

# VISION

## **FANUC 0 - T / 21 - T**

- Drehen
- Turning
- Tournage
- Tornear

**Ausgabe 2002**

**Ref. Nr.: VS 9972**

**Hersteller:**

EMCO MAIER Gesellschaft m.b.H. - P.O.Box 131- A-5400 Hallein/Austria- Tel.(06245) 891-0 Fax (06245) 86965

## INHALTSVERZEICHNIS

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1, 1a	Steuerungslayout Fanuc 0 - T, 21 - T
2	Bezugspunkte (M,A,W,R) und Koordinatensystem - Grundbild
3	Bezugspunkte am Werkzeugsystem (N,T,P); Darstellung Referenzieren.
4	Bezugspunkte: Symbole und Kurzzeichen
5	Nullpunktverschiebung (NPV) Offset - Grundbild
6	G92 Koordinatensystem setzen - Grundbild
7	Kombination Offset und G92 - Grundbild
8	Koordinatensystem zu NPV-Darstellung
9	Werkzeugkorrektur-Daten
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11	G01 Linearinterpolation
12	G02 Kreisinterpolation im Uhrzeigersinn
13	G03 Kreisinterpolation im Gegenuhrzeigersinn
14	Kreisinterpolation mit Mittelpunktskordinaten I, K
15	Einfügen von Radien "R" und Fasen "C"
16	G04 Verweilzeit
17	G10 Programmierung Werkzeugkorrekturen
18	G20 Längsdrehzyklus, Absolutwertprogrammierung
19	G20 Längsdrehzyklus, Inkrementalwertprogrammierung
20	G20 Längsdrehzyklus konisch
21	G21 Gewindeschneidzyklus zylindrisch
22	G21 Gewindeschneidzyklus konisch
23	G24 Plandrehzyklus zylindrisch
24	G24 Plandrehzyklus konisch
25	G28 Referenzpunkt anfahren
26	G33 Gewindeschneiden im Einzelsatz
27	G34 Gewindeschneiden im Einzelsatz, Steigung zunehmend
28	G34 Gewindeschneiden im Einzelsatz, Steigung abnehmend
29	G41, G42 Schneidenradiuskompensation (SRK) - Prinzip
30	G41, G42 Schneidenradiuskompensation (SRK) - Richtung
31	G40, G41, G42 Anwahl / Abwahl SRK im Programm

## INHALTSVERZEICHNIS

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33	G73 Längsdrehzyklus Kontur
34	G74 Plandrehzyklus Kontur
35	G75 Zyklus Musterwiederholung
36	G76 Zyklus Tieflochbohren
37	G76 Einstechzyklus Z-Achse
38	G77 Einstechzyklus X-Achse
39	G78 Mehrfach-Gewindeschneidzyklus
40	G78 Mehrfach-Gewindeschneidzyklus
41	G78 Mehrfach-Gewindeschneidzyklus
42	G83 Bohrzyklus
43	G84 Gewindebohrzyklus
44	G85 Ausreibbohrzyklus
45	G90 Absolutwertprogrammierung
46	G91 Inkrementalwertprogrammierung - Grundbild
47	G91 Werkzeug und Koordinaten
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## CONTENIDO

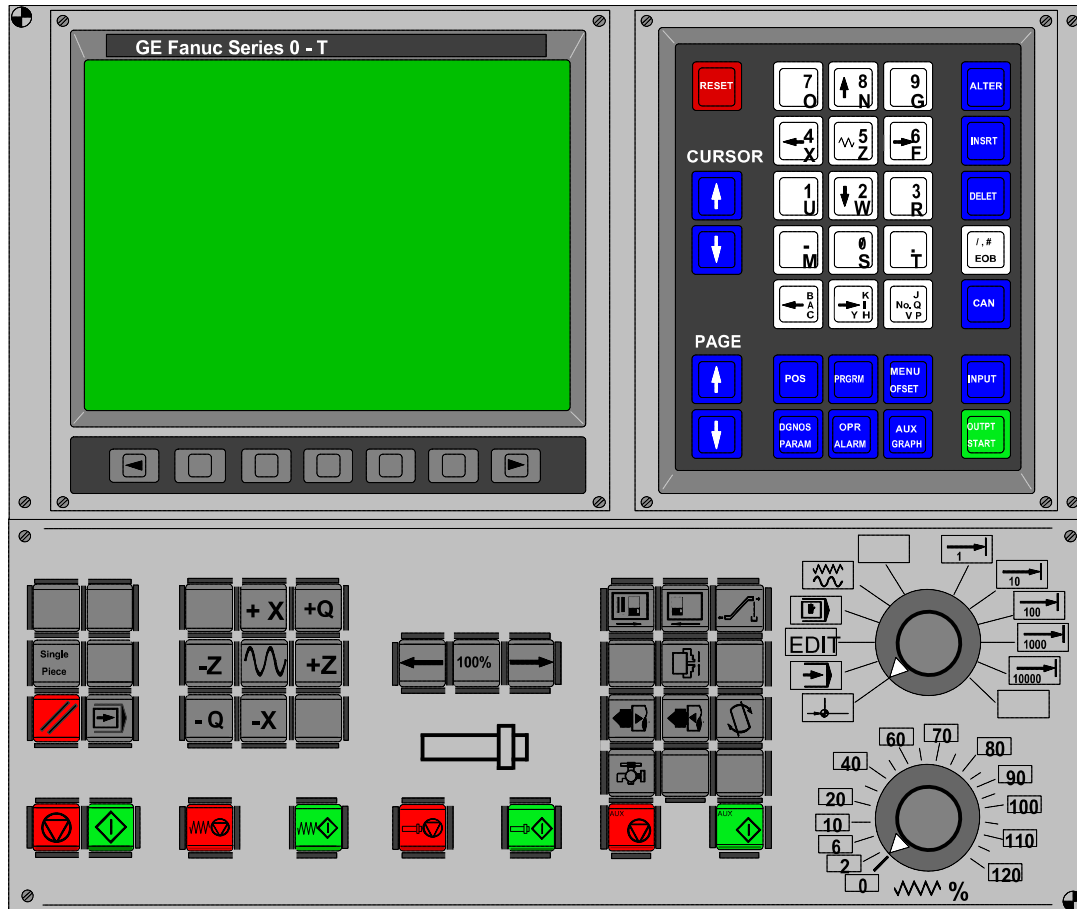
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1, 1a	Pupitre de mando Fanuc 0 - T, 21 - T
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31	G40, G41, G42 Selección / cancelación CRC en el programa



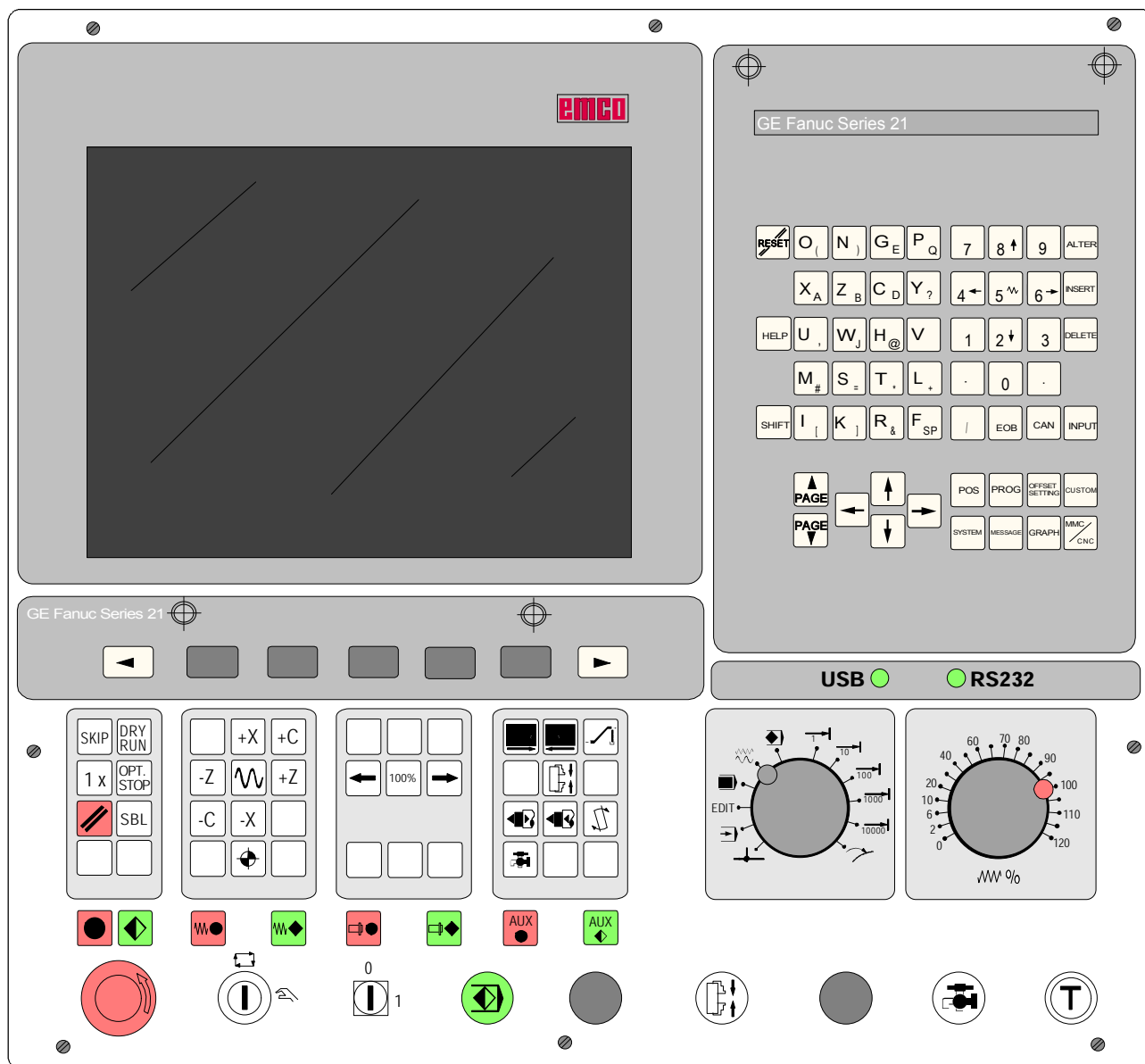
## CONTENIDO

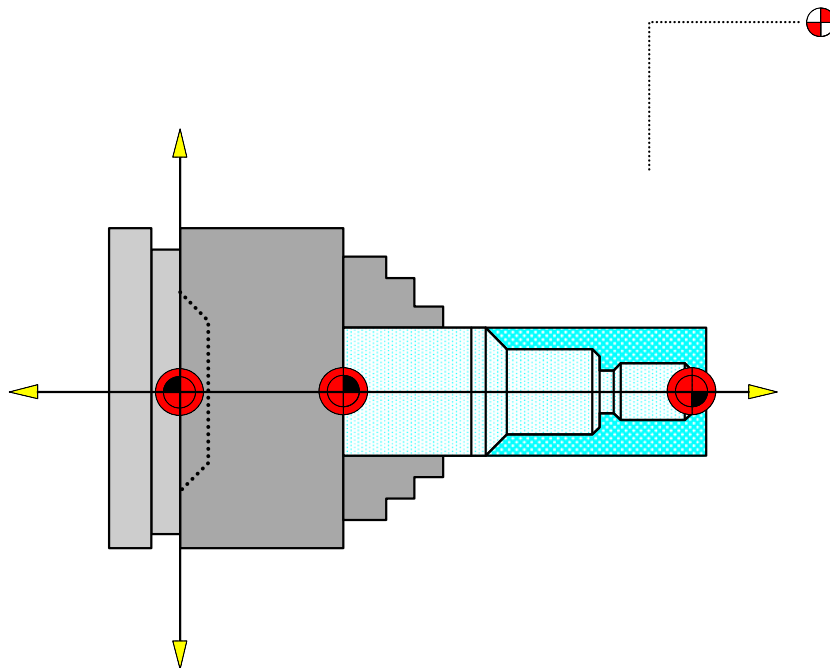
Hoja no.	Tema
32	G72 Ciclo de acabado contorno
33	G73 Ciclo de desbaste longitudinal contorno
34	G74 Ciclo de desbaste refrentar contorno
35	G75 Ciclo de repeticione del contorno
36	G76 Ciclo de taladrado profundo
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38	G77 Ciclo de ranurado en X
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49	M98, M99 Técnica de subprogramas
50	Contorno "recta"
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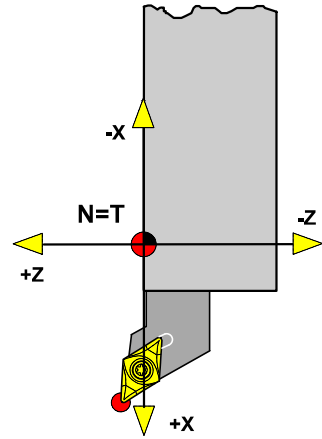
**0-T**



**21-T**









**M**

**Maschinennullpunkt**  
**Machine zero point**  
**Origine de la machine**  
**Punto cero de la máquina**



**A**

**Anschlag-Punkt**  
**Dead stop point**  
**Point d'arrêt du pièce**  
**Punto de tope**



**W**

**Werkstücknullpunkt**  
**Workpiece zero point**  
**Origine de la pièce**  
**Punto cero de la pieza**



**R**

**Referenzpunkt**  
**Reference point**  
**Référence de la machine**  
**Punto de referencia**



**T**

**Werkzeugträger-Bezugspunkt**  
**Toolholder reference point**  
**Référence des portes-outils**  
**Punto de referencia del portaherramientas**



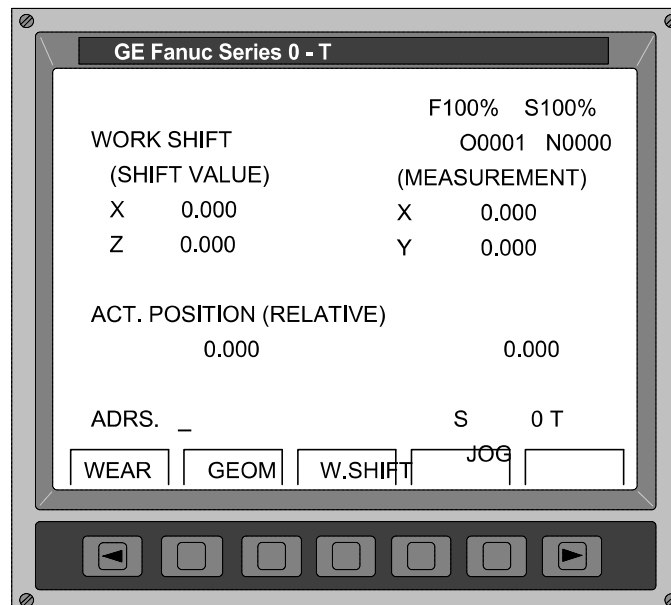
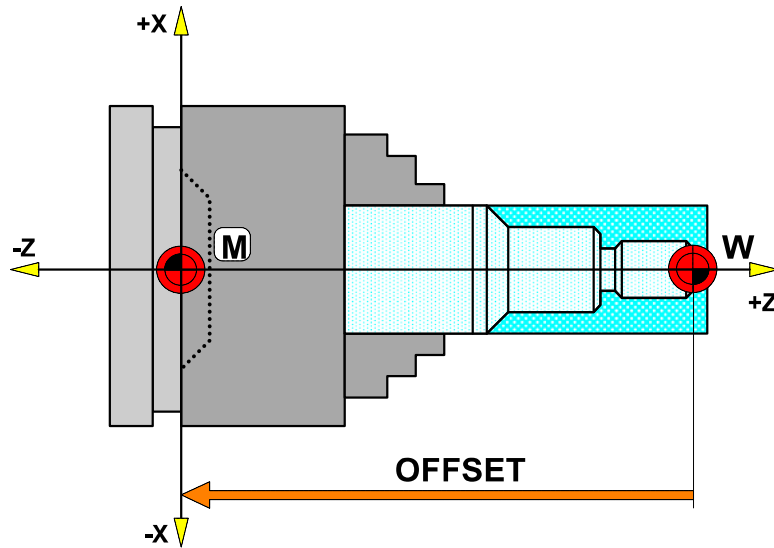
**N**

**Werkzeugaufnahme-Bezugspunkt**  
**Tool mount reference point**  
**Référence du système d'outillage**  
**Punto de referencia para toma de herramienta**

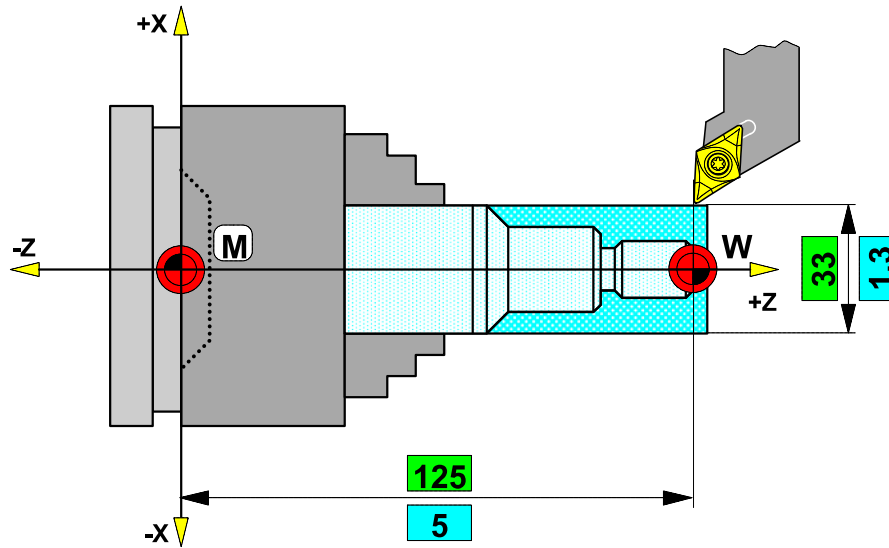


**P**

**Werkzeugpunkt**  
**Cutterpoint**  
**Point tranchant d'outil**  
**Punta de herramienta**



**G92**



```
N05 G00 X33 Z125
N10 G92 Z0
N..
N.. G00 Z0
N.. G92 Z125
```

mm

```
N05 G00 X1.3 Z5
N10 G92 Z0
N..
N.. G00 Z0
N.. G92 Z5
```

inch

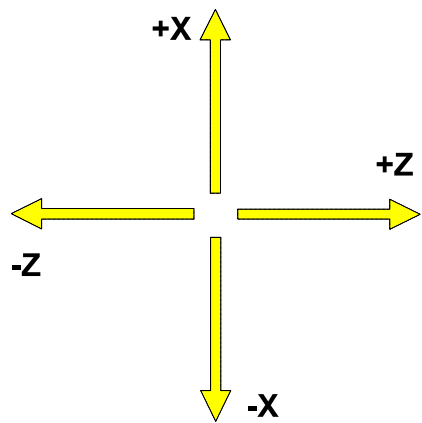


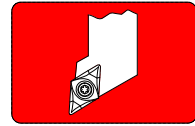
The diagram illustrates a lathe tool setup with the following components and dimensions:

- Coordinate Systems:**
  - Machine Coordinate System:** Defined by  $+X$  (vertical, yellow arrow) and  $-Z$  (horizontal, yellow arrow).
  - Tool Coordinate System:** Defined by  $+Z$  (horizontal, yellow arrow) and  $-X$  (vertical, yellow arrow).
- Tool and Workpiece:**
  - A turning tool is shown cutting a workpiece.
  - The workpiece has a diameter of  $33$  mm (green box) and a length of  $13$  mm (blue box).
- Offsets and Distances:**
  - Offset:** Indicated by an orange arrow from the  $-Z$  axis to the tool's reference point.
  - Distance 89:** A green box containing the value  $89$ , representing the distance from the tool's reference point to the workpiece's end face.
  - Distance 3.5:** A blue box containing the value  $3.5$ , representing the distance from the workpiece's end face to the tool's tip.
- Reference Points:**
  - M:** A red circle with a black dot, representing the machine's reference point.
  - A:** A red circle with a black dot, representing the tool's reference point.
  - W:** A red circle with a black dot, representing the workpiece's reference point.

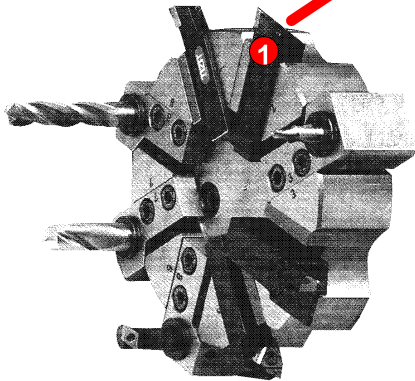
mm

**inch**





**T 01 01**



GE Fanuc Series 0 - T

F100% S100%

OFFSET/GEOMETRY O0001 N0000

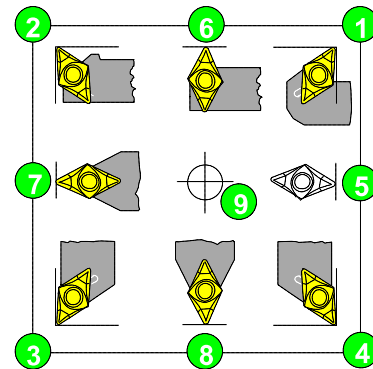
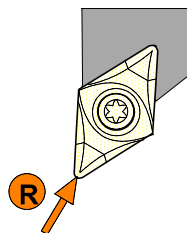
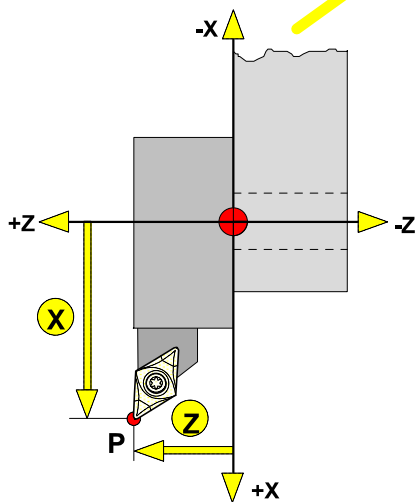
No.	X	Z	R	T
G 01	0.000	0.000	0.000	0
G 02	0.000	0.000	0.000	0
G 08	0.000	0.000	0.000	0

ACT. POSITION (RELATIVE)

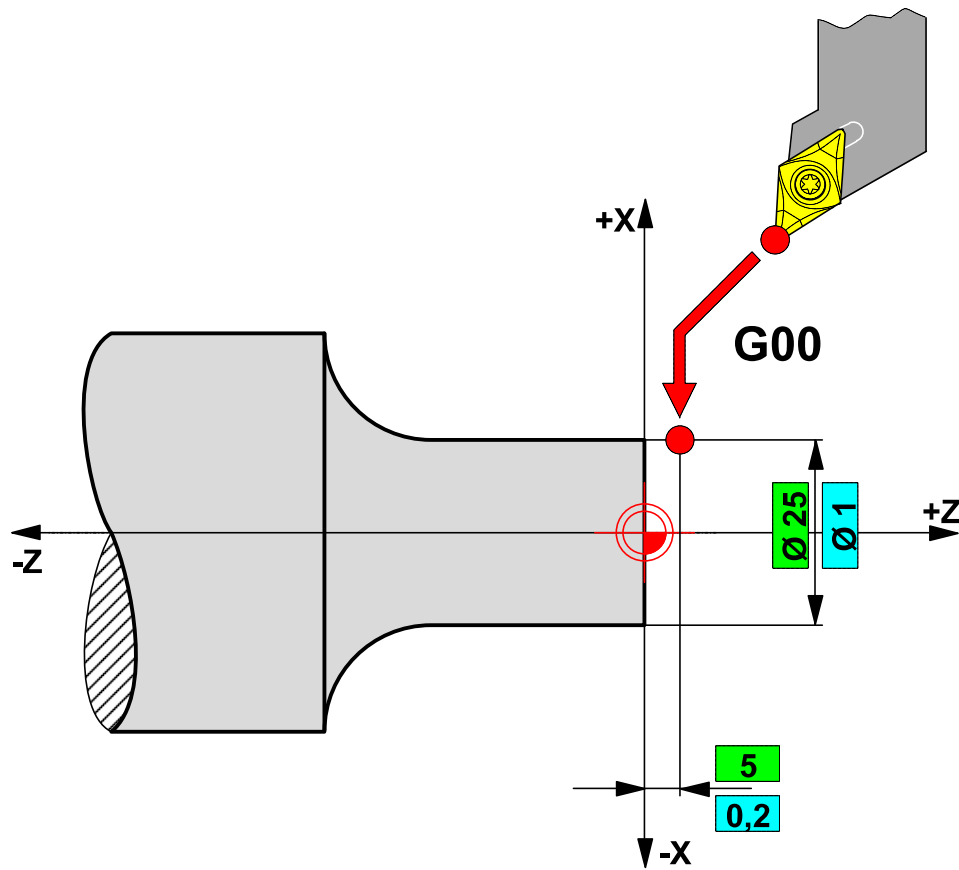
U 0.000 W 0.000

ADRS. S 0 T

WEAR GEOM W.SHIFT JOG



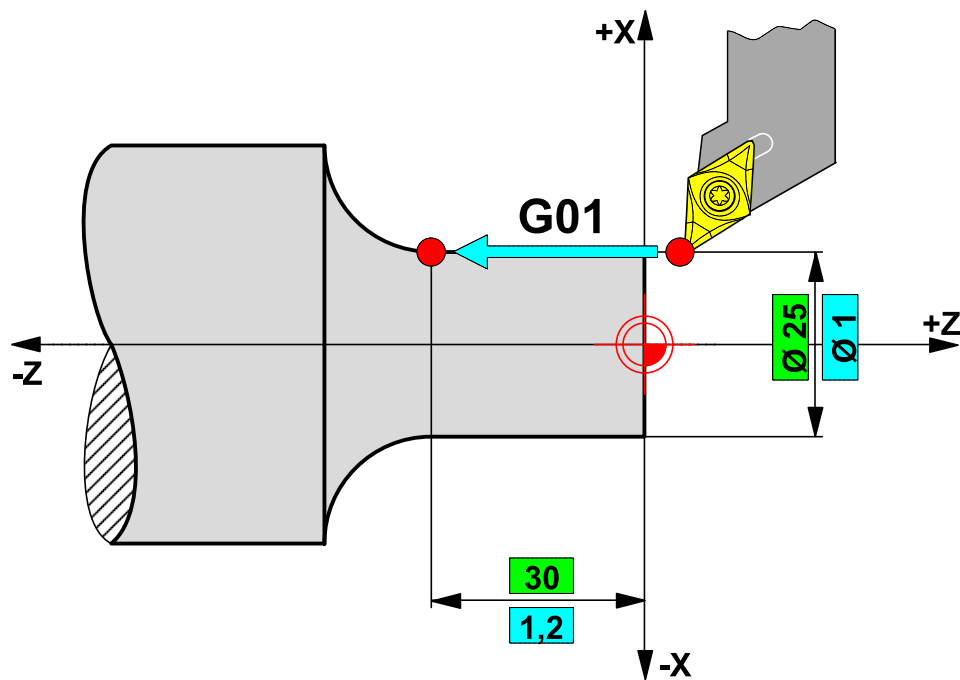
**G00**



N1234 G00 X25 Z5 mm

N1234 G00 X1 Z0,2 inch

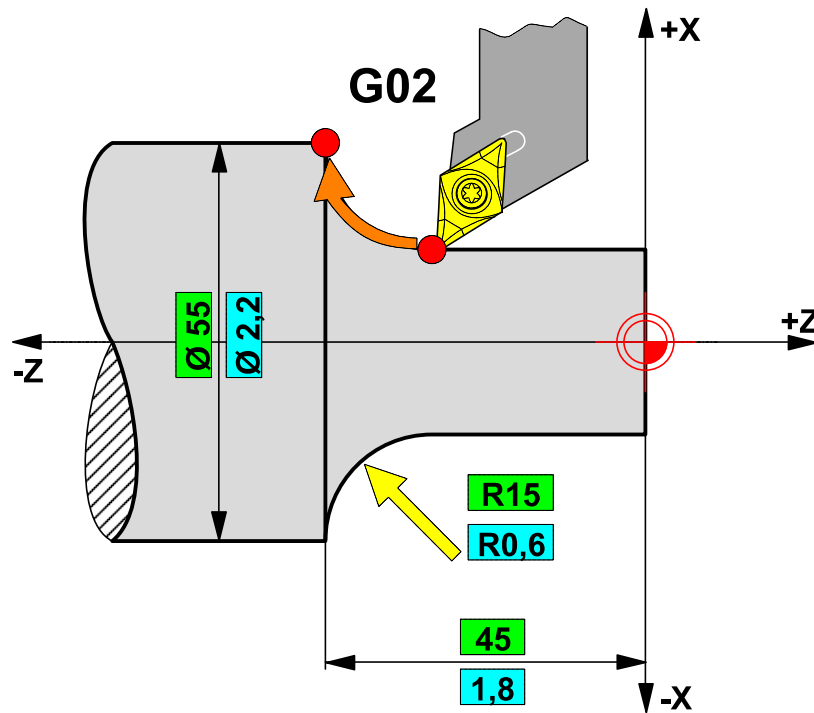
**G01**



N1234 G01 X25 Z-30 mm

N1234 G01 X1 Z-1,2 inch

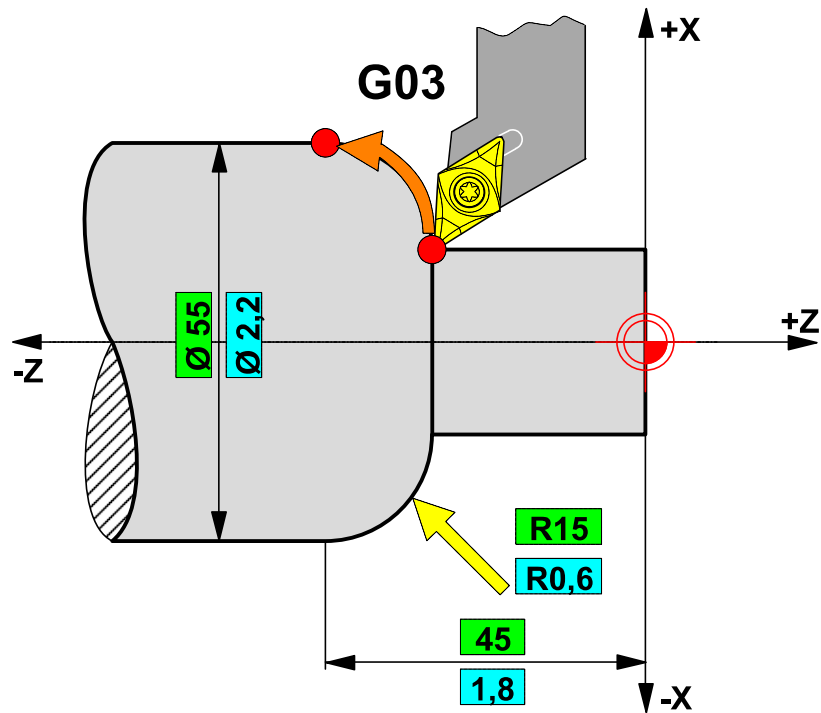
**G02**



N1234 G02 X55 Z-45 R15 mm

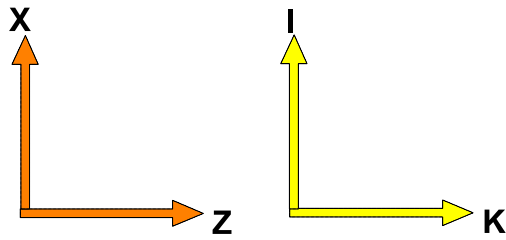
N1234 G02 X2,2 Z-1,8 R0,6 inch

## G03



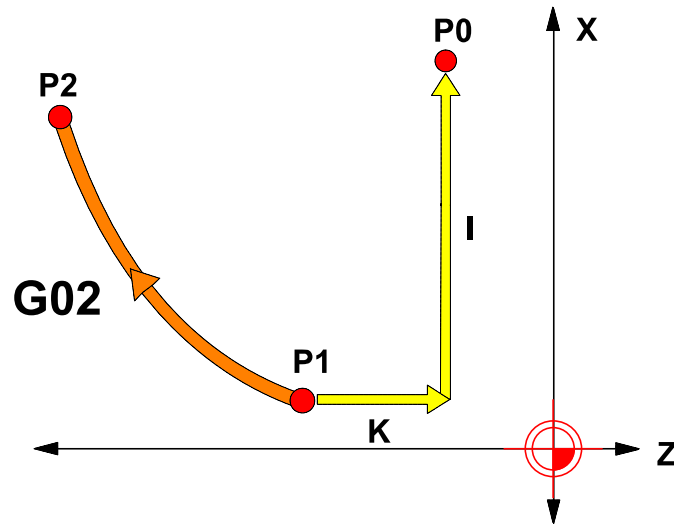
N1234 G03 X55 Z-45 R15 mm

N1234 G03 X2,2 Z-1,8 R0,6 inch

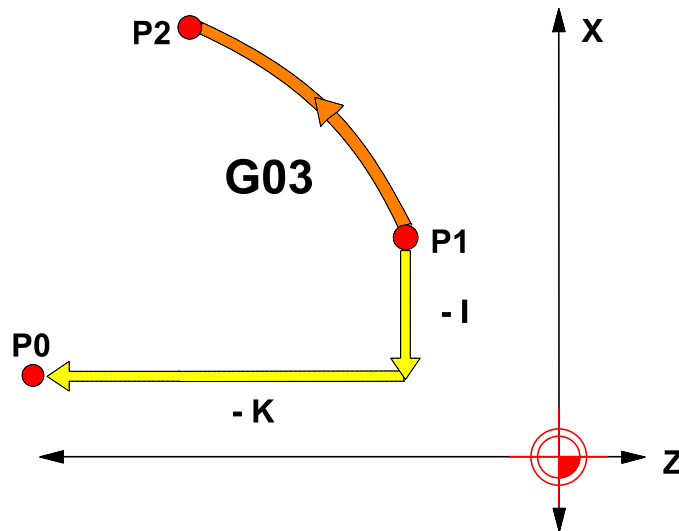


**G02**

**G03**



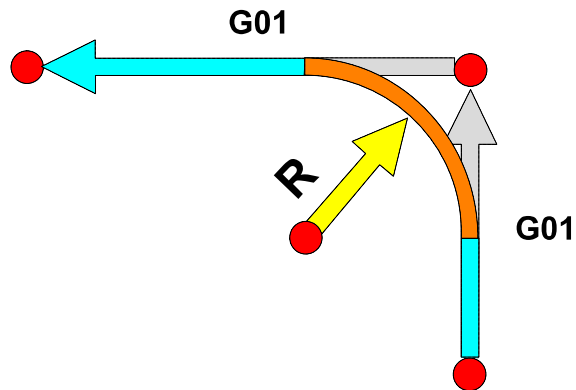
N1234 G02 X.. Z.. I.. K..



N1234 G03 X.. Z.. I-.. K-..



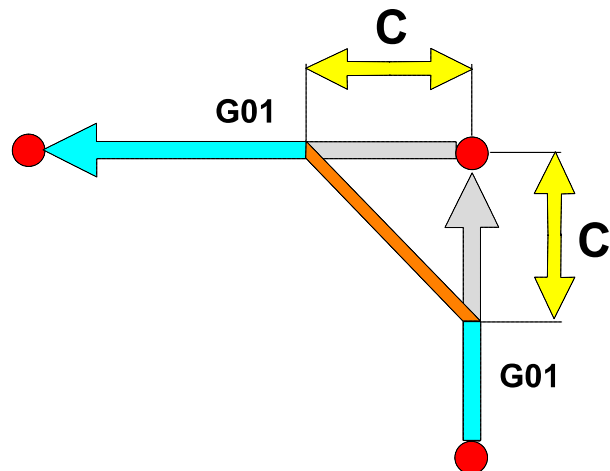
**R**



N0140 G01 X... R...

N0145 G01 Z...

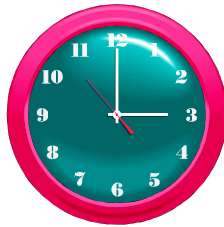
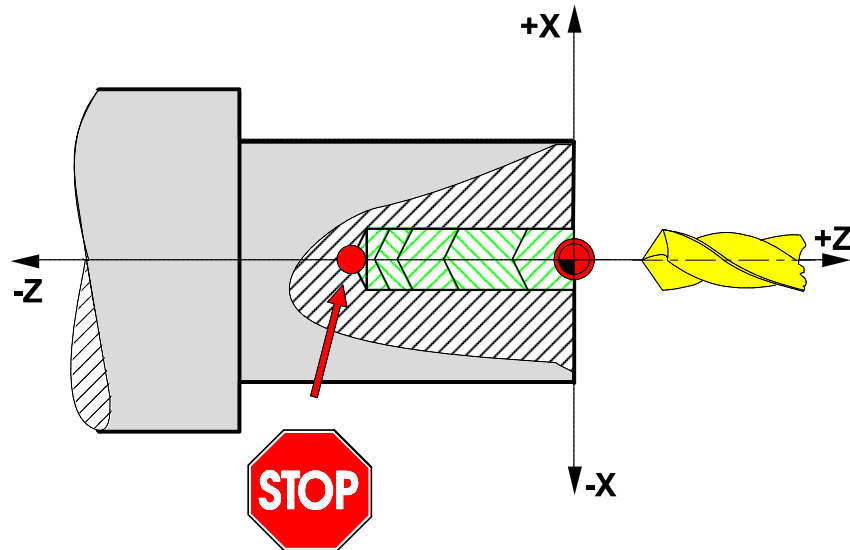
**C**



N0140 G01 X... C...

N0145 G01 Z...

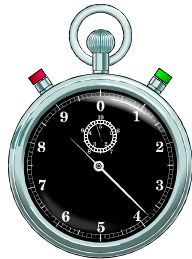
**G04**



N1234 G04 X...

(sec.)

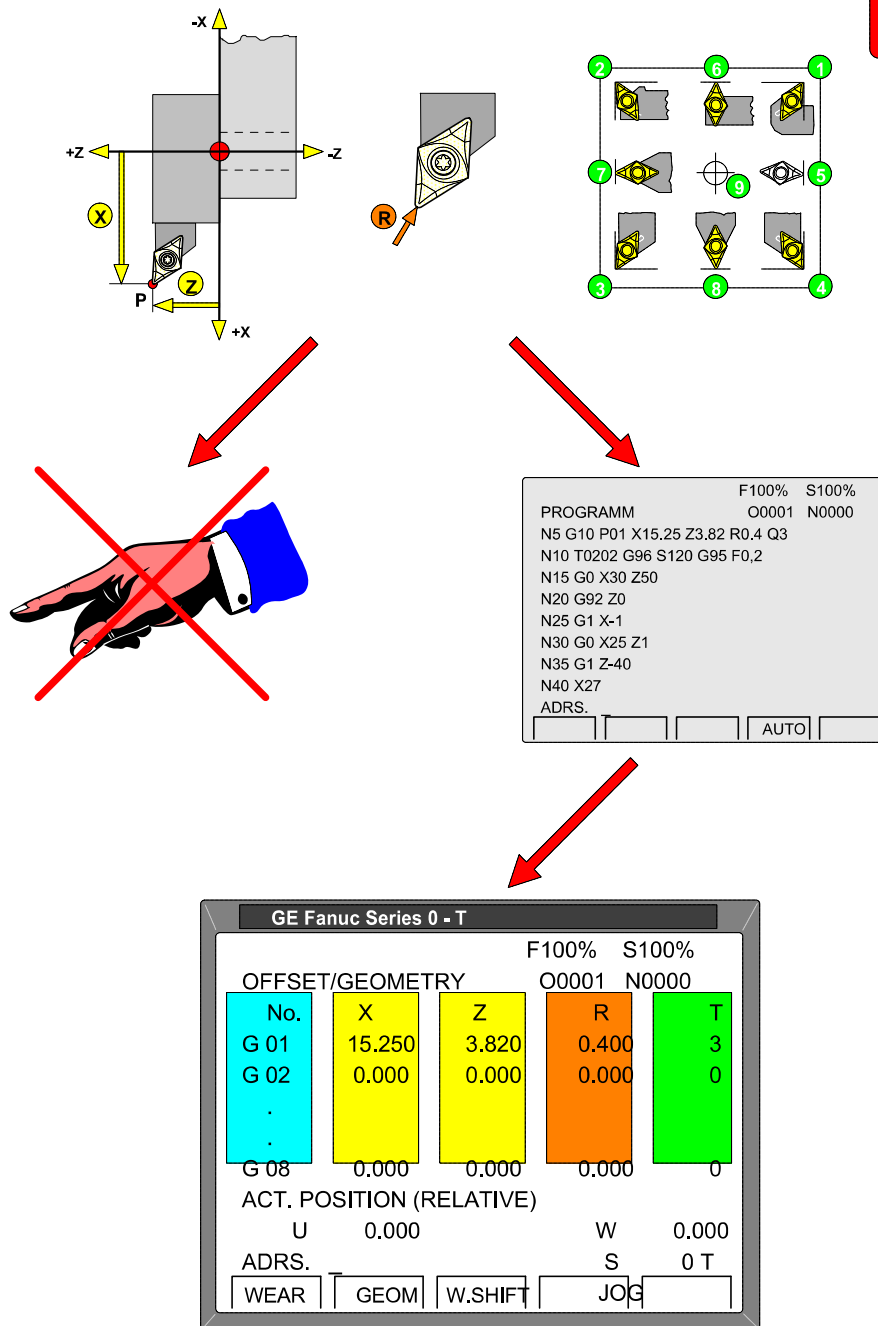
N1234 G04 U...



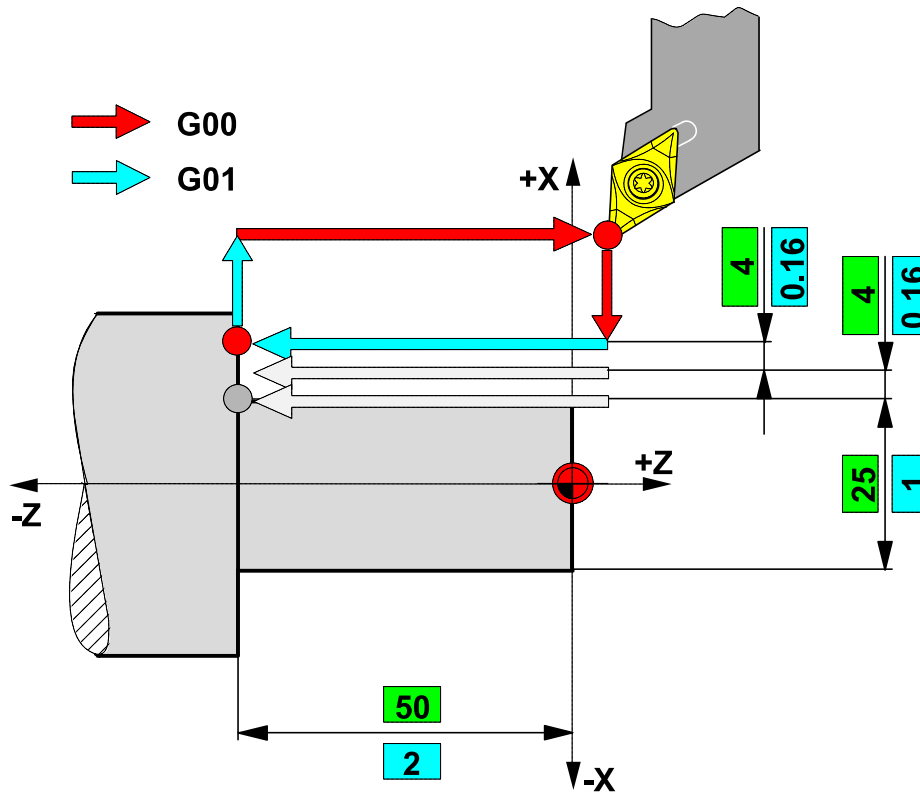
N1234 G04 P...

(msec.)

**G10**



**G20**



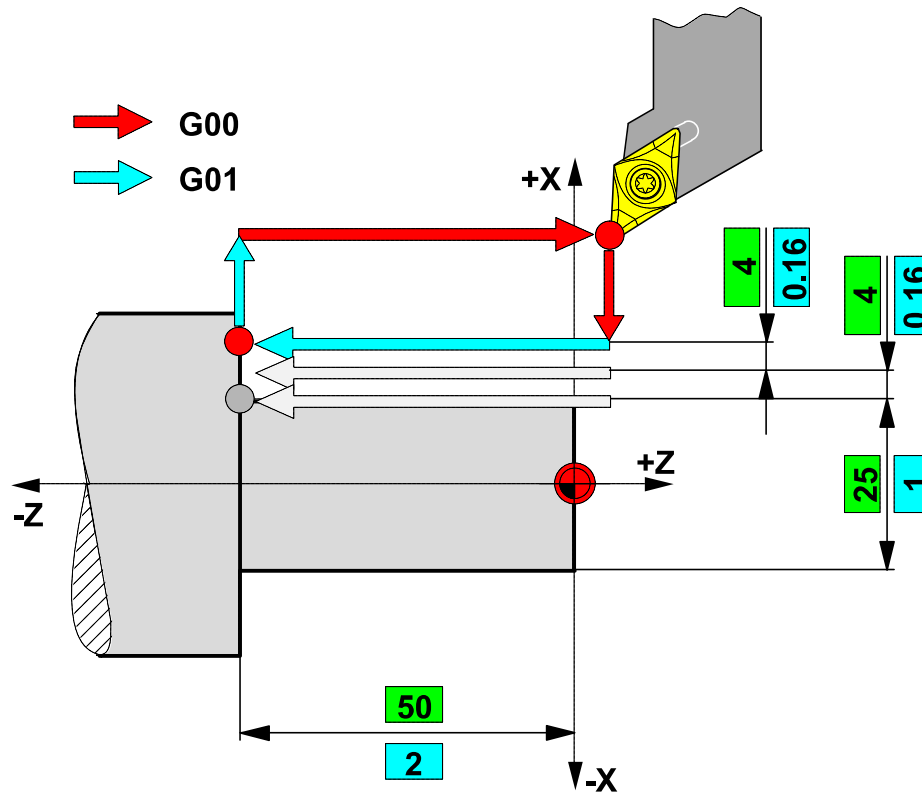
N1234 G90  
N1235 G20 X41 Z-50  
N1236 U-8  
N1237 U-8

mm

N1234 G90  
N1235 G20 X1.64 Z-2  
N1236 U-0.32  
N1237 U-0.32

inch

**G20**



N1234 G91  
N1235 G20 X41 Z-50  
N1236 U-4  
N1237 U-4

mm

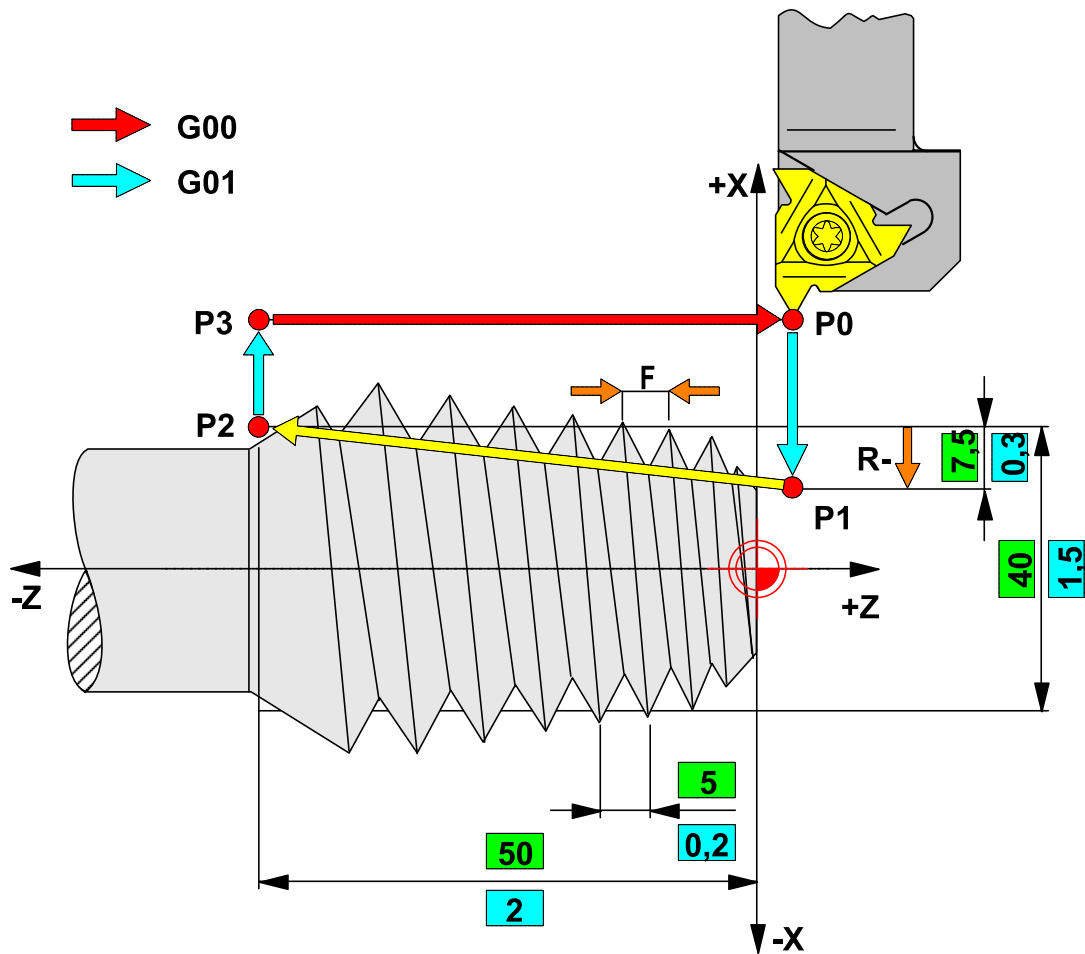
N1234 G91  
N1235 G20 X1.64 Z-2  
N1236 U-0.16  
N1237 U-0.16

inch

The diagram shows a 3D part with a coordinate system (+X, +Z, -X, -Z). A conical feature is defined by a radius  $R$  of 8 mm and a height of 40 mm. The part has a total width of 50 mm and a thickness of 2 mm. A yellow tool is shown cutting the conical surface. The tool's path is indicated by a red arrow (G00) and a cyan arrow (G01). The tool's diameter is 0.3 mm. The part's total height is 1.5 mm.

**N1234 G20 X1.5 Z-2 R-0.3      inch**

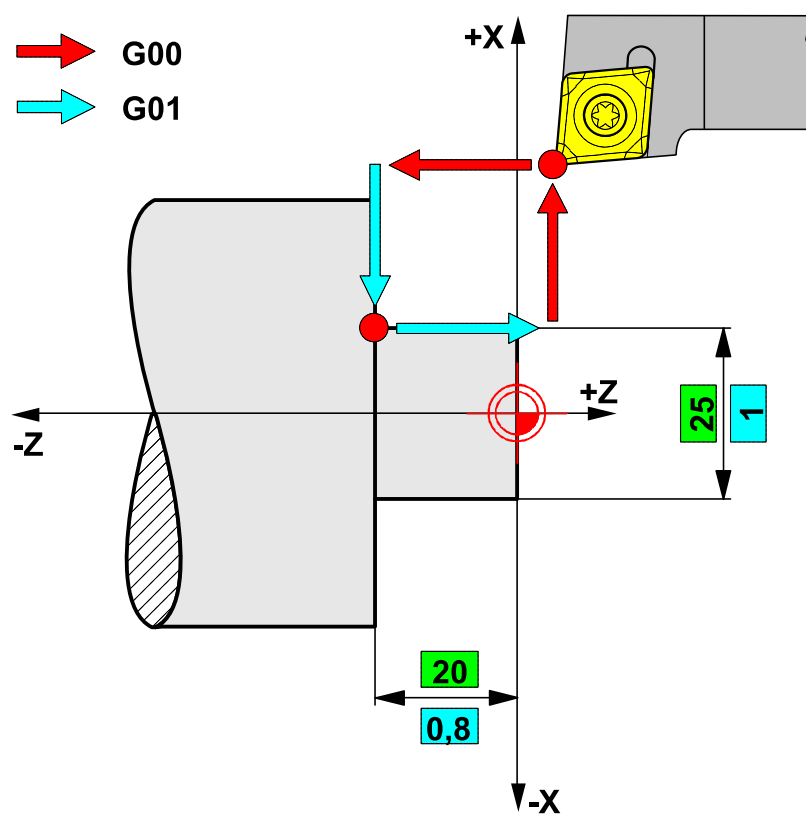
**N1234 G21 X1.5 Z-2 F0.2      inch**



N1234 G21 X40 Z-50 R-7.5 F5 mm

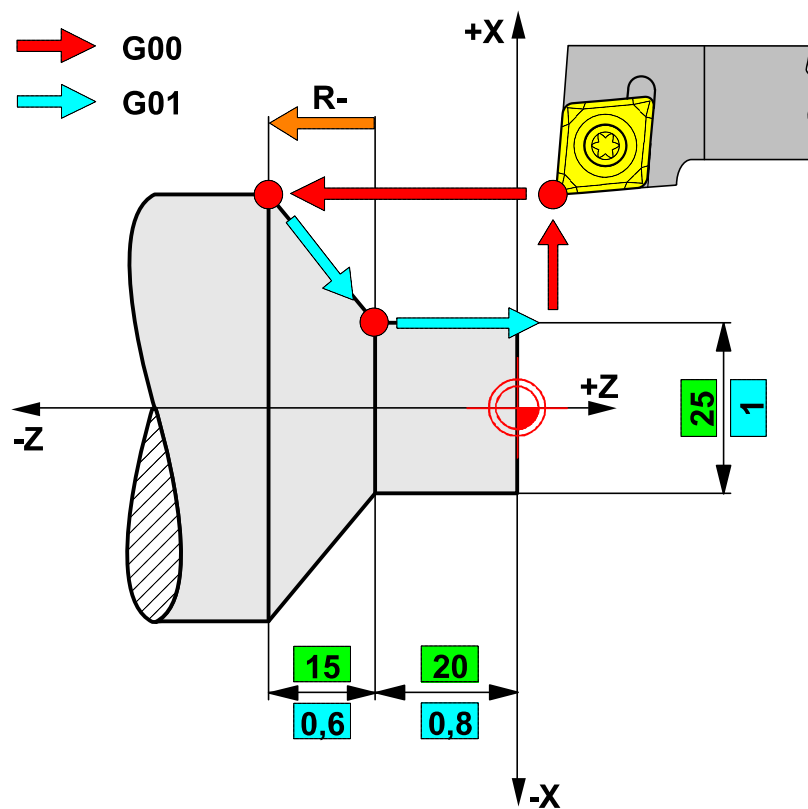
N1234 G21 X1.5 Z-2 R-0.3 F0.2 inch





N1234 G24 X25 Z-20 mm

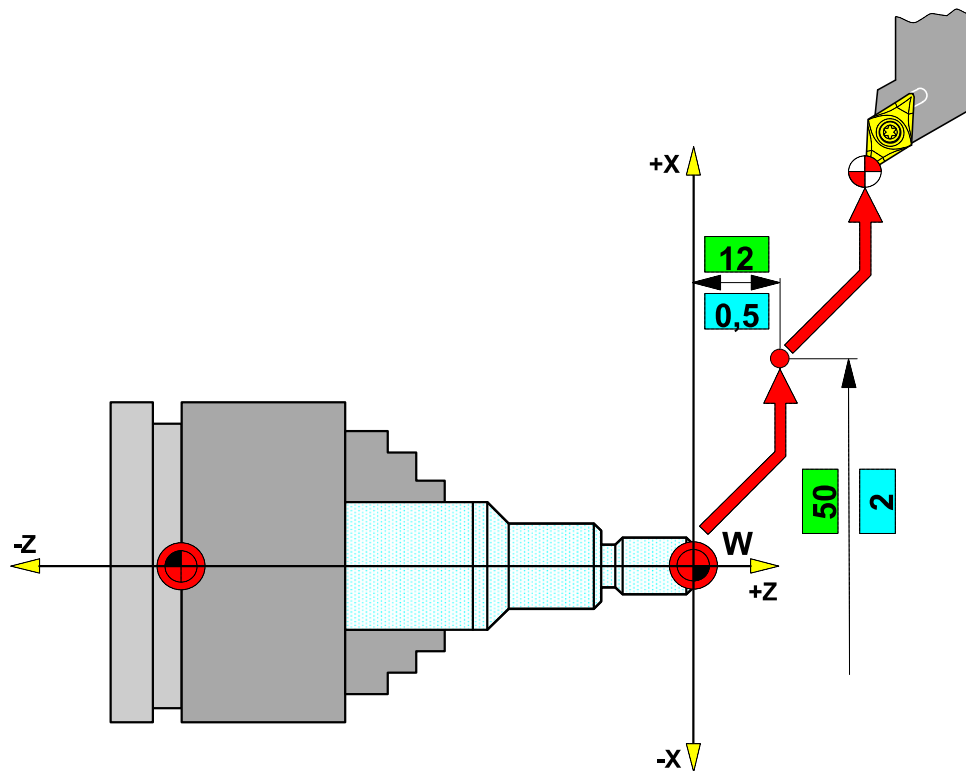
N1234 G24 X1 Z-0.8 inch



N1234 G24 X25 Z-20 R-15 mm

N1234 G24 X1 Z-0.8 R-0.6 inch

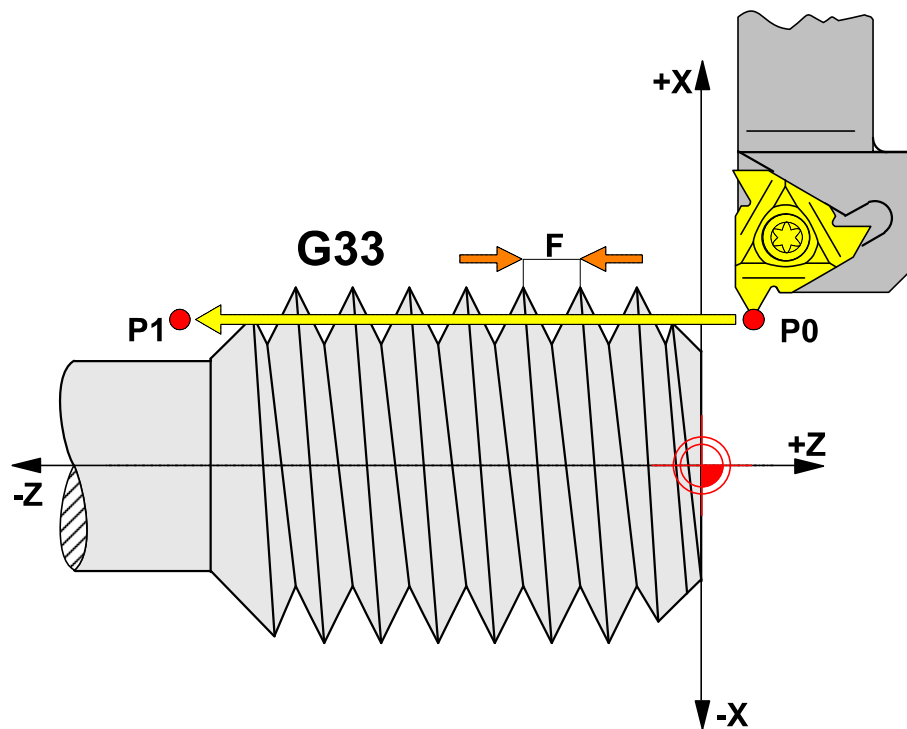
**G28**



N05 G28 X50 Z12 mm

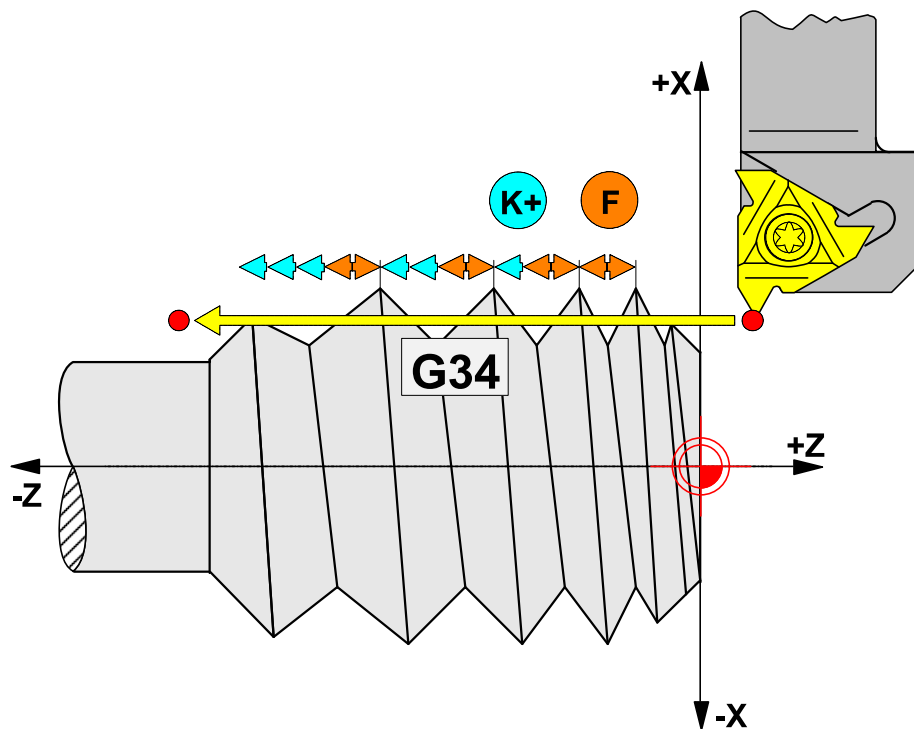
N05 G28 X2 Z0.5 inch

## G33



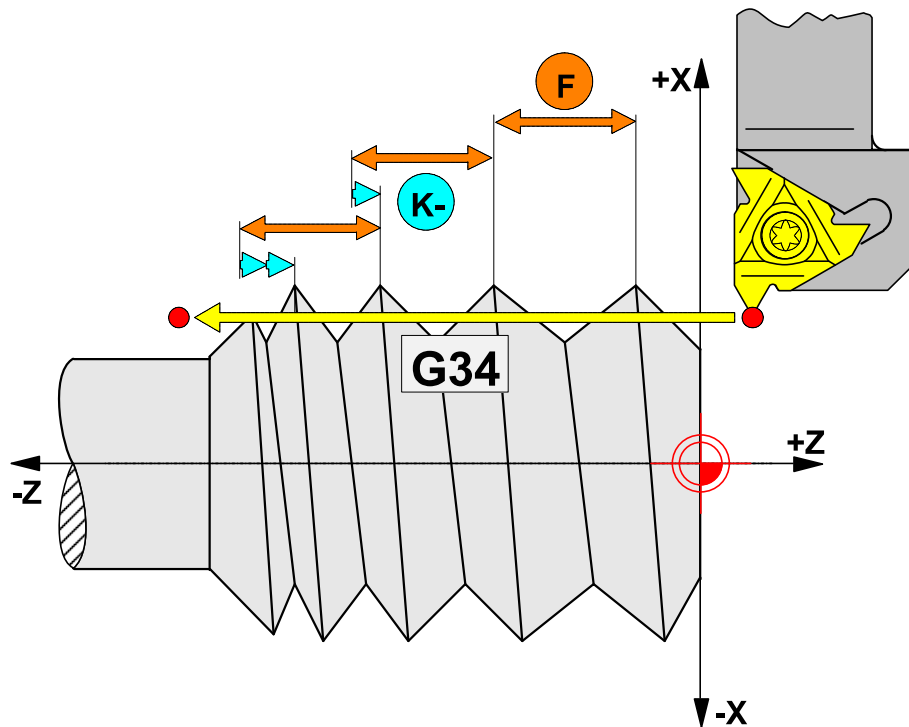
N1234 G33 X... Z... F..

## G34



N1234 G34 X... Z... F.. K+..

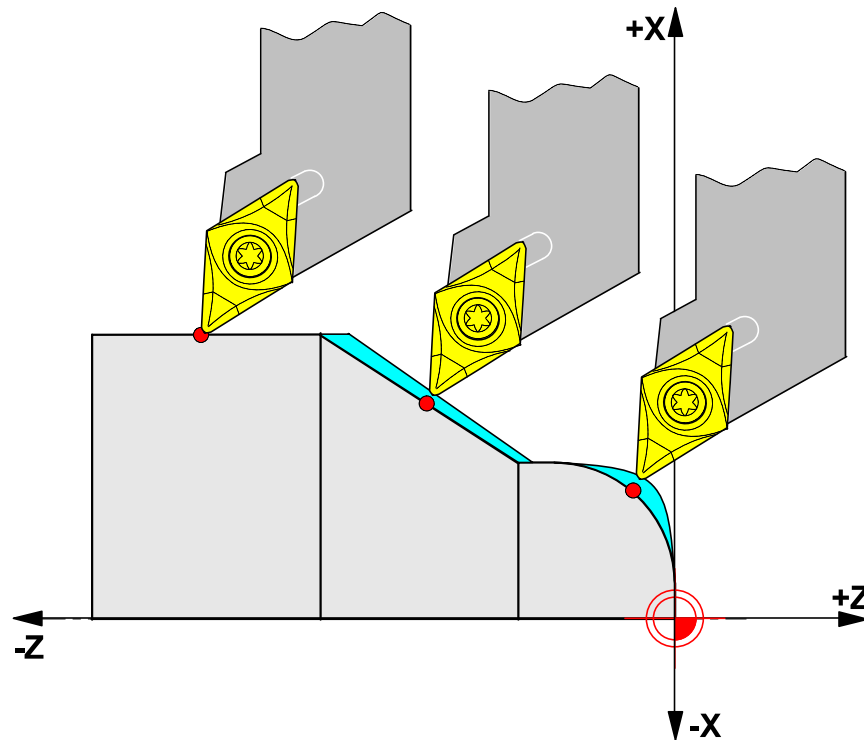
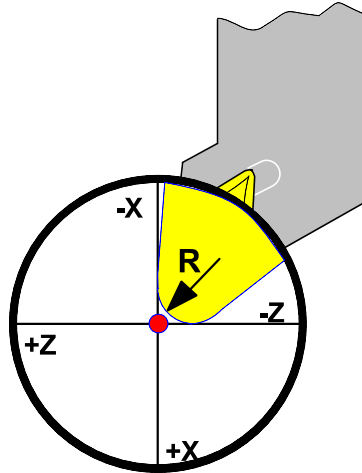
## G34

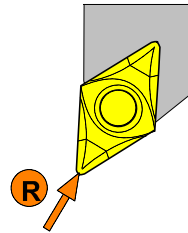
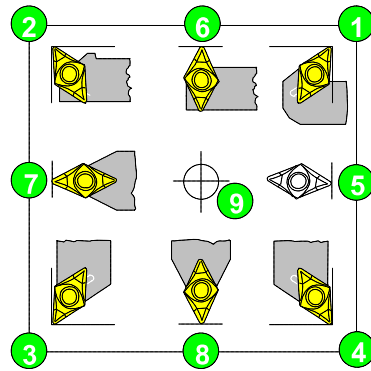


N1234 G34 X... Z... F.. K-..

**G41**

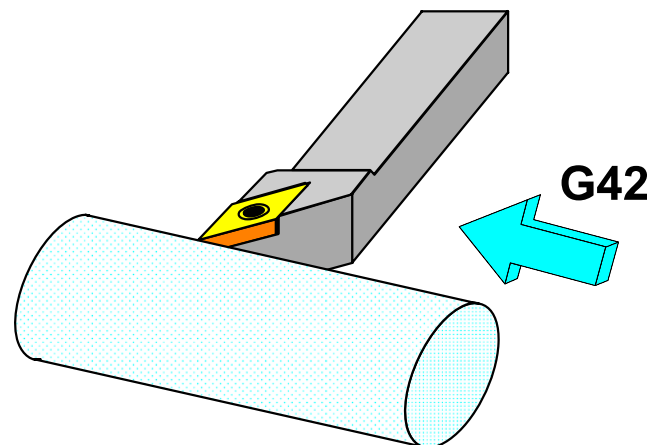
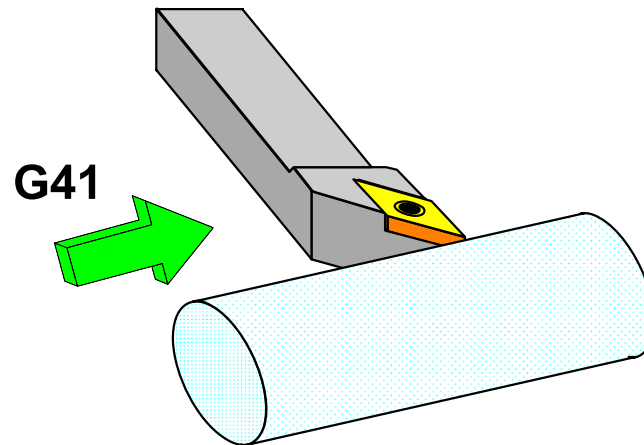
**G42**



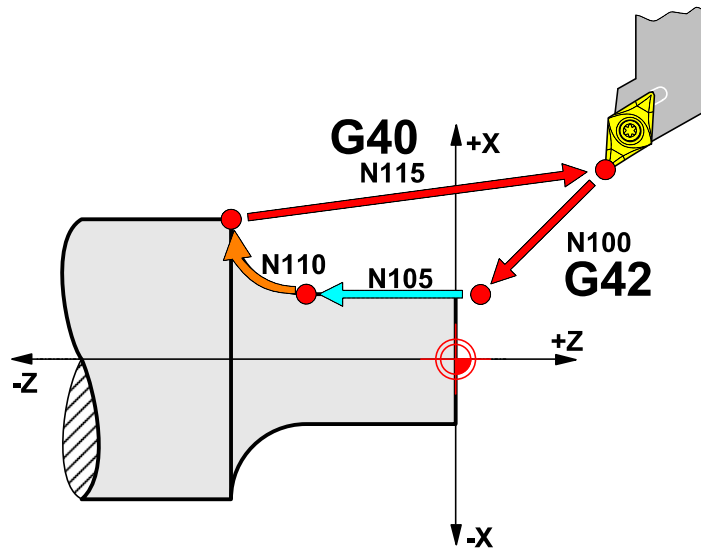


**G41**

**G42**



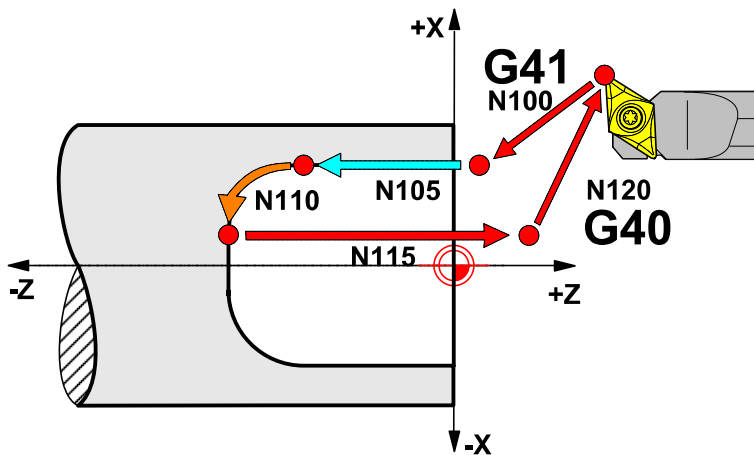




**G40**

**G42**

```
N100 G42 G00 X.. Z..
N105 G01 Z-.. F..
N110 G02 X.. Z-.. R..
N115 G40 G00 X.. Z..
```

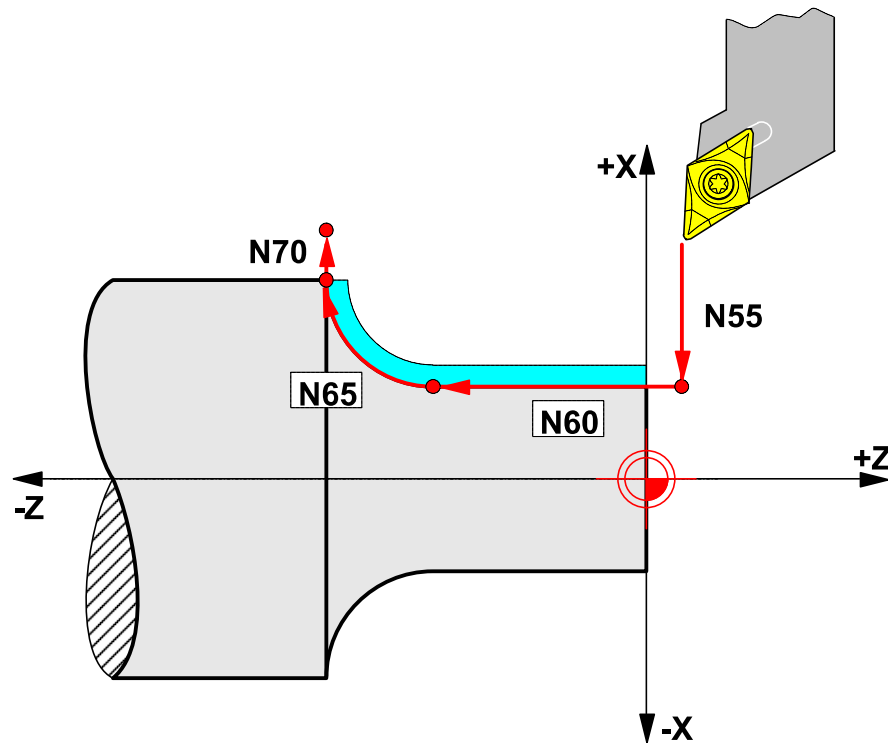


**G40**

**G41**

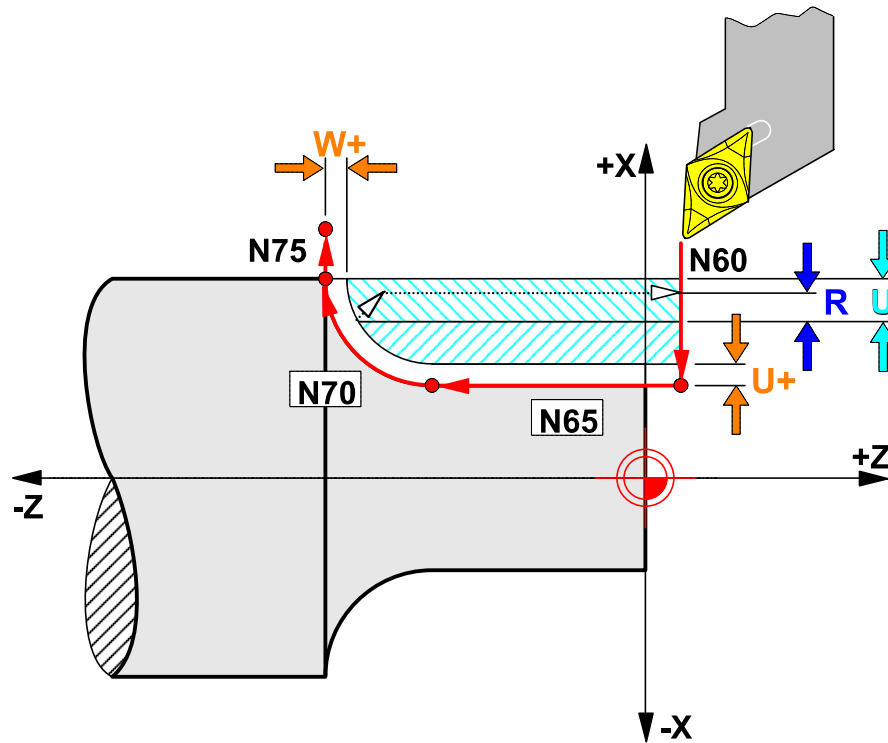
```
N100 G41 G00 X.. Z..
N105 G01 Z-.. F..
N110 G03 X.. Z-.. R..
N115 G00 Z..
N120 G40 G00 X.. Z..
```

**G72**



N..	
	N50 G72 P55 Q70
P	N55 G0 G42 X.. N60 G1 Z-.. N65 G2 X.. Z.. R..
Q	N70 G1 G40 X.. N..

## G73



N..

N50	G73	U..	R..		
N55	G73	P60	Q75	U+..	W+..

**P** → N60 G0 G42 X..  
 N65 G1 Z..  
 N70 G2 X.. Z.. R..  
**Q** → N75 G1 G40 X..  
 N..

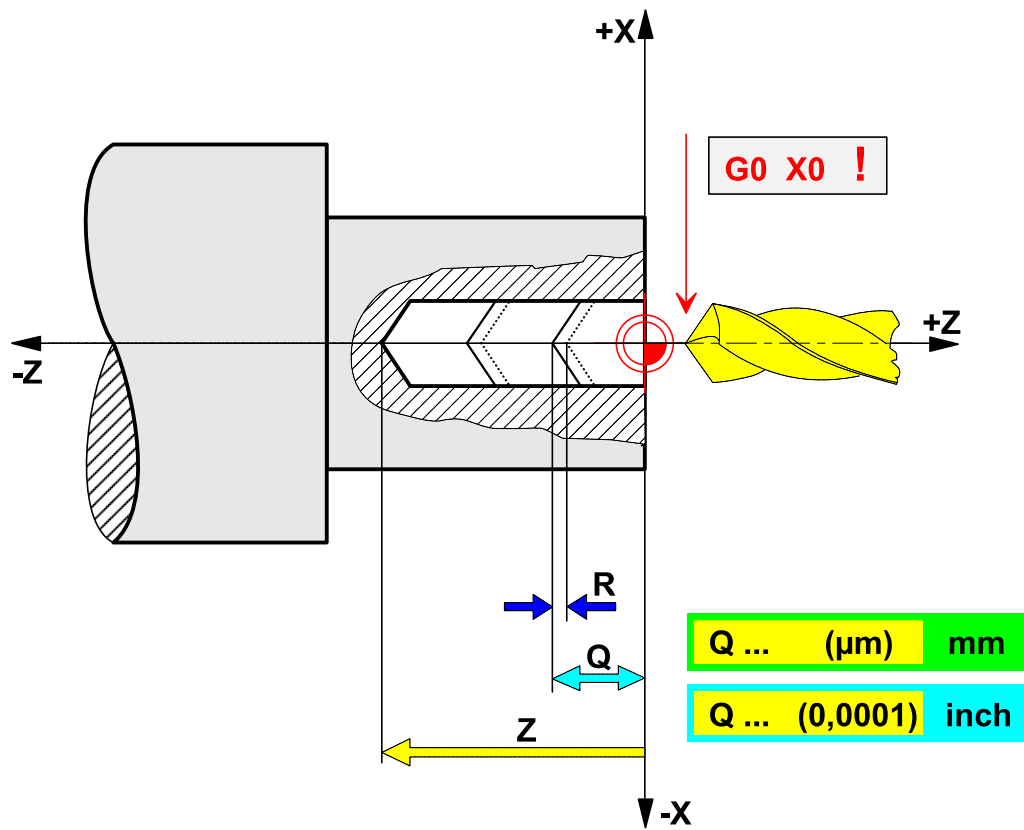
The diagram shows a mechanical assembly with a coordinate system where  $+X$  is vertical,  $+Z$  is horizontal to the right, and  $-Z$  is horizontal to the left. A yellow component is attached to the right. A red path with dots at key locations is shown. Force vectors are indicated:  $W$  (cyan arrows pointing left),  $W+$  (orange arrows pointing right),  $R$  (blue arrow pointing right), and  $U+$  (orange arrows pointing up and down). Nodes are labeled N60, N65, N70, and N75. A red circle with a dot is at the origin of the coordinate system.

**P**

**Q**

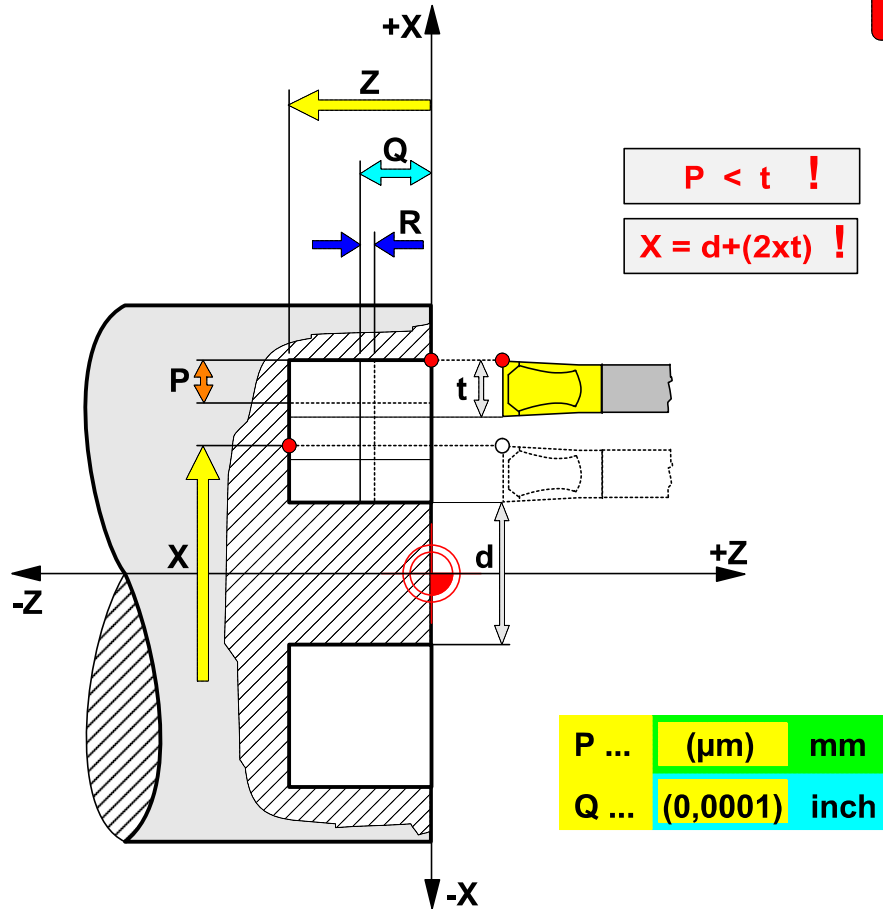
**P** → N60 G0 G42 X.. Z0  
N65 G1 Z..  
**Q** → N70 G1 X.. Z..  
N..

## G76



N50 G76 R...  
N55 G76 Z -... Q ...

## G76



N50 G76 R ...  
N55 G76 X ... Z- ... P ... Q ...

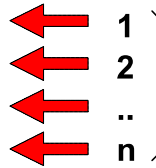
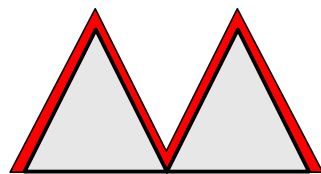
P ...	( $\mu\text{m}$ )	mm
Q ...	(0,0001)	inch

Fanuc 0-T / 21-T

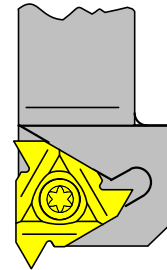


**G78**

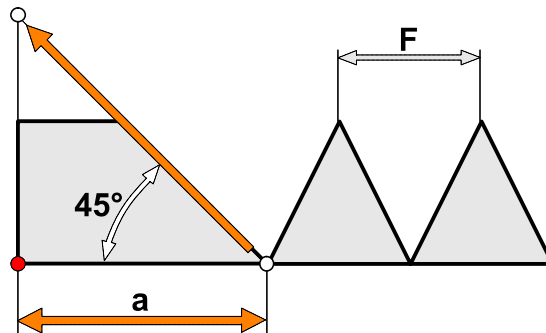
N50 G78 P **xx** xx xx Q ... R ...  
N55 G78 X ... Z ... R0 P ... Q ... F ...



**Pxx** ( 0 - 99 )



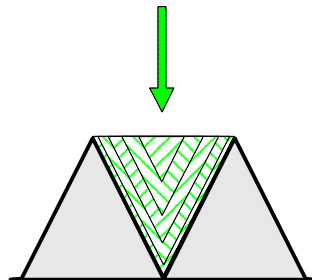
N50 G78 P xx **xx** xx Q ... R ...  
N55 G78 X ... Z ... R0 P ... Q ... F ...



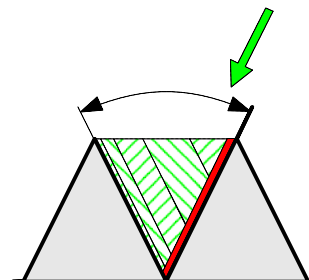
$$a = F * \left( \frac{P_{xx}}{10} \right)$$

**Pxx** ( 0 - 99 )

N50 G78 P xx xx **xx** Q ... R ...  
N55 G78 X ... Z ... R0 P ... Q ... F ...



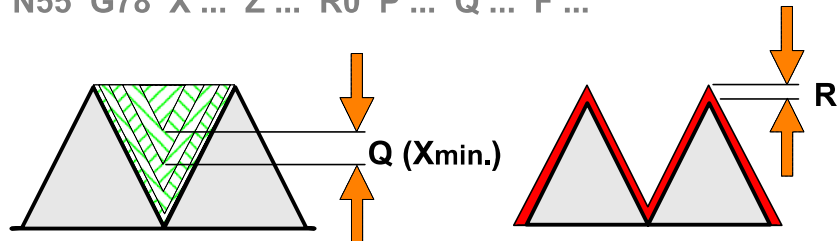
**Pxx** = 0



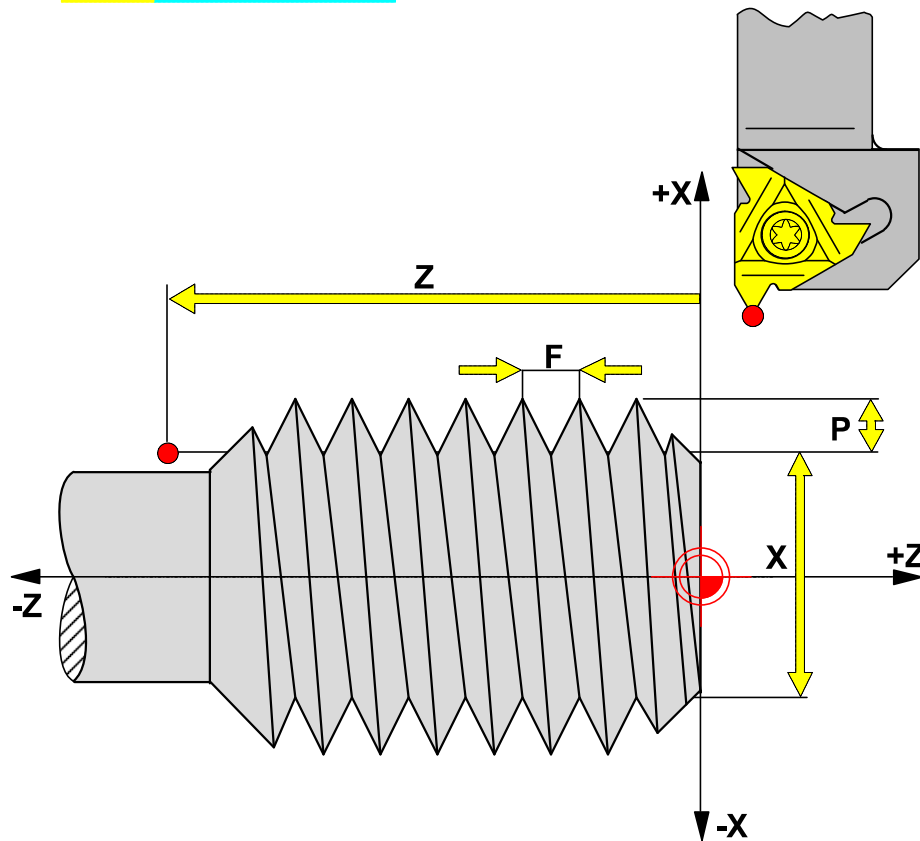
**Pxx** = (80°, 60°, 55°, 30°, 29°)

**G78**

N50 G78 P xx xx xx Q ... R ...  
N55 G78 X ... Z ... R0 P ... Q ... F ...



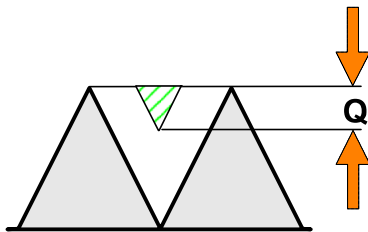
Q ...	( $\mu$ m)	mm
	(0,0001)	inch



N50 G78 P xx xx xx Q ... R ...  
N55 G78 X ... Z ... R0 P ... Q ... F ...

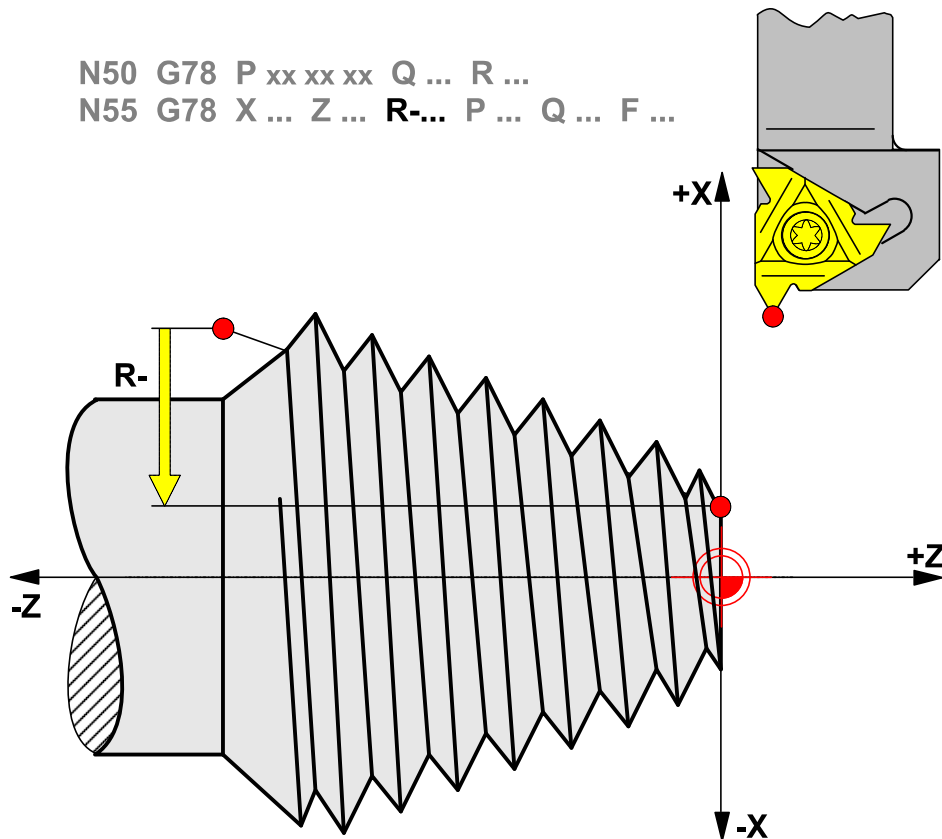
## G78

N50 G78 P xx xx xx Q ... R ...  
N55 G78 X ... Z ... R0 P ... Q ... F ...

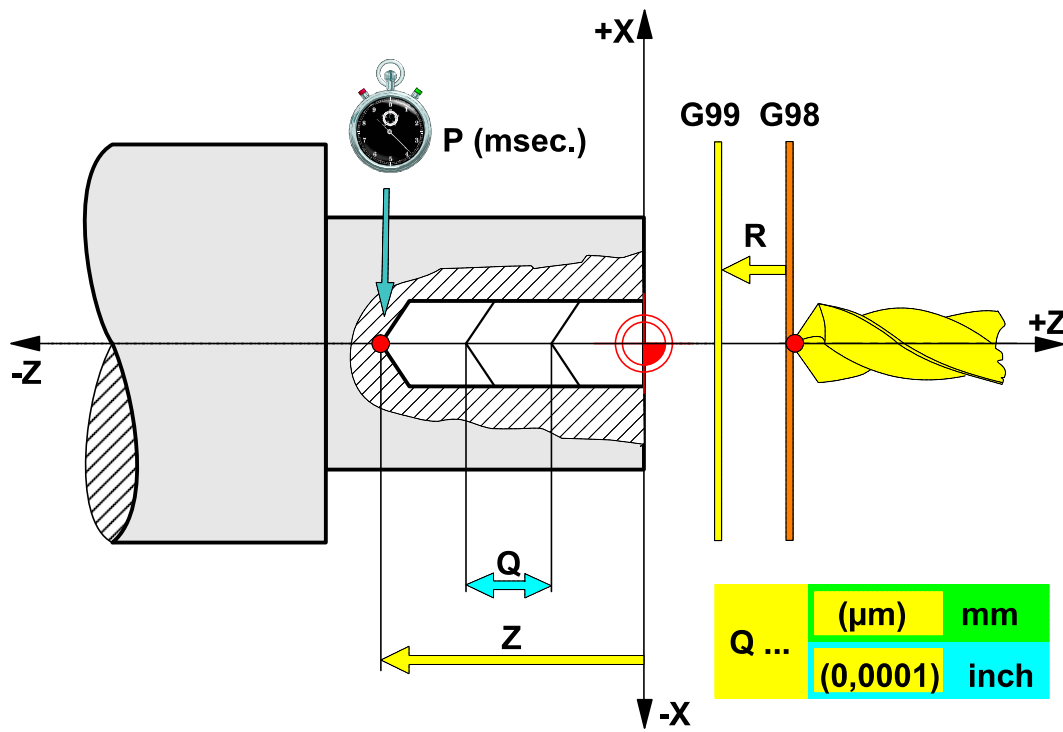


Q ...	( $\mu$ m)	mm
	(0,0001)	inch

N50 G78 P xx xx xx Q ... R ...  
N55 G78 X ... Z ... R-... P ... Q ... F ...



## G83

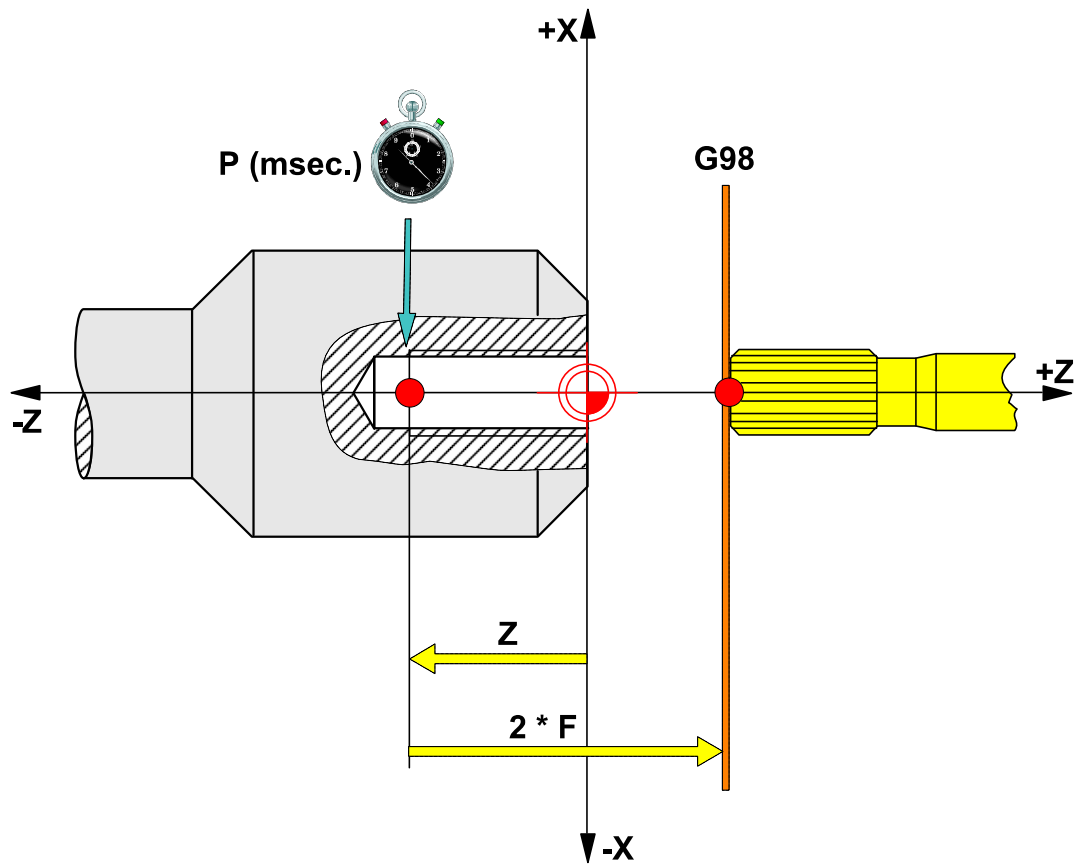


N50 G98 G83 X0 Z-... Q... P...

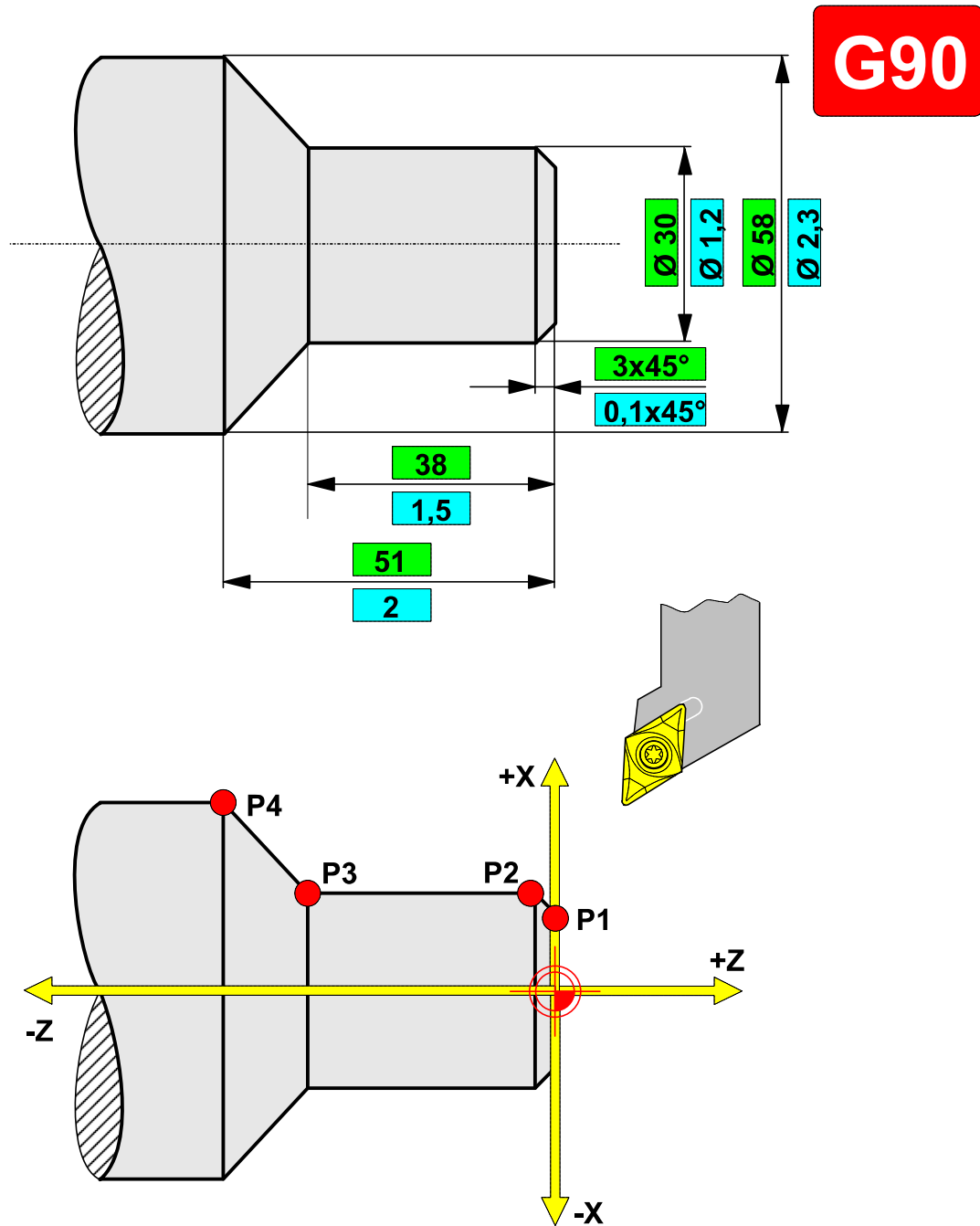
N50 G99 G83 X0 Z-... R-... Q... P...

N0050 G98 G84 X0 Z-... F ... M ...

**G85**

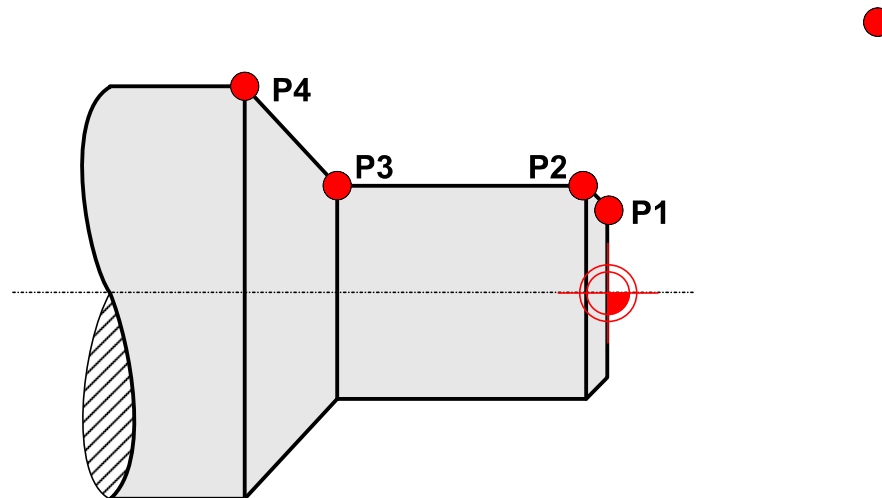
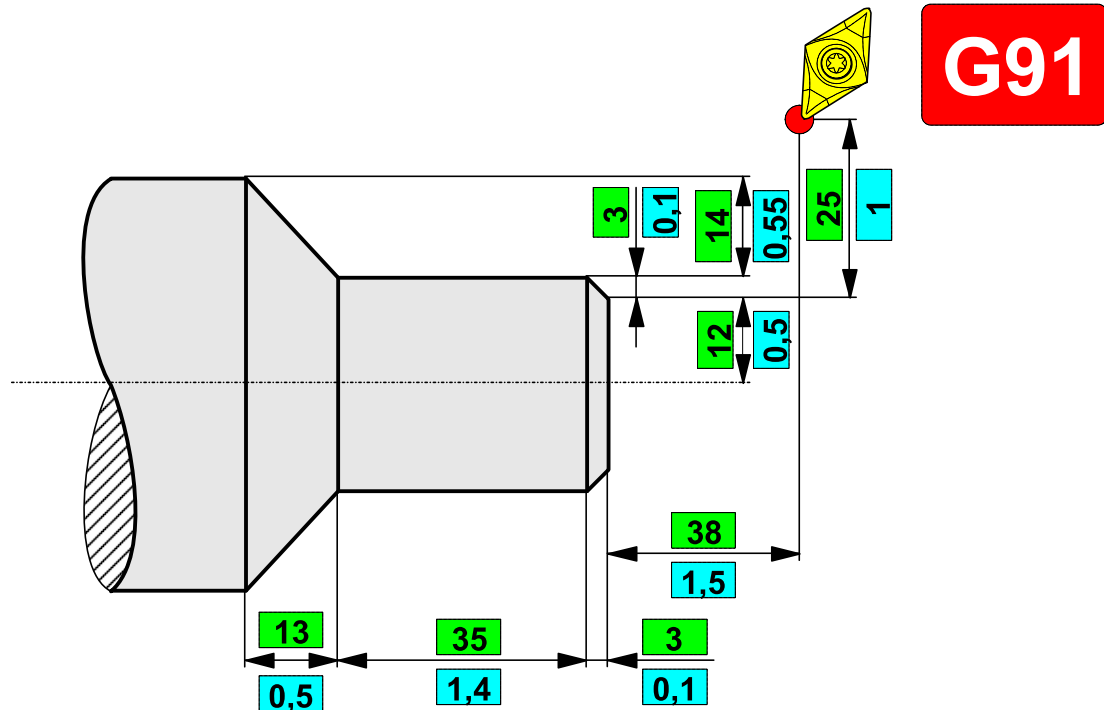


**N0050 G98 G85 X0 Z... P ... F ...**



N100 G01 X24 Z0	mm
N105 X30 Z-3	
N110 Z-38	
N115 X58 Z-51	

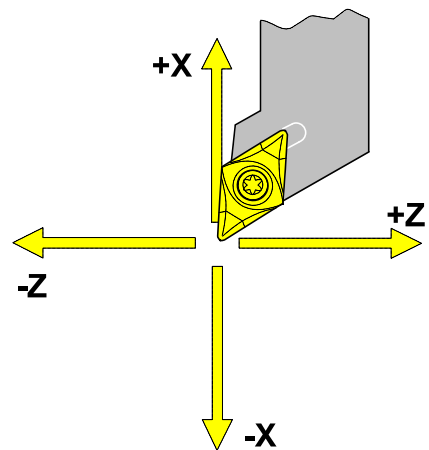
N100 G01 X1 Z0	inch
N105 X1,2 Z-0.1	
N110 Z-1.5	
N115 X2.3 Z-2	



<p>N100 G01 X-25 Z-38 N105 G01 X3 Z-3 N110 Z-35 N115 X14 Z-13</p>	mm
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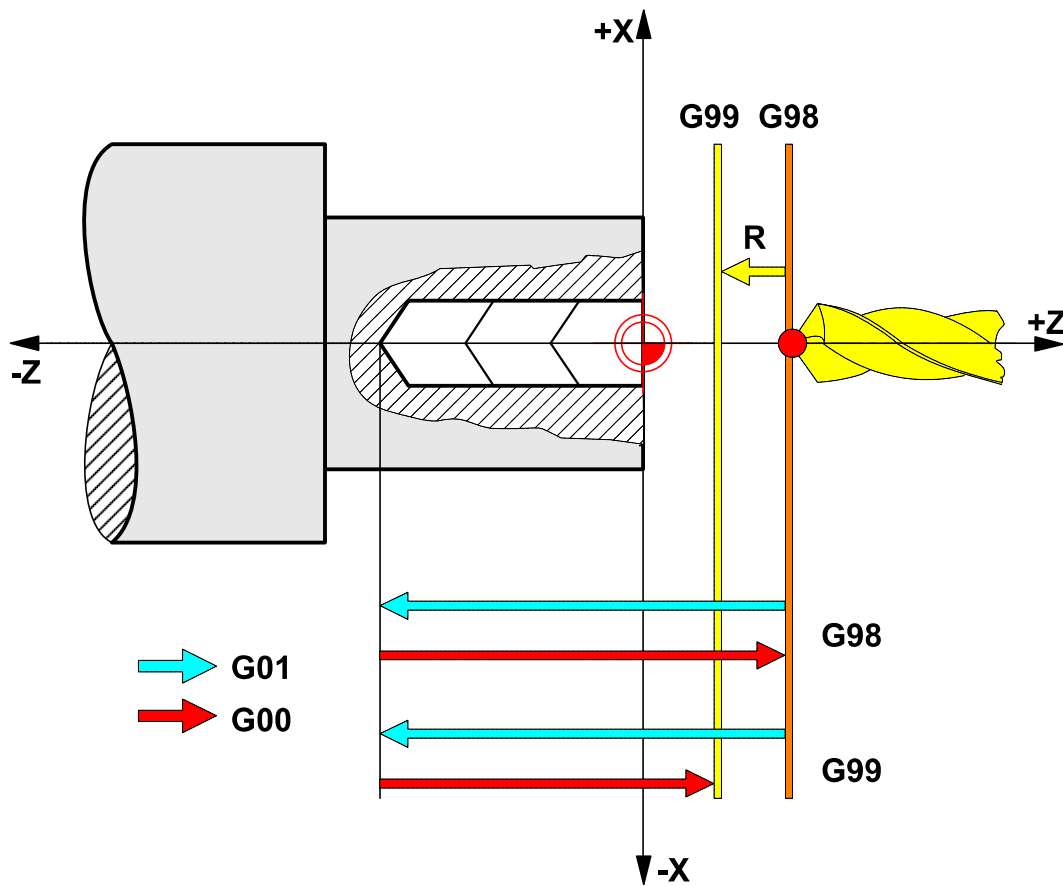
<p>N100 G01 X-1 Z-1.5 N105 G01 X0.1 Z-0.1 N110 Z-1.4 N115 X0.55 Z-0.5</p>	inch
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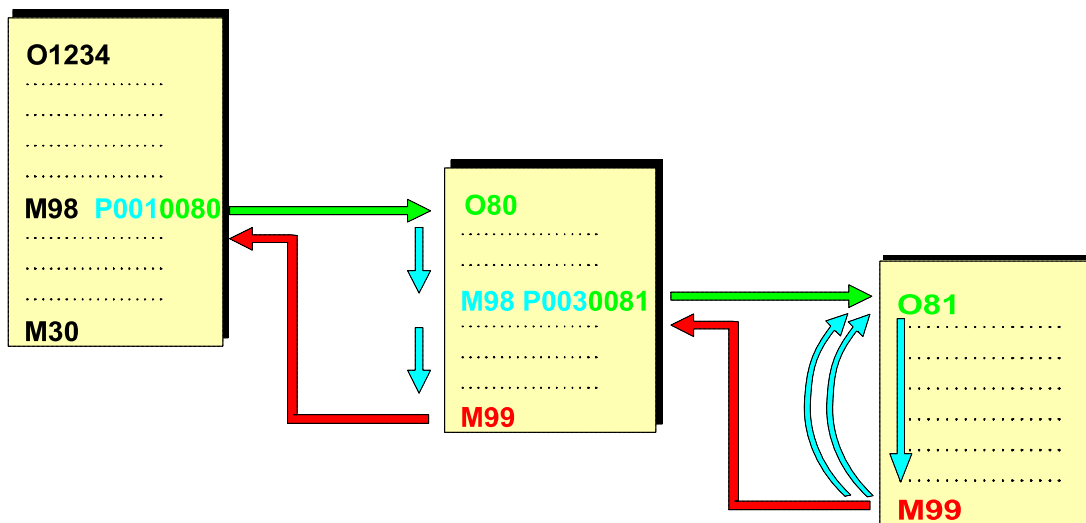
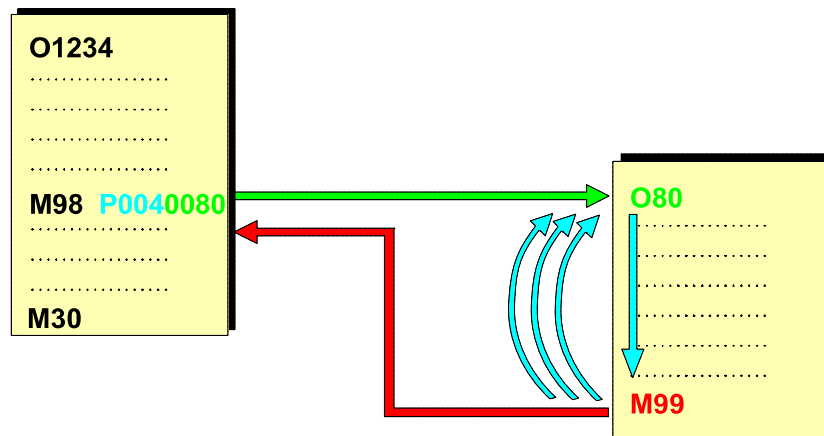
**G98**

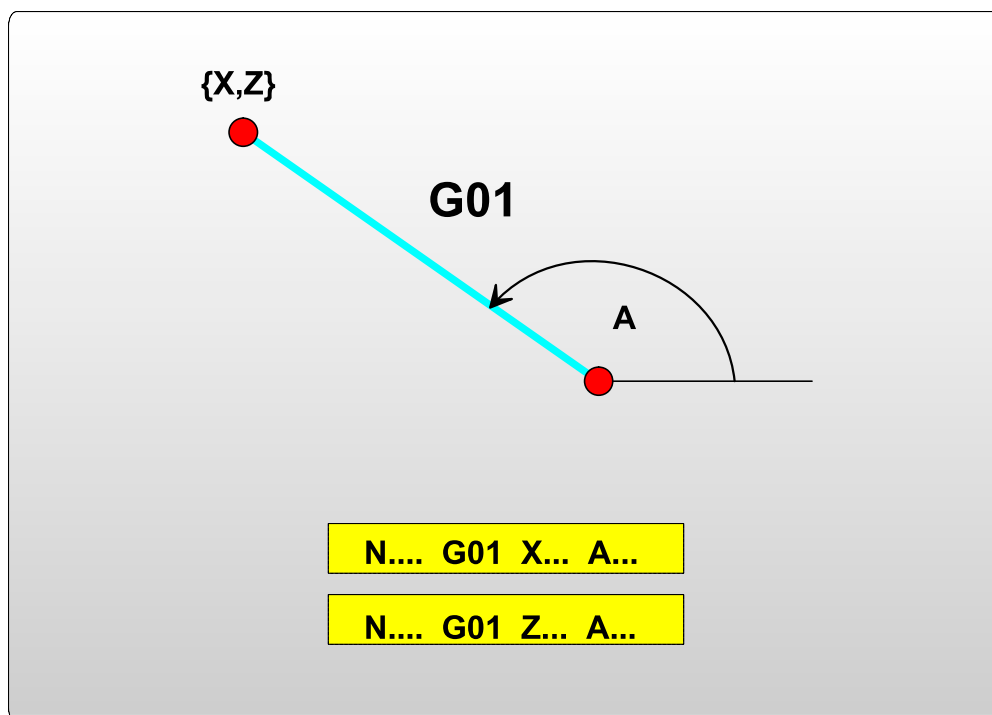
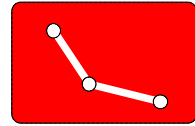
**G99**

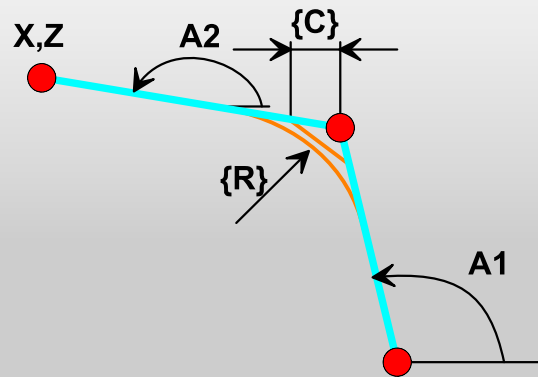
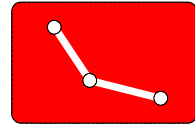


**M98**

**M99**

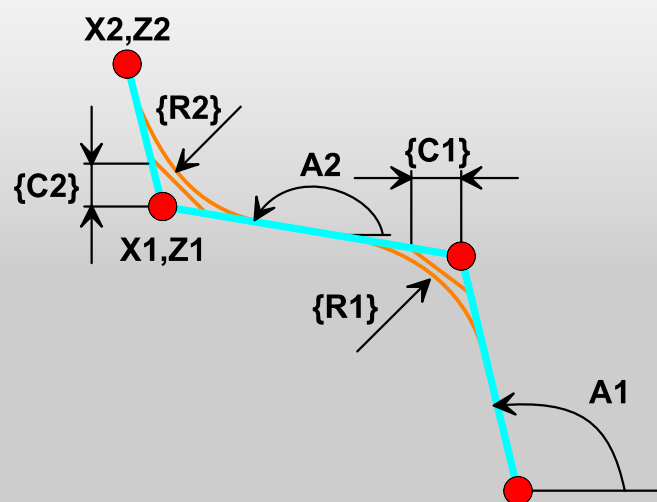
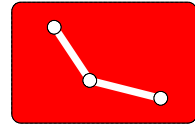






N.... G01 A1... C... (R...)  
N.... G01 X... Z... A2...

N.... G01 A1... C... (R...) X... Z... A2...



N... G01 A1... C1... (R1) A2... X1... Z1... C2... (R2)  
N... G01 X2... Z2...