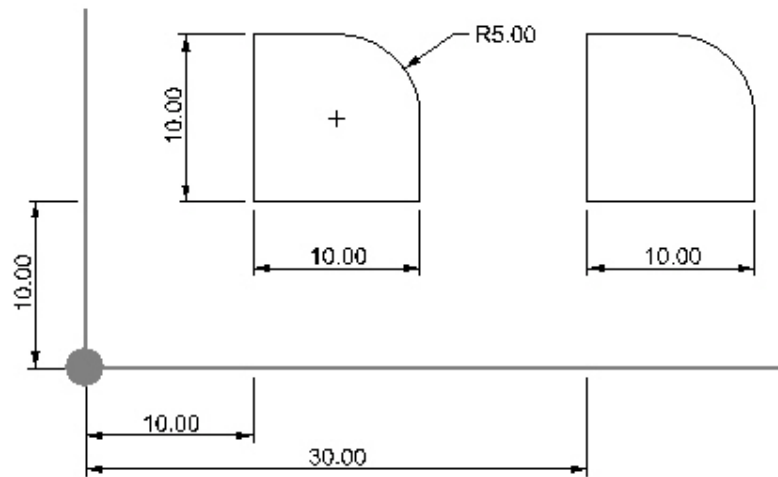


Roland RML (Roland Machine Language) Example

(Patrick Thorn 2008)

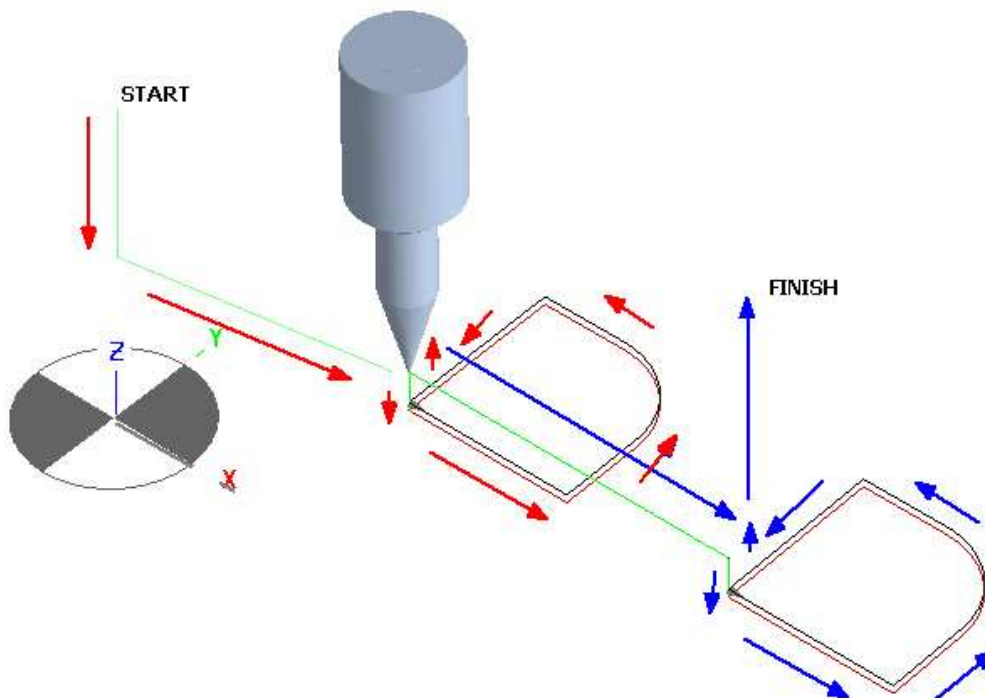
- Sample Drawing



- Sample Parameters used

Cutting parameters		Machine parameters	
Tool diameter :	<input type="text" value="0.500"/> mm	Tool number:	<input type="text" value="1"/>
Rapid plane :	<input type="text" value="2.000"/> mm	Spindle speed :	<input type="text" value="6500"/> rpm
Total depth :	<input type="text" value="0.500"/> mm	Feedrate :	<input type="text" value="12"/> mm/s
Depth cut pass :	<input type="text" value="3.000"/> mm	Plunge feed :	<input type="text" value="3"/> mm/s

- Tool path schematic



MDX15/20 Format (0.025mm step)

```

;;^N;
!MC1;
^PR;
V15.0;
Z0,0,162.6;
^PA;
Z402,400,400;
V15.0;
Z402,400,80;
V3.0;
Z402,400,-20;
V12.0;
Z421,400,-20;
Z800,400,-20;
Z800,610,-20;
Z798,624,-20;
Z796,639,-20;
Z793,653,-20;
Z788,667,-20;
Z783,681,-20;
Z776,694,-20;
Z769,707,-20;
Z761,719,-20;
Z751,731,-20;
Z741,741,-20;
Z731,751,-20;
Z719,761,-20;
Z707,769,-20;
Z694,776,-20;
Z681,783,-20;
Z667,788,-20;
Z653,793,-20;
Z639,796,-20;
Z624,798,-20;
Z610,800,-20;
Z600,800,-20;
Z400,800,-20;
Z400,400,-20;
Z402,400,-20;
V15.0;
Z402,400,80;
Z1200,400,80;
V3.0;
Z1200,400,-20;
V12.0;
Z1219,400,-20;
Z1600,400,-20;
Z1600,610,-20;
Z1598,624,-20;
Z1596,639,-20;
Z1593,653,-20;
Z1588,667,-20;
Z1583,681,-20;
Z1576,694,-20;
Z1569,707,-20;
Z1561,719,-20;
Z1551,731,-20;
Z1541,741,-20;
Z1531,751,-20;
Z1519,761,-20;
Z1507,769,-20;
Z1494,776,-20;
Z1481,783,-20;
Z1467,788,-20;
Z1453,793,-20;
Z1439,796,-20;
Z1424,798,-20;
Z1410,800,-20;
Z1400,800,-20;
Z1200,800,-20;
Z1200,400,-20;
V15.0;
Z1200,400,80;
!MC0;
^PR;
V15.0;
Z0,0,162.6;
^N;

```

MDX40 Format (0.01mm step)

```

;;^DF;
!MC0;V50.0;
^PR;
Z0,0,10500;
^PA;
!RC3;!MC1;
Z1005,1000,1000;
V85.0;
Z1005,1000,200;
V3.0;
Z1005,1000,-50;
V12.0;;
Z1053,1000,-50;
Z2000,1000,-50;
Z1999,1525,-50;
Z1996,1561,-50;
Z1990,1598,-50;
Z1982,1633,-50;
Z1971,1668,-50;
Z1957,1703,-50;
Z1941,1736,-50;
Z1922,1767,-50;
Z1902,1798,-50;
Z1879,1827,-50;
Z1854,1854,-50;
Z1827,1879,-50;
Z1798,1902,-50;
Z1767,1922,-50;
Z1736,1941,-50;
Z1703,1957,-50;
Z1668,1971,-50;
Z1633,1982,-50;
Z1598,1990,-50;
Z1561,1996,-50;
Z1525,1999,-50;
Z1500,2000,-50;
Z1000,2000,-50;
Z1000,1000,-50;
Z1005,1000,-50;
V50.0;
Z1005,1000,200;
Z3000,1000,200;
V3.0;
Z3000,1000,-50;
V12.0;
Z3048,1000,-50;
Z4000,1000,-50;
Z3999,1525,-50;
Z3996,1561,-50;
Z3990,1598,-50;
Z3982,1633,-50;
Z3971,1668,-50;
Z3957,1703,-50;
Z3941,1736,-50;
Z3922,1767,-50;
Z3902,1798,-50;
Z3879,1827,-50;
Z3854,1854,-50;
Z3827,1879,-50;
Z3798,1902,-50;
Z3767,1922,-50;
Z3736,1941,-50;
Z3703,1957,-50;
Z3668,1971,-50;
Z3633,1982,-50;
Z3598,1990,-50;
Z3561,1996,-50;
Z3525,1999,-50;
Z3500,2000,-50;
Z3000,2000,-50;
Z3000,1000,-50;
V50.0;
Z3000,1000,200;
^PR;
Z0,0,10500;
!MC0;
^DF;

```

MDX540 Format (0.01mm step)

```

;;^DF;
!MC0;V125.0;
^PR;
Z0,0,15500;
J1;
^PA;
!RC6;!MC1;
Z1005,1000,1000;
V125.0;
Z1005,1000,200;
V3.0;
Z1005,1000,-50;
V12.0;
Z1053,1000,-50;
Z2000,1000,-50;
Z1999,1525,-50;
Z1996,1561,-50;
Z1990,1598,-50;
Z1982,1633,-50;
Z1971,1668,-50;
Z1957,1703,-50;
Z1941,1736,-50;
Z1922,1767,-50;
Z1902,1798,-50;
Z1879,1827,-50;
Z1854,1854,-50;
Z1827,1879,-50;
Z1798,1902,-50;
Z1767,1922,-50;
Z1736,1941,-50;
Z1703,1957,-50;
Z1668,1971,-50;
Z1633,1982,-50;
Z1598,1990,-50;
Z1561,1996,-50;
Z1525,1999,-50;
Z1500,2000,-50;
Z1000,2000,-50;
Z1000,1000,-50;
Z1005,1000,-50;
V125.0;
Z1005,1000,200;
Z3000,1000,200;
V3.0;
Z3000,1000,-50;
V12.0;
Z3048,1000,-50;
Z4000,1000,-50;
Z3999,1525,-50;
Z3996,1561,-50;
Z3990,1598,-50;
Z3982,1633,-50;
Z3971,1668,-50;
Z3957,1703,-50;
Z3941,1736,-50;
Z3922,1767,-50;
Z3902,1798,-50;
Z3879,1827,-50;
Z3854,1854,-50;
Z3827,1879,-50;
Z3798,1902,-50;
Z3767,1922,-50;
Z3736,1941,-50;
Z3703,1957,-50;
Z3668,1971,-50;
Z3633,1982,-50;
Z3598,1990,-50;
Z3561,1996,-50;
Z3525,1999,-50;
Z3500,2000,-50;
Z3000,2000,-50;
Z3000,1000,-50;
V125.0;
Z3000,1000,200;
^PR;
Z0,0,15500;
!MC0;
^DF;

```

With this example you can see that all machines can be controlled using the minimum number of commands to achieve the same cutting path shape.

All machines can use the following commands, machine differences are shown below.

Files are TEXT based and begin with “;” characters, no other data like the red comments can be used.

^PR position relative is used to make sure the Z axis is moved to the maximum up position before cutting starts.

^PA position absolute controls all the cutting movements.

Z axis zero is set by the user, then Z up moves are Positive and Z down moves are Negative.

Using the Z command with all 3 axis coordinates is the simplest format to use. Coordinates are in machine steps, either 0.025mm or 0.01mm.

Feedrate is controlled with V command. Z axis move feedrates are usually slower than XY feedrates.

MDX15/20 Machines

Software resolution 0.025mm/steps

Spindle speed is fixed on the machine at 6,500 rpm and controlled on and off with the !1; and !0; commands.

XY axis origin is the front left of the machine.

Maximum feedrate is 15mm/sec in all axis.

The depth of cut is 0.5mm so on the MDX15/20 is -20 steps.

MDX40 Machine

Software resolution 0.01mm steps

Maximum feedrate is 50mm/sec in XY axis and 30mm/sec in Z axis.

Spindle speed is variable on the machine between 4,500 rpm and 15,000 rpm controlled using the !RC command.

!RC0; = 4,500rpm !RC15; = 15,000rpm (ie 6500rpm = !RC3;)

Spindle on and off uses the !MC1; and !MC0; commands.

XY axis origin is the front left of the machine and can be repositioned by the user via the Vpanel.

The depth of cut is 0.5mm so on the MDX40 is -50 steps.

MDX540 Machine

Software resolution 0.01mm steps

Maximum feedrate is 125mm/sec.

Spindle speed is variable on the machine between 3,000 rpm and 12,000 rpm controlled using the !RC command.

!RC0; = 3,000rpm !RC15; = 12,000rpm (ie 6500rpm = !RC6;)

Spindle on and off uses the !MC1; and !MC0; commands.

XY axis origin is the front left of the machine and can be repositioned by the user via the Vpanel.

Optional automatic tool changer is available on this machine. J1; = Tool 1 upto J4; for Tool4, J0; replaces any tool left in the spindle. If no tool changer is present, then the MDX540 ignores these commands.

The depth of cut is 0.5mm so on the MDX540 is -50 steps.

Other Roland machines.

In the history of Roland milling (MDX or CAMM-3) and engraving (EGX or CAMM-2)machines, virtually all of them will work with these examples depending if they are 0.01 or 0.025mm step machines. All earlier machines accept the spindle on/off commands !1 and !0, only machines since the 2001 accept the !RC and !MC commands. Therefore adopting this simple format will result in little or no change for other models not detailed above. Current EGX models use the format like the MDX40 with different spindle speeds.

Roland CAMM-3 (models PNC3000, 300, 3100, 3200, 2500, 2700)

As the machines evolved from plotters using R-PGL, a similar format to HPGL. The machines had the ability to work in 0.025mm steps for 2.5D programming using ^PU; ^PD; type commands.

In full 3D cutting using the "Z" command 0.01mm steps are preferred. F is used for XY feeds, V is used for Z feeds.

Example of original CAMM-3

```
..R;  
!1;  
^PA;  
F22;V22;  
Z1005,1000,1000;  
Z1005,1000,200;  
V3;  
Z1005,1000,-50;  
F12;  
Z1053,1000,-50;  
Z2000,1000,-50;  
Z1999,1525,-50;  
-----  
Z3000,2000,-50;  
Z3000,1000,-50;  
F22;V22;  
Z3000,1000,200;  
H;
```