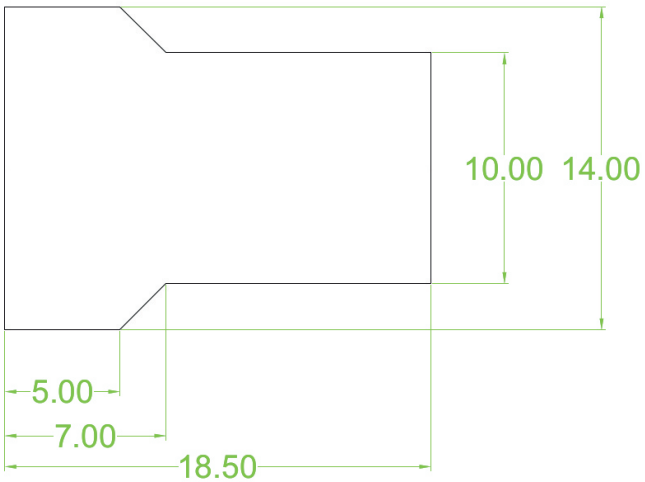
Notes on preparing programs for the Mori Seiki Duraturn lathe ENGR480 2023-10-16

1. Use only UPPER case letters. All lower case letters will be ignored by the control.
2. Begin and end program with '%' character.
3. Second line of program should be Oabcd where abcd is a four digit number.
4. Comments are enclosed in parentheses.
5. All coordinates values must have a decimal point.
6. File must be saved as plain text file (not .doc or other word processor format).
7. Copy file to k:\class\engr\cnc, naming it 'moricode.txt' (do this just before loading it in the lathe).

Assignment for Lab 2023-10-17

Write a program to machine the part below on the Mori Seiki lathe. Use one of the supplied programs as a template. Your program should face the part, rough turn, finish turn, and cutoff the part.



Example of simple cylinder (without variables)
http://engr.wallawalla.edu/engr480 -> examples -> mori -> ex20180926novar.ngc

```
%
O0927; (SIMPLE CYLINDER EXAMPLE 2018-09-26)
; (STOCK- ALUM 0.625IN X 19MM + 10MM)
; (FINISHED PART IS 10.0MM OD X 18.5MM
LONG)
; (TOOLS-)
; (T1- CNMG 80DEG DIAMOND)
; (T10- 3.175MM CUTOFF)

; (FACE WITH CNMG)

G0 T0101        (SELECT TOOL 1)
G50 S3000       (MAX SPEED 3000RPM)
G96 S300        (SET CONST SURFACE SPEED)
G99             (FEED PER REV)
M3              (TURN ON SPINDLE)
G0 Z18.5        (MOVE TO PLANE OF FACE)
G0 X16.0        (MOVE CLOSE TO STOCK OD)
M8              (TURN ON COOLANT)
G1 X-0.1 F0.2   (FACE DOWN TO CENTER)
G1 Z19.5 F1.0   (BACK OFF)
M9              (TURN OFF COOLANT)
M5              (TURN OFF SPINDLE)
G28 U0 W0       (GO HOME)
M1              (WAIT FOR START BUTTON)

; (ROUGH TURN OD WITH CNMG)

G0 T0101
G50 S3000
G96 S300
G99
G0 X18.0 Z28.0  (GET CLOSE)
M3
M8
G0 X13.0 Z21.0  (INITIAL POINT)
G1 Z-3.2 F0.2   (PASS 1)
G1 X18.0 F0.2
G0 Z21.0

G0 X11.5
G1 Z-3.2 F0.2   (PASS 2)
G1 X18.0 F0.2
G0 Z21.0

G0 X10.5
G1 Z-3.2 F0.2   (PASS 3)
G1 X40.0 F0.2
G0 Z21.0
M9
M5
G28 U0 W0
M1

; (FINISH TURN WITH CNMG)

G0 T0101
G50 S4000
G96 S300
G99
G0 X18.0 Z28.0       (GET CLOSE)
M3
G0 X13.0 Z21.0       (INITIAL POINT)
M8
G0 X10.0
G1 Z-3.2 F0.05
G1 X18.0 F0.05
G0 Z21.0
M9
M5
G28 U0 W0
M1

; (CUTOFF)

G0 T1010
G50 S1000
G96 S300
G0 Z0.0
G0 X20.0
M3
M8
G1 X-0.4 F0.05
G1 X20.0 F4.0
M9
M5
G28 U0 W0
M30
%
```

Example of simple cylinder (with variables)
http://engr.wallawalla.edu/engr480 -> examples -> mori -> ex20180926vars.ngc

```
%
O0927; (SIMPLE CYLINDER EXAMPLE 2017-09-27)
; (STOCK- ALUM 0.625IN X 19MM + 10MM)
; (FINISHED PART IS 10.0MM OD X 18.5MM
LONG)
; (TOOLS-)
; (T1- CNMG 80DEG DIAMOND)
; (T10- 3.175MM CUTOFF)

; (VARIABLES)
#500=15.875  (STOCK DIAM)
#501=18.5    (STOCK LEN)
#502=300.0   (SURFACE M/MIN)
#503=0.2     (ROUGH FEED MM/REV)
#504=0.05    (FINISH FEED MM/REV)
#510=10.0    (FINISH OD)

; (FACE WITH CNMG)

G0 T0101       (SELECT TOOL 1)
G50 S1000      (MAX SPEED 1000RPM)
G96 S#502      (SET CONST SURFACE SPEED)
G99            (FEED PER REV)
M3             (TURN ON SPINDLE)
G0 Z#501       (MOVE TO PLANE OF FACE)
G0 X[#500+1.0] (MOVE CLOSE TO STOCK OD)
M8             (TURN ON COOLANT)
G1 X-0.1 F#503 (FACE DOWN TO CENTER)
G1 Z[#501+1.0] F1.0    (BACK OFF)
M9             (TURN OFF COOLANT)
M5             (TURN OFF SPINDLE)
G28 U0 W0      (GO HOME)
M1             (WAIT FOR START BUTTON)

; (ROUGH TURN OD WITH CNMG)

G0 T0101
G50 S2000
G96 S#502
G99
G0 X[#500+10.0] Z[#501+10.0] (GET CLOSE)
M3
G0 X14.5 Z[#501 + 2.5]      (INITIAL POINT)
M8

G1 Z-3.2 F#503         (PASS 1)
G1 X[#500+2.0] F#503
G0 Z[#501 + 2.5]
G0 X13.0
G1 Z-3.2 F#503         (PASS 2)
G1 X[#500+2.0] F#503
G0 Z[#501 + 2.5]
G0 X11.5
G1 Z-3.2 F#503         (PASS 3)
G1 X[#500+2.0] F#503
G0 Z[#501 + 2.5]
G0 X10.5
G1 Z-3.2 F#503         (PASS 3)
G1 X[#500+2.0] F#503
G0 Z[#501 + 2.5]
M9
M5
G28 U0 W0
M1

; (FINISH TURN)

G0 T0101
G50 S4000
G96 S#502
G99
G0 X[#500+10.0] Z[#501+10.0] (GET CLOSE)
M3
G0 X[#500] Z[#501 + 2.5]    (INITIAL POINT)
M8
G0 X10.0
G1 Z-3.2 F#504    (USE FINISH FEED RATE)
G1 X[#500+2.0] F#503
G0 Z[#501 + 2.5]
M9
M5
G28 U0 W0
M1

; (CUTOFF)

G0 T1010
G50 S1000
G96 S#502
G0 Z0.0
G0 X[#500 + 2.0]
M3
M8
G1 X-0.4 F0.05
G1 X[#500+2.0] F4.0
M9
M5
G28 U0 W0
M30
%
```

Example of simple cylinder (with G71 cycle)
http://engr.wallawalla.edu/engr480 -> examples -> mori -> ex20180926g71.ngc

```
%
O0; (SIMPLE CYLINDER EXAMPLE WITH G71/G70
2018-09-26)
; (STOCK- ALUM 0.625IN X 19MM + 10MM)
; (FINISHED PART IS 10.0MM OD X 18.5MM
LONG)
; (TOOLS-)
; (T1- CNMG 80DEG DIAMOND)
; (T10- 3.175MM CUTOFF)

; (VARIABLES)

(- SET YOUR STOCK DIAM AND LENGTH HERE -)

    #500=15.875  (STOCK DIAM)
    #501=18.5    (STOCK LEN)

(---- END STOCK DIAM AND LEN ----)

#502=300.0   (SURFACE M/MIN)
#503=0.2     (ROUGH FEED MM/REV)
#504=0.05    (FINISH FEED MM/REV)
#510=10.0    (FINISH OD)

; (FACE WITH CNMG)
G0 T0101          (SELECT TOOL 1)
G50 S1000         (MAX SPEED 1000RPM)
G96 S#502         (SET CONST SURFACE SPEED)
G99               (FEED PER REV)
M3                (TURN ON SPINDLE)
G0 Z#501          (MOVE TO PLANE OF FACE)
G0 X[#500+1.0]    (MOVE CLOSE TO STOCK OD)
M8                (TURN ON COOLANT)
G1 X-0.1 F#503    (FACE DOWN TO CENTER)
G1 Z[#501+1.0] F1.0 (BACK OFF)
M9                (TURN OFF COOLANT)
M5                (TURN OFF SPINDLE)
G28 U0 W0         (GO HOME)
M1                (WAIT FOR START BUTTON)

; (ROUGH TURN OD WITH CNMG)
G0 T0101
G50 S2000
G96 S#502
G99
G0 X[#500+10.0] Z[#501+10.0] (GET CLOSE)
M3
G0 X#500 Z[#501 + 2.0]  (INITIAL POINT)
M8

G71 U2.0 R0.75    (2MM DOC, 0.75MM RETRACT)
G71 P100 Q110 U0.5 W0.25 F#503 (LEAVE 0.5MM
ON OD 0.25MM ON FACES)

(---- PUT ROUGHING PROFILES HERE ----)

  N100 G0 X0.0 Z[#501 + 2.0] (START POINT)

       G1 Z#501 F#504
          X10.0
          Z-3.2

  N110 G0 X[#500 + 2.0]      (EXIT)

(---- END ROUGHING PROFILES ----)

M9
M5
G28 U0 W0
M1

; (FINISH TURN WITH CNMG)

G0 T0101
G50 S4000
G96 S#502
G99
G0 X[#500+10.0] Z[#501+10.0] (GET CLOSE)
M3
G0 X#500 Z[#501 + 2.5]      (INITIAL POINT)
M8

G70 P100 Q110   (EXACT PROFILE FOR FINISH)

M9
M5
G28 U0 W0
M0

; (CUTOFF - DON'T CHANGE ANYTHING HERE)

G0 T1010
G50 S1000
G96 S#502
G0 Z0.0
G0 X[#500 + 2.0]
M3
M8
G1 X-0.4 F0.05
G1 X[#500+2.0] F4.0
M9
M5
G28 U0 W0
M30
%
```