LatheCity
Safely Working with Benchtop Systems
Volume 5 – CNC Benchtop Lathe
Featuring Sherline

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##

The codes available for free from our website do not include any commends or explanations.
For that you would need to get the book.

##
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```
########################################
; PRG 8x1

g00 g20 g40 g49 g90 x0 z0
g00 x1 z1
g01 x0 z0 f2
m2

########################################
; PRG 8x2

g00 g20 g40 g49 g90 x0 z0
g00 x1 z1
g01 x0 z0 f2
m2

########################################
; PRG 8x3

g18 g00 g20 g40 g49 g90 x0 z0;

m2
########################################
;PRG 9 x1


g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f5;
g01 x0 z0.5;
g01 x0 z-0.5;
g01 x0 z0;
g01 x0.25 z0;
g01 x-0.25 z0;
g01 x0 z0;
g01 x0.25 z1;
g01 x0 z0;
m2

########################################
;PRG 9x3


g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f5;
g01 x0 z-0.5;
g01 x0 z0.0;
g01 x-0.01 z0.0;
g01 x-0.01 z-0.5;
g01 x-0.01 z0.0;
g01 x-0.02 z0.0;
g01 x-0.02 z-0.5;
```

```
g01 x-0.02 z0.0;
g01 x-0.03 z0.0;
g01 x-0.03 z-0.5;
g01 x-0.03 z0.0;
g01 x-0.04 z0.0;
g01 x-0.04 z-0.5;
g01 x-0.04 z0.0;
g01 x-0.05 z0.0;
g01 x-0.05 z-0.5;
g01 x-0.05 z0.0;
g01 x0 z0;
m2;

##########################################
;PRG 9x 4



(msg, ...)
m1
g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f5;
g01 x0 z-0.5;
g01 x0 z0.0;
g01 x-0.01 z0.0;
g01 x-0.01 z-0.5;
g01 x-0.01 z0.0;
g01 x-0.02 z0.0;
g01 x-0.02 z-0.5;
g01 x-0.02 z0.0;
g01 x-0.03 z0.0;
g01 x-0.03 z-0.5;
g01 x-0.03 z0.0;
g01 x-0.04 z0.0;
g01 x-0.04 z-0.5;
g01 x-0.04 z0.0;
g01 x-0.05 z0.0;
g01 x-0.05 z-0.5;
g01 x-0.05 z0.0;
g01 x0 z0;
m2;

##########################################
;PRG 9 x 5


g18 g00 g20 g40 g49 g91 x0 z0;
g01 x0 z0 f5;
g01 x0 z-0.5;
g01 z0.5;
g01 x-0.01;
g01 z-0.5;
g01 z0.5;
g01 x-0.01;
g01 z-0.5;
g01 z0.5;
g01 x-0.01;
g01 z-0.5;
g01 z0.5;
g01 x-0.01;
g01 z-0.5;
g01 z0.5;
g01 x-0.01;
```

```
g01 z-0.5;
g01 z0.5;
m2;

########################################
;PRG 9x 6


g18 g00 g20 g40 g49 g91 x0 z0;
g01 x0 z0 f5;
x0 z-0.5;
z0.5;
x-0.01;
z-0.5;
z0.5;
x-0.01;
z-0.5;
z0.5;
x-0.01;
z-0.5;
z0.5;
x-0.01;
z-0.5;
z0.5;
x-0.01;
z-0.5;
z0.5;
m2;
########################################
;PRG 9x7

o100 sub;
(msg, ...I am subprogram 100 at your service...)
0100 endsub;

(msg, I am your main program)
(msg, let's try subprograms)
(msg, - are you ready?)
m1;
o100 call;
(msg, it's me again your main program)
(msg, let's try this again)
(msg, - are you ready?)
m1;
o100 call;
(msg, - I get bored. Bye Bye.)
m2;
########################################
;PRG 9x8


o100 sub;
    g01 z0.5;
    g01 x-0.01;
    g01 z-0.5;
0100 endsub;

g18 g00 g20 g40 g49 g91 x0 z0;
g01 x0 z0 f5;
g01 x0 z-0.5;
o100 call;
o100 call;
o100 call;
```

```
o100 call;
o100 call;
g01 z0.5;
m2;
########################################
;PRG 9x9

o100 sub;
     (debug, x =#1 and z = #2);
o100 endsub;

o100 call [0.2] [0.2];
m2;
########################################
;PRG 9x10

o100 sub;
   g0 x[#1] z[#2];
o100 endsub;

g18 g00 g20 g40 g49 g91;
g01 x0 z0 f5;
o100 call [0.2] [0.2];
o100 call [-0.2] [-0.2];
m2;

########################################
;PRG 9x11

o100 sub;
     (debug, diameter =#1 );
     #2=[#1/2];
    (debug, radius =#2 );
o100 endsub;

o100 call [2.5];
m2;
########################################
;PRG 9x12

o100 sub
     (debug, diameter =#1 )
     #<radius>=[#1/2];
     (debug, radius =#<radius> )
o100 endsub

o100 call [2.5];
m2;

########################################
;PRG 9x13

o<Calc> sub
     (debug, diameter =#1 )
     #<radius>=[#1/2]
     (debug, radius =#<radius> )
o<Calc> endsub

o<Calc> call [2.5]
m2;
########################################
;PRG 9x14
```

```
; 9/16 = diameter measured over the flats
; r = 9/16*0.5=0.28125 radius over flats
; radius of circumscribed circle = R = 1.155 r see handbook page 71
; R=9/16 * 0.5 * 1.155 = 0.3248 = starting radius
; diameter of circumscribed circle = 0.6497 = starting diameter
;cut off diameter 0.6497-0.3510=0.2987
;cut off radius 0.2987/2=0.14935
… from here use standard turning program
##########################################
;PRG 11X1


g18 g00 g20 g40 g49 g91 x0 z0;
g01 x0 z0 f7;
x-0.002;
z-0.723;
z0.723;
…(see Tab. 11.2, starting diameter 0.3561)
m2;

******************

#0      0.800
#1      0.723
#2      0.646
#3      0.569
#4      0.492
#5      0.415
#6      0.338
#7      0.262
#8      0.185
#9      0.108

0.002” slices


****************


g18 g00 g20 g40 g49 g91 x0 z0;
g01 x0 z0 f3;

x-0.002;
z-0.800;
z0.723;

x-0.002;
z-0.723;
z0.723;

x-0.002;
z-0.646;
z0.723;

x-0.002;
z-0.569;
z0.723;

x-0.002;
z-0.492;
z0.723;

x-0.002;
```

```
z-0.415;
z0.723;

x-0.002;
z-0.338;
z0.723;

x-0.002;
z-0.262;
z0.723;

x-0.002;
z-0.185;
z0.723;

x-0.002;
z-0.108;
z0.723;

m2;


##########################################
; prg 12X1


g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f6;

x   -0.0100 z    0.0200
x    0.0250 z   -0.0500
x   -0.0100 z    0.0200

x   -0.0150 z    0.0200
x    0.0200 z   -0.0500
x   -0.0150 z    0.0200

x   -0.0200 z    0.0200
x    0.0150 z   -0.0500
x   -0.0200 z    0.0200

x   -0.0250 z    0.0200
x    0.0100 z   -0.0500
x   -0.0250 z    0.0200

x   -0.0300 z    0.0200
x    0.0050 z   -0.0500
x   -0.0300 z    0.0200
m2;
##########################################
; PRG 12x2


g18 g20 g40 g49 g90;
g01 x0.0145 z-0.0397 f3;
g2 x-0.0397 z0.0145 r0.05;
g3 x0.0145 z-0.0397 r0.05;


g01 x0.0068 z-0.0473 f3;
g2 x-0.0473 z0.0068 r0.05;
g3 x0.0068 z-0.0473 r0.05;
```

```
g01 x-0.0002 z-0.0543 f3;
g2 x-0.0543 z-0.0002 r0.05;
g3 x-0.0002 z-0.0543 r0.05;

m2;

##########################################
;PRG 12x3
;g18 g20 g40 g49 g90;

;g01 x0 z0 f30;
;g01 x0 z-1
;g01 x-0.5 z-1
;g01 x-0.5 z-0
;g01 x0 z0



g18 g20 g40 g49 g90;
g01 x0.0434 z-0.1191 f3;
g2 x-0.1191 z0.0434 r0.15;
g3 x0.0434 z-0.1191 r0.15;


g01 x0.0309 z-0.1231 f3;
g2 x-0.1231 z0.0309 r0.15;
g3 x0.0309 z-0.1231 r0.15;


g01 x0.0209 z-0.1331 f3;
g2 x-0.1331 z0.0209 r0.15;
g3 x0.0209 z-0.1331 r0.15;

g01 x0.0109 z-0.1431 f3;
g2 x-0.1431 z0.0109 r0.15;
g3 x0.0109 z-0.1431 r0.15;

;g01 x0.0009 z-0.1531 f3;
;g2 x-0.1531 z0.0009 r0.15;
;g3 x0.0009 z-0.1531 r0.15;


g01 x-0.0006 z-0.1631 f3;
g2 x-0.1631 z-0.0006 r0.15;
g3 x-0.0006 z-0.1631 r0.15;

g01 x0 z0 f3;

m2
##########################################
;PRG 13x1


g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f3;
; **********************

g01 x0 z0.1 f5;
x0 z-0.313;
z0.05;

x-0.010;
```

```
z-0.268;
z0.050;

x-0.020;
z-0.238;
z0.050;

x-0.030;
z-0.217;
z0.050;

x-0.040;
z-0.196;
z0.050;

x-0.050;
z-0.179;
z0.050;

x-0.060;
z-0.163;
z0.050;

x-0.070;
z-0.149;
z0.050;

x-0.080;
z-0.136;
z0.050;

x-0.090;
z-0.124;
z0.050;

x-0.100;
z-0.115;
z0.050;

x-0.110;
z-0.103;
z0.050;

x-0.120;
z-0.094;
z0.050;


x-0.130;
z-0.086;
z0.050;

x-0.140;
z-0.077;
z0.050;

x-0.150;
z-0.070;
z0.050;

x-0.160;
z-0.064;
z0.050;
```

```
x-0.170;
z-0.057;
z0.050;

x-0.180;
z-0.050;
z0.050;

x-0.190;
z-0.045;
z0.050;

x-0.200;
z-0.039;
z0.050;

x-0.210;
z-0.035;
z0.050;

x-0.220;
z-0.031;
z0.050;

x-0.230;
z-0.026;
z0.050;

x-0.240;
z-0.023;
z0.050;

x-0.250;
z-0.019;
z0.050;

x-0.260;
z-0.016;
z0.050;

x-0.270;
z-0.013;
z0.050;

x-0.280;
z-0.010;
z0.050;

x-0.290;
z-0.008;
z0.050;

x-0.300;
z-0.006;
z0.050;

x-0.310;
z-0.005;
z0.050;

x-0.320;
z-0.003;
```

```
z0.050;

;x-0.330;
;z-0.002;
;z0.050;

x-0.340;
z-0.002;
z0.050;

;x-0.350;
;z-0.001;
;z0.050;

x-0.360;
z-0.001;
z0.050;

;**********************
z1 f8;
(msg,finished)
(msg,remove part)
(msg,go back to HOME - ready?)
m0
x0 z0 f3;
m2;

##########################################
;PRG 13x2

g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f3;

g01 x0 z0 f3;
g2 x-0.25 z0.25 r0.25;
g3 x0 z0 r0.25;

g01 x0 z-0.05 f3;
g2 x-0.25 z0.20 r0.25;
g3 x0 z-0.05 r0.25;

g01 x0 z-0.1 f3;
g2 x-0.25 z0.15 r0.25;
g3 x0 z-0.1 r0.25;

g01 x0 z-0.15 f3;
g2 x-0.25 z0.10 r0.25;
g3 x0 z-0.15 r0.25;

g01 x0 z-0.20 f3;
g2 x-0.25 z0.05 r0.25;
g3 x0 z-0.20 r0.25;


g01 x0 z-0.25 f3;
g2 x-0.25 z0 r0.25;
g3 x0 z-0.25 r0.25;

x0 z0 f3;
m2;
##########################################
; prg 14X1
```

```
g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f3;

x -0.344  z 0.0 f3;
x -0.339  z 0.0;
x -0.339  z -0.505;
x -0.339  z 0.0;

x -0.334  z 0.0;
x -0.334  z -0.505;
x -0.334  z 0.0;
…
x -0.3125  z 0.0;
x -0.3125  z -0.505;
x -0.3125  z -0.0;

z1 f8;
(msg,finished)
(msg,remove part)
(msg,go back to HOME - ready?)
m0
x0 z0 f3;
m2;
##########################################
; prg 15X1



(msg, switch on spindle)
m0
g18 g00 g20 g40 g49 g90 x0 z0;
g01 x0 z0 f3;




x   -0.0983 z    0.0500 f3
x   -0.1177 z   -0.8000
x   -0.0983 z    0.0500

x   -0.0933 z    0.0500
x   -0.1127 z   -0.8000
x   -0.0933 z    0.0500

x   -0.0883 z    0.0500
x   -0.1077 z   -0.8000
x   -0.0883 z    0.0500

x   -0.0833 z    0.0500
x   -0.1027 z   -0.8000
x   -0.0833 z    0.0500

x   -0.0783 z    0.0500
x   -0.0978 z   -0.8000
x   -0.0783 z    0.0500

z0.15 f8;
(msg,finished)
(msg,remove part)
(msg,go back to HOME - ready?)
m0
x0 z0 f3;
```

```
m2;
##########################################
; prg 16X1


o100 sub;

g0 z0 z0;
o100


g18 g00 g20 g40 g49 g90 x0 z0 f3;


g92 x0.0 z0.0;
o100 call;
g92.2;


g92 x0.0 z0.0;
o100 call;
g92.2;


m2
##########################################
;Fig 16x2

o100 sub


g18 g20 g40 g49 g90;
g01 x0.0145 z-0.0397 f3;
g2 x-0.0397 z0.0145 r0.05;
g3 x0.0145 z-0.0397 r0.05;

g01 x0.0068 z-0.0473 f3;
g2 x-0.0473 z0.0068 r0.05;
g3 x0.0068 z-0.0473 r0.05;

g01 x-0.0002 z-0.0543 f3;
g2 x-0.0543 z-0.0002 r0.05;
g3 x-0.0002 z-0.0543 r0.05;
g01 x0 z0 f3;
o100 endsub

g18 g00 g20 g40 g49 g90 x0 z0 f5;

g01 x0 z-0.5;
g01 x0 z0.0;
g01 x-0.05 z0.0;
g01 x-0.05 z-0.5;
g01 x-0.05 z0.0;
g01 x-0.10 z0.0;
g01 x-0.10 z-0.5;
g01 x-0.10 z0.0;

g01 x-0.10 z0.0;
g92 x0.0 z0.0;
o100 call;
g92.2;

g01 x0 z-0.5;
```

```
g92 x0.0 z0.0;
o100 call;
g92.2;
g01 x-0.0 z1.0;
m2;
##########################################
tAB 11.2
0.001” slices

#0      0.800
#1      0.762
#2      0.723
#3      0.685
#4      0.646
#5      0.608
#6      0.569
#7      0.531
#8      0.492
#9      0.454
#10      0.415
#11      0.377
#12      0.338
#13      0.300
#14      0.262
#15      0.223
#16      0.185
#17      0.146
#18      0.108
#19      0.069

0.002” slices

#0      0.800
#1      0.723
#2      0.646
#3      0.569
#4      0.492
#5      0.415
#6      0.338
#7      0.262
#8      0.185
#9      0.108

##########################################
Tab. 13.1


#1      0.313
#2      0.268
#3      0.238
#4      0.217
#5      0.196
#6      0.179
#7      0.163
#8      0.149
#9      0.136
#10      0.124
#11      0.115
#12      0.103
#13      0.094
#14      0.086
#15      0.077
#16      0.070
```

```
#17      0.064
#18      0.057
#19      0.050
#20      0.045
#21      0.039
#22      0.035
#23      0.031
#24      0.026
#25      0.023
#26      0.019
#27      0.016
#28      0.013
#29      0.010
#30      0.008
#31      0.006
#32      0.005
#33      0.003
#34      0.002
#35      0.001
 #36      0.001
################################
```

Useful links

http://en.wikipedia.org/wiki/G- code#Abbreviations_used_by_
programmers_and_operators List of CNC bubble terms
http://www.sherline.com/CNCmenu.htm download of Sherline CNC manuals
http://www.sherline.com/8400pg.htm Specs of Sherline CNC lathe, scroll down to the bottom
http://linuxcnc.org/docs/EMC2_User_Manual.pdf
http://www.sherline.com/8760pg.htm

CNC thread cutting for Sherline lathe
http://www.cadcamcadcam.com/ commercial
http://www.cadcamcadcam.com/latheencoderkit.aspx
http://www.imsrv.com/deskcnc/lathe/desktopcncthreading.pdf
http://www.dakeng.com/threading.html self-made system
Linux and EMC
http://wiki.linuxcnc.org/cgi-bin/wiki.pl?LinuxCNCKnowledgeBase
http://www.linuxcnc.org/

G-code
http://en.wikipedia.org/wiki/G-code
http://www.sherline.com/gcode.htm g-code list
http://carlsonmfg.com/industrial-resources-articles/18-cnc-code-programming g-code list
http://gnipsel.com/linuxcnc/index.html on-line book
http://www.cnccookbook.com/CCCNCGCodeCourse.htm on-line book
http://www.cnccookbook.com/CCCNCGCodeBasicLatheProgramming.html on-line book-lathe section
http://www.deskcnc.com/
http://en.wikipedia.org/wiki/G-code complete list
http://wiki.linuxcnc.org/cgi-bin/wiki.pl?Simple_LinuxCNC_G-Code_Generators g-code generators

Internet movies
https://www.youtube.com/results?search_query=Sherline+CNC+lathe search for movies
http://www.youtube.com/watch?v=Q92C9xd9Ybw intro from Sherline
https://www.youtube.com/watch?v=C8zwXztmpEc thread cutting on Sherline’s CNC lathe

Journals
http://www.homeshopmachinist.net/home
http://www.gasenginemagazine.com/
http://www.model-engineer.co.uk/

CNC controller for small machines
http://www.imsrv.com/
http://www.imsrv.com/imservice_controller_model.htm

##
chapter 12.3
read the chapter before using this code!

```
g18 g20 g40 g49 g91;
g01 x0 z0 f2;
```

****

```
g2 x0 z0 i0 k0.5;
```

****

```
g2 x0 z0 i0.5 k0
```

****

```
g2 x0 z0 i0.5 k0.5
g2 x0 z0 i0 k-0.5
```

****

```
g18 g20 g40 g49 g90;
g0 x0 z0 f3;
g3 x-0.5 z0.5 i0 k0.5;
```

****

```
g18 g20 g40 g49 g91; i
g01 x0 z0 f2;
g2 x0.5 z0.5 r0.5;
```

****

```
g18 g20 g40 g49 g91;
g01 x0 z0 f2;
g2 x0 z1 r0.5;
```

****

```
g18 g20 g40 g49 g90;
g01 x0.5 z0.5 f3;
g2 x0 z1 r0.5;
g3 x0.5 z0.5 r0.5;
g01 x0.4 z0.5;
g2 x 0 z 0.9;
g3 x0.4 z0.5 r0.5;
```

****

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AllCodes

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