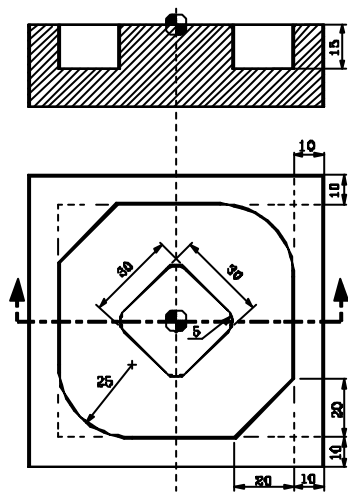
```

N500 T9 D9 ..... Ø8.5 mm Drill bit
G0 G90 G43 Z100 F200 S1050 M4 M41
G83 G98 X0 Y0 Z5 I-12 J3 ..... Drilling Taladrado (P1).
G80
T7 D7 ..... Broca Ø5 mm.
F200 S1500 M4 M42
G81 G99 X-24 Y0 Z-10 I-30 K0 ..... Drilling (P2).
G63 X24 Y0 I30 C2 F300 ..... Drilling (P3 to P13).
G80
G0 Z100
T12 D12 ..... Tap.
G0 G90 G43 Z20 F450 S300 M4 M41
G84 G98 X0 Y0 Z5 I-30 ..... Tapping at point P1.
G0 G44 Z50
M30
    
```


Example 2 of an irregular pocket with islands.

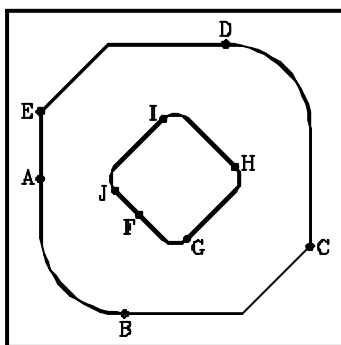


```
T2 D2
M06
G0 G90 G43 X0 Y0 Z20 F160 S1600 M3 M42
```

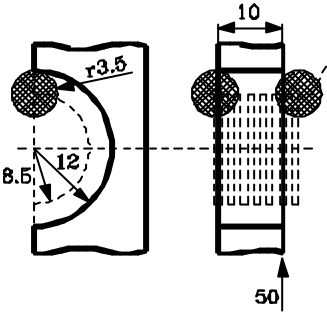
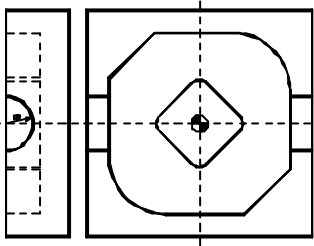


Irregular pocket with islands

```
G66 D100 R110 F250 S130 E140
G0 G44 Z50
(GOTO N300)
N100 G81 Z3 I-15
N110 G67 A45 B7.5 C7 I-15 R3 T2 D2 M6
N120 G68 B0 L-1 T2 D2 M6
N130 G1 X-40 Y0 Z0 ..... Point "A".
G36 R25 Y-40 ..... Section A-B.
G39 R20 X40 ..... Section B-C.
G36 R25 Y40 ..... Section C-D.
G39 R20 X-40 ..... Section D-E.
Y0 ..... Section E-A.
G0 X-10.606 Y-10.606 ..... Point "F".
G1 G36 R5 X0 Y-21.213 ..... Section F-G.
G36 R5 X21.213 Y0 ..... Section G-H.
G36 R5 X0 Y21.213 ..... Section H-I.
G36 R5 X-21.213 Y0 ..... Section I-J.
N140 X-10.606 Y-10.606 ..... Section J-F.
```

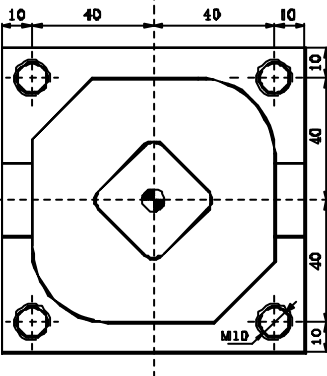
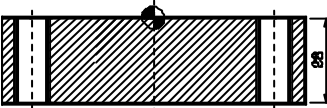


Arc grooving



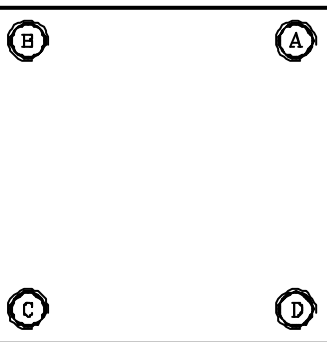
N300 T4 D4 Selects the tool
M6
G19 Selects the YZ plane as
main plane.
G15Z Selects the Z axis as vertical
axis.
F150 S1200 M3 M42
G0 G43 G90 X54.5 Y8.5 Z0
G1 X53.5 Right groove.
N310 G91 G1 X-1
G2 G90 Q180
G91 G1 X-1
N320 G3 G90 Q0
(RPT N310, N320) N6
G0 G90 Z10
X-36.5 Left groove.
Z0
(RPT N310, N320) N7
G0 G90 G17 G44 Z50

Drilling



T9 D9 Selects the tool
M6
F200 S1050 M4 M41
G0 G43 G90 X40 Y40 Z20
G83 G99 Z3 I-13 J3 Drilling at point "A".
N400 X-40 Drilling at point "B".
Y-40 Drilling at point "C".
X40 Drilling at point "D".
N410 G80
G0 G44 Z60

Tapping



T12 D12 Selects the tool
M6
F450 S300 M4 M41
G0 G43 G90 X40 Y40 Z20
G84 G99 Z5 I-30 Tapping of hole "A"
(RPT N400, N410) Tapping of holes "B", "C"
and "D".
G0 G44 Z60
M30

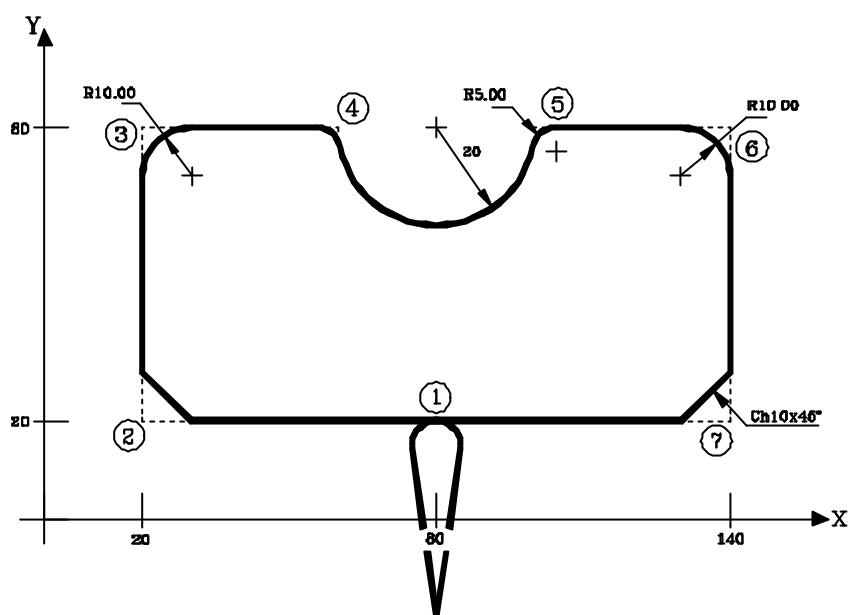
8040M

8055M

Profile editor. Example 1.	34
Profile editor. Example 2.	35
Profile editor. Example 3.	36
Profile editor. Example 4.	37
Profile editor. Example 5.	38
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Programming examples: Profile editor

Profile editor. Example 1.



PROFILE DEFINITION WITHOUT ROUNDINGS, CHAMFERS, TANGENTIAL ENTRY AND EXIT

- STARTING POINT : X = 80 Y = -20
- STRAIGHT LINE : X = 80 Y = 20
- STRAIGHT LINE : X = 20 Y = 20
- STRAIGHT LINE : X = 20 Y = 80
- STRAIGHT LINE : X = 60 Y = 80
- CCW ARC : X = 100 Y = 80 Xcenter = 80 Ycenter = 80 Radius = 20
- STRAIGHT LINE : X = 140 Y = 80
- STRAIGHT LINE : X = 140 Y = 20
- STRAIGHT LINE : X = 80 Y = 20
- STRAIGHT LINE : X = 80 Y = -20

DEFINITION OF ROUNDINGS, CHAMFERS, TANGENTIAL ENTRY AND EXIT

Select the CORNERS option and define:

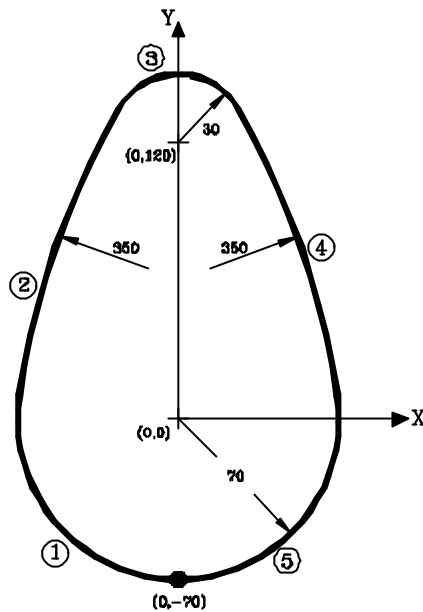
- TANGENTIAL ENTRY Select point "1" Press ENTER Set radius = 5
- CHAMFER..... Select point "2" Press ENTER Set size = 10
- ROUNDING Select point "3" Press ENTER Set radius = 10
- ROUNDING Select point "4" Press ENTER Set radius = 5
- ROUNDING Select point "5" Press ENTER Set radius = 5
- ROUNDING Select point "6" Press ENTER Set radius = 10
- CHAMFER..... Select point "7" Press ENTER Set size = 10
- TANGENTIAL EXIT Select point "1" Press ENTER Set radius = 5

Press ESC to quit the Corners option .

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.

Profile editor. Example 2.



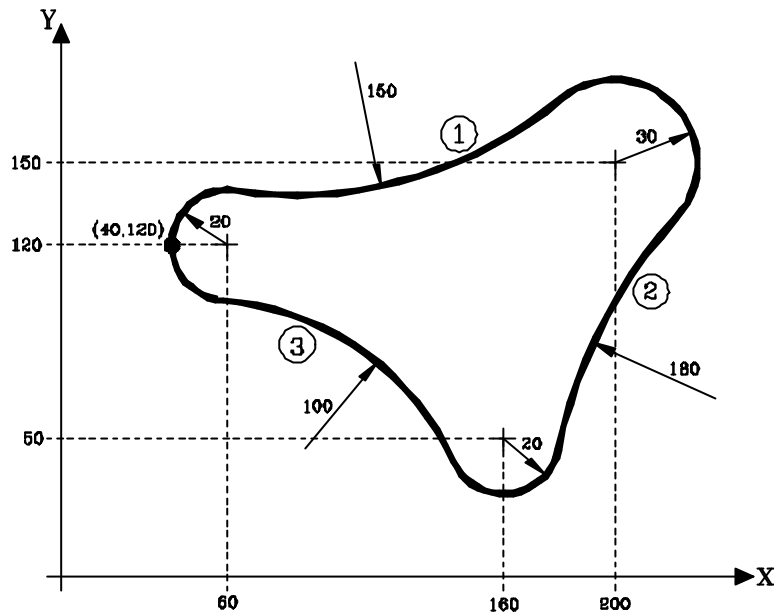
PROFILE DEFINITION

- STARTING POINT : X= 0 Y= -70
- CW ARC (1) : Xcenter= 0 Ycenter= 0 Radius= 70
- CW ARC (2) : Radius= 350 Tangent= Yes
- CW ARC (3) : Xcenter= 0 Ycenter= 120 Radius= 30 Tangent= Yes
The CNC shows all the possible options for section 2. Select the right one
- CW ARC (4) : Radius= 350 Tangent= Yes
- CW ARC (5) : X= 0 Y= -70 Xcenter= 0 Ycenter= 0 Radius= 70 Tangent= Yes
The CNC shows all the possible options for section 4. Select the right one

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.

Profile editor. Example 3.



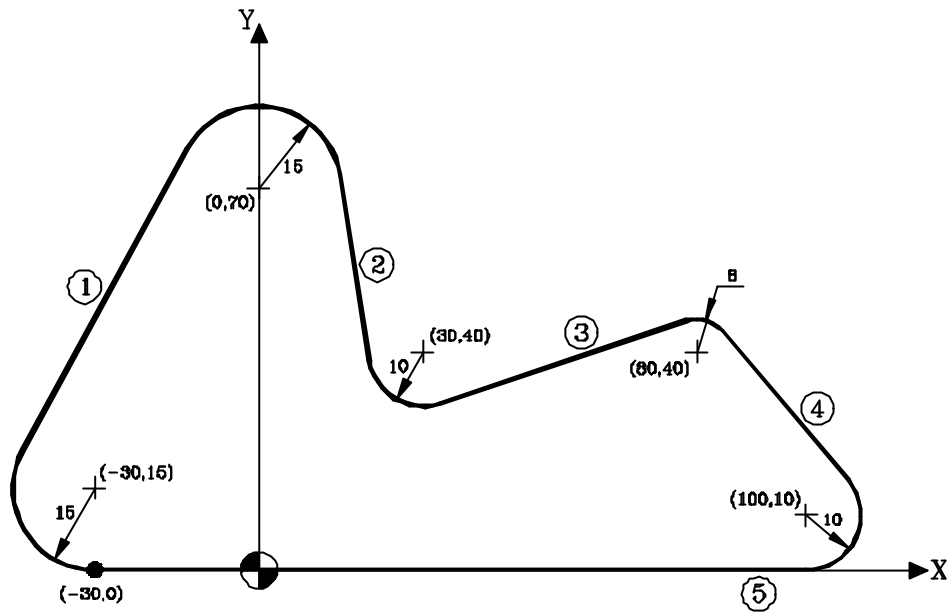
PROFILE DEFINITION

- STARTING POINT : X = 40 Y = 120
- CW ARC : Xcenter = 60 Ycenter = 120 Radius = 20
- CCW ARC (1) : Radius = 150 Tangent = Yes
- CW ARC : Xcenter = 200 Ycenter = 150 Radius = 30 Tangent = Yes
The CNC shows all the possible options for section 1. Select the right one.
- CCW ARC (2) : Radius = 180 Tangent = Yes
- CW ARC : Xcenter = 160 Ycenter = 50 Radius = 20 Tangent = Yes
The CNC shows all the possible options for section 2. Select the right one.
- CCW ARC (3) : Radius = 100 Tangent = Yes
- CW ARC : X = 40 Y = 120 Xcenter = 60 Ycenter = 120 Tangent = Yes
The CNC shows all the possible options for section 3. Select the right one.

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.

Profile editor. Example 4.



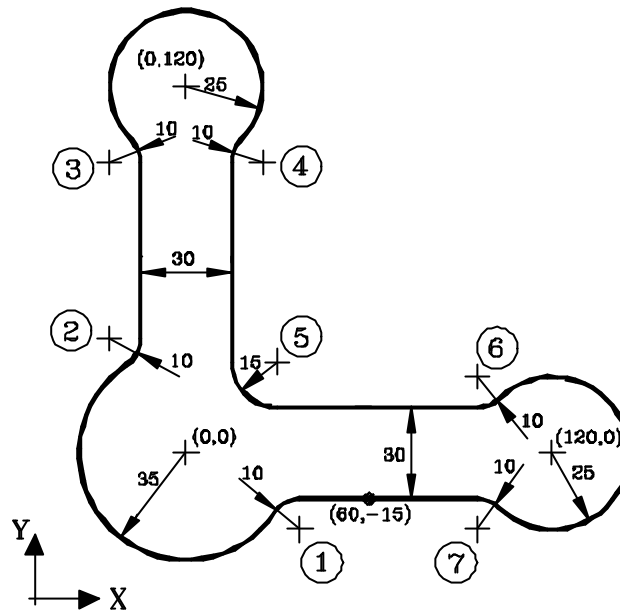
PROFILE DEFINITION

- STARTING POINT : X = -30 Y = 0
- CW ARC : Xcenter = -30 Ycenter = 15 Radius = 15
- STRAIGHT LINE (1) : Tangent = Yes
- CW ARC : Xcenter = 0 Ycenter = 70 Radius = 15 Tangent = Yes
The CNC shows all the possible options for section 1. Select the right one.
- STRAIGHT LINE (2) : Tangent = Yes
- CCW ARC : Xcenter = 30 Ycenter = 40 Radius = 10 Tangent = Yes
The CNC shows all the possible options for section 2. Select the right one.
- STRAIGHT LINE (3) : Tangent = Yes
- CW ARC : Xcenter = 80 Ycenter = 40 Radius = 8 Tangent = Yes
The CNC shows all the possible options for section 3. Select the right one.
- STRAIGHT LINE (4) : Tangent = Yes
- CW ARC : Xcenter = 100 Ycenter = 10 Radius = 10 Tangent = Yes
The CNC shows all the possible options for section 4. Select the right one.
- STRAIGHT LINE (5) : X = -30 Y = 0 Tangent = Yes
The CNC shows all the possible options for this section. Select the right one.

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.

Profile editor. Example 5.



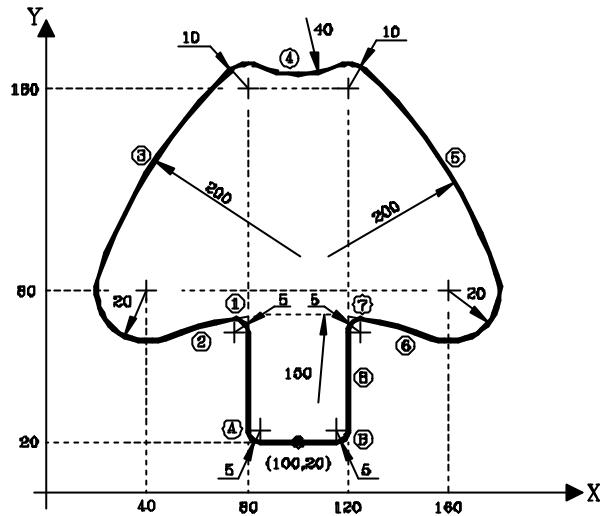
PROFILE DEFINITION

- STARTING POINT : X = 60 Y = -15
- STRAIGHT LINE : Y = -15 Angle = 180
- CCW ARC (1) : Radius = 10 Tangent = Yes
- CW ARC : Xcenter = 0 Ycenter = 0 Radius = 35 Tangent = Yes
The CNC shows all the possible options for section 1. Select the right one
- CCW ARC (2) : Radius = 10 Tangent = Yes
- STRAIGHT LINE : X = -15 Angle = 90 Tangent = Yes
The CNC shows all the possible options for section 2. Select the right one.
- CCW ARC (3) : Radius = 10 Tangent = Yes
- CW ARC : Xcenter = 0 Ycenter = 120 Radius = 25 Tangent = Yes
The CNC shows all the possible options for section 3. Select the right one.
- CCW ARC (4) : Radius = 10 Tangent = Yes
- STRAIGHT LINE : X = 15 Angle = 270 Tangent = Yes
The CNC shows all the possible options for section 4. Select the right one.
- CCW ARC (5) : Xcenter = 30 Radius = 15 Tangent = Yes
- STRAIGHT LINE : Y = 15 Angle = 0 Tangent = Yes
The CNC shows all the possible options for section 5. Select the right one.
- CCW ARC (6) : Radius = 10 Tangent = Yes
- CW ARC : Xcenter = 120 Ycenter = 0 Radius = 25 Tangent = Yes
The CNC shows all the possible options for section 6. Select the right one
- CCW ARC (7) : Radius = 10 Tangent = Yes
- STRAIGHT LINE : X = 60 Y = -15 Angle = 0 Tangent = Yes
The CNC shows all the possible options for section 7. Select the right one.

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.

Profile editor. Example 6.



PROFILE DEFINITION

- STARTING POINT : X = 100 Y = 20
- STRAIGHT LINE : X = 80 Y = 20
- STRAIGHT LINE : X = 80 Angle = 90
- CCW ARC (1) : Xcenter = 75 Radius = 5 Tangent = Yes
- CCW ARC (2) : Xcenter = 100 Radius = 150 Tangent = Yes
- CW ARC : Xcenter = 40 Ycenter = 80 Radius = 20 Tangent = Yes
The CNC shows all the possible options for section 2. Select the right one.
The CNC shows all the possible options for section 1. Select the right one.
- CW ARC (3) : Radius = 200 Tangent = Yes
- CW ARC : Xcenter = 80 Ycenter = 160 Radius = 10 Tangent = Yes
The CNC shows all the possible options for section 3. Select the right one
- CCW ARC (4) : Radius = 40 Tangent = Yes
- CW ARC : Xcenter = 120 Ycenter = 160 Radius = 10 Tangent = Yes
The CNC shows all the possible options for section 4. Select the right one.
- CW ARC (5) : Radius = 200 Tangent = Yes
- CW ARC : Xcenter = 160 Ycenter = 80 Radius = 20 Tangent = Yes
The CNC shows all the possible options for section 5. Select the right one
- CCW ARC (6) : Xcenter = 100 Radius = 150 Tangent = Yes
The CNC shows all the possible options for section 6. Select the right one.
- CCW ARC (7) : Xcenter = 125 Radius = 5 Tangent = Yes
The CNC shows all the possible options for section 7. Select the right one.
- STRAIGHT LINE (8) : X = 120 Y = 20 Tangent = Yes
The CNC shows all the possible options for section 8. Select the right one.
- STRAIGHT LINE : X = 100 Y = 20

DEFINITION OF ROUNDINGS "A" and "B"

Select the CORNERS option and define:

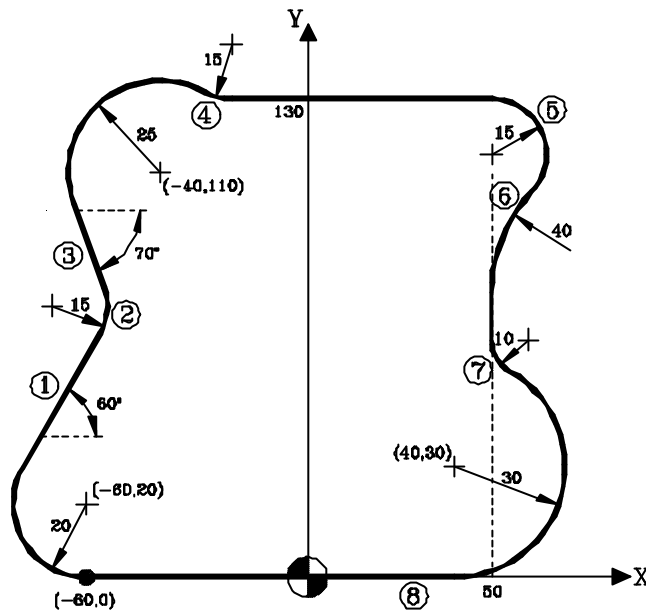
ROUNDING Select point "A" Press ENTER Set radius = 5
 ROUNDING Select point "B" Press ENTER Set radius = 5

Press [ESC] to quit the Corners option.

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.

Profile editor. Example 7.




PROFILE DEFINITION

- STARTING POINT : X = -60 Y = 0
- CW ARC : Xcenter = -60 Ycenter = 20 Radius = 20
- STRAIGHT LINE (1) : Angle = 60 Tangent = Yes
The CNC shows all the possible options for section 1. Select the right one
- CCW ARC (2) : Radius = 15 Tangent = Yes
- STRAIGHT LINE (3) : Angle = -70 Tangent = Yes
- CW ARC : Xcenter = -40 Ycenter = 110 Radius = 25 Tangent = Yes
The CNC shows all the possible options for section 3. Select the right one
The CNC shows all the possible options for section 2. Select the right one
- CCW ARC (4) : Radius = 15 Tangent = Yes
- STRAIGHT LINE : Y = 130 Angle = 0 Tangent = Yes
The CNC shows all the possible options for section 4. Select the right one
- CW ARC (5) : Xcenter = 50 Radius = 15 Tangent = Yes
The CNC shows all the possible options for section 5. Select the right one
- CCW ARC (6) : Radius = 40 Tangent = Yes
- STRAIGHT LINE : X = 50 Angle = 270 Tangent = Yes
The CNC shows all the possible options for section 6. Select the right one
- CCW ARC (7) : Radius = 10 Tangent = Yes
- CW ARC : Xcenter = 40 Ycenter = 30 Radius = 30 Tangent = Yes
The CNC shows all the possible options for section 7. Select the right one
- STRAIGHT LINE (8) : X = -60 Y = 0 Tangent = Yes
The CNC shows all the possible options for section 8. Select the right one

END OF EDITING

Select the softkeys END+SAVE PROFILE. The CNC quits the profile editing mode and displays, in ISO code, the program that has been generated.



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**Programming examples:
User screen customizing programs**

Machine diagnosis.

This example shows:

a.- How to write a user screen customizing program.

In order to be able to execute this program in the user channel of the MANUAL mode, general machine parameter «USERMAN» must be set with the program number.

For better understanding, the explanation is divided into parts indicating the section of the program and the creation of the corresponding screens (pages) and symbols. The different parts are:

- Part 1 : It requests the access code (password).
- Part 2 : It shows the status of inputs I1 to I40.
(it uses user page 2 and the symbols 21 and 22)
- Part 3 : It shows the status of outputs O1 to O18.
(It uses user page 3 and the symbols 21 and 22)
- Part 4 : It shows the consumption of the motors.
(It uses user page 4 and the symbols 0 to 20)

To go to the previous or next page, use the «previous page» and «next page» keys.

b.- How to create a user screen (page).

c.- How to create a user symbol.

Part 1: "Request password"

```

N100 (IB1= INPUT "PASSWORD = ", 6) ..... Requests the password
      (IF IB1 NE (123456) GOTO N100) ..... If the password is not correct (123456), it requests
                                              it again.

;
N200 ..... If it is correct, the program continues on line
                                              N200 (part 2)

```

Part 2: "Shows the status of inputs I1 through I40"

Program lines (main program).

```

N200 (PAGE2) ..... Shows page 2
      (KEY=0) ..... Clears the memory of the last key pressed.
N210 (P100=PLCI1) ..... Assigns to parameter P100, the value of inputs I1 to I32
      (P199=85) ..... Row where to insert the symbol
      (CALL 2) ..... Call to subroutine (it inserts symbols)
      (P100=PLCI11) ..... Assigns to parameter P100 the value of inputs I11 to I42
      (P199=155) ..... Row where to insert the symbol
      (CALL 2) ..... Call to subroutine (it inserts symbols)
      (P100=PLCI21) ..... Assigns to parameter P100 the value of inputs I21 to I52
      (P199=225) ..... Row where to insert the symbol
      (CALL 2) ..... Row where to insert the symbol
      (P100=PLCI31) ..... Asigna al parámetro P100 el valor de las entradas I31 a I62
      (P199=295) ..... Row where to insert the symbol
      (CALL 2) ..... Row where to insert the symbol
      (IF KEY EQ $FFAF GOTO N300) ... If "next page" has been pressed, it goes on to line N300 (part 3)
      (GOTO N210) ..... If not, refresh the status of the inputs.
  
```

Program lines (subroutine that indicates the status of a row of inputs).

This subroutine analyzes the 10 least significant bits of parameter P100. If the bit is set to «1», it inserts symbol 21 (lamp lit, red color) and if it is set to «0», it inserts symbol 22 (lamp off, background color).

Call parameters:

- P100 = Value of the inputs to be displayed.
- P199 = Row where the symbols are to be inserted.

```

(SUB 2)
  (IF (P100 AND 1) EQ 0 SYMBOL 22,80,P199 ELSE SYMBOL 21,80,P199)
  (IF (P100 AND 2) EQ 0 SYMBOL 22,130,P199 ELSE SYMBOL 21,130,P199)
  (IF (P100 AND 4) EQ 0 SYMBOL 22,180,P199 ELSE SYMBOL 21,180,P199)
  (IF (P100 AND 8) EQ 0 SYMBOL 22,230,P199 ELSE SYMBOL 21,230,P199)
  (IF (P100 AND $10) EQ 0 SYMBOL 22,280,P199 ELSE SYMBOL 21,280,P199)
  (IF (P100 AND $20) EQ 0 SYMBOL 22,330,P199 ELSE SYMBOL 21,330,P199)
  (IF (P100 AND $40) EQ 0 SYMBOL 22,380,P199 ELSE SYMBOL 21,380,P199)
  (IF (P100 AND $80) EQ 0 SYMBOL 22,430,P199 ELSE SYMBOL 21,430,P199)
  (IF (P100 AND $100) EQ 0 SYMBOL 22,480,P199 ELSE SYMBOL 21,480,P199)
  (IF (P100 AND $200) EQ 0 SYMBOL 22,530,P199 ELSE SYMBOL 21,530,P199)
(RET)
  
```

Editing symbols 21 and 22.

Access the screen customizing mode and select: [Utilities] [Editor] [Symbol] (symbol number) [Enter]

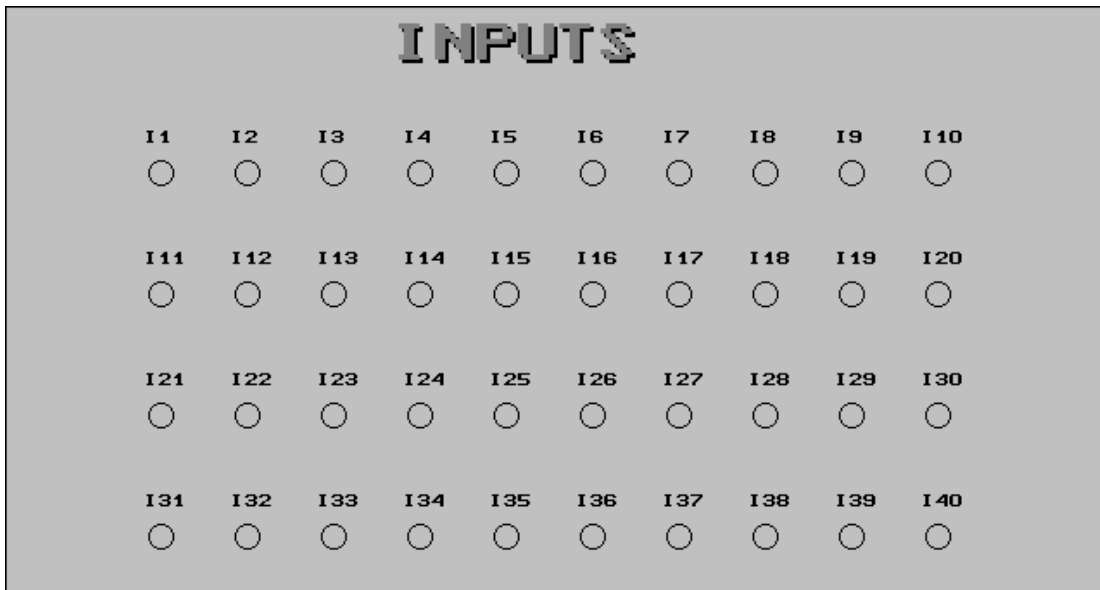
Symbol 21

Background color: Navy blue
 Main color: Red
 Line: Fine solid
 Filled circle
 Center: X10 Y10
 Move to.: X10 Y15

Symbol 22

Background color: Navy blue
 Main color: Navy blue
 Line: Fine solid
 Filled circle
 Center: X10 Y10
 Move to.: X10 Y15

Editing page 2



Access the screen customizing mode and select: [Utilities] [Edit] [Page] 2 [Enter]

Select background color: Navy blue

Edit the following texts:

Main color	Size	Text	Position
White	Large	INPUTS	X226 Y10
Red	Large	INPUTS	X224 Y8
White	Small	I1	X80 Y70
White	Small	I2	X130 Y70
White	Small	I3	X180 Y70
White	Small	I4	X230 Y70
White	Small	I5	X280 Y70
White	Small	I6	X330 Y70
White	Small	I7	X380 Y70
White	Small	I8	X430 Y70
White	Small	I9	X480 Y70
White	Small	I10	X530 Y70
White	Small	I11	X80 Y140
White	Small	I12	X130 Y140

Main color	Size	Text	Position
White	Small	I13	X180 Y140
White	Small	I14	X230 Y140
White	Small	I15	X280 Y140
White	Small	I16	X330 Y140
White	Small	I17	X380 Y140
White	Small	I18	X430 Y140
White	Small	I19	X480 Y140
White	Small	I20	X530 Y140
White	Small	I21	X80 Y210
White	Small	I22	X130 Y210
White	Small	I23	X180 Y210
White	Small	I24	X230 Y210
White	Small	I25	X280 Y210
White	Small	I26	X330 Y210

Main color	Size	Text	Position
White	Small	I27	X380 Y210
White	Small	I28	X430 Y210
White	Small	I29	X480 Y210
White	Small	I30	X530 Y210
White	Small	I31	X80 Y280
White	Small	I32	X130 Y280
White	Small	I33	X180 Y280
White	Small	I34	X230 Y280
White	Small	I35	X280 Y280
White	Small	I36	X330 Y280
White	Small	I37	X380 Y280
White	Small	I38	X430 Y280
White	Small	I39	X480 Y280
White	Small	I40	X530 Y280

Edit the following circles (unfilled) with white main color and line type: Fine solid.

Main color	Center	Move to...
White	X90 Y95	X90 Y102
White	X140 Y95	X140 Y102
White	X190 Y95	X190 Y102
White	X240 Y95	X240 Y102
White	X290 Y95	X290 Y102
White	X340 Y95	X340 Y102
White	X390 Y95	X390 Y102
White	X440 Y95	X440 Y102
White	X490 Y95	X490 Y102
White	X540 Y95	X540 Y102
White	X90 Y165	X90 Y172
White	X140 Y165	X140 Y172
White	X190 Y165	X190 Y172
White	X240 Y165	X240 Y172

Main color	Center	Move to...
White	X290 Y165	X290 Y172
White	X340 Y165	X340 Y172
White	X390 Y165	X390 Y172
White	X440 Y165	X440 Y172
White	X490 Y165	X490 Y172
White	X540 Y165	X540 Y172
White	X90 Y235	X90 Y242
White	X140 Y235	X140 Y242
White	X190 Y235	X190 Y242
White	X240 Y235	X240 Y242
White	X290 Y235	X290 Y242
White	X340 Y235	X340 Y242
White	X390 Y235	X390 Y242
White	X440 Y235	X440 Y242

Main color	Center	Move to...
White	X490 Y235	X490 Y242
White	X540 Y235	X540 Y242
White	X90 Y305	X90 Y312
White	X140 Y305	X140 Y312
White	X190 Y305	X190 Y312
White	X240 Y305	X240 Y312
White	X290 Y305	X290 Y312
White	X340 Y305	X340 Y312
White	X390 Y305	X390 Y312
White	X440 Y305	X440 Y312
White	X490 Y305	X490 Y312
White	X540 Y305	X540 Y312



Part 3: "Shows the status of outputs O1 to O18"

Program lines (main program).

```

N300 (PAGE3) ..... Shows page 3
      (KEY = 0 ) ..... Clears memory of last key pressed
N310 (P100=PLCO1) ..... Assigns to parameter P100 the value of the outputs O1 to O32
      (P199=85) ..... Row where to insert the symbol
      (CALL 3) ..... Call to subroutine (it inserts symbols)
      (P100=PLCO10) ..... Assigns to parameter P100 the value of the outputs O10 to O41
      (P199=155) ..... Row where to insert the symbol
      (CALL 3) ..... Call to subroutine (it inserts symbols)
      (IF KEY EQ $FFA5 GOTO N200) ... If "previous page" has been pressed, it goes on to line N200 (part
                                     2)
      (IF KEY EQ $FFAF GOTO N400) ... If "next page" has been pressed, it goes on to line N400 (part
                                     4)
      (GOTO N310) ..... If not, it refreshes the status of the outputs

```

Program lines (subroutine that indicates the status of a row of outputs).

This subroutine analyzes the 10 least significant bits of parameter P100. If the bit is set to «1», it inserts symbol 21 (lamp on, red color), if it is set to «0», it inserts symbol 22 (lamp off, background color).

Call parameters:

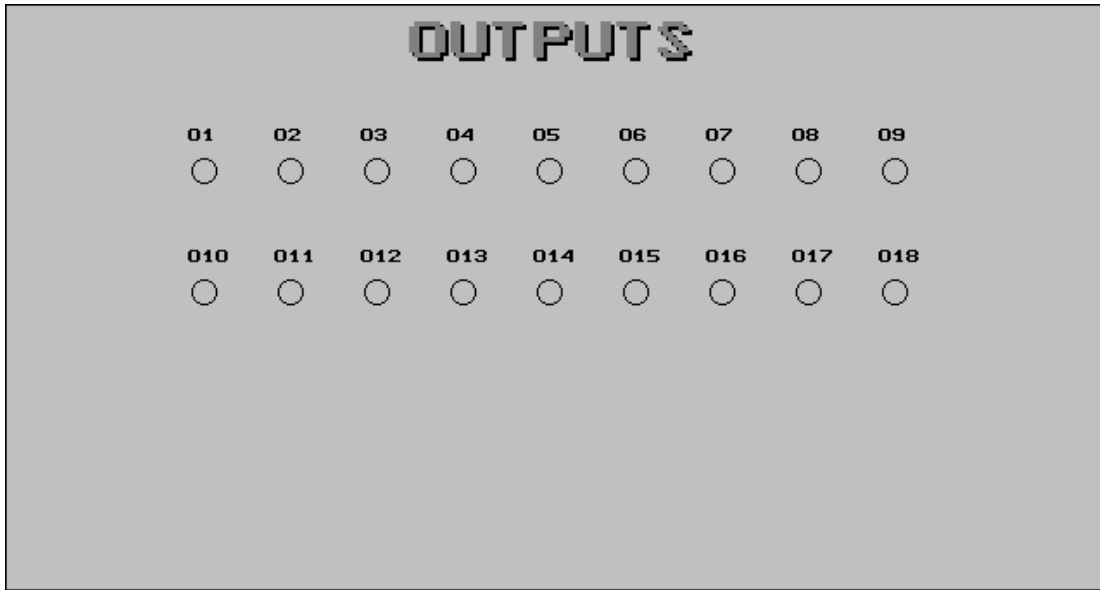
- P100 = Value of the outputs to be displayed.
- P199 = Row where to insert the symbols.

```

(SUB 3)
  (IF (P100 AND 1) EQ 0 SYMBOL 22,105,P199 ELSE SYMBOL 21,105,P199)
  (IF (P100 AND 2) EQ 0 SYMBOL 22,155,P199 ELSE SYMBOL 21,155,P199)
  (IF (P100 AND 4) EQ 0 SYMBOL 22,205,P199 ELSE SYMBOL 21,205,P199)
  (IF (P100 AND 8) EQ 0 SYMBOL 22,255,P199 ELSE SYMBOL 21,255,P199)
  (IF (P100 AND $10) EQ 0 SYMBOL 22,305,P199 ELSE SYMBOL 21,305,P199)
  (IF (P100 AND $20) EQ 0 SYMBOL 22,355,P199 ELSE SYMBOL 21,355,P199)
  (IF (P100 AND $40) EQ 0 SYMBOL 22,405,P199 ELSE SYMBOL 21,405,P199)
  (IF (P100 AND $80) EQ 0 SYMBOL 22,455,P199 ELSE SYMBOL 21,455,P199)
  (IF (P100 AND $100) EQ 0 SYMBOL 22,505,P199 ELSE SYMBOL 21,505,P199)
(RET)

```

Editing page 3



Access the screen customizing mode and select: [Utilities] [Editor] [Page] 3 [Enter]

Select background color: Navy blue

Edit the following texts:

Main color	Size	Text	Position
White	Large	OUTPUTS	X235 Y10
Red	Large	OUTPUTS	X233 Y8
White	Small	O1	X105 Y70
White	Small	O2	X155 Y70
White	Small	O3	X205 Y70
White	Small	O4	X255 Y70
White	Small	O5	X305 Y70

Main color	Size	Text	Position
White	Small	O6	X355 Y70
White	Small	O7	X405 Y70
White	Small	O8	X455 Y70
White	Small	O9	X505 Y70
White	Small	O10	X105 Y140
White	Small	O11	X155 Y140
White	Small	O12	X205 Y140

Main color	Size	Text	Position
White	Small	O13	X255 Y140
White	Small	O14	X305 Y140
White	Small	O15	X355 Y140
White	Small	O16	X405 Y140
White	Small	O17	X455 Y140
White	Small	O18	X505 Y140

Edit the following circles (unfilled) with white main color and line type: Fine solid

Main color	Center	Move to...
White	X115 Y95	X115 Y102
White	X165 Y95	X165 Y102
White	X215 Y95	X215 Y102
White	X265 Y95	X265 Y102
White	X315 Y95	X315 Y102
White	X365 Y95	X365 Y102

Main color	Center	Move to...
White	X415 Y95	X415 Y102
White	X465 Y95	X465 Y102
White	X515 Y95	X515 Y102
White	X115 Y165	X115 Y172
White	X165 Y165	X165 Y172
White	X215 Y165	X215 Y172

Main color	Center	Move to...
White	X265 Y165	X265 Y172
White	X315 Y165	X315 Y172
White	X365 Y165	X365 Y172
White	X415 Y165	X415 Y172
White	X465 Y165	X465 Y172
White	X515 Y165	X515 Y172

Part 4: "Shows the consumption of motors"

The speed drives have an analog output (0 to 10V) proportional to the current consumed by the motor.

In this example, the following connections have been made:

- The X axis drive's current output is connected to the analog input 1 of the CNC.
- The Y axis drive's current output is connected to the analog input 2 of the CNC.
- The Z axis drive's current output is connected to the analog input 3 of the CNC.
- The spindle (S) drive's current output is connected to the analog input 4 of the CNC.

Therefore, variables "ANAI1", "ANAI2", "ANAI3" and "ANAI4" show the analog voltage corresponding to the currents of the X, Y and Z axes and of the spindle S.

21 symbols (0-20) are used to display the value of the current, in increments corresponding to 0.5V.

To select the right symbol each time, the formula: "ABS ROUND (ANAI1/0.5)" is applied. In other words, the rounded-up absolute value of the result of the operation "ANAI1/0.5".

Program lines.

```

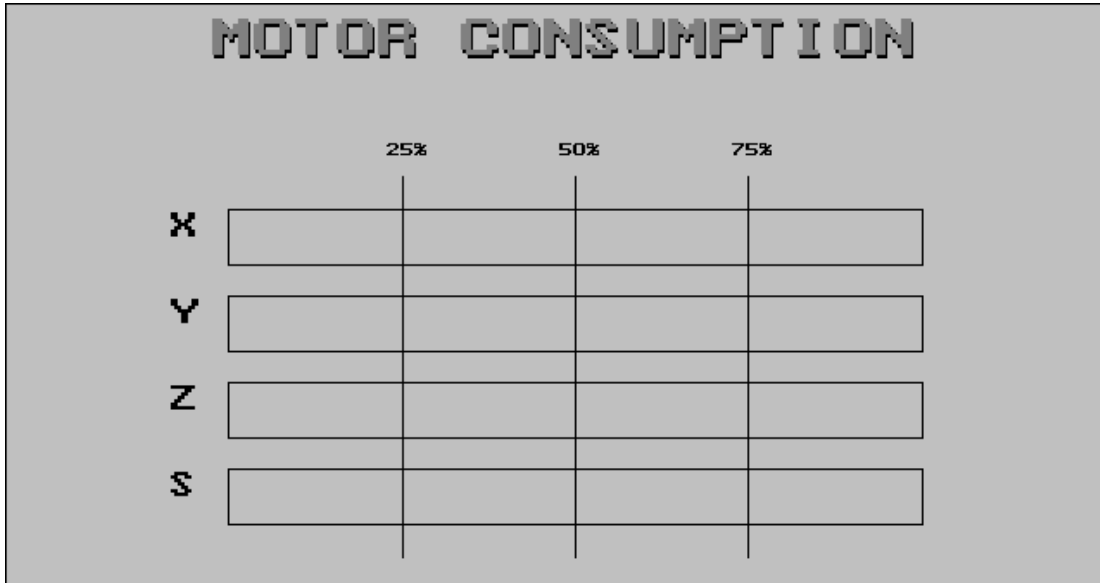
N400 (PAGE 4) ..... Shows page 4.
      (KEY = 0) ..... Clears memory of last key pressed.
N410 (SYMBOL ABS ROUND (ANAI1/0.5), 130, 120)
      (SYMBOL ABS ROUND (ANAI2/0.5), 130, 170)
      (SYMBOL ABS ROUND (ANAI3/0.5), 130, 220)
      (SYMBOL ABS ROUND (ANAI4/0.5), 130, 270)
      (IF KEY EQ $FFA5 GOTO N300) ..... If "previous page" has been pressed, it goes on to
                                          line N300 (part 3)
      (GOTO N410) ..... If not, it refreshes the motor consumption.
    
```

Editing symbols 0-20

Access the screen customizing mode and select: [Utilities] [Editor] [Symbol] (symbol number) [Enter]

SYMBOL	FILLED RECTANGLE								FINE SOLID LINE					
	Green		Yellow		Red		Gray		Green		Yellow		Red	
	From	to	From	to	From	to	From	to	From	to	From	to	From	to
0	---	---	---	---	---	---	X0 Y0	X400 Y30	X100 Y0	X100 Y30	X200 Y0	X200 Y30	X300 Y0	X300 Y30
1	X0 Y0	X20 Y30	---	---	---	---	X20 Y0	X400 Y30	X100 Y0	X100 Y30	X200 Y0	X200 Y30	X300 Y0	X300 Y30
2	X0 Y0	X40 Y30	---	---	---	---	X40 Y0	X400 Y30	X100 Y0	X100 Y30	X200 Y0	X200 Y30	X300 Y0	X300 Y30
3	X0 Y0	X60 Y30	---	---	---	---	X60 Y0	X400 Y30	X100 Y0	X100 Y30	X200 Y0	X200 Y30	X300 Y0	X300 Y30
4	X0 Y0	X80 Y30	---	---	---	---	X80 Y0	X400 Y30	X100 Y0	X100 Y30	X200 Y0	X200 Y30	X300 Y0	X300 Y30
5	X0 Y0	X100 Y30	---	---	---	---	X100 Y0	X400 Y30	---	---	X200 Y0	X200 Y30	X300 Y0	X300 Y30
6	X0 Y0	X120 Y30	---	---	---	---	X120 Y0	X400 Y30	---	---	X200 Y0	X200 Y30	X300 Y0	X300 Y30
7	X0 Y0	X140 Y30	---	---	---	---	X140 Y0	X400 Y30	---	---	X200 Y0	X200 Y30	X300 Y0	X300 Y30
8	X0 Y0	X160 Y30	---	---	---	---	X160 Y0	X400 Y30	---	---	X200 Y0	X200 Y30	X300 Y0	X300 Y30
9	X0 Y0	X180 Y30	---	---	---	---	X180 Y0	X400 Y30	---	---	X200 Y0	X200 Y30	X300 Y0	X300 Y30
10	X0 Y0	X200 Y30	---	---	---	---	X200 Y0	X400 Y30	---	---	---	---	X300 Y0	X300 Y30
11	X0 Y0	X200 Y30	X200 Y0	X220 Y30	---	---	X220 Y0	X400 Y30	---	---	---	---	X300 Y0	X300 Y30
12	X0 Y0	X200 Y30	X200 Y0	X240 Y30	---	---	X240 Y0	X400 Y30	---	---	---	---	X300 Y0	X300 Y30
13	X0 Y0	X200 Y30	X200 Y0	X260 Y30	---	---	X260 Y0	X400 Y30	---	---	---	---	X300 Y0	X300 Y30
14	X0 Y0	X200 Y30	X200 Y0	X280 Y30	---	---	X280 Y0	X400 Y30	---	---	---	---	X300 Y0	X300 Y30
15	X0 Y0	X200 Y30	X200 Y0	X300 Y30	---	---	X300 Y0	X400 Y30	---	---	---	---	---	---
16	X0 Y0	X200 Y30	X200 Y0	X300 Y30	X300 Y0	X320 Y30	X320 Y0	X400 Y30	---	---	---	---	---	---
17	X0 Y0	X200 Y30	X200 Y0	X300 Y30	X300 Y0	X340 Y30	X340 Y0	X400 Y30	---	---	---	---	---	---
18	X0 Y0	X200 Y30	X200 Y0	X300 Y30	X300 Y0	X360 Y30	X360 Y0	X400 Y30	---	---	---	---	---	---
19	X0 Y0	X200 Y30	X200 Y0	X300 Y30	X300 Y0	X380 Y30	X380 Y0	X400 Y30	---	---	---	---	---	---
20	X0 Y0	X200 Y30	X200 Y0	X300 Y30	X300 Y0	X400 Y30	---	---	---	---	---	---	---	---

Editing page 4



Access the screen customizing mode and select: [Utilities] [Editor] [Page] 4 [Enter]

Select background color: Navy blue

Edit the following texts:

Main color	Size	Text	Position
White	Large	MOTOR CONSUMPTION	X120 Y10
Red	Large	MOTOR CONSUMPTION	X118 Y8
White	Medium	X	X95 Y120
White	Medium	Y	X95 Y170
White	Medium	Z	X95 Y220

Main color	Size	Text	Position
White	Medium	S	X95 Y270
White	Small	25%	X220 Y80
White	Small	50%	X320 Y80
White	Small	75%	X420 Y80

Edit the following graphics elements with line type: Fine solid.

Main color	Element	1st corner	2st corner
White	Unfilled Rectangle	X129 Y119	X531 Y151
White	Unfilled Rectangle	X129 Y169	X531 Y201
White	Unfilled Rectangle	X129 Y219	X531 Y251
White	Unfilled Rectangle	X129 Y269	X531 Y301

Main color	Element	1st end	2nd end
Green	Continuous line	X230 Y100	X230 Y320
Yellow	Continuous line	X330 Y100	X330 Y320
Red	Continuous line	X430 Y100	X430 Y320



Whole program

```

;Part 1 (password)
N100 (IB1=INPUT "CODIGO DE ACCESO = ", 6)
      (IF IB1 NE (123456) GOTO N100)
;
;Part 2 (status of the inputs)
N200 (PAGE2)
      (KEY = 0)
N210 (P100=PLC11)
      (P199=85)
      (CALL 2)
      (P100=PLC111)
      (P199=155)
      (CALL 2)
      (P100=PLC121)
      (P199=225)
      (CALL 2)
      (P100=PLC131)
      (P199=295)
      (CALL 2)
      (IF KEY EQ $FFAF GOTO N300)
      (GOTO N210)
;
      (SUB 2)
      (IF (P100 AND 1) EQ 0 SYMBOL 22,80,P199 ELSE SYMBOL 21,80,P199)
      (IF (P100 AND 2) EQ 0 SYMBOL 22,130,P199 ELSE SYMBOL 21,130,P199)
      (IF (P100 AND 4) EQ 0 SYMBOL 22,180,P199 ELSE SYMBOL 21,180,P199)
      (IF (P100 AND 8) EQ 0 SYMBOL 22,230,P199 ELSE SYMBOL 21,230,P199)
      (IF (P100 AND $10) EQ 0 SYMBOL 22,280,P199 ELSE SYMBOL 21,280,P199)
      (IF (P100 AND $20) EQ 0 SYMBOL 22,330,P199 ELSE SYMBOL 21,330,P199)
      (IF (P100 AND $40) EQ 0 SYMBOL 22,380,P199 ELSE SYMBOL 21,380,P199)
      (IF (P100 AND $80) EQ 0 SYMBOL 22,430,P199 ELSE SYMBOL 21,430,P199)
      (IF (P100 AND $100) EQ 0 SYMBOL 22,480,P199 ELSE SYMBOL 21,480,P199)
      (IF (P100 AND $200) EQ 0 SYMBOL 22,530,P199 ELSE SYMBOL 21,530,P199)
      (RET)
;
;Part 3 (status of the outputs)
N300 (PAGE3)
      (KEY = 0)
N310 (P100=PLCO1)
      (P199=85)
      (CALL 3)
      (P100=PLCO10)
      (P199=155)
      (CALL 3)
      (IF KEY EQ $FFA5 GOTO N200)
      (IF KEY EQ $FFAF GOTO N400)
      (GOTO N310)
;
      (SUB 3)
      (IF (P100 AND 1) EQ 0 SYMBOL 22,105,P199 ELSE SYMBOL 21,105,P199)
      (IF (P100 AND 2) EQ 0 SYMBOL 22,155,P199 ELSE SYMBOL 21,155,P199)
      (IF (P100 AND 4) EQ 0 SYMBOL 22,205,P199 ELSE SYMBOL 21,205,P199)
      (IF (P100 AND 8) EQ 0 SYMBOL 22,255,P199 ELSE SYMBOL 21,255,P199)
      (IF (P100 AND $10) EQ 0 SYMBOL 22,305,P199 ELSE SYMBOL 21,305,P199)
      (IF (P100 AND $20) EQ 0 SYMBOL 22,355,P199 ELSE SYMBOL 21,355,P199)
      (IF (P100 AND $40) EQ 0 SYMBOL 22,405,P199 ELSE SYMBOL 21,405,P199)
      (IF (P100 AND $80) EQ 0 SYMBOL 22,455,P199 ELSE SYMBOL 21,455,P199)
      (IF (P100 AND $100) EQ 0 SYMBOL 22,505,P199 ELSE SYMBOL 21,505,P199)
      (RET)
;
;Part 4 (motor consumption)
N400 (PAGE 4)
      (KEY = 0)
N410 (SYMBOL ABS ROUND (ANAI1/0.5), 130, 120)
      (SYMBOL ABS ROUND (ANAI2/0.5), 130, 170)
      (SYMBOL ABS ROUND (ANAI3/0.5), 130, 220)
      (SYMBOL ABS ROUND (ANAI4/0.5), 130, 270)
      (IF KEY EQ $FFA5 GOTO N300)
      (GOTO N410)
;

```

Slot milling.

This example shows:

a.- How to create a subroutine for milling a slot.

In the example, the program contains the subroutine to make the slot (Subrutina 55).
The dimensions of the slot must be defined by the user before calling this subroutine.

b.- How to create a user screen customizing program.

In order to be able to execute this program in the user channel of the Editing mode, general machine parameter «USEREDIT» it must be set with the program number.

Once all data of the slot have been defined, this program generates, in the program being edited, the blocks necessary to make the defined slot.

c.- How to create a user screen (page).

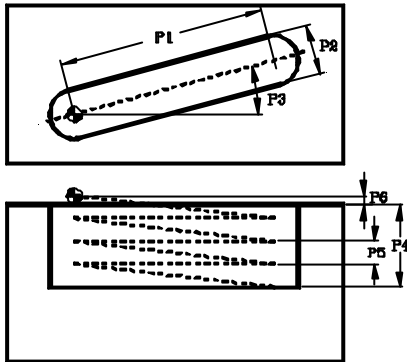
This program uses page 50. This is the screen the CNC displays when selecting the “User Editor” in the Editor mode.

Subroutine for milling the slot (Subroutine 55)

The subroutine executes the following operations:

- 1.- Assumes the calling point as the new part zero.
- 2.- Mills the slot.
 - Penetrates in Z down to the bottom running equal passes.
 - Mills the sides with the endmill at the bottom of the slot.
 - Withdraws the endmill to the calling point.
- 3.- Restores the part zero active before milling the slot.

The call parameters of the subroutine are:



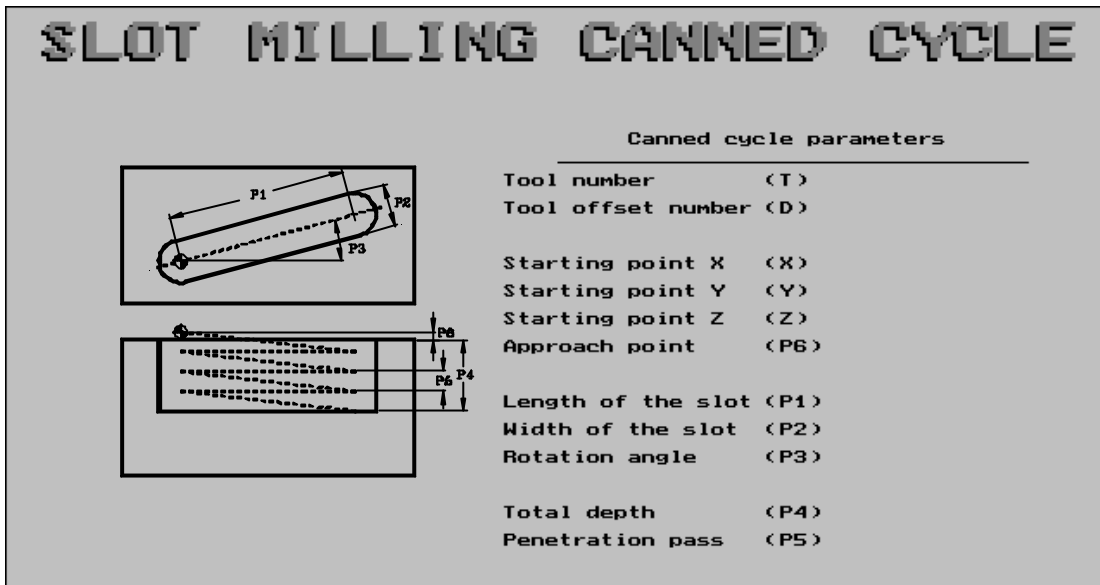
- P1 = Length of the slot.
 - P2 = Width of the slot.
 - P3 = Rotation angle of the slot.
 - P4 = Total depth of the slot.
 - P5 = Milling pass.
 - P6 = Approach coordinate.
- Parameters used in this program: from P100 to P110.

Program lines of the subroutine:

```

(SUB 55)
;-----
; Assumes the calling point as new Part zero
;-----
(P100=PPOSX, P101=PPOSY, P102=PPOSZ) ..... Stores current coordinate
G92 XYZ ..... Presets new Part zero
;-----
; Go down in Z to the bottom of the hole. Equal passes
;-----
(P5=(P4+P6)/(FUP((P4+P6)/P5))) ..... Equal penetration passes
(P103=P1*COS P3, P104=P1*SIN P3) ..... Components per axis
N10 G01 G91 G01 XP103 YP104 Z-P5 F150 ..... Basic penetration, section 1
X-P103 Y-P104 ..... Basic penetration, section 2
(IF (PPOSZ NE -(P4+P6)) GOTO N10) ..... If not at the bottom, repeat basic.
;-----
; Milling of the sides with the endmill at the bottom of the slot
;-----
(P105=P2*SIN P3, P106=P2*COS P3, P107=P105/2, P108=P106/2)
G1 G41 XP107 Y-P108
XP103 YP104 ..... Side milling. Beginning
G3 X-P105 YP106 I-P107 JP108
G1 X-P103 Y-P104
G3 XP105 Y-P106 IP107 J-P108 ..... Side milling. End
;-----
; Withdraw to calling point. It recovers previous part zero
;-----
G0 G90 G40 X Y Z
G92 XP100 YP101 ZP102
(RET)
    
```

Editing of page 50.



Access the screen customizing mode and select: [Utilities] [Editor] [Page] 50 [Enter]

Select background color: Black

Edit the following texts:

Main Color	Size	Text	Position
White	Large	SLOT MILLING CANNED CYCLE	X20 Y10
Red	Large	SLOT MILLING CANNED CYCLE	X18 Y8
Yellow	Small	Canned cycle parameters	X360 Y72
Light blue	Small	Tool number	X288 Y96
Light blue	Small	(T)	X440 Y96
Light blue	Small	Tool offset number	X288 Y112
Light blue	Small	(D)	X440 Y112
Red	Small	Starting point X	X288 Y144
Red	Small	(X)	X440 Y144
Red	Small	Starting point Y	X288 Y160
Red	Small	(Y)	X440 Y160
Red	Small	Starting point Z	X288 Y176
Red	Small	(Z)	X440 Y176

Main Color	Size	Text	Position
Red	Small	Approach point	X288 Y192
Red	Small	(P6)	X440 Y192
Purple	Small	Length of the slot	X288 Y224
Purple	Small	(P1)	X440 Y224
Purple	Small	Width of the slot	X288 Y240
Purple	Small	(P2)	X440 Y240
Purple	Small	Rotation angle	X288 Y256
Purple	Small	(P3)	X440 Y256
Yellow	Small	Total depth	X288 Y288
Yellow	Small	(P4)	X440 Y288
Yellow	Small	Penetration pass	X288 Y304
Yellow	Small	(P5)	X440 Y304

Edit the following graphic element:

Line type: Thick solid Main color: Yellow From point (X320 Y90) to (X592 Y90)

Create the drawing with the graphic elements.

	Request starting position in X
N13	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB3=INPUT "Starting point (X):", -6.5) (DW3=IB3) (GOTO N1)
	Request starting position in Y
N14	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB4=INPUT "Starting point (Y):", -6.5) (DW4=IB4) (GOTO N1)
	Request starting position in Z
N15	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB5=INPUT "Starting point (Z):", -6.5) (DW5=IB5) (GOTO N1)
	Request approach point for the slot
N16	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB6=INPUT "Approach coordinate to the slot (P6):", 6.5) (DW6=IB6) (GOTO N1)
	Request length of the slot
N21	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB7=INPUT "length of the slot (P1):", 6.5) (DW7=IB7) (GOTO N2)
	Request width of the slot
N22	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB8=INPUT "Width of the slot (P2):", 6.5) (DW8=IB8) (GOTO N2)

	Request rotation angle of the slot
N23	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB9=INPUT "Rotation angle of the slot (P3):", -3.5) (DW9=IB9) (GOTO N2)
	Request total depth of the slot
N24	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB10=INPUT "Total depth of the slot (P4):", 6.5) (DW10=IB10) (GOTO N2)
	Request penetrating pass for the slot
N25	(SK1="", SK2="", SK3="", SK4="", SK5="", SK6="", SK7="") (IB11=INPUT "Penetrating pass for the slot (P5):", 6.5) (DW11=IB11) (GOTO N2)
	Generate program blocks
N100	(WBUF "T",IB1) (WBUF "D",IB2) (WBUF) (WBUF "G0 G90 X",IB3) (WBUF "Y",IB4) (WBUF "Z", (IB5+IB6)) (WBUF) (WBUF "(PCALL 55, P1=",IB7) (WBUF ",P2=",IB8) (WBUF ",P3=",IB9) (WBUF ",P4=",IB10) (WBUF ",P5=",IB11) (WBUF ",P6=",IB6) (WBUF ")") (WBUF) (SYSTEM)