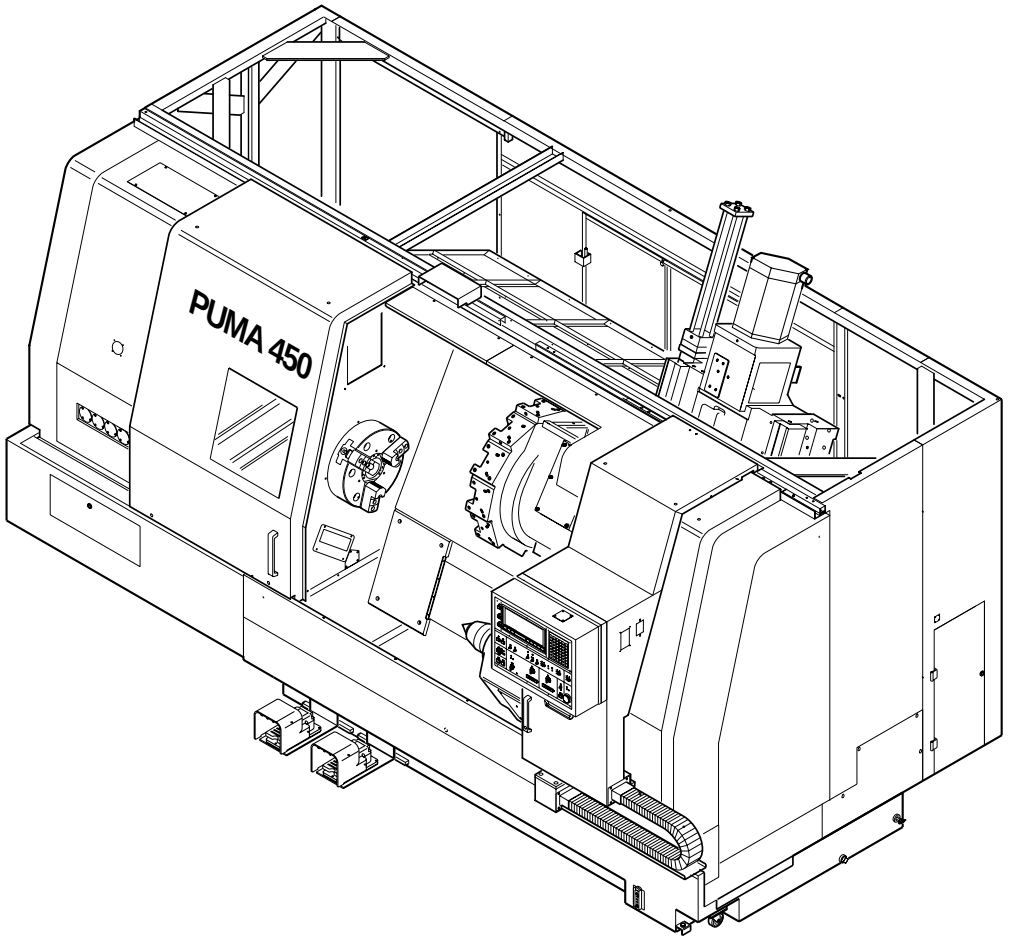
CNC

PROGRAMLAMA REHBERI



DAEWOO

DAEWOO HEAVY INDUSTRIES &
MACHINERY LTD.

G-KODLARI

STANDART G KODU	OZEL G KODU	GRUP	ACIKLAMA
#G00 G01 G02 G03	G00 G01 G02 G03	01	Pozisyonlama (Bosta hizli ilerleme) Dogrusal kesme hareketi Dairesel kesme hareketi (Saat yonunde, CW) Dairesel kesme hareketi (Saat yonunun tersi, CCW)
G04	G04	00	Bekleme
G20 #G21	G20 G21	06	Veri Girisi (inch) Veri Girisi (mm)
#G22 G23	G22 G23	04	Kaydedilen mesafe limiti aktif Kaydedilen mesafe limiti aktif degil
G27 G28 G29 G30	G27 G28 G29 G30	00	Makina referans noktasina donus kontrolu Otomatik referans noktasina donus Referans noktasindan donus Ikinci referans noktasina donus
#G32	G33	01	Dis Cekme
G40 G41 G42	G40 G41 G42	07	Uc yaricap telefisi iptali Sola, uc yaricap telafisi Saga, uc yaricap telafisi
G50 G70 G71 G72 G73 G74 G75 G76	G92 G70 G71 G72 G73 G74 G75 G76	00	Fener mili max devir sayisi sinirlama Birlesik tekrar cevrimi(Finish [son cevrim] dongusu) Birlesik tekrar cevrimi(Z yonunde kaba bosaltma cevrimi) Birlesik tekrar cevrimi(X yonunda kaba bosaltma cevrimi) Birlesik tekrar cevrimi(Sekil tekrarli cevrim) Birlesik tekrar cevrimi(Z yonunde gagalayarak delik delme cevrimi) Birlesik tekrar cevrimi(X yonunde kanal acma cevrimi) Birlesik tekrar cevrimi(Otomatik dis cekme cevrimi)
G90 G92 G94	G77 G78 G79	01	Sabit cevrim(Boyda kaba bosaltma cevrimi, z yonunde) Sabit cevrim(Dis cekme cevrimi) Sabit cevrim(Alinda kaba bosaltma cevrimi, x yonunde)
G96 #G97	G96 #G97	02	Sabit kesme hizi kontrolu aktif (m/min) Sabit kesme hizi kontrolunu iptal eder (dev/dak, rpm)
G98 #G99	G94 #G95	05	Zamana bagli ilerleme (mm/min) Devire bagli ilerleme(mm/rev.)
- -	G90 G91	03	Mutlak koordinat sistemine gore programlama Artimsal koordinat sistemine gore programlama

Not) 1. # isaretli G kodlari, makina ilk acildiginda aktif olan G kodlarini gosterir

(Modal) Kalici G kodlari

2. Genellikle tornalarda standart G kodlari kullanilir, fakat parametre ayarlarina gore ozel G kodlarini da secmek mumkundur.

CNC TORNA M KODLARI LISTESI

M-KOD	ACIKLAMA	OZELLIK	M-KOD	ACIKLAMA	OZELLIK
M00	PROGRAM DURDURMA		M39	ARA YATAK 1 UNCLAMP (ACMA)	OPSIYON
M01	ISTEGE BAGLI PROGRAM DURDURMA		M40	SANZIMAN (DISLI KUTUSU) BOSTA	
M02	PROGRAM SONU		M41	SANZIMAN 1. KADEME	
M03	ANA FENER MILI DONDURME, CW		M42	SANZIMAN 2. KADEME	
M04	ANA FENER MILI DONDURME, CCW		M43	SANZIMAN 3. KADEME	
M05	ANA FENER MILI DURDURMA		M46	PROG. PUNTA GOVDE SERBEST VE PIN YUKARI	OPSIYON
M07	YUKSEK BASINCLI SOGUTMA ACIK	OPSIYON	M47	PROG. PUNTA GOVDE SIKMA VE PIN ASAGI	OPSIYON
M08	SOGUTMA SUYU ACIK		M50	CUBUK SURUCU KOMUT 1	OPSIYON
M09	SOGUTMA SUYU KAPALI		M51	CUBUK SURUCU KOMUT 2	OPSIYON
M10	PARCA YAKALAYICI ILERI	OPSIYON	M52	KORUYUCU KAPI ACIK	OPSIYON
M11	PARCA YAKALAYICI GERI	OPSIYON	M53	KORUYUCU KAPI KAPALI	OPSIYON
M13	TURRET HAVA UFLEME	OPSIYON	M54	PARCA SAYMA	OPSIYON
M14	ANA FENER MILI HAVA UFLEME	OPSIYON	M58	ARA YATAK 2 SIKMA	OPSIYON
M15	HAVA UFLEME KAPALI	OPSIYON	M59	ARA YATAK 2 ACMA	OPSIYON
M17	MAKINA (EKSENLER) KILITLEME AKTIF	(SADECE) MDI	M61	DUSUK DEVIR SECME (TORK)	α P60
M18	MAKINA (EKSENLER) KILITLEME IPTAL	(SADECE) MDI	M62	YUKSEK DEVIR SECME	α P60
M19	ANA FENER MILI ORYANTASYON	OPSIYON	M63	ANA FENER MILINI DONDUR (CW) VE SOGUTMA SUYU AC	
M24	TALAS KONVEYORU ACIK	OPSIYON	M64	ANA FENER MILINI DONDUR (CCW) VE SOGUTMA SUYU AC	
M25	TALAS KONVEYORU KAPALI	OPSIYON	M65	ANA FENER MILINI DURDUR VE SOGUTMA SUYU KAPA	
M30	PROGRAM SONU VE GERI SARMA		M66	ANA AYNA DUSUK BASINCTA SIKMA	OPSIYON
M31	KENETLENME IPTALI (FENER MILI VE PUNTA)		M67	ANA AYNA YUKSEK BASINCTA SIKMA	OPSIYON
M32	KENETLENME IPTALI (ARA YATAK)	3 EKSEN	M68	ANA AYNA SIKMA	
M33	DONER TAKIM FENER MILI DONDURME,CW	3 EKSEN	M69	ANA AYNA ACMA	
M34	DONER TAKIM FENER MILI DONDURME, CCW		M70	PUNTA PINOLU DUSUK BASINCTA ILERI	OPSIYON
M35	DONER TAKIM FENER MILI DURDURMA		M74	HATA ALGILAMA ACIK	
M38		OPSIYON	M75	HATA ALGILAMA KAPALI	

CNC TORNA M KODLARI LISTESI

M-KOD	ACIKLAMA	OZELLIK	M-KOD	ACIKLAMA	OZELLIK
M76	PAH KIRMA ACIK		M131	KENETLENME IPTALI (IKINCI FENER MILI)	
M77	PAH KIRMA KAPALI		M163	IKINCI FENER MILI SAAT YONU DONDURME VE SOGUTMA SUYU ACIK	
M78	PUNTA PINOLU ILERI		M164	IKINCI FENER MILI SAAT YONU TERSI DONDURME VE SOGUTMA SUYU ACIK	
M79	PUNTA PINOLU GERI		M165	IKINCI FENER MILI DURDURMA VE SOGUTMA SUYU KAPALI	
M80	PROB KOLU ASAGI	OPSIYON	M168	IKINCI AYNA SIKMA	
M81	PROB KOLU YUKARI	OPSIYON	M169	IKINCI AYNA ACMA	
M84	TARET SAAT YONU DONUS		M203	SAAT YONUNDE DONEREK SENKRONIZASYON KOMUTU	
M85	TARET SAATIN TERSI YONDE DONUS		M204	SAAT YONU TERSINE DONEREK SENKRONIZASYON KOMUTU	
M86	TORK KONTROLU AKTIF DEGIL	B EKSENI	M205	SENKRONIZASYON DONUSU DURDURMA	
M87	TORK KONTROLU AKTIF	B EKSENI	M206	FENER MILI SENKRONIZASYONUNDAN AYRILMA	
M88	FENER MILI DISKI DUSUK BASINCTA SIKMA				
M89	FENER MILI DISKI YUKSEK BASINCTA SIKMA				
M90	FENER MILI DISKI ACMA				
M91	HARICI M KOMUTU, M91	3 EKSEN			
M92	HARICI M KOMUTU, M92	3 EKSEN			
M93	HARICI M KOMUTU, M93				
M94	HARICI M KOMUTU, M94	OPSIYON			
M98	ALT PROGRAM CAGIRMA	OPSIYON			
M99	ALT PROGRAM SONU	OPSIYON			
M103	IKINCI FENER MILI DONDURME, CW				
M104	IKINCI FENER MILI DONDURME, CCW				
M105	IKINCI FENER MILI DURDURMA				
M110	PARCA YAKALAYICI ILERI (IKINCI)	OPSIYON			
M111	PARCA YAKALAYICI GERI (IKINCI)	OPSIYON			
M114	IKINCI FENER MILI HAVA UFLEME	OPSIYON			
M119	IKINCI FENER MILI ORYANTASYON	OPSIYON			

Not) 1. M00 : Bu komutla, ana fener mili, kesme sivisi, motorlar, program okumasi durur ve devam etmez.

M01 : Bu M komutu da M00 ile ayni olmakla birlikte, kontrol paneli uzerindeki istege bagli program durdurma butonu acik konumda ise aktiftir.
Istege bagli program durdurma butonu aktif degilse, bu M kodu ihmal edilebilir

M02 : Ana program sonunu gosterir.

M30 : M02 ile ayni gorevi yapar. Farkli olarak, bu kodu gordugunde programin ilk satirina doner ve bekler.

2. Ayni satirda birden fazla M komutu kullanilmaz.

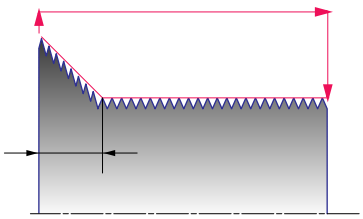
3. Alternatif akim servo motorunun karakteristik etkisinden dolayi islenen malzemenin kenarlari dairesel hale gelir. Bunu engellemek icin M74 ve M75 komutlari kullanilir.

M75 komutu kullanildiginda
(Hata algilama kapali)

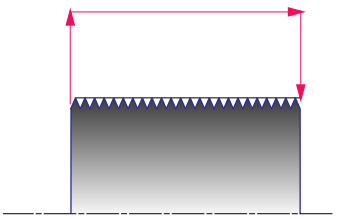
M74 komutu kullanildiginda
(Hata algilama acik)

4. M76, M77

Bu komutlar G92 dis acma komutu kullanildiginda aktifitir, Dis cekerken acili sekilde keserek uzaklasmayi acip, kapamak icin kullanilir.



(Dis pah kirma acik)



(Dis pah kirma kapali)

Aciklama	Simge	Simgenin Anlami
Program numarasi	O (EIA)/(ISO)	Program numarasi
Blok (Satir) sira numarasi	N	Sira numarasi
Hazirlik fonksiyonu	G	Bir hareket modunu gosterir (Dogrusal, dairesel, vs.)
Pozisyonlama fonksiyonlari	X, Z	Her bir eksenin hareket komutlari (Mutlak Tip)
	U, W	Hareket mesafe ve yon komutlari(Artimsal Tip)
	I, K	Baslangic noktasinin yayin merkezine olan uzakliklari
	R	Daire yaricapi,kose R,kenar R
Ilerleme Fonksiyonu	F	Kesme ilerlemesi
Yardimci fonksiyonlar	M	Makinanin calisan fonksiyonlarini acip kapatan komutlar
Fener mili hiz fonksiyonu	S	Ana fener milinin devir sayisini belirler
Takim fonksiyonu	T	Takim numarasi ve takim ofset numarasi
Bekleme	P, U, X	Bekleme zamani
Alt program Numarasi	P	Alt program cagirma numarasi
Sira Numarasi	P, Q	Birlesik tekrar cevriminde baslangic ve bitis satir numaralari
Tekrar Sayisi	L	Alt program tekrar sayisi
Parametreler	A, D, I, K	Sabit cevrimlerdeki parametreler

Bir satir asagidaki gibi duzenlenebilir,

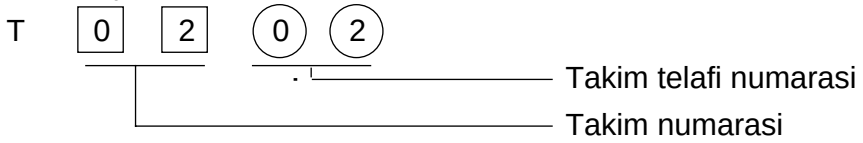
Bir blok (Satir)

N	G	X Z	F	S	T	M		:
Satir Numarasi	Hazirlik fonksiyonu	Pozisyonlama fonksiyonu	Ilerleme fonksiyonu	Fener Mili devir fonksiyonu	Takim fonksiyonu	Yardimci fonksiyon		Satir Sonu

Simge Anlami

T fonksiyonu, takim numaralari ve takim telafileri icin dizayn edilmistir.

T fonksiyonu, 4 rakamli bir takim secme kodudur.



Ornek) Eger (T 0 2 ⓪ ②) seklinde adlandirilirsa

0 2 nolu takimi cagirir ve ayni numarali takim telafi degerini aktifler , ve

Takim telefisinin iptali yandaki sekilde komut edilir. T □ □ ⓪ ⓪

Eger bir sonraki takimi cagirmak ve telafisi aktiflenmek istenirse, aktif olan takim telafisinin iptal edilmesi iyi olur. Rahat bir calisma icin, ayni numarali takim ve telafisinin kulanilmasi tavsiye edilir.

Ayni takimtelafi numarasinin ikifarkli takimda kullanilmasina izin verilmez.

Minimum telafi degeri : + 0.001mm

Maximum telafi degeri : + 999.999mm

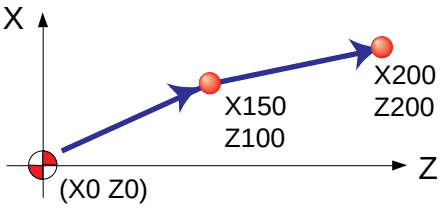
Takim telafi degerleri X icin capa gore tasarlanmisitir.

G00

G00(Bosta hizli pozisyonlama)

Bu G kodu ile yazilan komutlarda eksenler maksimum hizda ilerler.

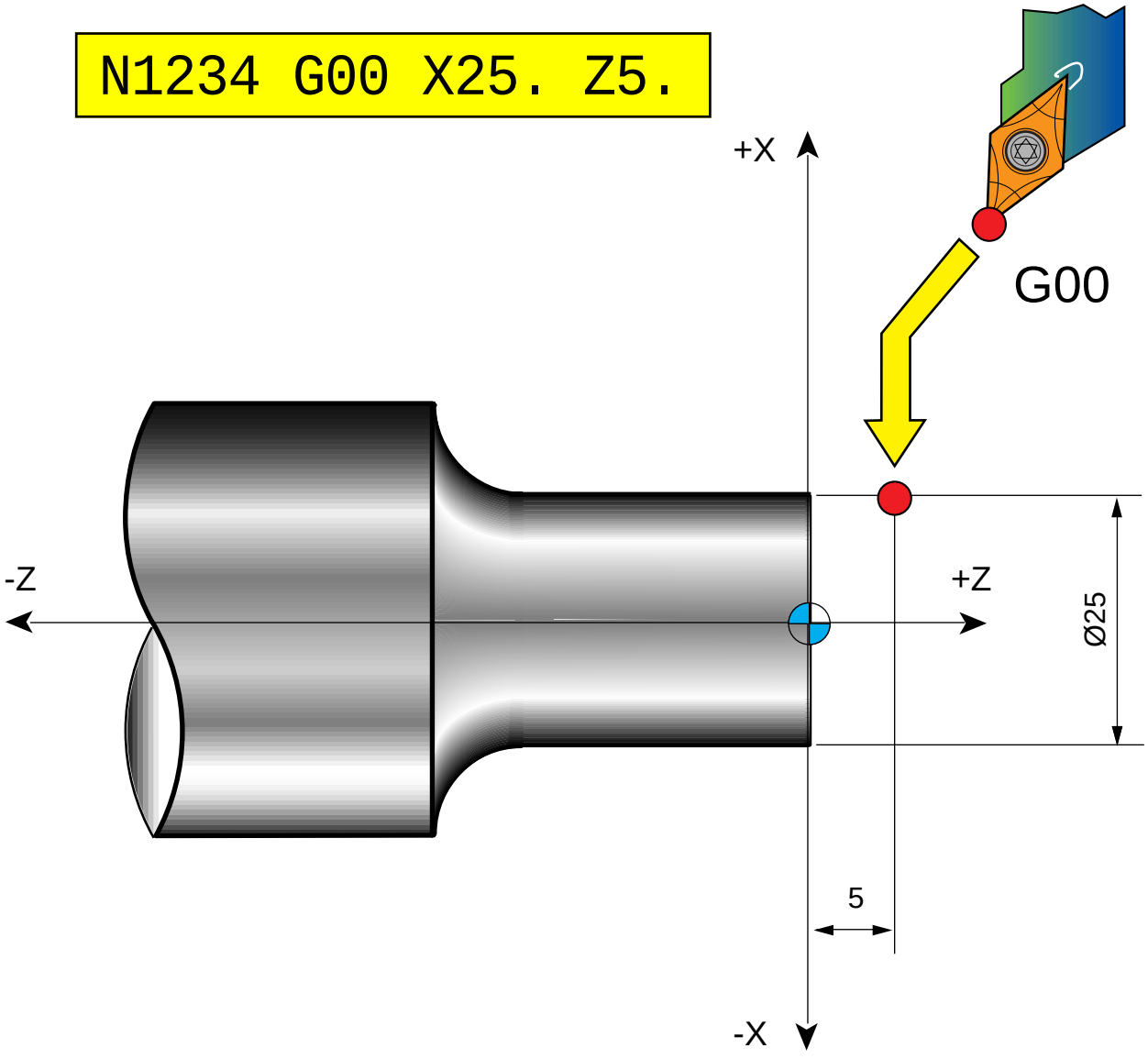
```
G00    X(U)    Z(W);
```



G00 X150.0 Z100.0
X200.0 Z200.0

G00 U150.0 W100.0
U50.0 W100.0

```
N1234 G00 X25. Z5.
```

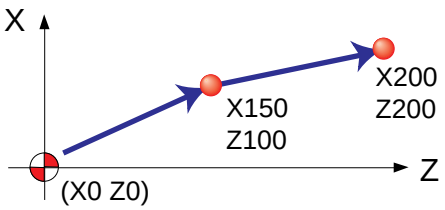


G01

G01(Dogrusal kesme pozisyonlamasi)

Bu G kodu ile yazilan komutlarda eksenler belirtilen F ilerlemesinde hareket eder.

G01 X(U)_ Z(W)_ F_



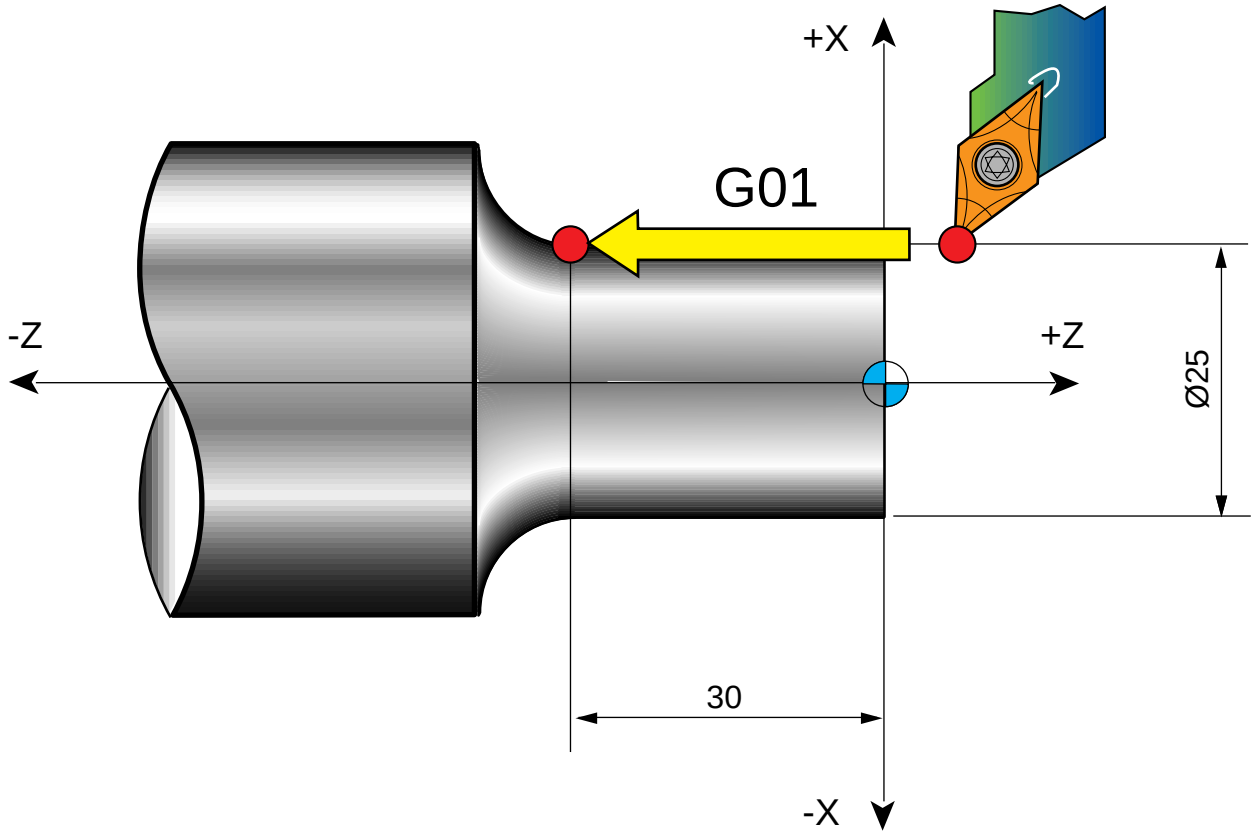
G01 X150.0 Z100.0 F0.2 :

X200.0 Z200.0 :

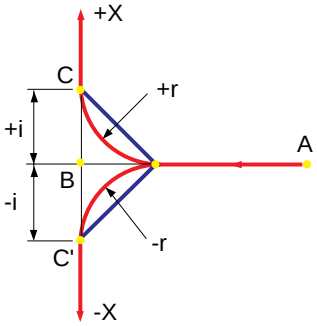
G01 U150.0 W100.0 F0.2 :

U50.0 W100.0 :

```
N1234 G01 X25. Z-30. F0.2
```



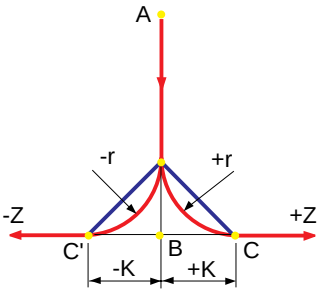
OTMATIK PAH KIRMA "C" VE RADIUS "R" (Opsiyon)



Komut yolu Z→X : Komut baslangic noktasi

G01 Z(w) B C (¡ i) : B : Komut bitis noktasi

G01 Z(w) B C (¡ r) :CC' : Komutun calisma noktasi



Komut yolu X →Z :

G01 X(u) B C (¡ k)

G01 X(u) B R (¡ r)

Not) (1) G01 komutu bir eksene uygulandiktan sonra, bir sonraki komut satiri dikey yonde olacak sekilde verilmelidir.

(2) Eger bir sonraki komut satiri artimsal olarak verilmis ise, bu artimsal deger B notasina gore verilmelidir.

(3) Asagidaki durumlarda,hata olusur. (G01 Modu)

– Ayni zamanda I, K, R parametrelerinden biri ve X, Z kullanildiginda.

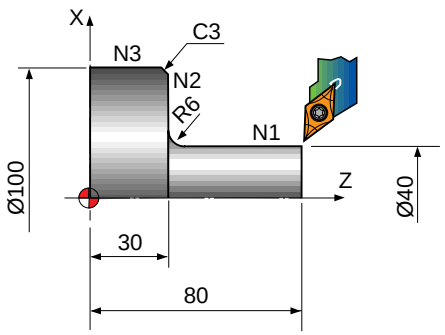
– Ayni satirda I, K, R parametrelerinden ikisi kullanildiginda.

– X ve I ya da Z ve K kullanildiginda.

– Hareket mesafesi bir sonraki komuttan daha kisa ise.

(4) Tek satirlik bir komutun calismasi sirasinda, komut C noktasinda sona erer.

Ornek)



N1 G01 Z30.0 R6.0 F0.2 :

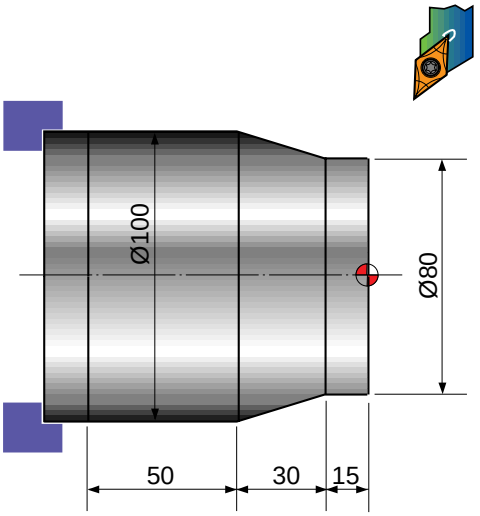
N2 X100.0 K-3.0 :

N3 Z0 :

(N2 X100.0 C3.0 :)Normal

G01 PROGRAM

Ornek1)



O0001 :

N10 G50 S1500 T0100 M42 :
G96 S180 M03 :
G00 X100.5 Z5.0 T0101 M08 :
G01 Z-95.0 F0.25 :
G00 U2.0 Z0.5 :
G01 X-1.6 F0.2 :
G00 X95.0 W1.0 :
G01 Z-37.3 F0.25 :
X100.0 Z-45.5 :
G00 Z1.0 :
X90.0 :
G01 Z-29.8 :
X95.0 Z-37.3 :
G00 Z1.0 :
X85.0 :
G01 Z-22.3 :
X90.0 Z-29.8 :
G00 Z1.0 :
X80.5 :
G01 Z-15.55 :
X85.0 Z-22.3 :
G00 X200.0 Z200.0 M09 T0100 :
M01 :

N20 G50 S2000 T0300 :
G96 S200 M03 :
G00 X85.0 Z5.0 T0303 M08 :
Z0 :
G01 X-1.6 F0.2 :
G00 X80.0 Z3.0 :
G42 Z1.0 :
G01 Z-15.0 F0.18 :
X100.0 Z-45.0 :
Z-95.0 :
G40 U2.0 W1.0
G00 X200.0 Z200.0 M09 T0300 :
M30 :

G50 : Fener mili max donus hizi ayarlama komutu

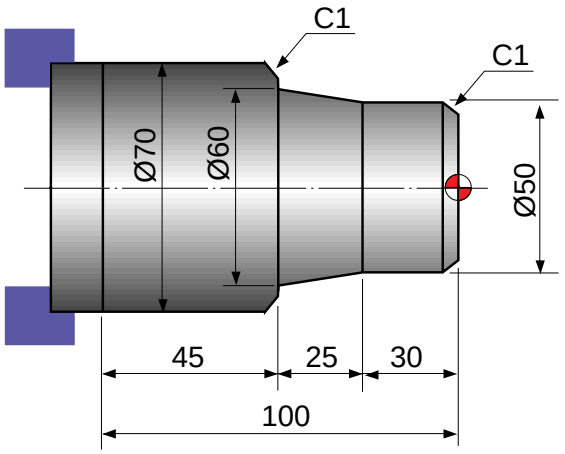
G96 : Sabit yuzey hizi kontrolu komutu

G40 : Takim uc yaricapi telafisi iptali

G42 : Saga takim uc yaricapi telafisi

G01 PROGRAM

Ornek 2)



O0002 :

N10 G50 S2000 T0100 :

G96 S180 M03 :

G00 X70.5 Z5.0 T0101 M08 :

G01 Z-100.0 F0.25 :

G00 U2.0 Z0.5 :

G01 X-1.6 F0.23 :

G00 X65.0 W1.0 :

G01 Z-54.5 F0.25 :

G00 U2.0 Z1.0 :

X60.0 :

G01 Z-54.5 :

G00 U2.0 Z1.0 :

X55.0 :

G01 Z-30.0 :

X60.0 Z-54.5 :

G00 U2.0 Z1.0 :

X50.5 :

G01 Z-30.0 :

X60.3 Z-54.7 :

X72.0

G00 X150.0 Z200.0 T0100 :

M01 :

N20 G50 S2300 T0300 :

G96 S200 M03 :

G00 X55.0 Z5.0 T0303 M08 :

Z0 :

G01 X-1.6 F0.2 :

G00 X46.0 Z3.0 :

G42 Z1.0 :

G01 X50.0 Z-1.0 F0.15 :

Z-30.0 :

X60.0 Z-55.0 :

X68.0 :

X70.0 W-1.0 :

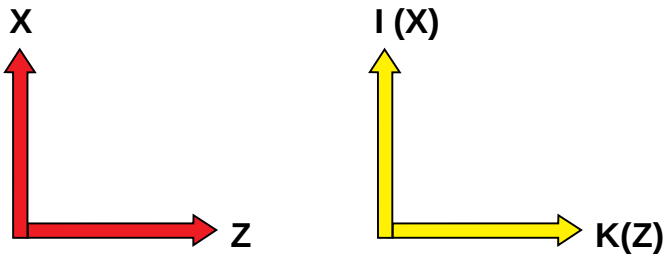
Z-100.0 :

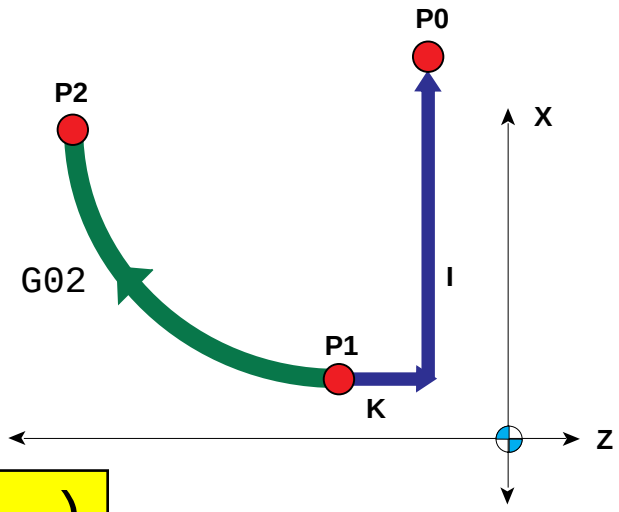
G40 U2.0 W1.0

G00 X150.0 Z200.0 M09 T0300 :

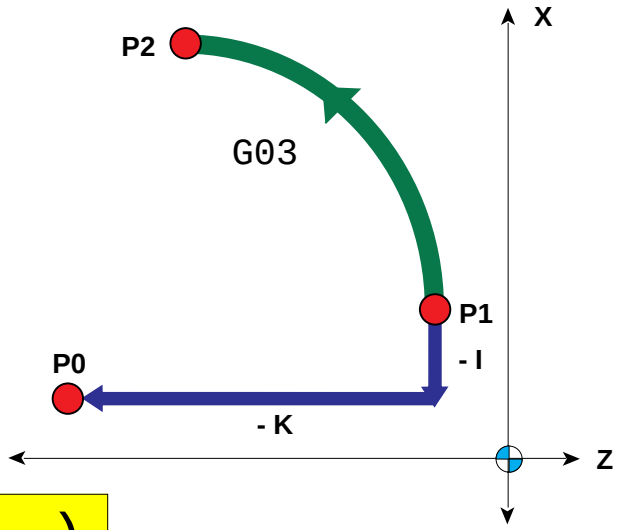
M30 :

G02 G03





N1234 G02 X.. Z.. (R..)



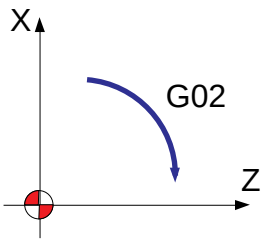
N1234 G03 X.. Z.. (R..)

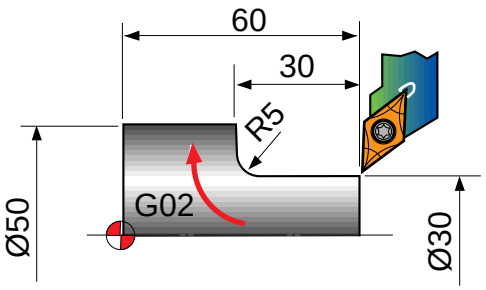
G02, G03(Dairesel interpolasyon)

Her eksen belirtilen hizda dairesel hareket yaparak belirtilen koordinata gider.

Conditions		Komut	Aciklama	
1	Hareket yonu	G02	CW (Saat yonu)	
		G03	CCW (Saat yonu tersi)	
2	Hareketin son nokta koordinatlari Son noktaya olan uzakliklar	X,Z U,W	Son noktanin koordinatlari Baslangic noktasindan son noktaya olan uzakliklar	
3	Baslangic noktasi ile yayin merkezi arasindaki uzakliklar	I,K	Baslangic noktasindan yayin merkezine olan x ve y eksen uzakliklari , isaretleri ile birlikte	
	Yayin yaricapi	R	Yay yaricapi	

G02 X(u) Z(w) R_ F_ :





G01 X30.0 Z60.0 F0.3 :

Z35.0 :

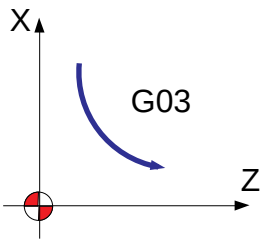
G02 X40.0 Z30.0 I5.0 :

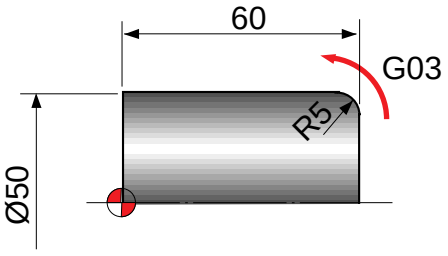
(G02 U10.0 W-5.0 I5.0)

G01 X50.0 :

Z0 :

G03 X(u) Z(w) R_ F_ :





G01 X40.0 Z60.0 F0.3 :

G03 X50.0 Z55.0 K-5.0 :

Note) (1) I ya da K eger 0 ise yazilmayabilir.

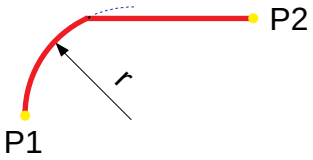
(2) G02 I_: bir daire yapar.

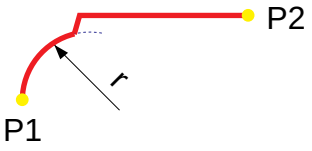
(3) 180 dereceden kucuk yaylar icin R yaricap degerinin + alinmasi tavsiye edilir

G03 R_: hareket olmaz

(4) I, K ve R ayni zamanda kullanildiginda, R aktiftir.

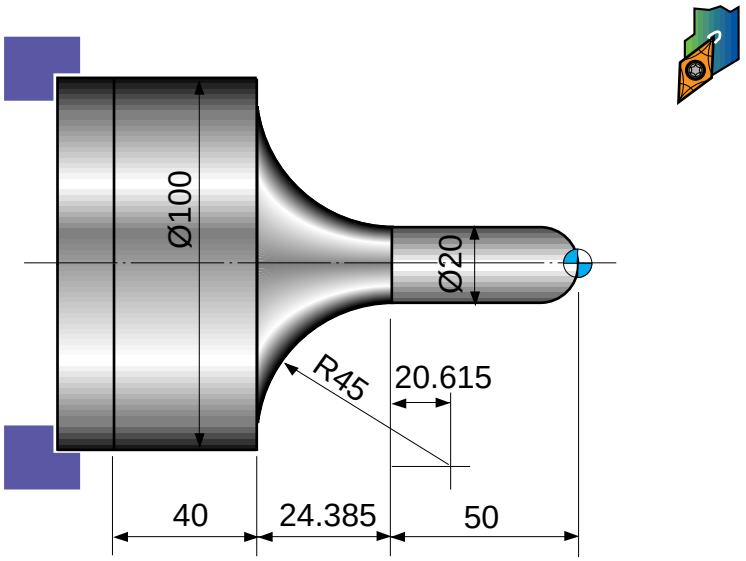
(5) Eger son nokta koordinatlari yay uzerinde degilse bu K degerinin yanlis olmasi sonucudur:





G03) PROGRAM
G02

Ornek 1)



N10 :

N20 G50 S2000 T0300 :

G96 S200 M03 :

G00 X0 Z3.0 T0303 M08 :

G42 G01 Z0 F0.2 :

G03 X20.0 Z-10.0 R10.0 :

G01 Z-50.0 :

G02 X100.0 Z-74.385 I40.0 K20.615 : (G02 X100.0 Z-74.385 R45.0)

G01 Z-125.0 :

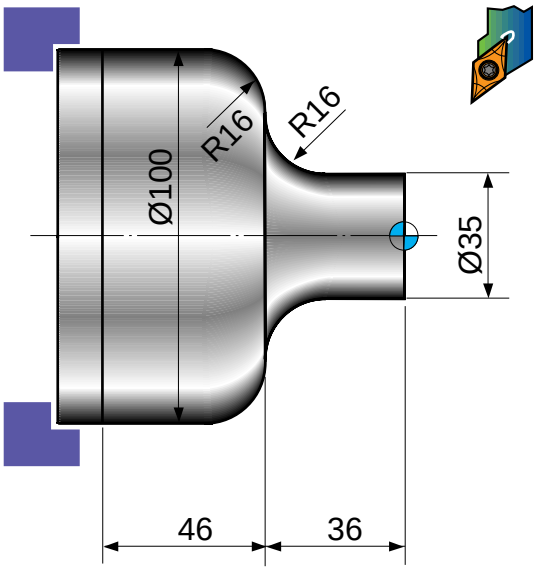
G40 U2.0 W1.0

G00 X200.0 Z200.0 M09 T0300 :

M30 :

G02) PROGRAM
G03

Ornek 2)



N10 :

N20 G50 S2000 T0300 :

G96 S200 M03 :

G42 G00 X35.0 Z5.0 T0303 M08 :

G01 Z-20.0 F0.2 :

G02 X67.0 Z-36.0 R16.0 : (G02 X67.0 Z-36.0 I16.0 K0)

G01 X68.0 :

G03 X100.0 Z-52.0 R16.0 : (G02 X100.0 Z-52.0 I0 K-16.0)

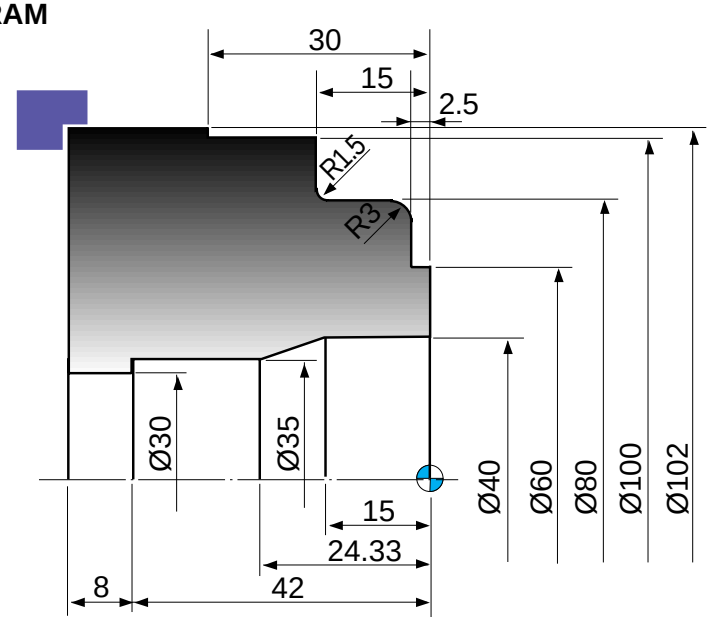
G01 Z-82.0 :

G40 G00 X200.0 Z200.0 M09 T0300 :

M30 :

#I ve K kullanildiginda, ieger degerler “0” ise kullanilmayabilir.

G01
G02) **PROGRAM**
G03



O0000 :

N10 (ø30 MATKAP)

G50 T0200 :

G97 S250 M03 :

G00 X0 Z5.0 T0202 M08 :

G01 Z-5.0 F0.07 :

W1.0 :

Z-40.0 F0.25 :

G00 Z5.0 :

Z-39.0 :

G01 Z-60.0 :

G00 Z10.0 :

X200.0 Z200.0 T0200 :

M01 :

N20 (Dis cap kaba bosaltma)

G50 S1500 T0100 :

G96 S180 M03 :

G00 X94.0 Z5.0 T0101 M08 :

G01 Z-14.8 F0.27 :

G00 U2.0 Z0.5 :

G01 X28.0 F0.23 :

G00 X87.0 W1.0 :

G01 Z-14.8 F0.27 :

G00 U2.0 Z1.0 :

X80.5 :

G01 Z-14.1 :

G02 X81.9 Z-14.8 R0.7 :

G00 X100.5 W1.0

G01 Z-29.8

G00 U2.0 Z-1.0 :

G01 X60.5 F0.23 :

G00 X82.0 W1.0 :

Z-2.4 :

G01 X60.5 :

X72.9 :

G03 X80.5 Z-6.2 R3.8 :

G00 U2.0 Z5.0 :

X200.0 Z200.0 T0100 :

M01 :

```
N30 (ic cap kaba bosaltma)
    G50 S1500 T0400 :
    G96 S180 M03 :
    G00 X34.5 Z3.0 T0404 M08 :
    G01 Z-41.8 F0.27 :
    G00 U-0.5 Z1.0 :
        X39.5 :
    G01 Z-15.0 :
        X34.5 Z-24.3 :
    G00 Z10.0 :
        X200.0 Z200.0 T0400  :
    M01 :
N40 (Dis cap finish)
    G50 S1800 T0500 :
    G96 S200 M03 :
    G00 X63.0 Z5.0 T0505 M08 :
        Z0 :
    G01 X38.0 F0.2 :
    G00 X60.0 Z3.0 :
     G42  Z1.0 :
    G01 Z-2.5 F0.2 :
        X74.0 :
    G03 X80.0 Z-5.5 R3.0 :
    G01 Z-13.5 :
    G02 X83.0 Z-15.0 R1.5 :
    G01 X100.0 :
        Z-30.0 :
        X103.0 :
    G40 G00 U2.0 W1.0 :
    G00 Z10.0 :
        X200.0 Z200.0 T0500  :
    M01 :
```

```
N50 (ic cap finish)
    G50 S1800 T0600 :
    G96 S200 M03 :
    G00 X40.0 Z5.0 T0606 M08 :
    G41 Z1.0 :
    G01 Z-15.0 F0.2 :
        X35.0 Z-24.33 :
        Z-42.0 :
        X29.0 :
    G40 G00 Z10.0 :
        X200.0 Z200.0 T0600 M09 :
    M30 :
```

G04 (Bekleme)

X, P veya U komutlarindan biri ile verilen bekleme suresinden sonra, bir sonraki satira gecilir.

Ornegin 10 s'lik bir bekleme icin,
G04 X10.0 : (G04 X10000 :)
G04 U10.0 : (G04 U10000 :)
G04 P10000.0 : (G04 P10000 :)

Otomatik olarak referans noktasina donus

Referans makina uzerinde sabit bir nokta anlamina gelir ve referans noktasinin koordinat degeri kontrol uzerinde belirtilmistir.

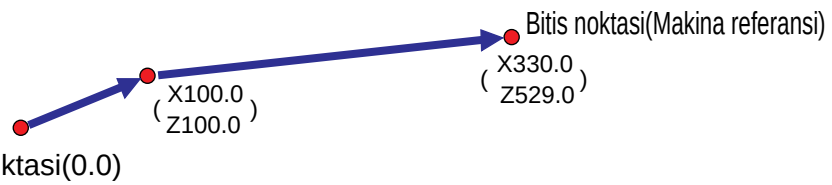
	OT-C/F	FS16/18T
Parametre NO	N708(X) N709(Z)	N1240(X, Z)

1) G27(Referans noktasina donus kontrolu)

Pozisyon, rapid hareketle kontrol unitesindeki parametre degerindeki pozisyona gore belirlenir.

Ornek) Parametre N708(X) 330000 oldugu zaman
N709(Z) 529000

G00 X100.0 Z100.0 :
G27 X330.0 Z529.0 :



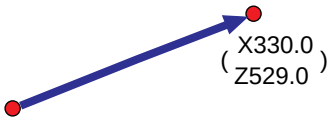
Eger ulasilan pozisyon referans noktasi ise, referans lambasi yanar.

Not) G27 kullanildiginda, OFFSET degerleri iptal edilmelidir

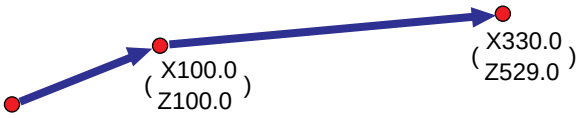
2) G28(Referans noktasina otomatik donus)

Asagidaki komut ile komut edilen eksen referans noktasina otomatik olarak doner.
G28 X(u) Z(w) :
Ornek) PARAMETRE N708(X) is 330000
N709(Z) is 529000 oldugunda

G28 U0 W0 :



G27 X100.0 Z100.0



G28 satirinin calismasi , komut edilen eksen merkezden gecerek rapid hareketle referans noktasina donmesi seklinde olur.

Note) G28 satiri calistirildiginda, takim telafisi ve offset degerleri de genellikle iptal edilir.

3) G29(Otomatik referans noktasina donus)

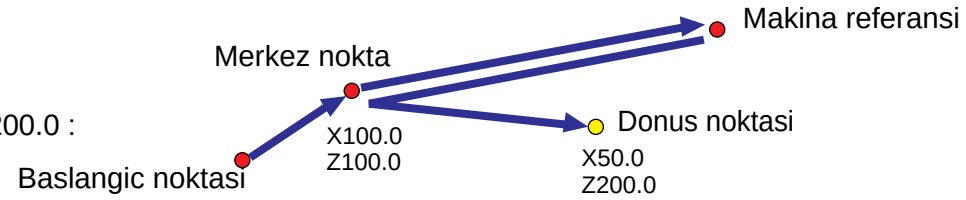
Eksenler belirlenen merkez noktasindan gecerek, komutta belirtilen pozisyona hareket ederler.

G29 X(u) Z(w) :

∴Genellikle G28 ya da G30 komutundan sonra kullanilir.

G28 X100.0 Z100.0 :

G29 X50.0 Z200.0 :



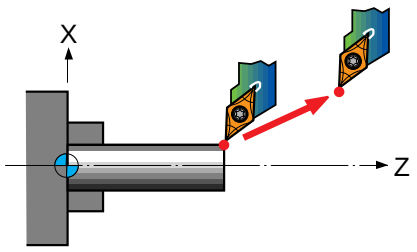
4) G30(Ikinci referans noktasina donus)

Eksenler otomatik olarak komut edilen ikinci referans noktasina donerler.
(koordinat noktasi parametre icersinde set edilmistir)

G30 X(u) Z(w)) :

∴Is ile takim degistirme pozisyonu arasinda, gerekli parametre icersinde uygun degerler girilmelidir.

PARAMETRE NO N735(X) = 200000 FS16/18T
N736(Z) = 300000 N1241(X,Z)



2. referans noktasi
X200.0 G30 U0 W0 :
Z300.0

Referans) 2. referans noktasi genellikle program baslangic noktasi olarak kullanilir.

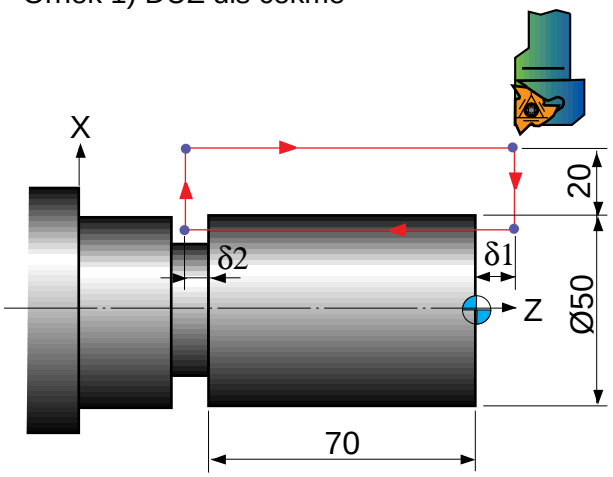
G32(DIS CEKME DONGUSU)

G32 komutuna gore, belli bir hatvedeki duz ve konik disler cekilir.

G32 Z(w) F : (G32 sadece tek bir satirda uygulanir)

X(u) F :

Ornek 1) DUZ dis cekme



Hatve : 3mm

δ 1 : 5mm

δ 2 : 1.5mm

Kesme derinligi : 1mm(iki kerede kesilecek)

(MUTLAK KOORDINAT SISTEMI)

G50 T0100 :

G97 S800 M03 :

G00 X90.0 Z5.0 T0101 M8 :

X48.0 :

G32 Z-71.5 F3.0 :

G00 X90.0 :

Z5.0 :

X46.0 :

G32 Z-71.5 :

G00 X90.0 :

Z5.0

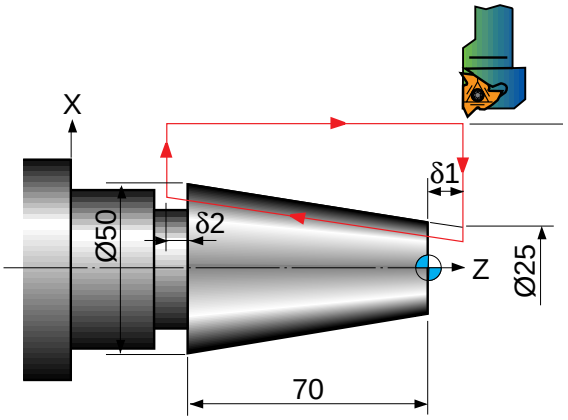
X150.0 Z150.0 T0100 :

M30 :

*G32 kullanildiginda, ilerleme (hatve) kalicidir.

Ornek 2) KONIK dis cekme

G32 X(u) Z(w) F : Dis konik oldugundan , ayni zamanda iki eksene beraber uygulanir.



Hatve : 3mm

δ1 : 5mm

δ2 : 1.5mm

Kesme derinligi : 1mm(iki kerede kesilecek)

(MUTLAK)

G50 S800 T0100 :

G97 S800 M03 :

G00 X90.0 Z5.0 T0101 :

X22.026 :

G32 X49.562 Z-71.5 F3.0 :

G00 X90.0 :

Z5.0 :

X21.052 :

G32 X48.588 Z-71.5 :

G00 X90.0 :

Z5.0 :

X150.0 Z150.0 T0100 :

M30 :

(ARTIMSAL)

G50 S800 T0100 :

G97 S800 M03 :

G00 X90.0 Z5.0 T0101 :

U-67.974 :

G32 U27.321 W-76.5 F3.0 :

G00 U40.438 :

W76.5 :

U-68.948 :

G32 U27.321 W-76.5 :

G00 X90.0 :

W76.5 :

X150.0 Z150.0 T0100 :

M30 :

Referans)

Tamamlanmamis dis icin δ 1 and δ 2. degerleri

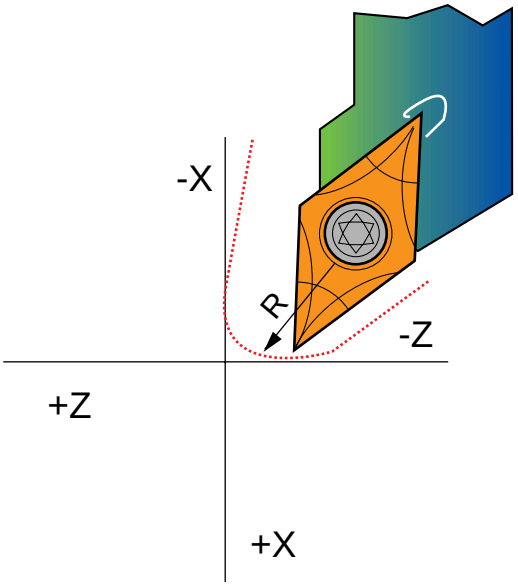
$$\delta 1 = \frac{3.6 \times L \times n}{1800}$$

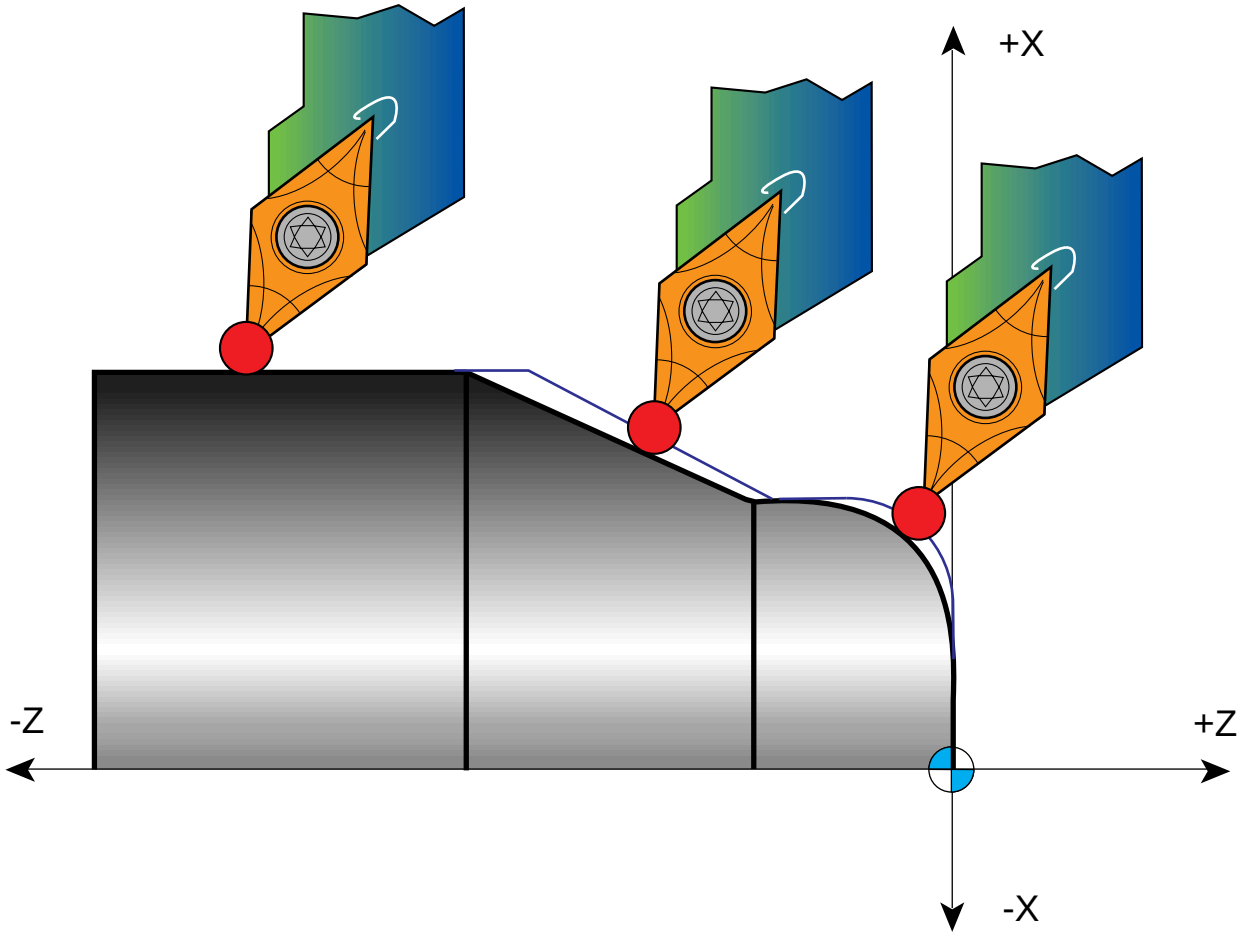
L = Hatve

n = Fenermili devri

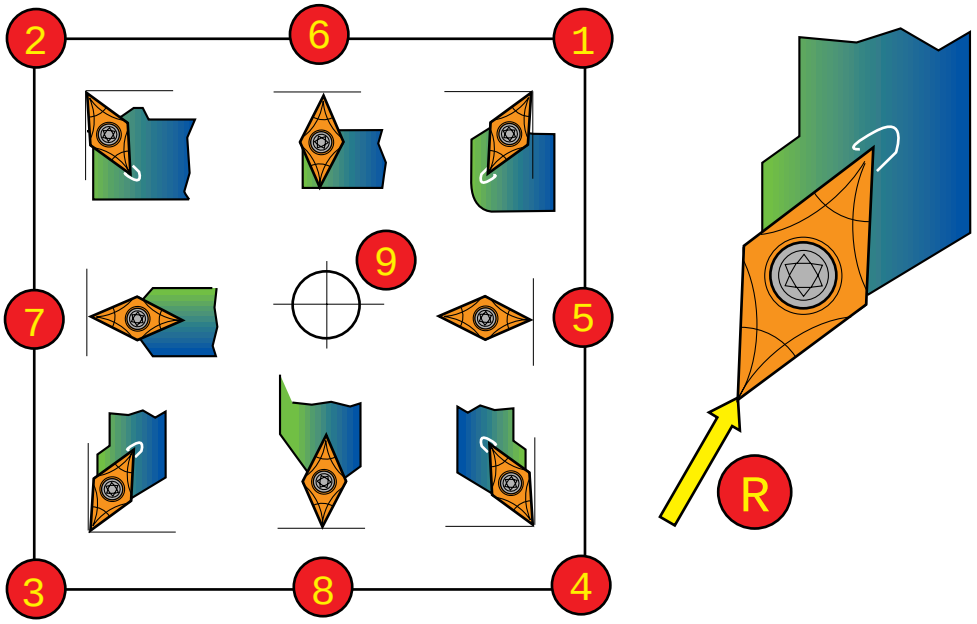
$$\delta 2 = \frac{L \times n}{1800}$$

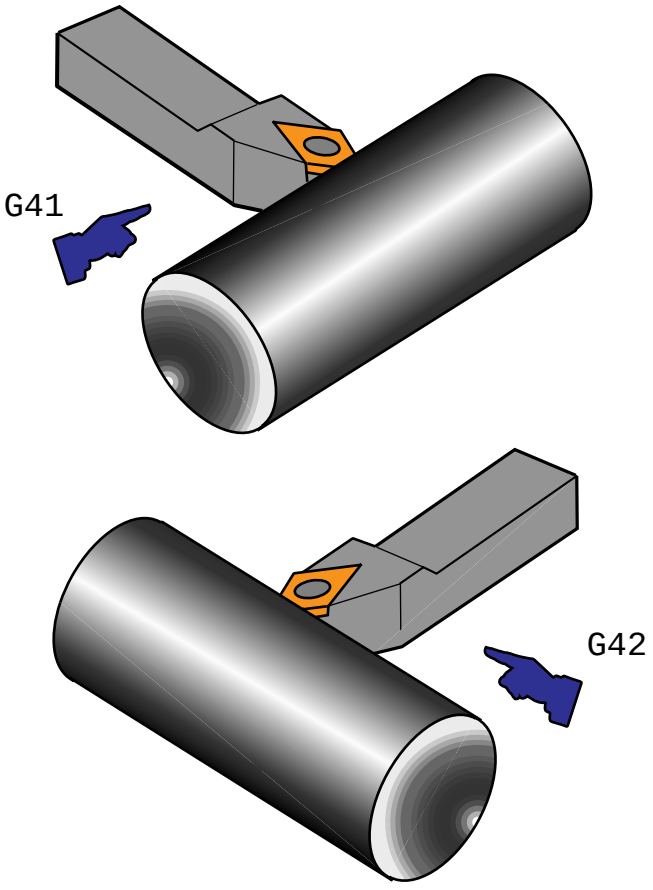
G42





G41 G42

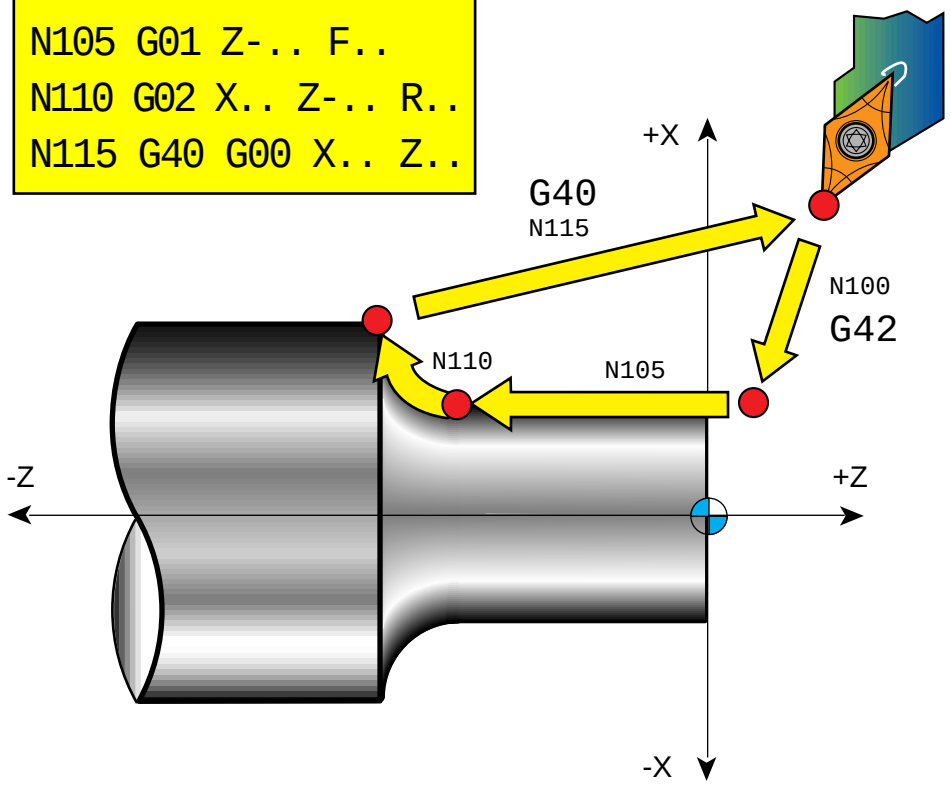




G40

G42

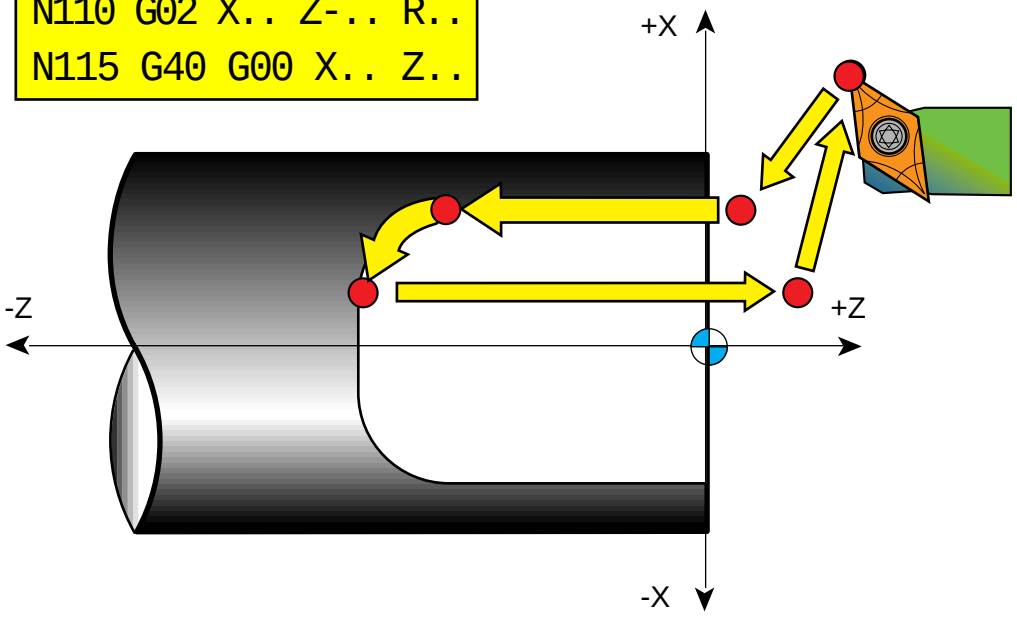
```
N100 G42 G00 X.. Z..
N105 G01 Z-.. F..
N110 G02 X.. Z-.. R..
N115 G40 G00 X.. Z..
```



G41

G40

```
N100 G41 G00 X.. Z..
N105 G01 Z-.. F..
N110 G02 X.. Z-.. R..
N115 G40 G00 X.. Z..
```

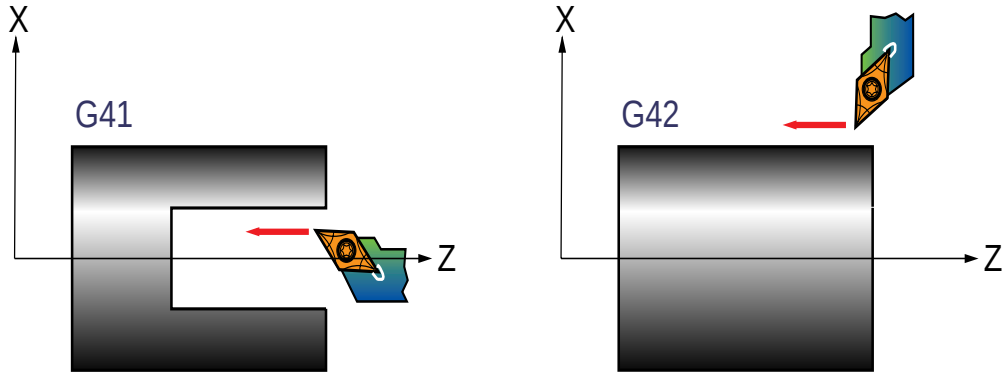


Takim cap telafisi

G40 :Telafi iptali

G41 : Ilerleme yonune gore is parcasinin sol tarafinda konumlandirildiginda,

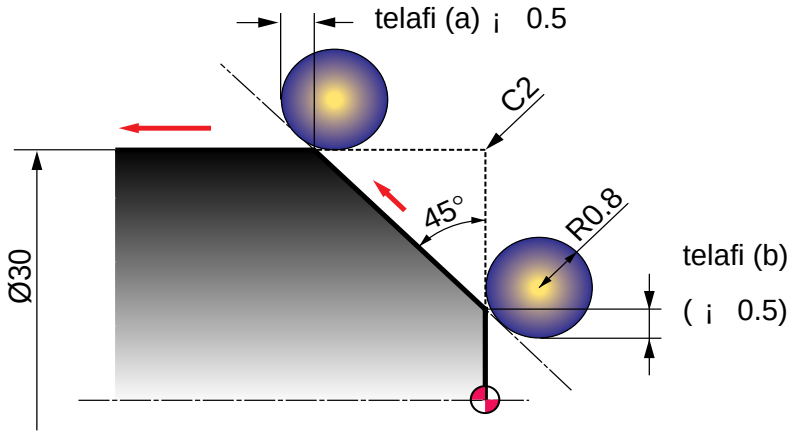
G42 : Ilerleme yonune gore is parcasinin sag tarafinda konumlandirildiginda,



Takim cap telafisi nedir?

Takim uclari teorikte goruldugu gibi duz kenarli degil aslinda daireseldir. Eger biz bu takim ucu yaricap telafisini kullanmadigimiz zaman normal isleme esnasinda o kadarlik bir hata yapmis oluruz. cap telafisi kullanacagi zaman ofset sayfasinda bulunan R ve T (Takim yonu) degerlerinin girilmesi gerekir.

ORNEK 1) cap telafisi kullanilmadigi zaman(R yaricap a ve b degerlerinin hesaplanmasi gerekir)



PROGRAM

G01 X25.0 Z0 F0.2 :

X30.0 Z-2.5 :

G00 U1.0 Z1.0 :

G28 UO WO :

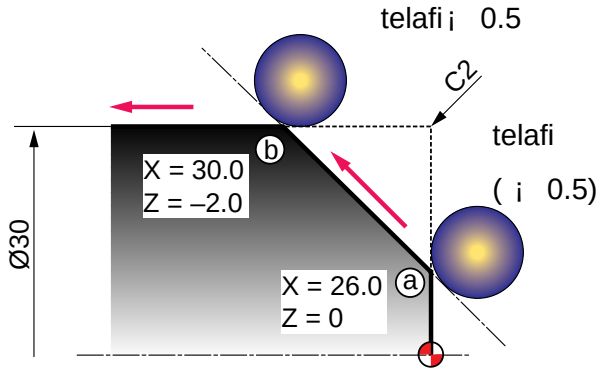
M30 :

*

ornek 2) takim telafisi kulanildiginda

* yaricap telafisi ave b degerlerini hesaplamazsiniz

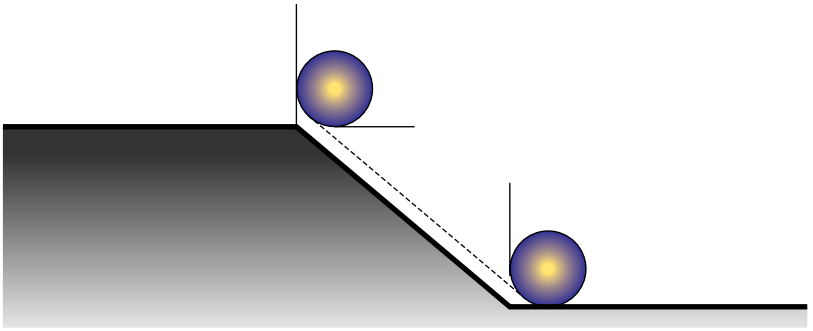
* eger a ve b degerlerini programda yazilirsa , takim yaricap telafisiniotomatik olarak yapar ve bir sonraki yone dogru hareket eder.



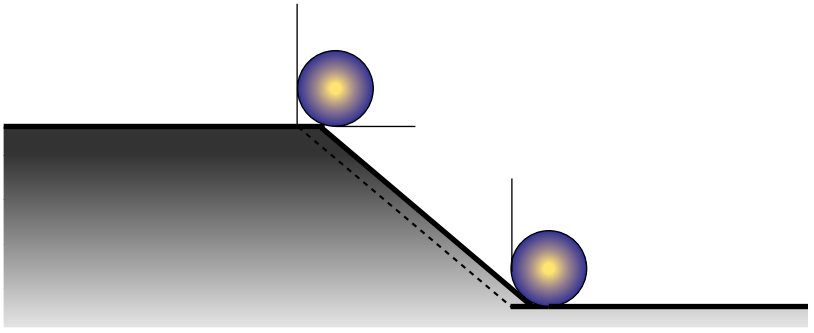
PROGRAM

```
G42 X26.0 Z0 F0.2 :
G01 X30.0 Z-2.0 :
Z-30.0 :
G00 U1.0 Z1.0 :
G28 UO WO :
M30 :
*
```

sunum 1) telafi kullanilmadigi durumda



sunum 2) telafi kullanilmadigi durumda

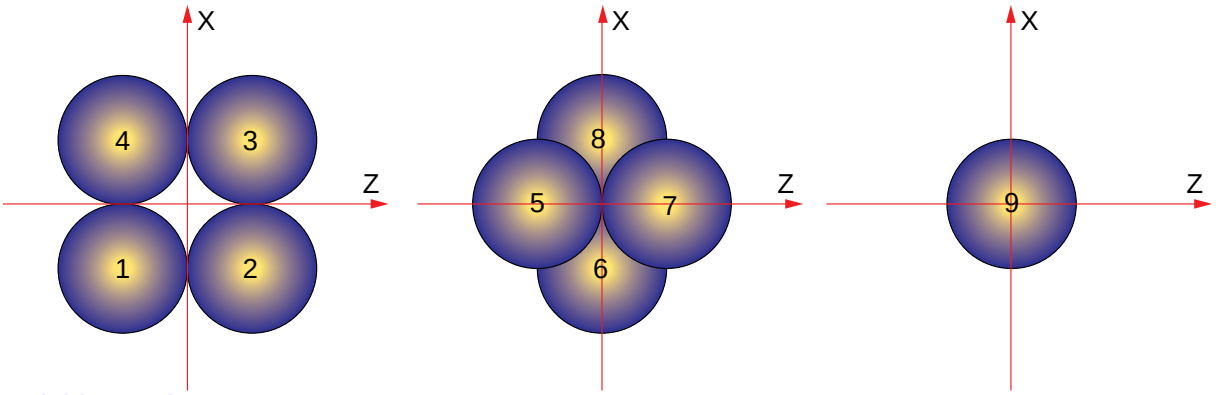


1) sanal yon(koordinatin durumu)

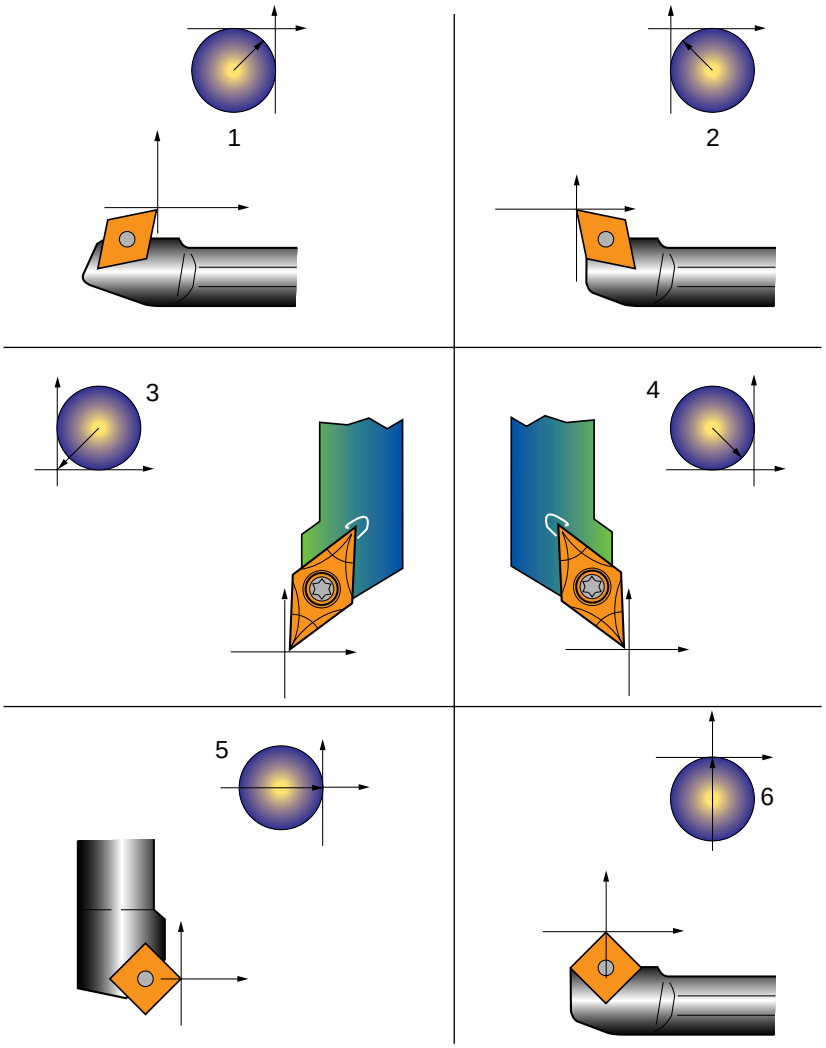
Radusun merkezinden gelen bu sanal yon,kesme aninda, takimin kesme yonu ile belli olur.

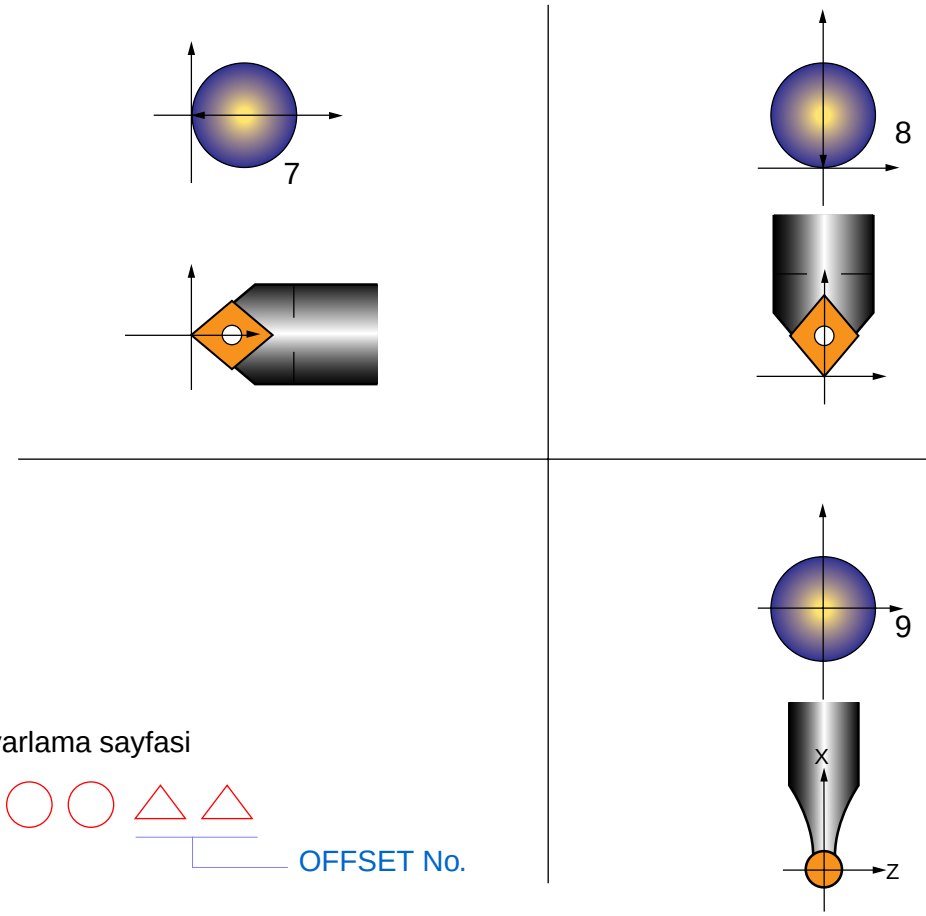
bu yuzden.o telafi degerleri kadar set edilmelidir.

sanal yon ve numaralar asagidaki 8 tip ile kararlastirilmistir.



<ornek bir sanal numara ve yon secme>



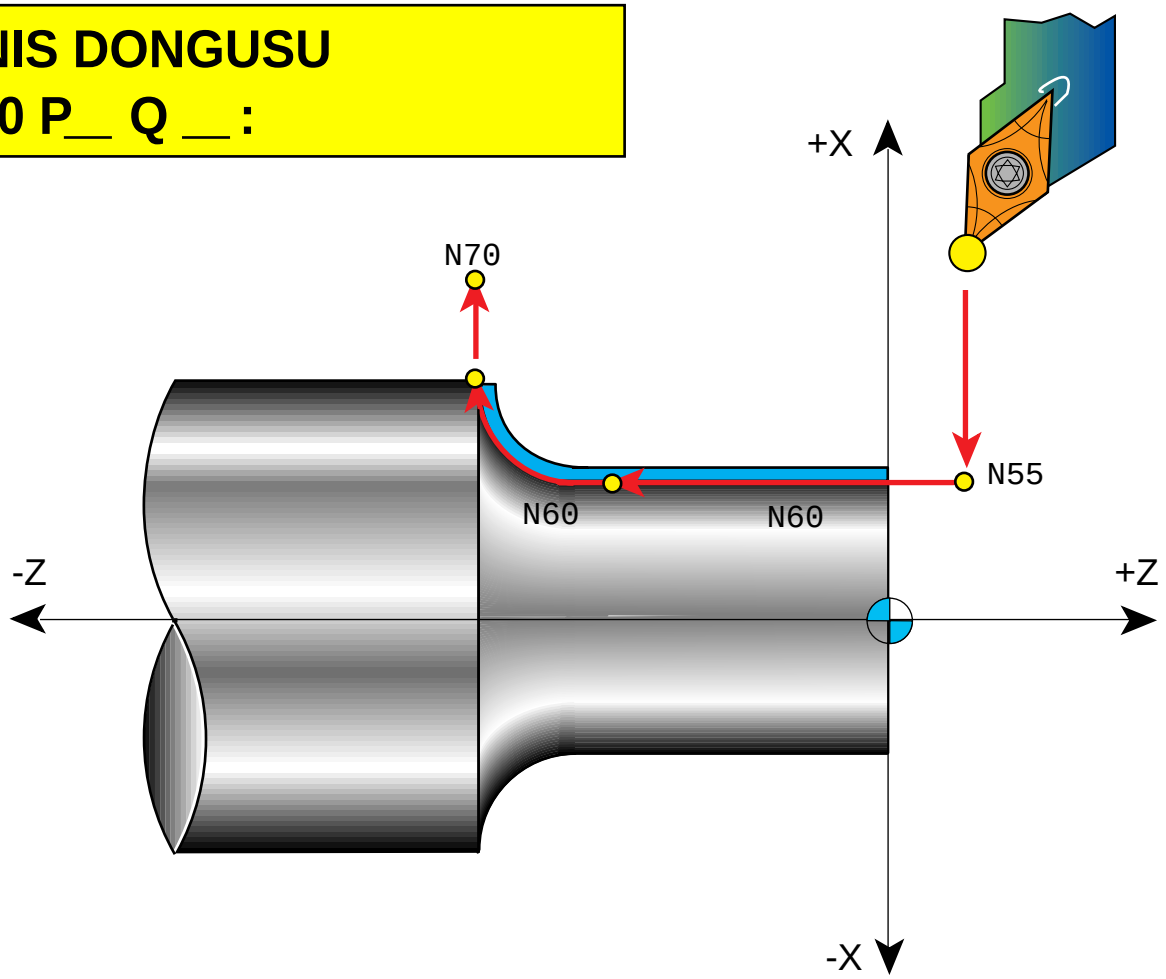


2) telafi ayarlama sayfasi

OFFSETNO.	X	Z		TAKIM YONU
01	0.75	-0.93	0.4	3
0.2	-1.234	10.987	0.8	2
.	.	.	.	.
.	.	.	.	.
16	.	.	.	.

G70

FINIS DONGUSU
G70 P__ Q __ :

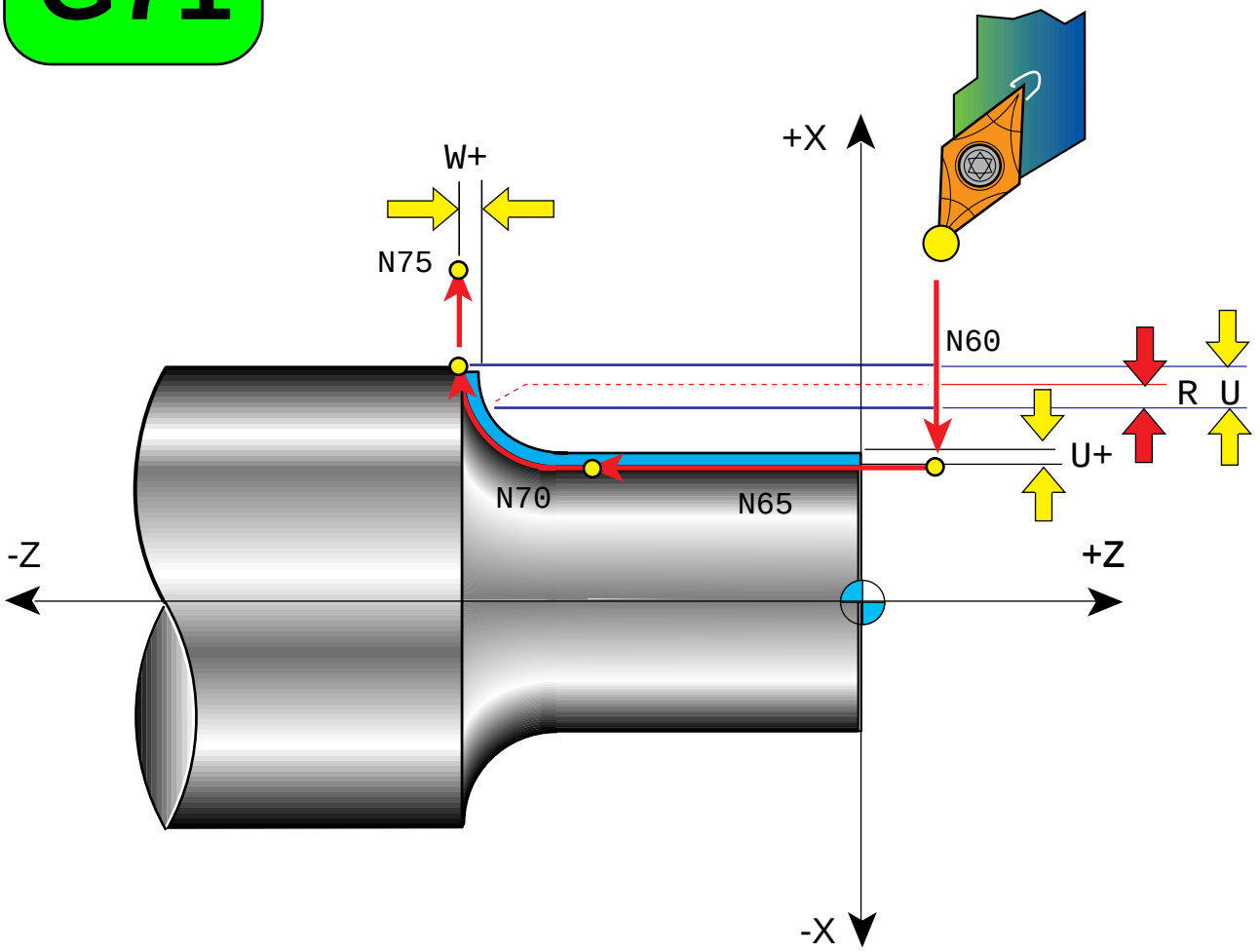



```
N..
N50  G70  P55  Q70
```

P →
```
N55   G0   G42   X..
N60   G1   Z-..
N65   G2   X..   Z..   R..
```

Q →
```
N70   G1   G40   X..
N..
```

G71



N..

N50	G71	U..	R..		
N55	G71	P60	Q75	U+..	W+..

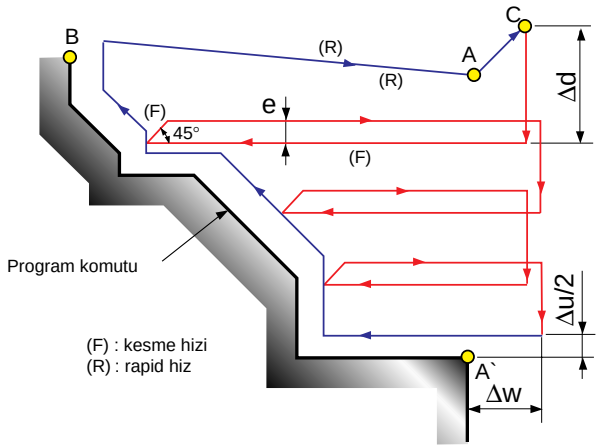
P →
```
N60   G0   G42   X..
N65   G1   Z-..
N70   G2   X..   Z-..   R..
```

Q →
```
N75   G1   G40   X..
N..
```

G71 BIRLESIK TEKRAR CEVRIMI (Z YONUNDE KABA BOSALTMA DONGUSU)

G71 U(¡ d) R(e) :

G71 P__ Q__ U(¡ u) W(¡ w) F :



P :baslangic satir numarasi

Q : bitis satir numarasi

U(¡ d) : yaricapta tek defada alacagi talas miktari

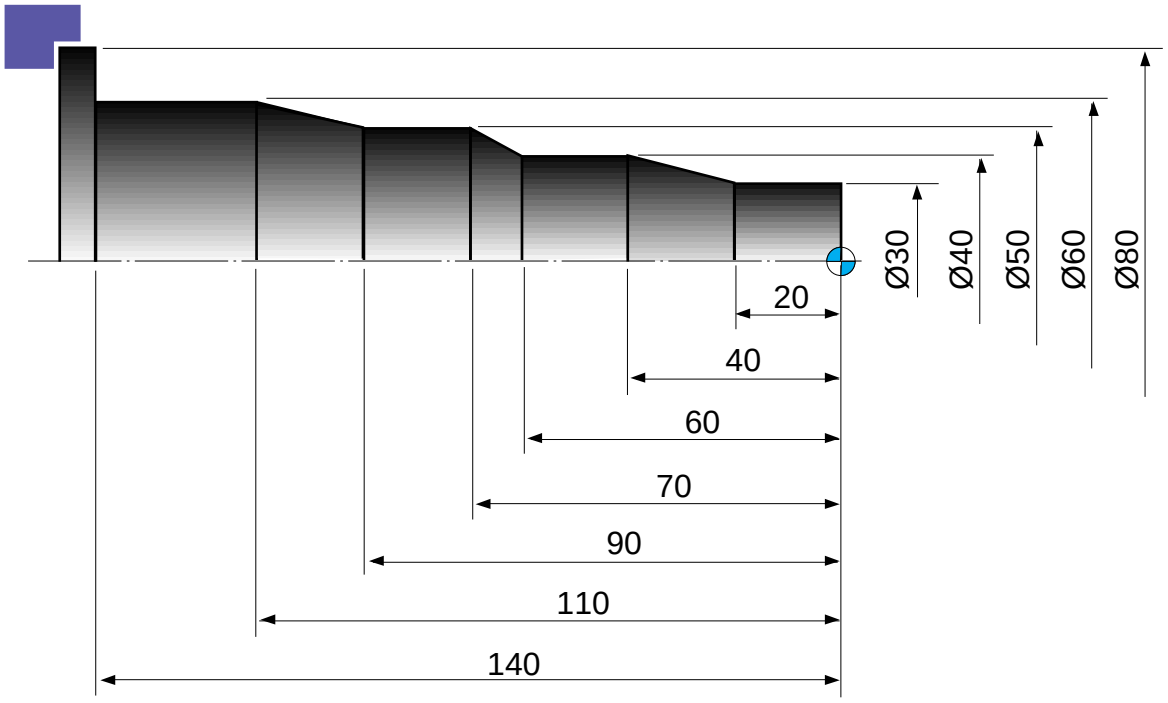
R(e) : geri cekilme miktari

U(¡ u) : x ekseninde finis icin birakilacak miktar

W(¡ w) : z ekseninde finis icin birakilacak miktar

F(f) : kesme ilerlemesi

ORNEK PROGRAM



(G70, G71)

N10 G50 S1500 T0101 :

G96 S180 M03 :

G00 X85.0 Z5.0 M08 :

Z0 :

G01 X-1.6 F0.25 :

G00 X83.0 Z2.0 :

G71 U3.0 R1.0 :

G71 P20 Q30 U0.5 W0.1 F0.27 :

N20 G42 G00 X30.0 : ← G71 DONGU KESME HIZI

G01 Z-20.0 F0.17 :

← G70 DONGU KESME HIZI

X40.0 Z-40.0 :

Z-60.0 :

X50.0 Z-70.0 :

Z-90.0 :

X60.0 Z-110.0 :

Z-140.0 :

X80.0 :

N30 G40 :

G70 P20 Q30 :

G00 X200.0 Z200.0 T0100 :

M30 :

G00 X200.0 Z200.0 T0100 :

M01 :

N40 G50 S2000 T0303 :

G96 S200 M03 :

G00 X83.0 Z2.0 M08 :

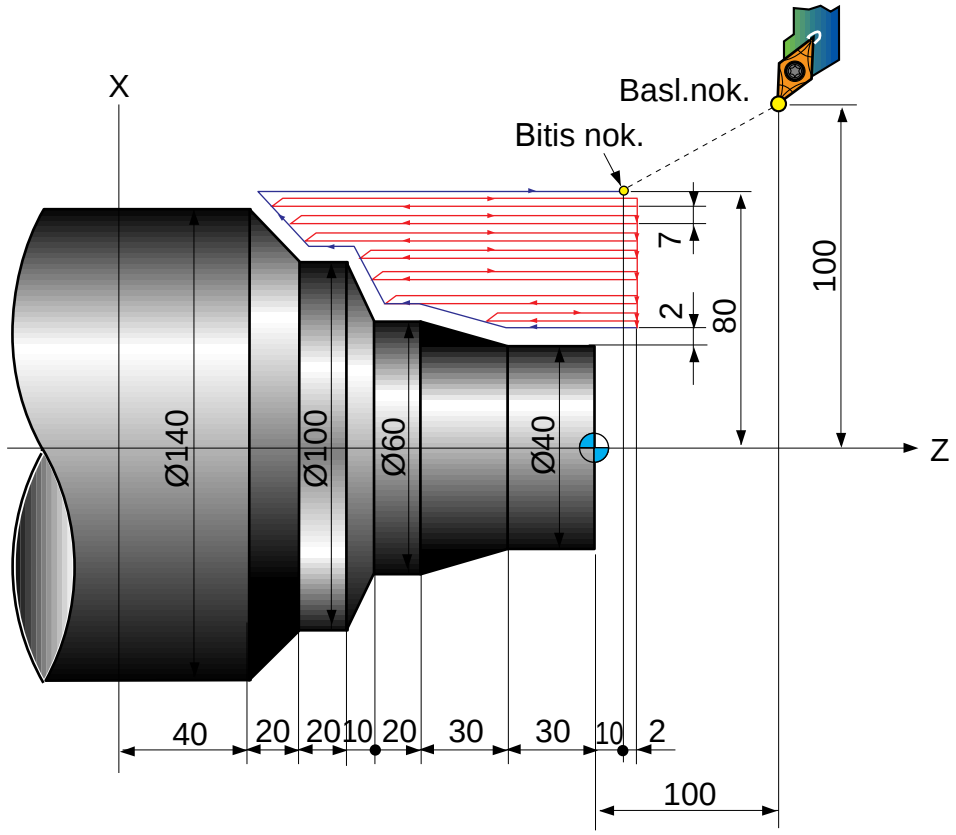
G70 P20 Q30 :

G00 X200.0 Z200.0 T0300 :

M30 :

ornek program

Birlesik tekrar cevrimi(G71)



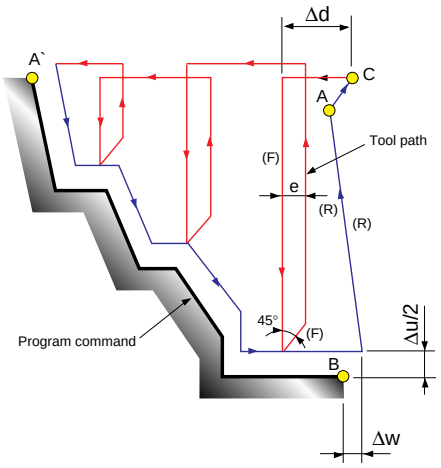
(Cap olculeri Metrik)

```
N010 G00 X200.0 Z100.0 :
N011 G00 X160.0 Z10.0 :
N012 G71 U7.0 R1.0 :
N013 G71 P014 Q021 U4.0 W2.0 F0.3 S550 :
N014 G00 G42 X40.0 S700 :
N015 G01 W-40.0 F0.15 :
N016      X60.0 W-30.0 :
N017      W-20.0 :
N018      X100.0 W-10.0 :
N019      W-20.0 :
N020      X140.0 W-20.0 :
N021      G40 U2.0 :
N022 G70 P014 Q021 :
N023 G00 X200.0 Z100.0 :
M30 :
```

G72 BIRLESIK TEKRAR CEVRIMI (X YONUNDE BOSALTMA DONGUSU)

G72 W(¡ d) R(e) :

G72 P_ Q_ U(¡ u) W(¡ w) F :



W (¡ d) : her defada alacagi talas miktari

R(e) : geri cekilme miktari

P : baslangic satir numarasi

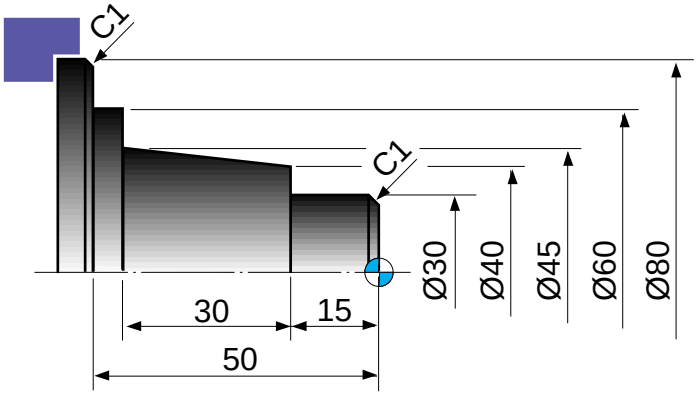
Q : bitis satir numarasi

U(¡ u) : x ekseninde finis icin birakilacaktalas miktari

W(¡ w) : z ekseninde finise birakilacak talas miktari

F(f) : kesme hizi

Ornek program



N10 G50 S2000 T0100 :

G96 S180 M03 :

G00 X85.0 Z5.0 T0101 :

Z0 :

G01 X-1.6 F0.2 :

G00 X85.0 Z1.0 :

G72 W2.0 R1.0 :

G72 P12 Q14 U0.5 W0.2 F0.25 :

N12 G00 G41 Z-51.0 :

G01 X80.0 F0.2 :

X78.0 W1.0 :

X60.0 :

Z-45.0 :

X40.0 Z-15.0 :

X30.0 :

Z-1.0 :

X26.0 Z1.0 :

N14 G40 :

G70 P12 Q14 :

G00 X200.0 Z200.0 T0100 :

M30 :

¡ (farkli takim ile finis yapilacaksa)

G00 X200.0 Z200.0 T0100 :

M01 :

N16 G50 S2500 T0300 :

G96 S200 M03 :

G00 X85.0 Z5.0 T0303 :

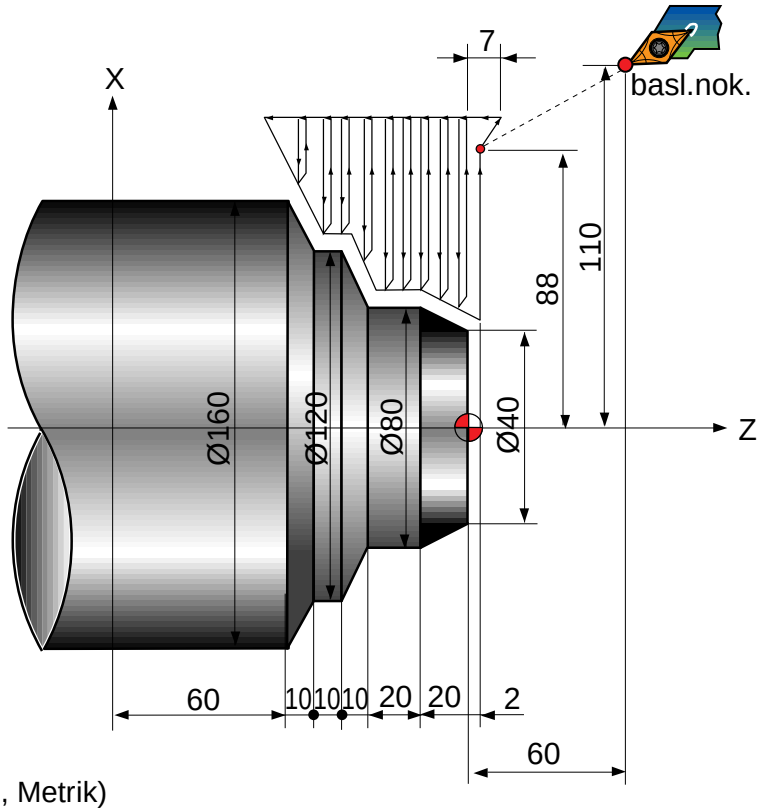
G70 P12 Q14 :

G00 X200.0 Z200.0 T0300 :

M30 :

Ornek program

BIRLESIK TEKRAR CEVRIMI(G72)



(Olcu birimi, Metrik)

N010 G00 X220.0 Z60.0 :

N011 G00 X176.0 Z2.0 :

N012 G72 W7.0 R1.0 :

N013 G72 P014 Q021 U4.0 W2.0 F0.3 S550 :

N014 G00 G41 Z-70.0 S700 :

N015 X160.0 :

N016 G01 X120.0 Z-60.0 F0.15 :

N017 W10.0 :

N018 X80.0 W10.0 :

N019 W20.0 :

N020 X36.0 W22.0 :

N021 G40 :

N022 G70 P014 Q021 :

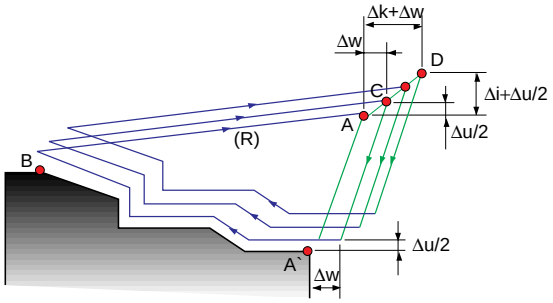
N023 G00 X220.0 Z60.0 :

N024 M30 :

G73(PROFIL TEKRARLAMA)

G73 U(¡ i) R(d) W(¡ k) :

G73 P Q U(¡ u) W(¡ w) F :



U(¡ i) :X eksani icin yaricapta bosaltma miktari

W(¡ k) : Z ekseni icin bosaltma miktari

R(d) : Tekrarlama sayisi

P :baslangic satir numarasi

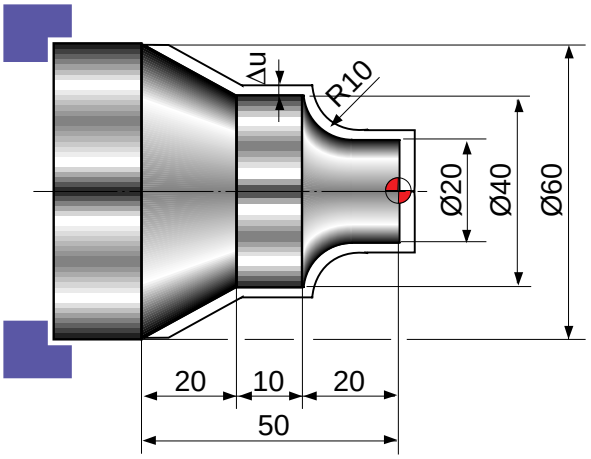
Q : bitis satir numarasi

U(¡ u) :X ekseni icin(yaricapta)finis icin birakilacak miktar

W(¡ w) : Z ekseni icin fiise birakilacak miktar

F(f) : ilerleme hzi

ORNEK PROGRAM



N10 G50 S2000 T0300 :
G96 S200 M03 :

G00 X35.0 Z5.0 T0303 :

Z0 :

G01 X-1.6 F0.2 :

G00 X70.0 Z10.0 :

G73 U3.0 W2.0 R2 :

G73 P12 Q16 U0.5 W0.1 F0.25 :

N12 G00 G42 X20.0 Z2.0 :

G01 Z-10.0 F0.15 :

G02 X40.0 Z-20.0 R10.0 :

G01 Z-30.0 :

X60.0 Z-50.0 :

N16 G40 U1.0 :

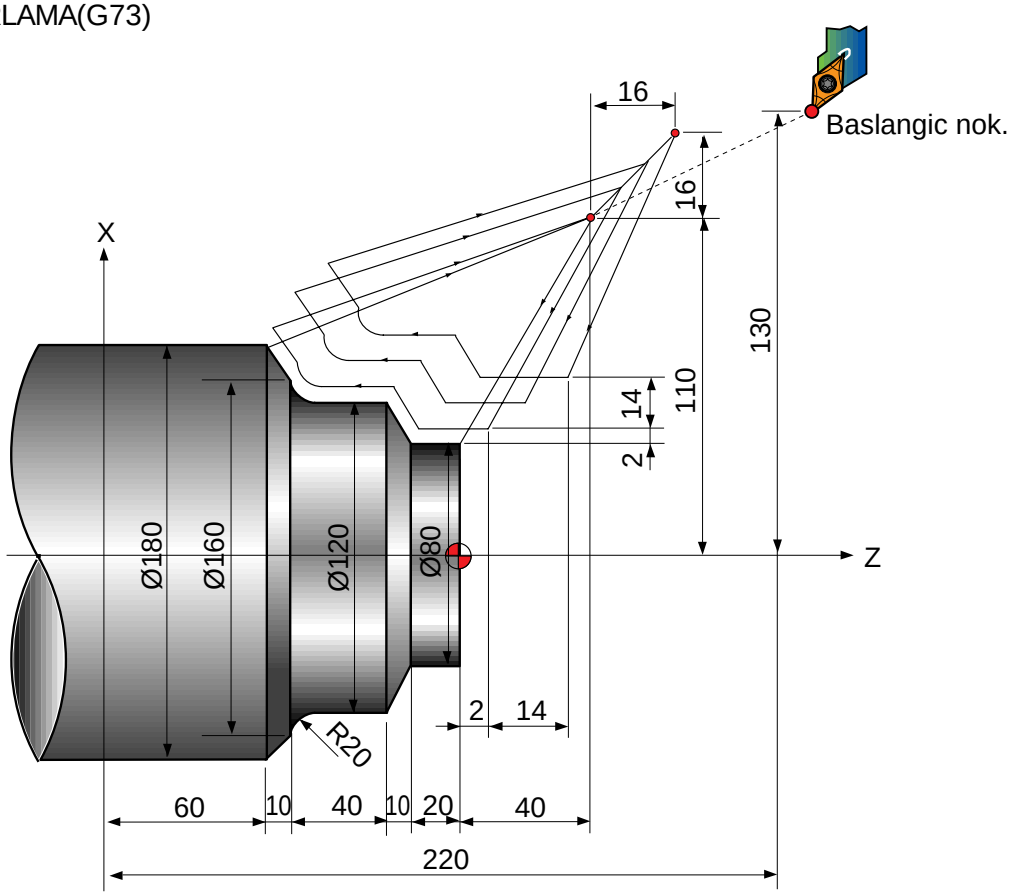
G70 P12 Q16 :

G00 X200.0 Z200.0 T0300 :

M30 :

ORNEK PROGRAM

PROFIL TEKRARLAMA(G73)



(OLCU BIRIMI,METRIK)

N010 G00 X260.0 Z80.0 :

N011 G00 X220.0 Z40.0 :

N012 G73 U14.0 W14.0 R3 :

N013 G73 P014 Q020 U4.0 W2.0 F0.3 S0180 :

N014 G00 G42 X80.0 Z2.0 :

N015 G01 W-20.0 F0.15 S0600 :

N016 X120.0 W-10.0 :

N017 W-20.0 S0400 :

N018 G02 X160.0 W-20.0 R20.0 :

N019 G01 X180.0 W-10.0 S0280 :

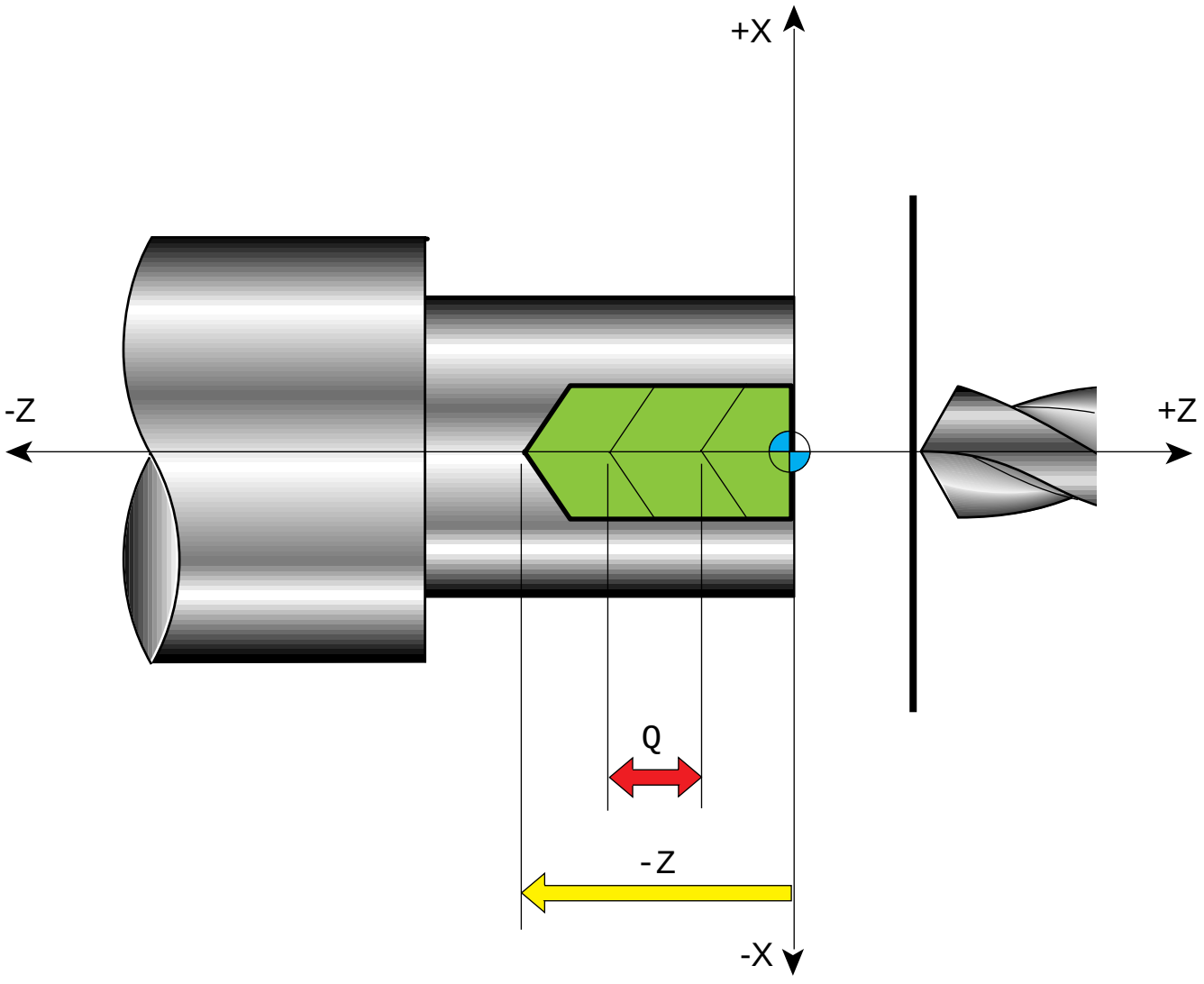
N020 G40 :

N021 G70 P014 Q020 :

N022 G00 X260.0 Z80.0 :

N023 M30 :

G74



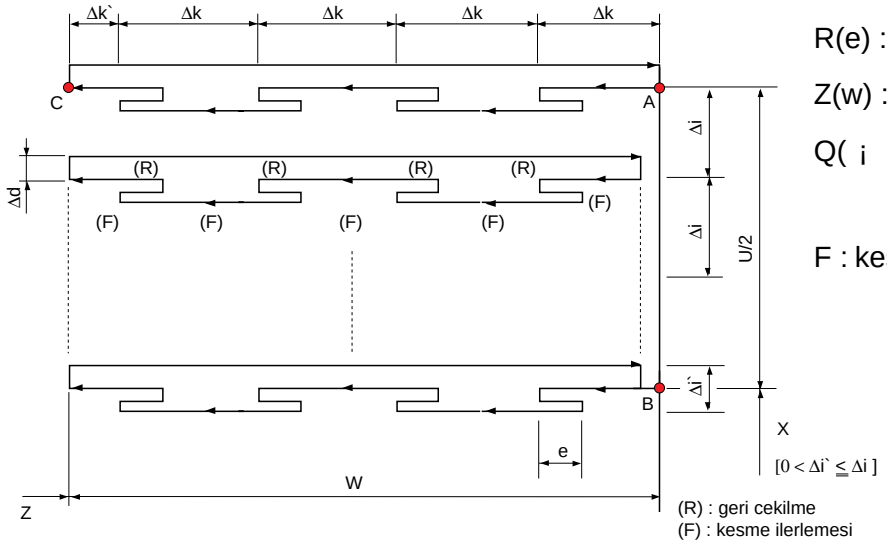

```
N40   G74   R..
N50   G74   Z-..   Q..   F..
```

G74 BIRLESIK TEKRAR CEVRIMI (Z ekseni yonunde GAGALAYARAK delik delme)

1) Delik Dongusu

G74 R(e) :

G74 Z(w) Q(¡ k) F :



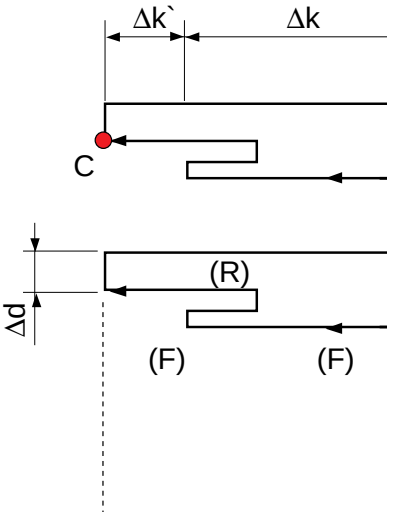
R(e) : geri cikma miktari

Z(w) : deligin bittigi Z noktasi

Q(¡ k) : her defada kesme miktari(mikron)
(1000=1mm)

F : kesme hizi

Ornek program



N10 G50 S500 T0200 :

G97 S280 M03 :

G00 X0 Z5.0 T0202 M08 :

→ delik icin baslangic noktasi

G74 R1.0 :

G74 Z-90.0 Q5000 F0.23 :

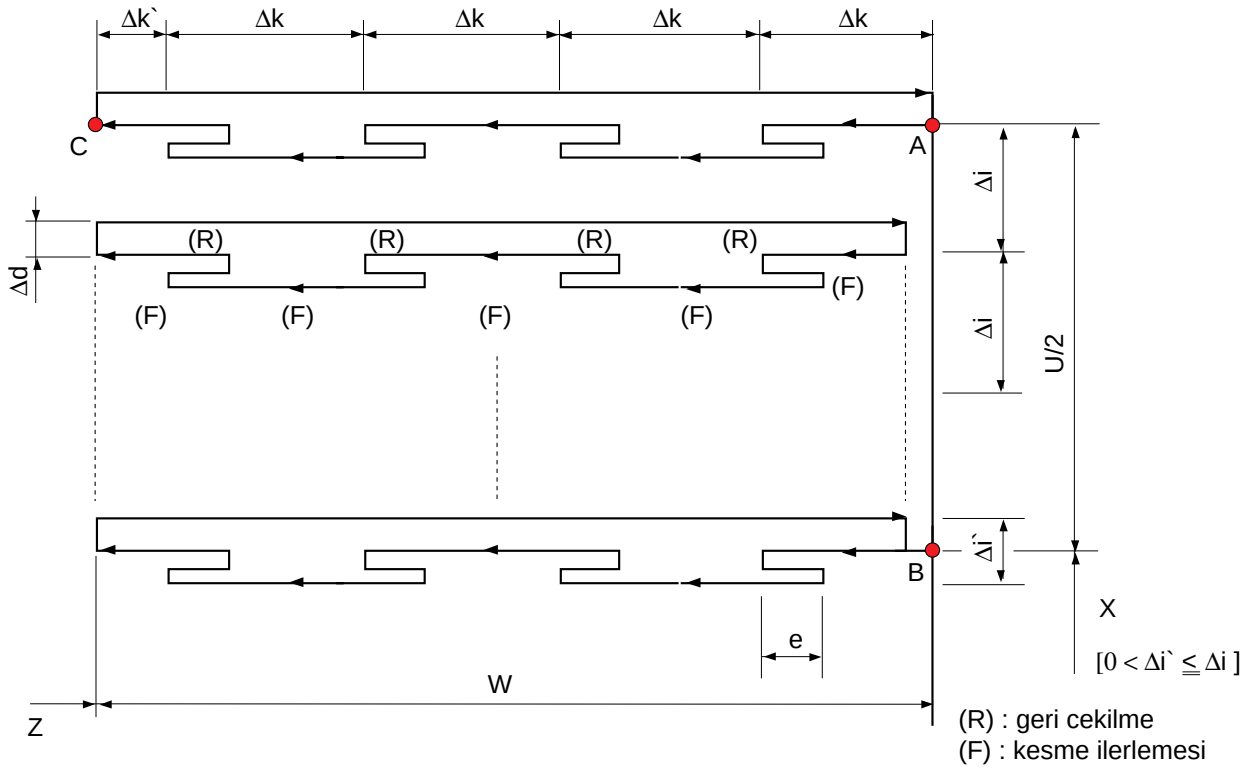
G00 X200.0 Z150.0 T0200 :

M01 :

2) Alinda kanal acma dongusu

G74 R(e) :

G74 X(u) Z(w) P(¡ i) Q(¡ k) R(¡ d) F :



R(e) : geri cekilme miktari)

P(¡ i) : X ekseninde kayma miktari

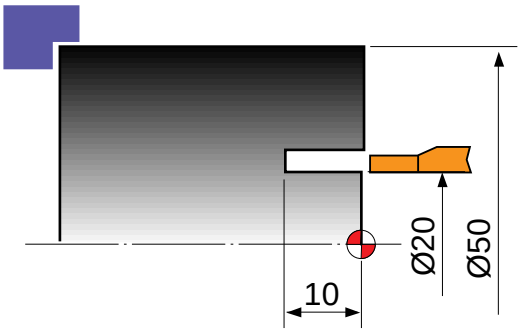
Q(¡ k) : Z ekseninde kayma miktari (mikron)(Q5000=5mm)

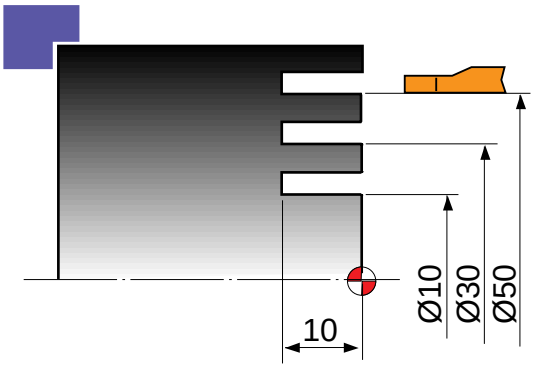
X(u) : Baslangic noktasi (X ekseni icin)

Z(w) : delik derinligi

R(¡ d) : geri cekilme miktari (Z ekseni icin)

F : kesme ilerlemesi





¡¯Eger tek kanal acilacaksa, X(u), P(¡ i)yazilmayabilir.

(

N10

G00 X20.0 Z1.0 :

G74 R1.0 :

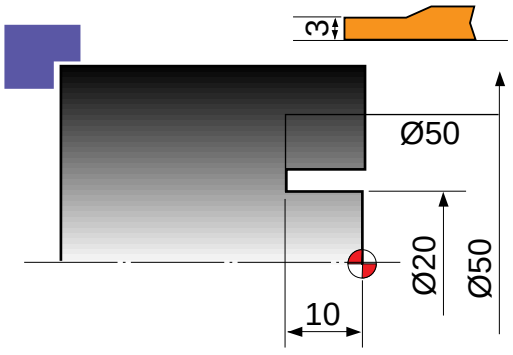
G74 Z-10.0 Q3000 F0.1 :

G00 X200.0 Z200.0 :

M30 :

Dikkat

FANUC 0TC
Q3000=3mm
P10000=10MM



N10 G50 S2000 T0100 :

G96 S80 M03 :

G00 X50.0 Z1.0 T0101 :

G74 R1.0 :

G74 X10.0 Z-10.0 P10000 Q3000 F0.1 :

G00 X200.0 Z200.0 T0100 :

M30 :

N1 G50 S2000 T0100 :

G96 S80 M3 :

G0 X47.0 Z1.0 T0101M8 :

G74 R1.0 :

G74 Z-10.0 Q3000 F0.1 :

G0 U-5.0 :

G74 X20.0 Z-10.0 P2500 Q3000 F0.1 :

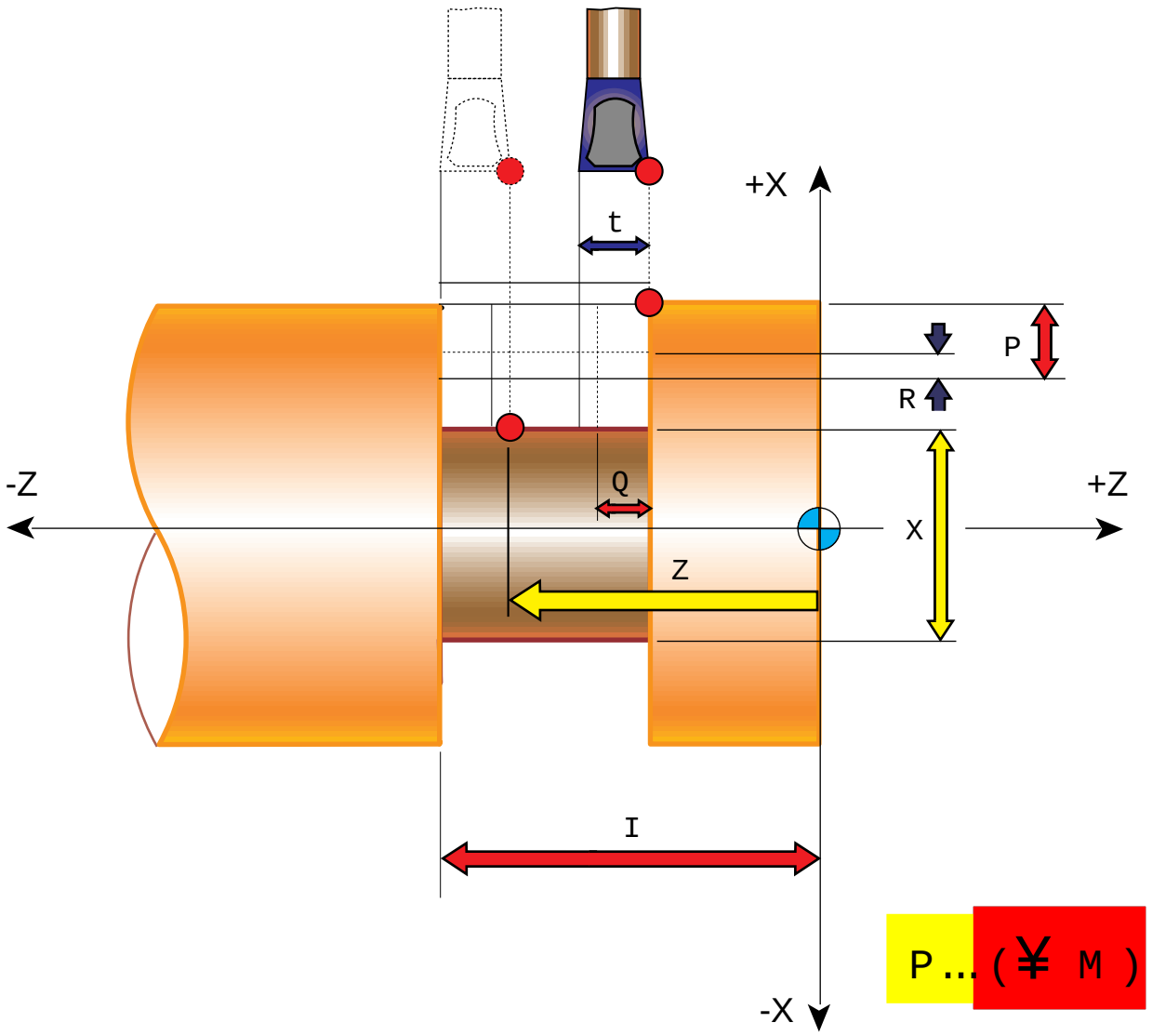
G0 X200.0 Z200.0 T0100 :

M30 :

G75

Q<T!

Z = I - T!



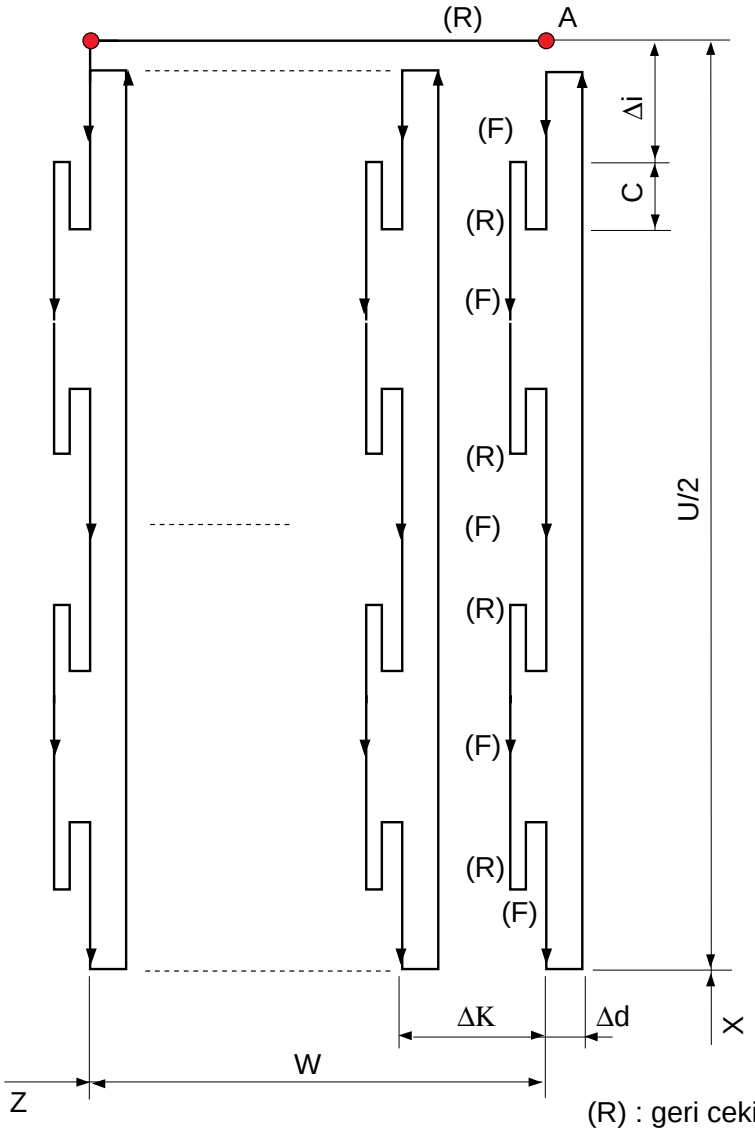
P... (¥ M)

```
N50 G75 R
N55 G75 X... Z-... P... Q...
```

G75 BIRLESIK TEKRAR CEVRIMI (X ekseninde (capta) kanal acma dongusu)

G75 R(e) :

G75 X(u) Z(w) P(¡ i) Q(¡ k) R(¡ d) F :



(R) : geri cekilme
(F) : kesme hizi

R(e) : geri cekilme miktari

X(u) : kanalin bittigi noktanin x koordinati

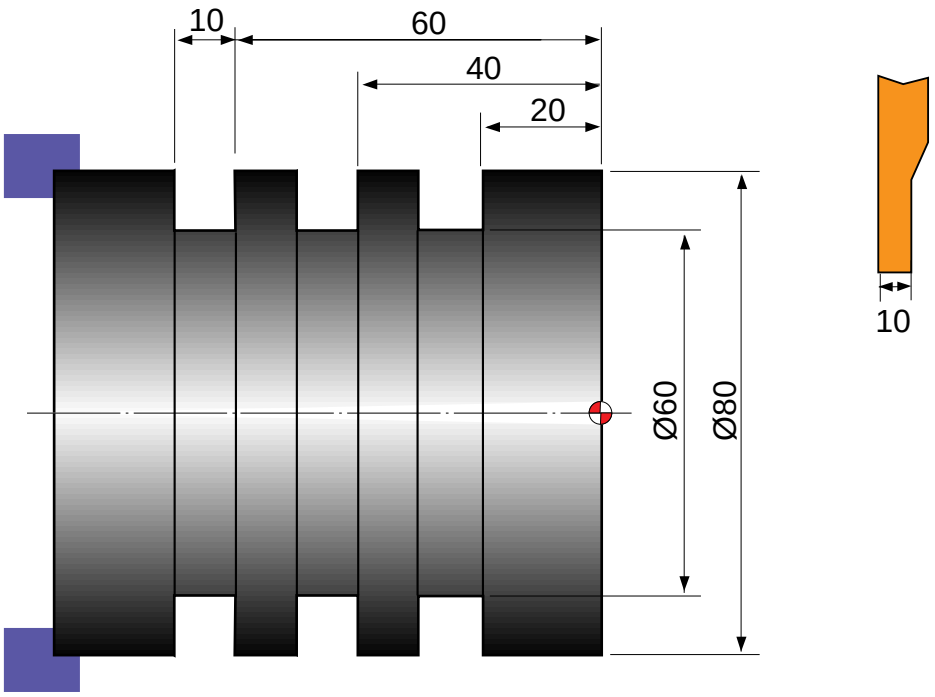
Z(w) :kanalin bittigi z noktasi

Q(k) : z ekseninde kayma miktari

P(i) : x ekseninde kayma miktari

R(d) : geri cekilme miktari

F : kesme ilerleme hizi



N10 G50 S500 T0100 :

G97 S_ M03 :

G00 X90.0 Z1.0 T0101 :

X82.0 Z-60.0 :

G75 R1.0 :

G75 X60.0 Z-20.0 P3000 Q20000 F0.1 : ¡¸ ¡£

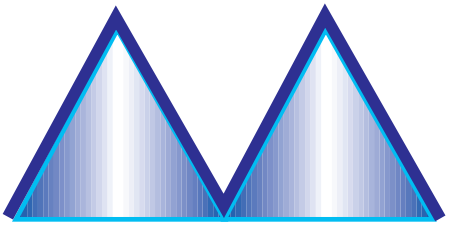
G00 X90.0

X200.0 Z200.0 T0100 :

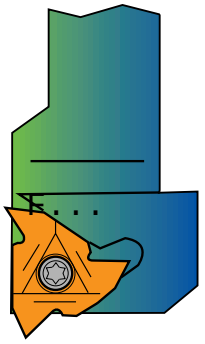
M30 :

G76

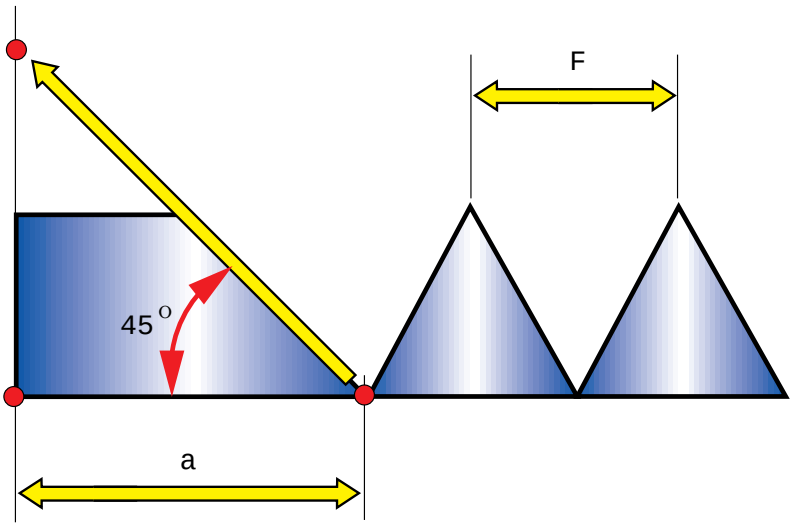
```
N50   G76   Pxx xx xx   Q...   R...
N55   G76   X...   Z... R0   P...   Q...   F...
```



Pxx (0 - 99)



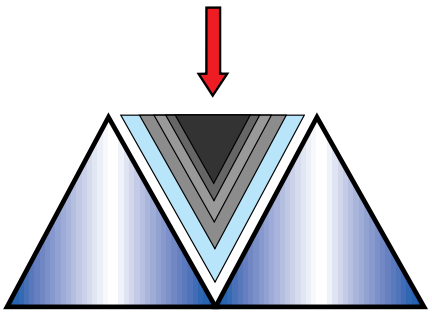
```
N50   G76   Pxx xx xx   Q...   R...
N55   G76   X...   Z... R0   P...   Q...   F...
```



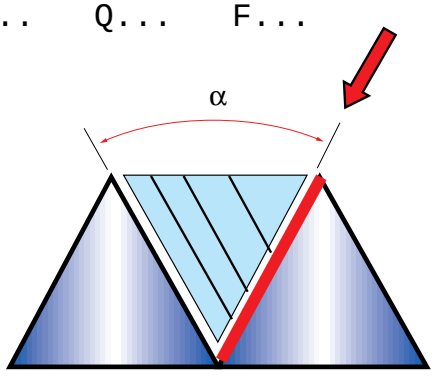
$$a = F*(\frac{Pxx}{10})$$

Pxx (0 - 99)

```
N50   G76   Pxx xx xx   Q...   R...
N55   G76   X...   Z... R0   P...   Q...   F...
```



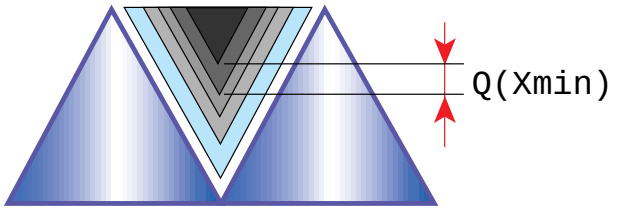
Pxx = 0

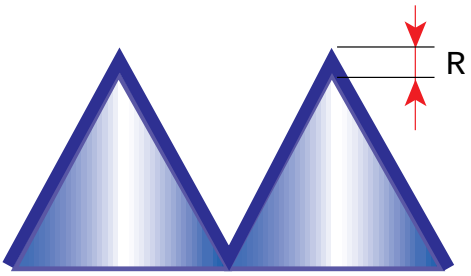


Pxx = α (80° , 60° , 55° , 30° , 29)

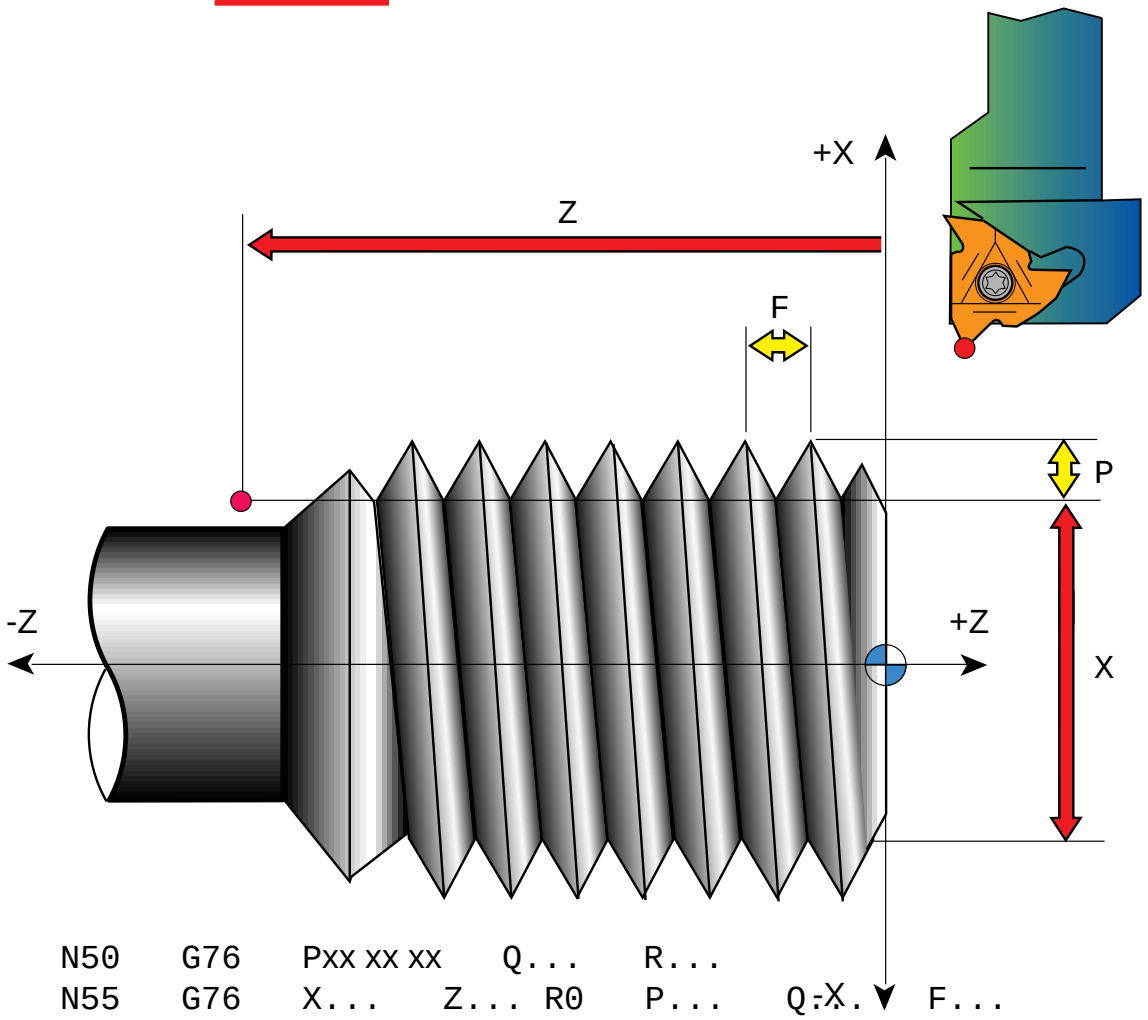
G76

```
N50   G76   Pxx xx xx   Q...   R...
N55   G76   X...   Z... R0   P...   Q...   F...
```





Q .. (µm)




```
N50   G76   Pxx xx xx   Q...   R...
N55   G76   X...   Z... R0   P...   Q...   F...
```

G76 BIRLESIK TEKRAR CERIMI (otomatik dis cekme dongusu)

G76 komutunun uygulanma sekli.

FORMAT	G76 P(m) (r) (a) Q(Δdmin) R(d) G76 X(u) Z(w) R(i) P(k) Q(Δd) F(f)

P(m) : finisten onceki tekrar sayisi

(r) : disin sonundaki paht miktari

(a) : dis acisi

ex) P 0 2 1 0 6 0

- 02 → finisten onceki tekrar sayisi
- 10 → paht miktari
- 60 → dis yuzeyinin acisi

Q(§Edmin) : minumum kesme derinligi

R(§Ed) : finis temizleme miktari

X(u) : dis dibi capi

Z(w) : Z ekseni icin dis boyu

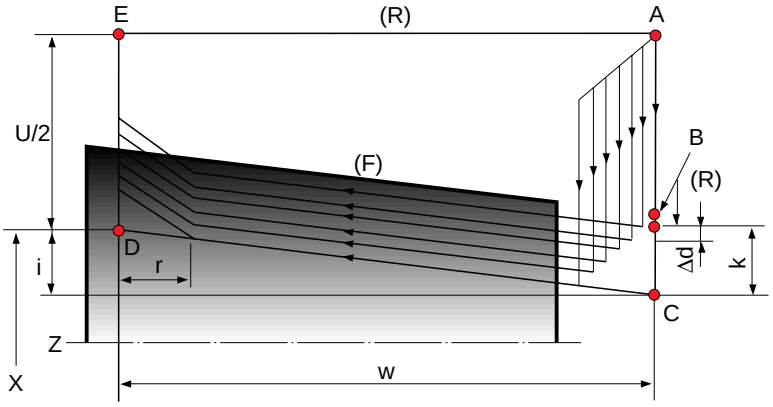
R(i) : konik acisi

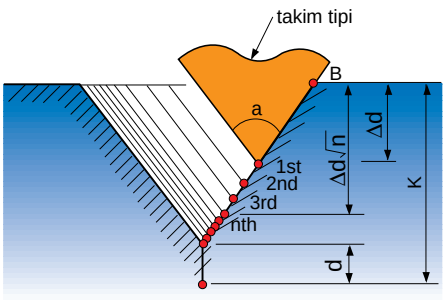
P(k) : dis yuksekligi mikron cinsinden

Q(d) : ilk kesme derinligi mikron cinsinden

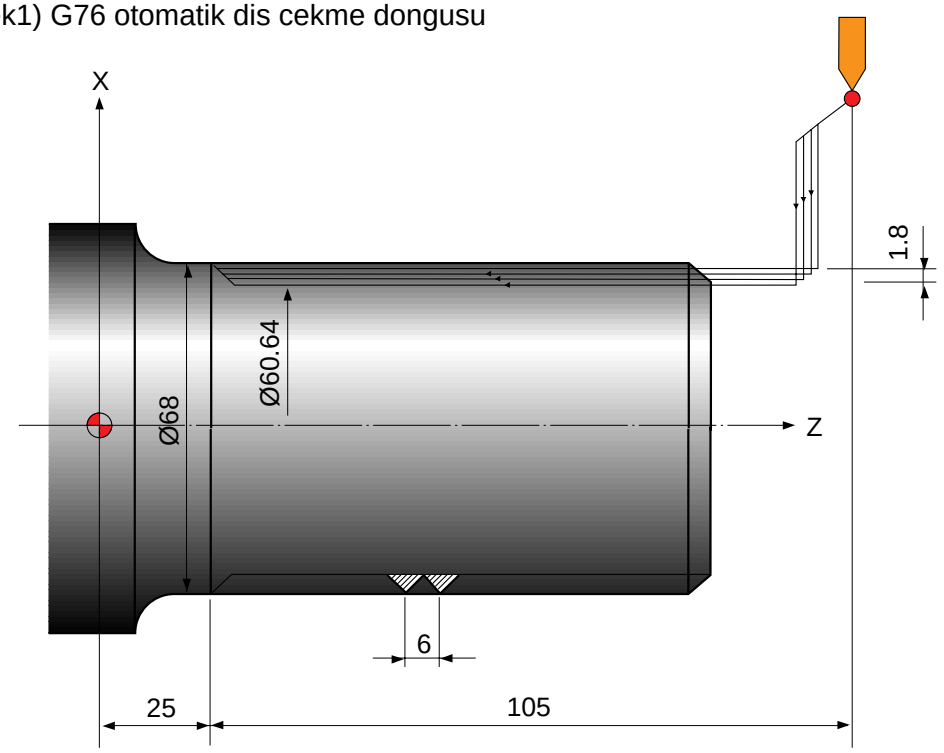
F(f) : kesme ilerleme hizi

(ornek1) G76 otomatik dis cekme dongusu





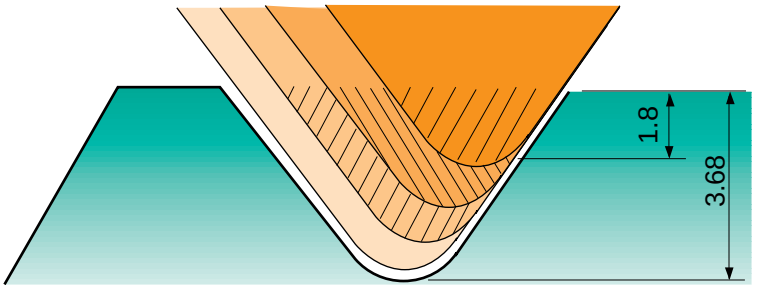
(ornek1) G76 otomatik dis cekme dongusu



G00 X80.0 Z130.0 :

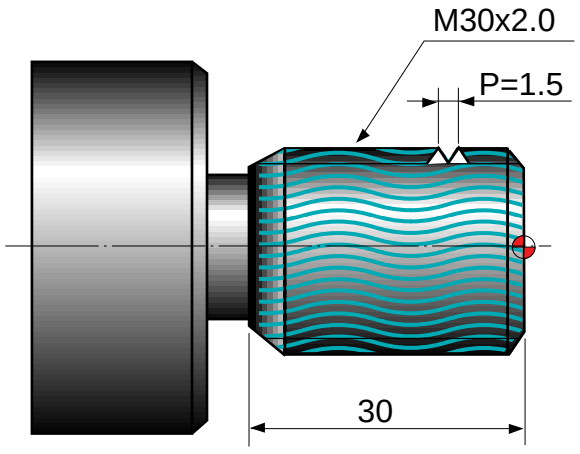
G76 P011060 Q100 R200 :

G76 X60.64 Z25.0 P3680 Q1800 F6.0 ;



PROGRAM

N10 G97 S1000 M03



T0100

G00 X50.0 Z5.0 T0101

G76 P021060 Q100 R100

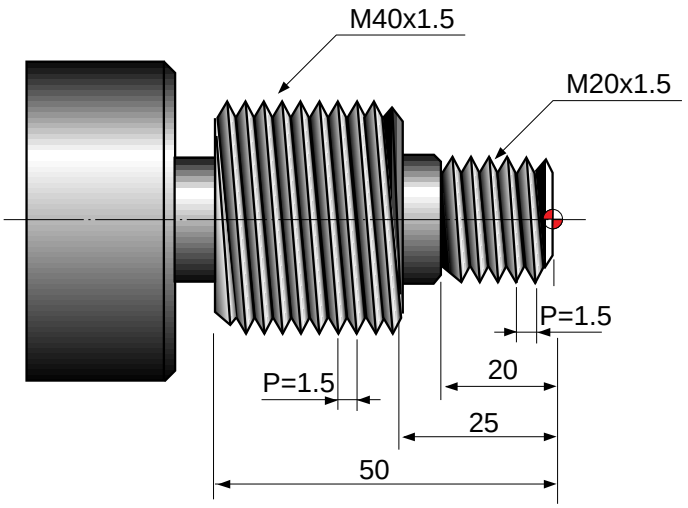
G76 X28.2 Z-32.0 P900 Q500 F1.5

G00 X200.0 Z200.0 T0100

M30

*

ornek1) G76 otomatik dis cekme dongusu



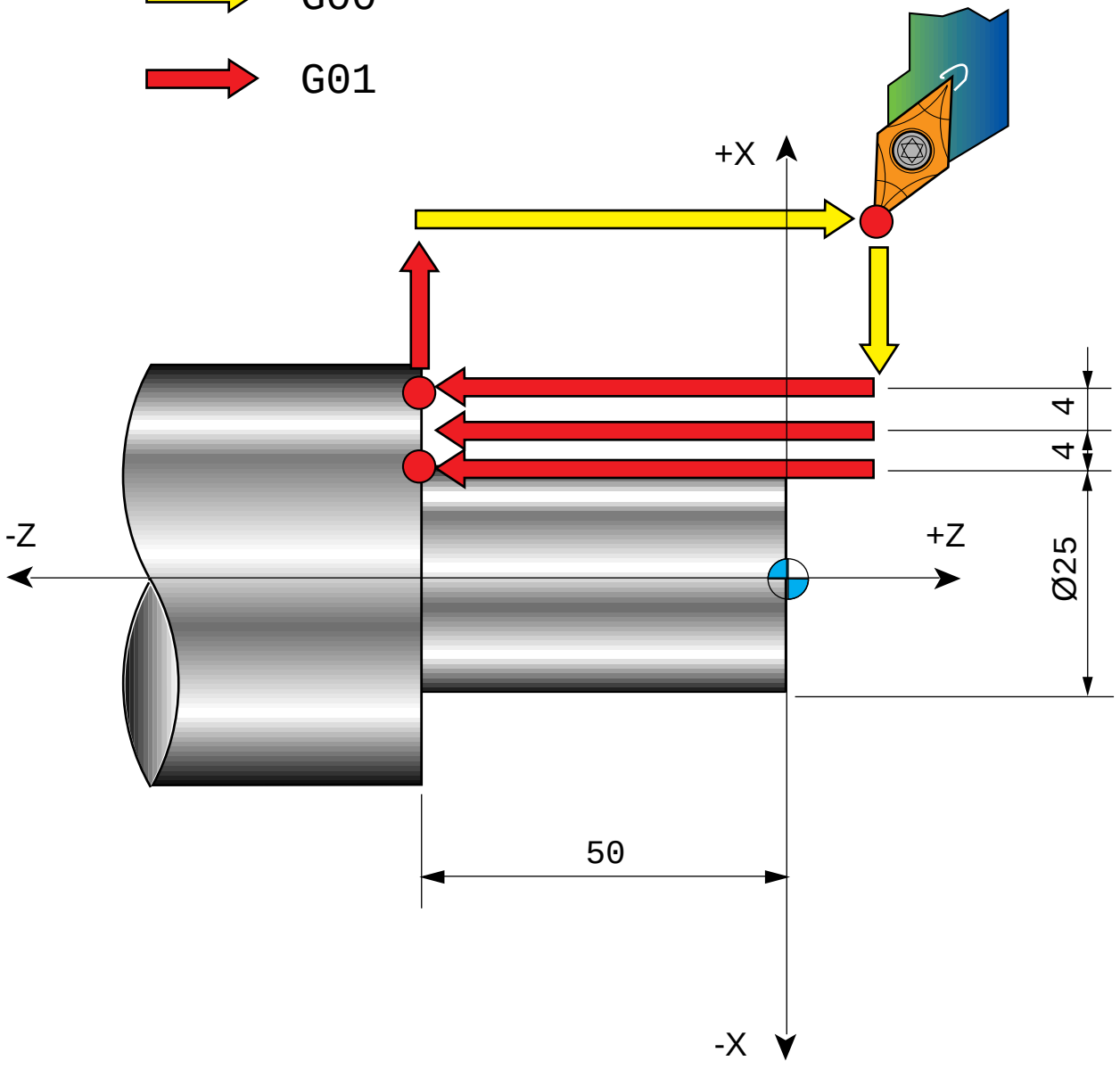
PROGRAM

```
N10 G97 S800 M03
    T0300
    G00 X30.0 Z5.0 T0303
    G76 P021060 Q100 R100
    G76 X18.2 Z-20.0 P900 Q500 F1.5
    G00 X50.0 Z-20.0
    G76 P021060 Q100 R100
                          yazilimi
    G76 X38.2 Z-52.0 P900 Q500 F1.5
    G00 X200.0 Z200.0 T0300
    M30
    *
```

G90

G00

G01



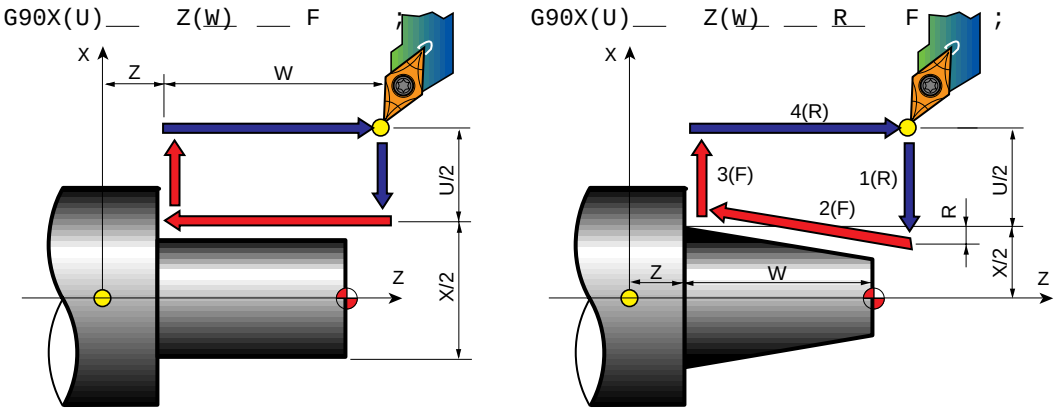

```
N1234  G90
N1235  G90  X41  Z-50
N1236  U-8
N1237  U-8
```

G90 SABIT BOSALTMA CEVRIMI (Boyda kaba bosaltma dongusu,Z yonunde)

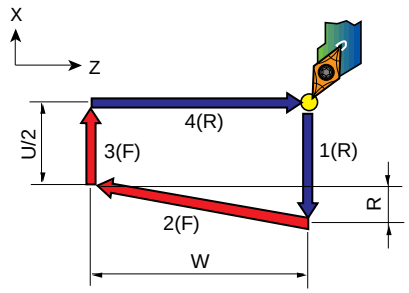
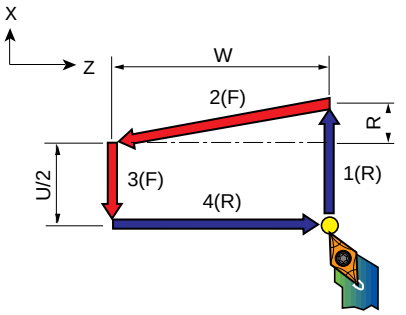
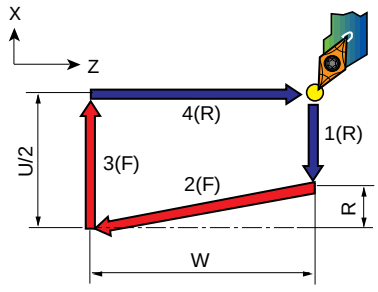
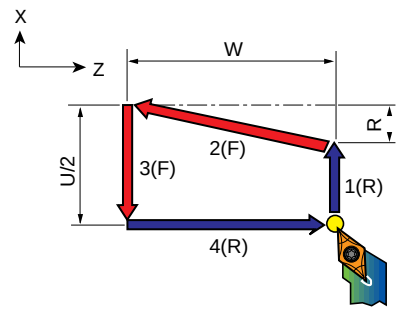
1) Adim adim bosaltarak kesme

FORMAT G90 X(U) Z(W) _R _F_	konik kesme

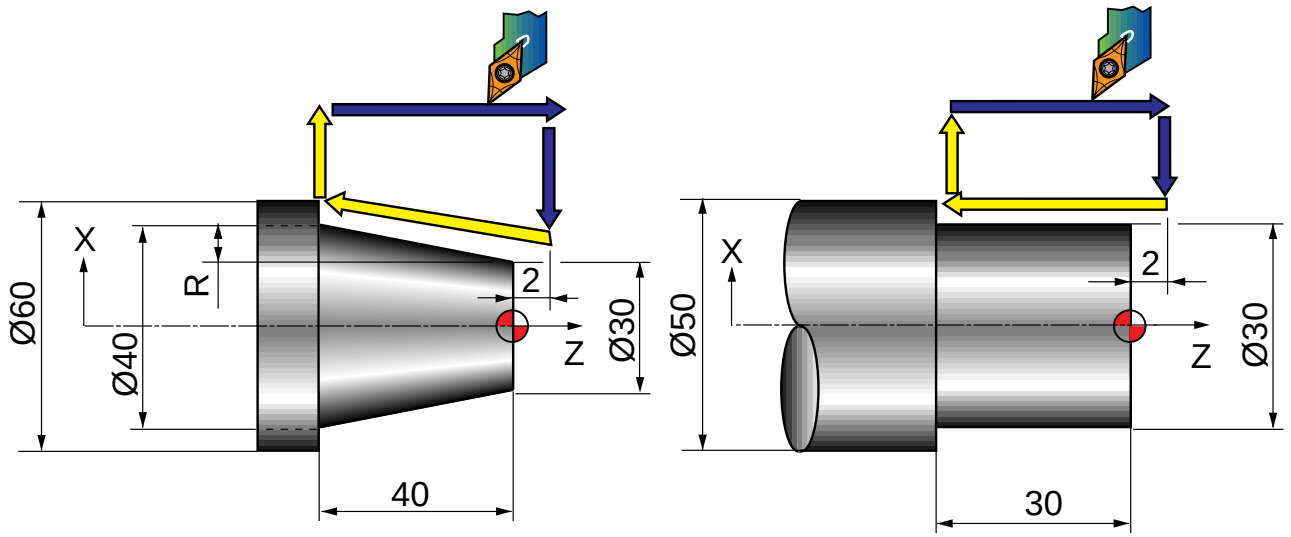
- X(U) : X koordinati
- Z(W) : bitis noktasi
- R- : +X yonunde ise baslangic noktasi
- R+ : -X yonunde ise baslangic noktasi
- I/R : koniklik



R... bosta hareket
F... kesme hareketi

1. U<0, W<0, R<0	2. U>0, W<0, R>0
	
3. U<0, W<0, R>0 at $\lvert R \rvert \leqq \frac{\lvert U \rvert}{2}$	4. U>0, W<0, R<0 at $\lvert R \rvert \leqq \frac{\lvert U \rvert}{2}$
	

ornek1)R konikligi varsa



PROGRAM

G30 U0 W0 :

G50 S2000 T0100 :

G96 S200 M03 :

G00 X61.0 Z2.0 T0101 M8 :

G90 X55.0 W–42.0 F0.25 :

X50.0 :

X45.0 :

X40.0 :

Z-12.0 R-1.75 :

Z-26.0 R-3.5 :

Z-40 R-5.25 :

G30 U0 W0 :

M30 :

*f*T

PROGRAM

G30 U0 W0 :

G50 S2000 T0100 :

G96 S200 M03 :

G00 X56.0 Z2.0 T0101 M08 :

G90 X51.0 W-32.0 F0.25 :

X46.0 :

X41.0 :

X36.0 :

X31.0 :

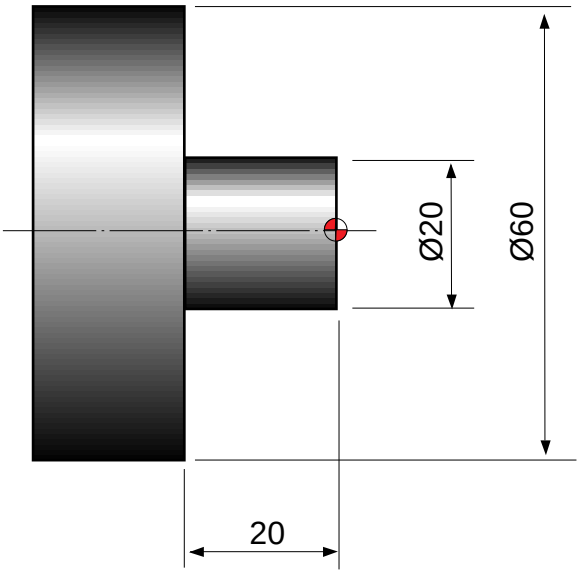
X30.0 :

G30 U0 W0 :

M30 :

cap icinde kesim yapildigi zaman formata uygun kullanilmalidir

(ornekl1) G90

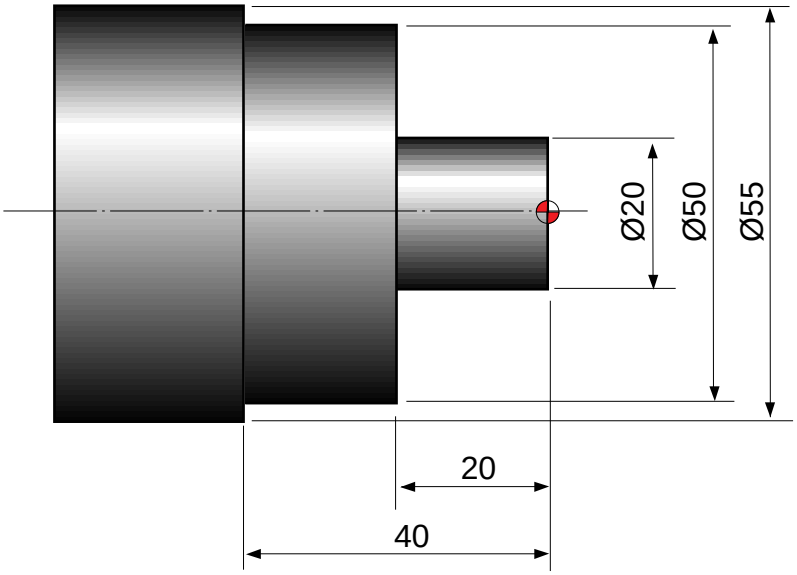


PROGRAM

```
N10 G50 S2000
    G96 S180 M03
    T0100
    G00 X65.0 Z3.0 T0101
    G90 X55.0 Z-20.0 F0.25
        X50.0
        X45.0
        X40.0
        X35.0
        X30.0
        X25.0
        X20.5
        X20.0
    G00 X200.0 Z200.0 T0100
    M30
```

f T

(ornek 2) G90



PROGRAM

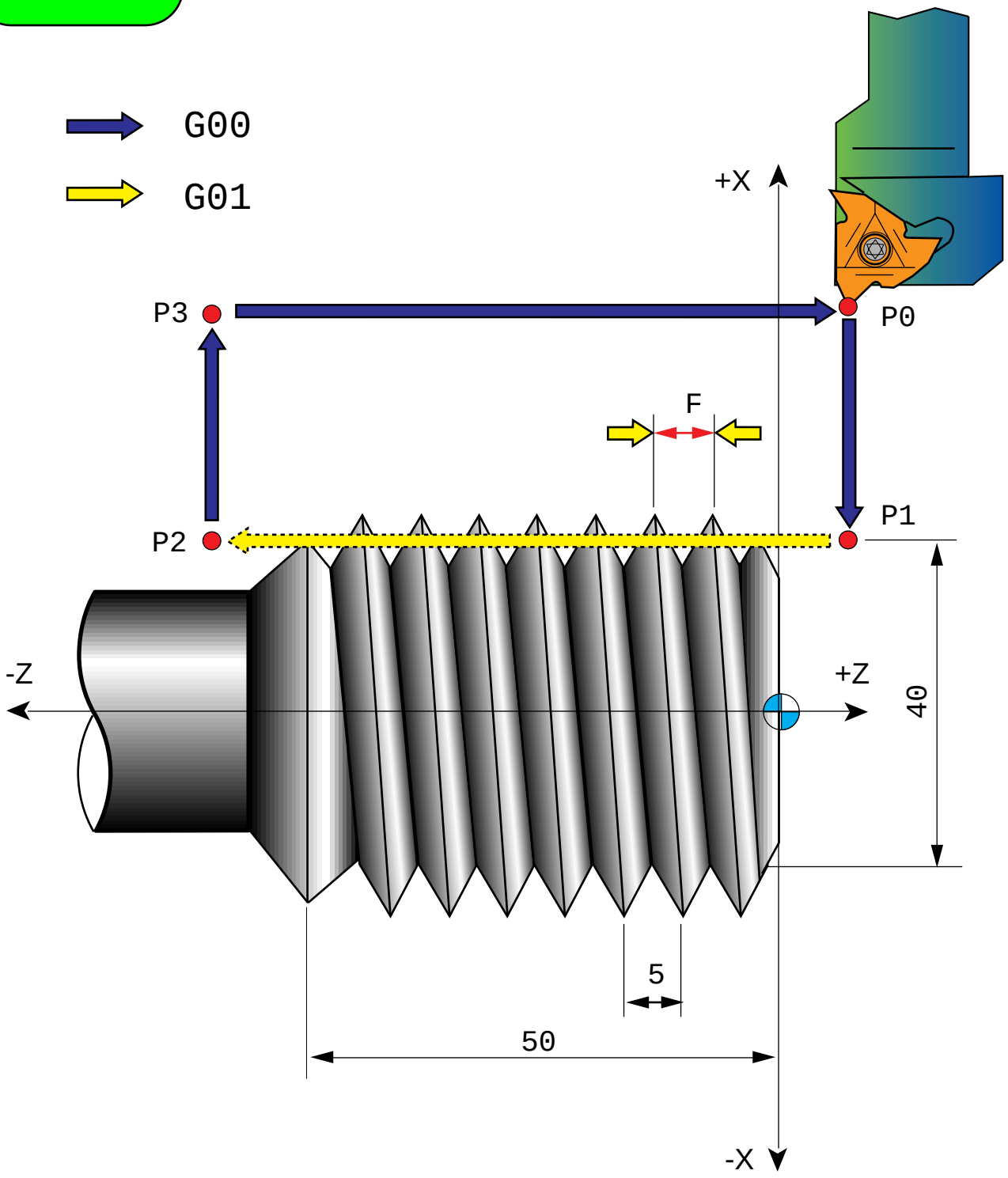
ex1)

```
N10 G50 S2000
    G96 S180 M03
    T0100
    G00 X60.0 Z0 T0101
    G01 X-1.6 F0.2
    G00 X50.0 Z1.0
    G01 Z-40.0 F0.25
    G00 U1.0 Z1.0
    G90 X45.0 Z-20.0 F0.25
        X40.0
        X35.0
        X30.0
        X25.0
        X20.5
        X20.0
    G00 X200.0 Z200.0 T0100
    M30
    fT
```

ex2)

```
N10 G50 S2000
    G96 S180 M3
    T0100
    G0 X60.0 Z5.0 T0101 M8
    G90 X50.0 Z-40.0 F0.25
        X45.0 Z-20.0
        X40.0
        X35.0
        X30.0
        X25.0
        X20.0
    G00 X200.0 Z200.0 T0100
    M30
```

G92




```
N1234  G92  X40.  Z-55.  F5.
```

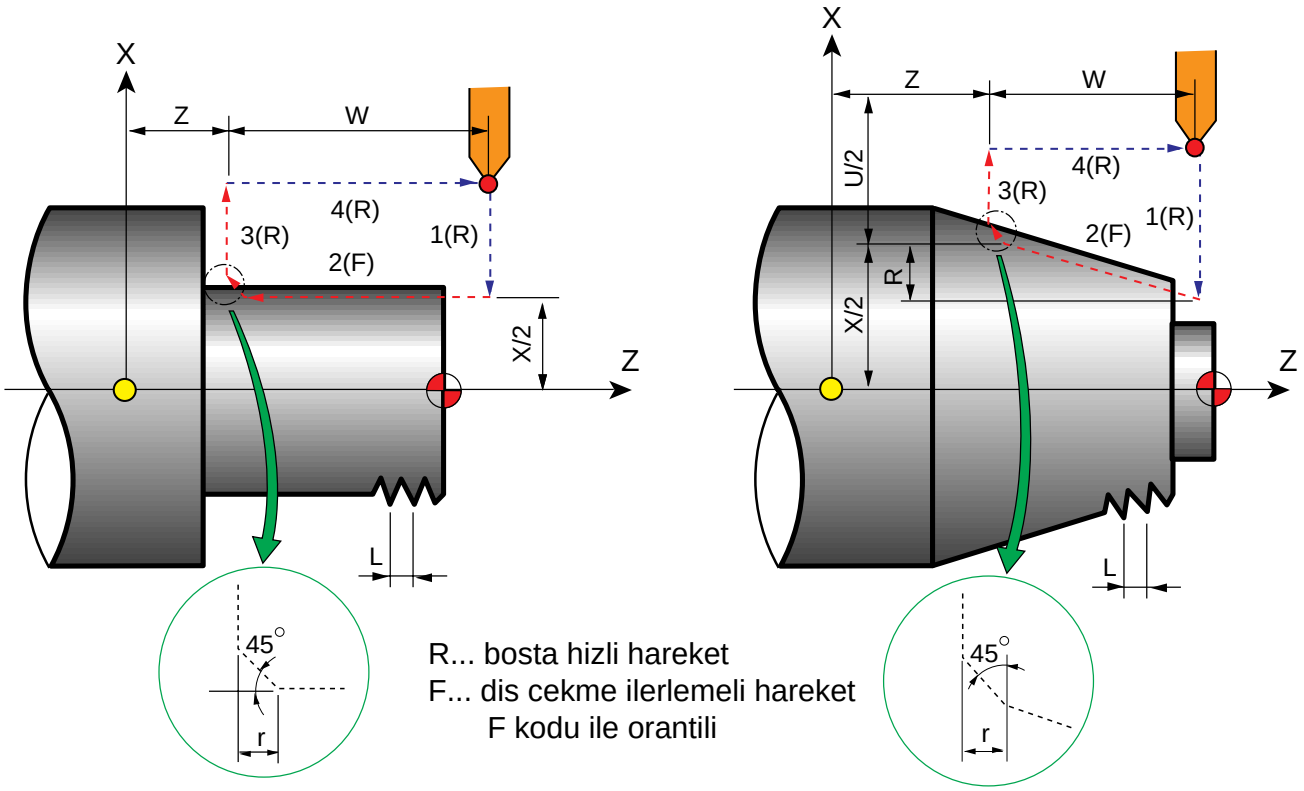
G92 DIS CEKME CEVRIMI

FORMAT	G92 X(U) Z(W) _R_F_

- X(U) : dis dibi capi
- Z(W) : disin bittigi Z koordinati
- R- : baslangic noktasi X+ yonunde olan kesmeler
- R+ : baslangic noktasi X- yonunde olan kesmeler
- I/R : hatve(adim)

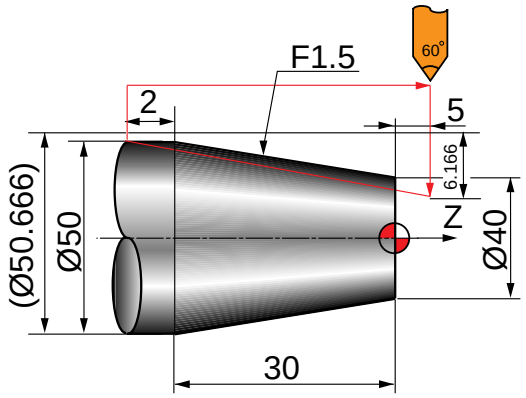
Not)Dis dongusune basldigi zaman fenermili donme ve ilerleme hiz potans. kontrol edilemez.

```
G92x(U)___  Z(W) ___ F__   ;
```



R... bosta hizli hareket
F... dis cekme ilerlemeli hareket
F kodu ile orantili

Ornek 1) koniklik varsa



PROGRAM

G30 U0 W0 :

G50 S1000 T0100 :

G97 S1000 M03 :

G00 X70.0 Z5.0 T0101 M08 :

G92 X49.4 Z–32.0 R–6.166 F1.5 :

X49.0 :

X48.7 :

X48.5 :

-

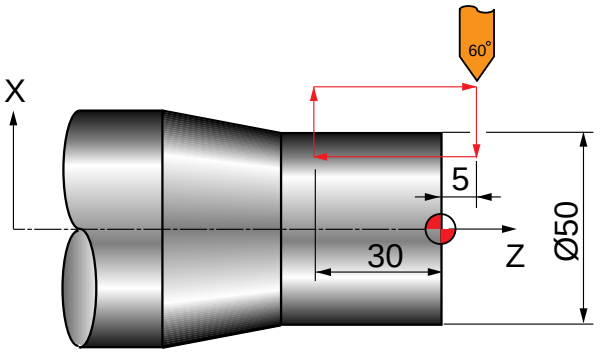
-

G30 U0 W0 :

M30 :

ƒT

Ornek) M50 x 1.5



PROGRAM

G30 U0 W0 :

G50 S1000 T0100 :

G97 S1000 M03 :

G00 X60.0 Z5.0 T0101 M08 :

G92 X49.5 Z–30.0 F1.5 :

X49.2 :

X48.9 :

X48.7 :

-

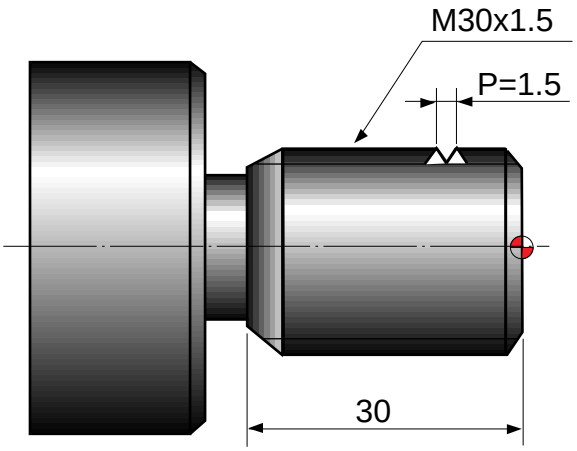
-

G30 U0 W0 :

M30 :

ƒT

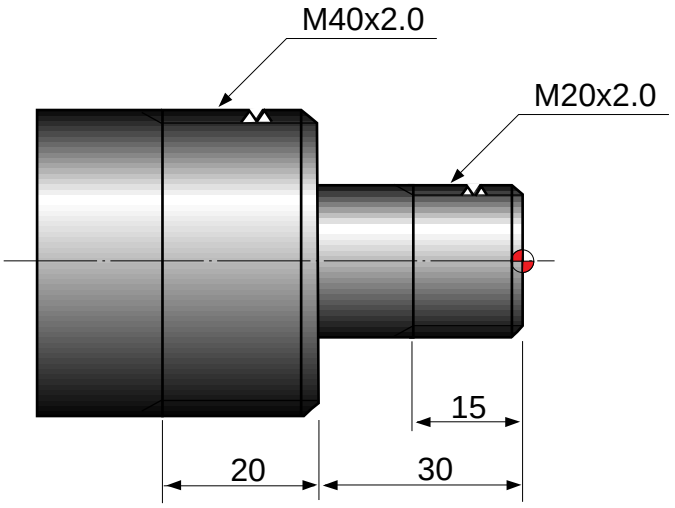
Ornek)G90 sabit bosaltma dongusu



PROGRAM

```
N10 G97 S1000 M03
    T0300
    G00 X35.0 Z5.0 T0303
    G92 X29.5 Z-32.0 F1.5
        X29.2
        X28.9
        X28.7
        :
    G00 X200.0 Z200.0 T0300
    M30
    ƒT
```

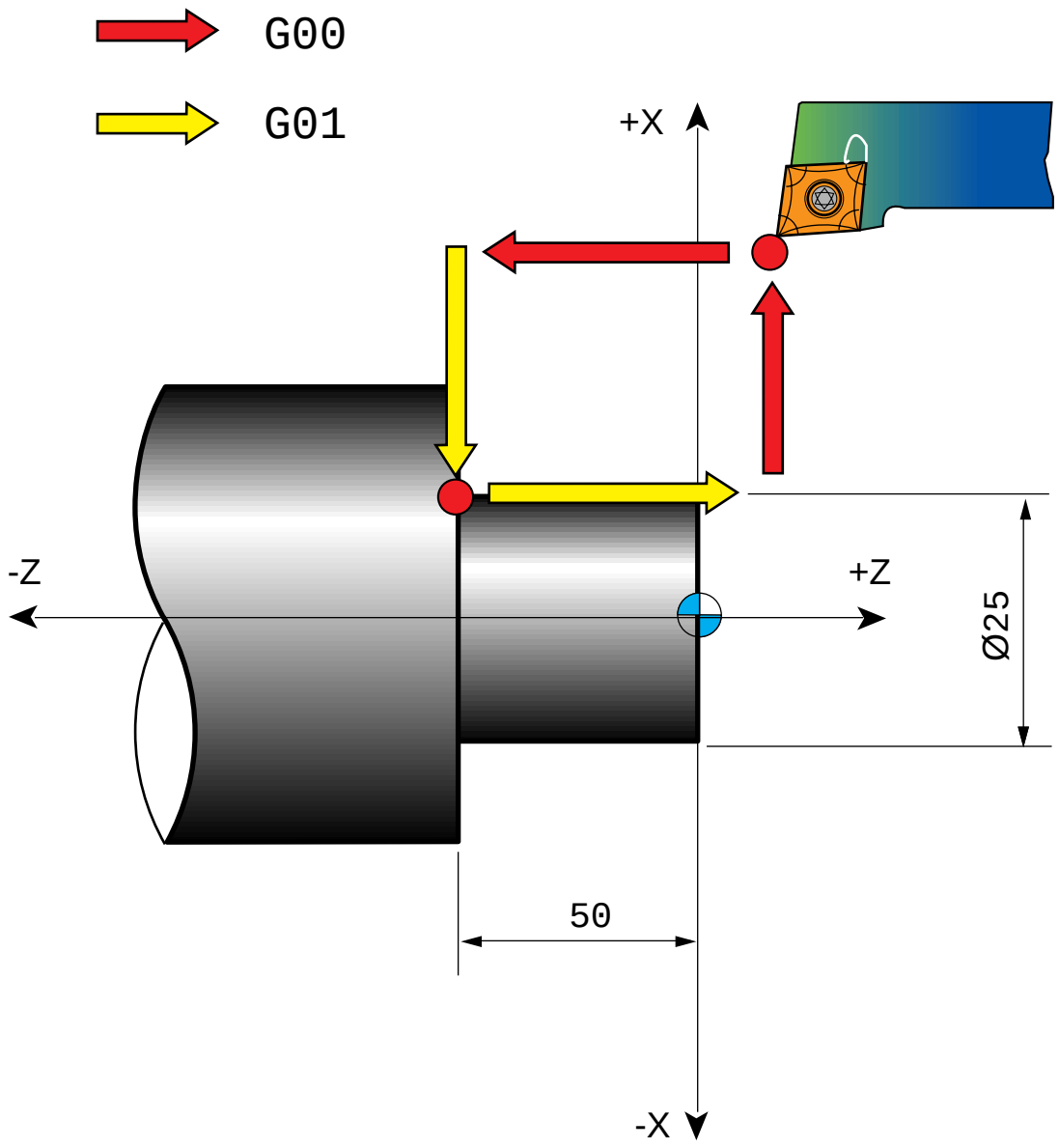
Ornek 2)G92 dis dongusu



PROGRAM

```
N10 G97 S1500 M03
    T0300
    G00 X30.0 Z5.0 T0303
    G92 X19.5 Z-15.0 F2.0
        X19.2
        X18.9
        X18.6
        X18.4
        :
    G00 X50.0
        Z-25.0 S1000
    G92 X39.5 Z-50.0 F2.0
        X39.2
        X38.9
        X38.6
        X38.4
    G00 X200.0 Z200.0 T0300
    M30
    *
```

G94




```
N1234  G94  X25.  Z-50.
```

G94 SABIT BOSALTMA DONGUSU (Alinda kaba bosaltma dongusu,X yonunde)

FORMAT	G92 X(U) Z(W)_R_F_

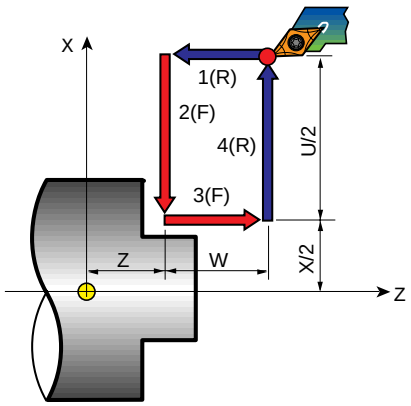
X(U) : bitis noktasi

Z(W) : bitis noktasi

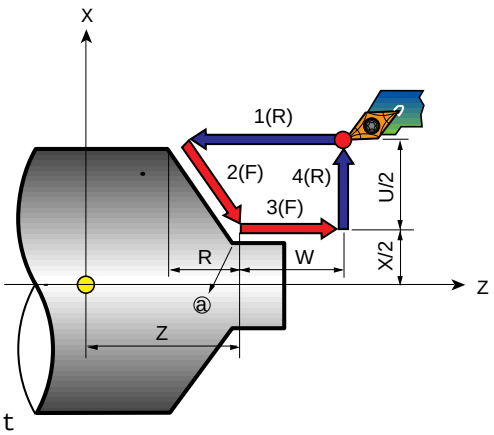
R- : programdaki egilim degeri

F : ilerleme hizi

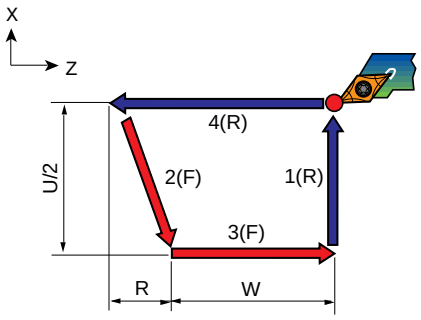
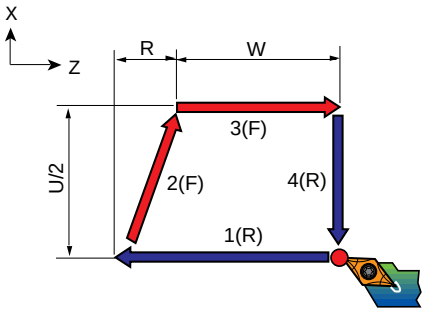
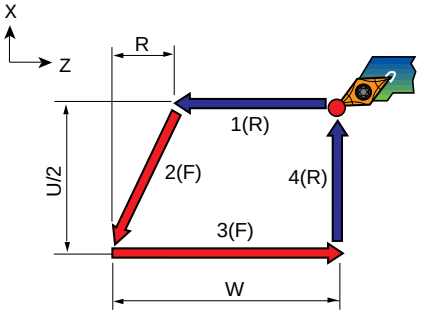
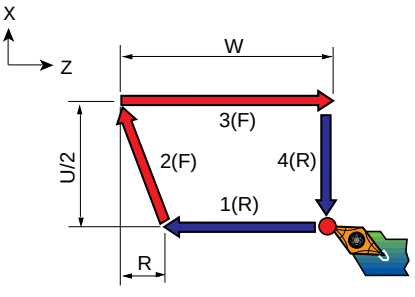
G94X(U)__ Z(W)__ F ;



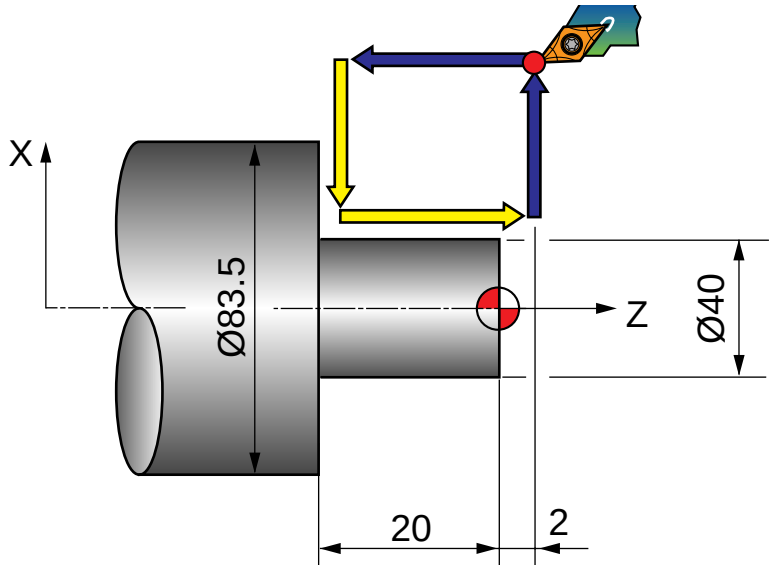
G90X(U)__ Z(W)__ R__ F ;



R... bosta hizli hareket
F... kesme ilerleme hizi

1. U<0, W<0, R<0	2. U>0, W<0, R<0
	
3. U<0, W<0, R>0 at |R|≦|W|	4. U>0, W<0, R<0 at |R|≦|W|
	

Ornek



PROGRAM

G30 U0 W0 :

G50 S2000 T0100 :

G96 S200 M03 :

G00 X85.0 Z2.0 T0101 M08 :

G94 X40.0 Z–2.0 F0.2

Z–4.0 :

Z–6.0 :

Z–8.0 :

Z–10.0 :

Z–12.0 :

Z–14.0 :

Z–16.0 :

Z–18.0 :

Z-19.7 :

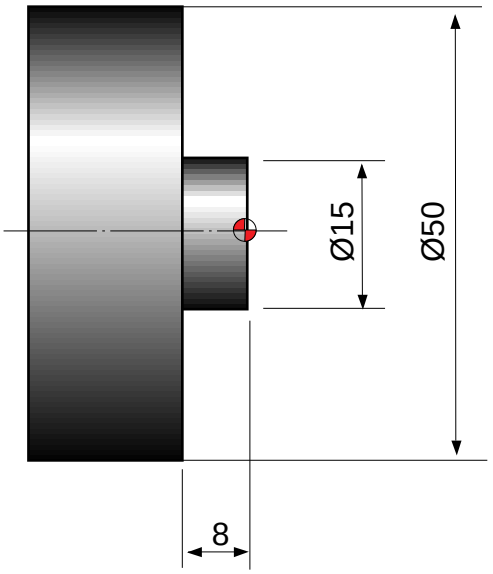
Z–20.0 :

G30 U0 W0 :

M30 :

*

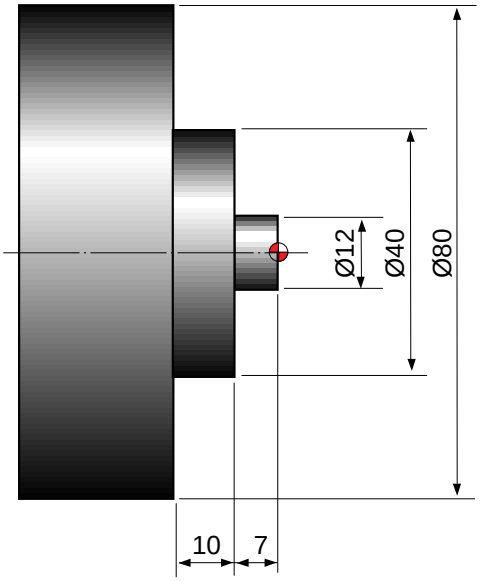
Ornek 1) G94 kaba yuzey bosaltma



PROGRAM

```
N10 G50 S2500
    G96 S180 M03
    T0100
    G00 X55.0 Z2.0 T0101
    G94 X15.0 Z-2.0 F0.2
        Z-4.0
        Z-6.0
        Z-8.0
    G00 X200.0 Z200.0 T0100
    M30
    *
```

Ornek 2)



PROGRAM

or1)

```
N10 G50 S2500 :
    G96 S180 M03 :
    T0300 :
    G00 X85.0 Z2.0 T0303 :
    G94 X12.0 Z-2.0 F0.2 :
        Z-4.0 :
        Z-6.0 :
        Z-7.0 :
    G00 X85.0 Z-5.0 :
    G94 X40.0 Z-9.0 F0.2 :
        Z-11.0 :
        Z-13.0 :
        Z-15.0 :
        Z-17.0 :
    G00 X200.0 Z200.0 T0300 :
    M30 :
    *
```

or2)

```
N10 G50 S2500 :
    G96 S180 M3 :
    T0300 :
    G0 X85.0 Z2.0 T0303 :
    G94 X12.0 Z-2.0 F0.2 :
        Z-4.0 :
        Z-6.0 :
        Z-7.0 :
      X 40.0 Z-9.0 :
        Z-11.0 :
        Z-13.0 :
        Z-15.0 :
        Z-17.0 :
    G0 X200.0 Z200.0 T0300 :
    M30 :
    *
```

G96, G97(Sabit kesme hizi kontrolu) ON, OFF)

G Code	Sabit kesme hizi kontrolu	anlami	birimi
G 96	ON	sabit kesme hizi kontrol	metre/dak
G 97	OFF	fenermili devrine gore hiz kontr	rpm

ORNEK) G96 S100 :

kesme hizi 100m/min

G97 S100 :

fener mili donme miktarina gore 100rpm

G98, G99 Ilerleme hizi secme

G GODE	Meaing	Unit
G 98	dakika icin ilerleme	mm/min
G 97	donme devrine gore ilerleme	mm/rev

Ornek) G98 G01 Z100.0 F50.0 :

takimin ilerleme hizi dakika icin 50mm

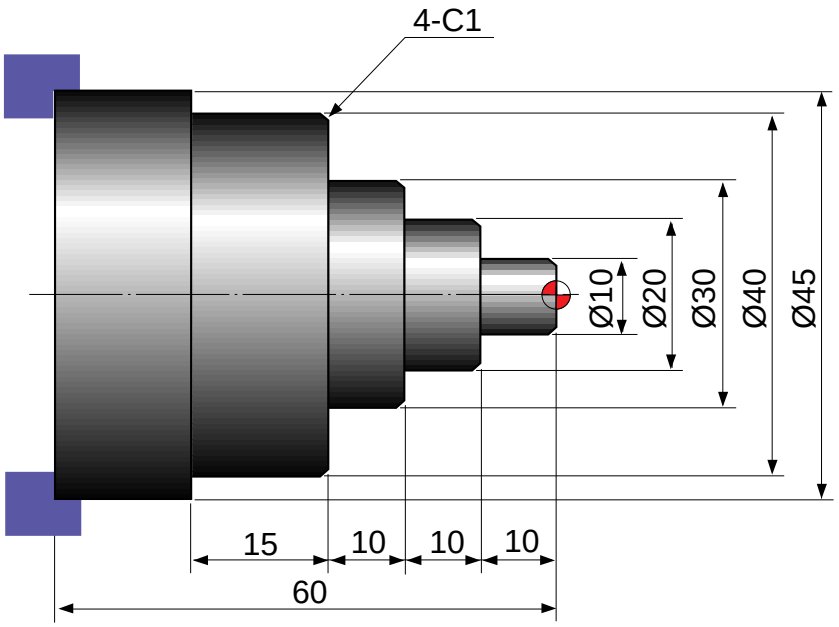
G97 G01 Z10.0 F0.3 :

takimin ilerleme hizifenermili donme devrine icin 0.3mm

Bununla beraber G98 komutu kullanilmadigi surece N.C unitesi daima G99 tanir.

(Example 1)

Process	Facing process, Outside diameter process
Dimension	ø 45 x 60L
Material	S45C



Condition of using tool

Facing process

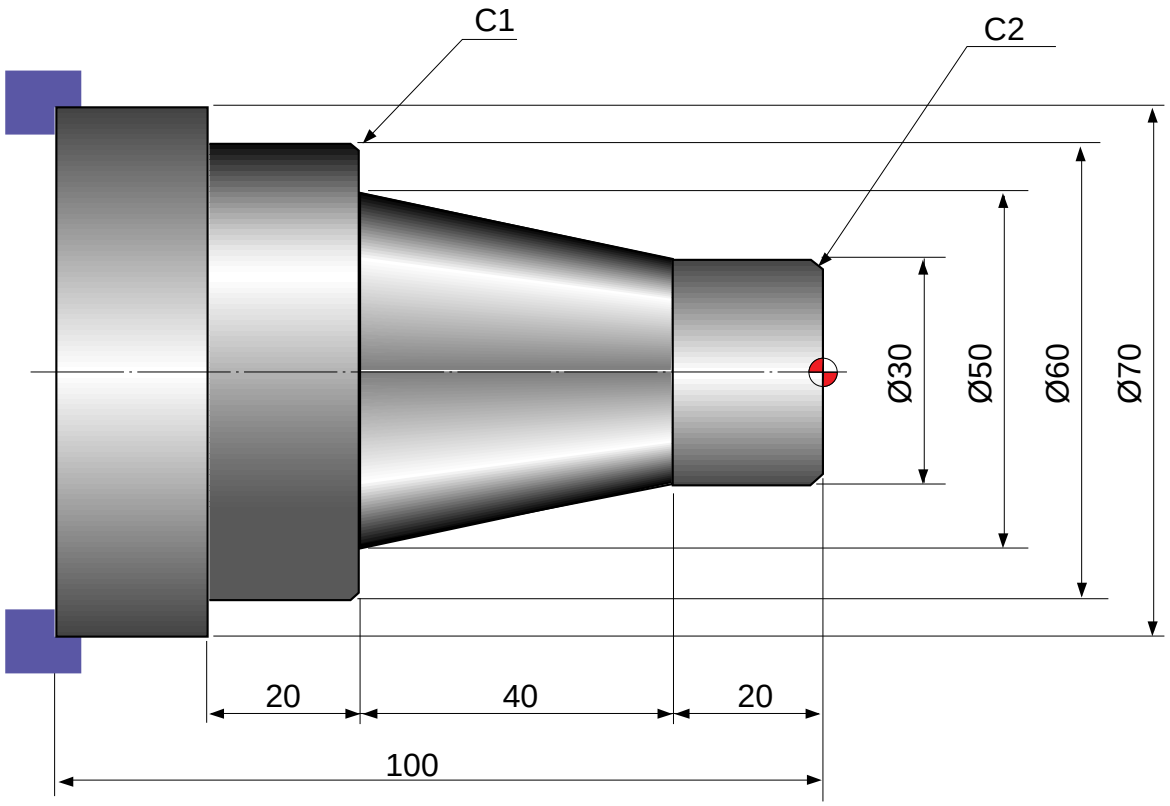
TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

(Example 2)

Process	Facing process, Outside diameter taperprocess
Dimension	ø 70 x 100L
Material	S45C



Condition of using tool

Facing process

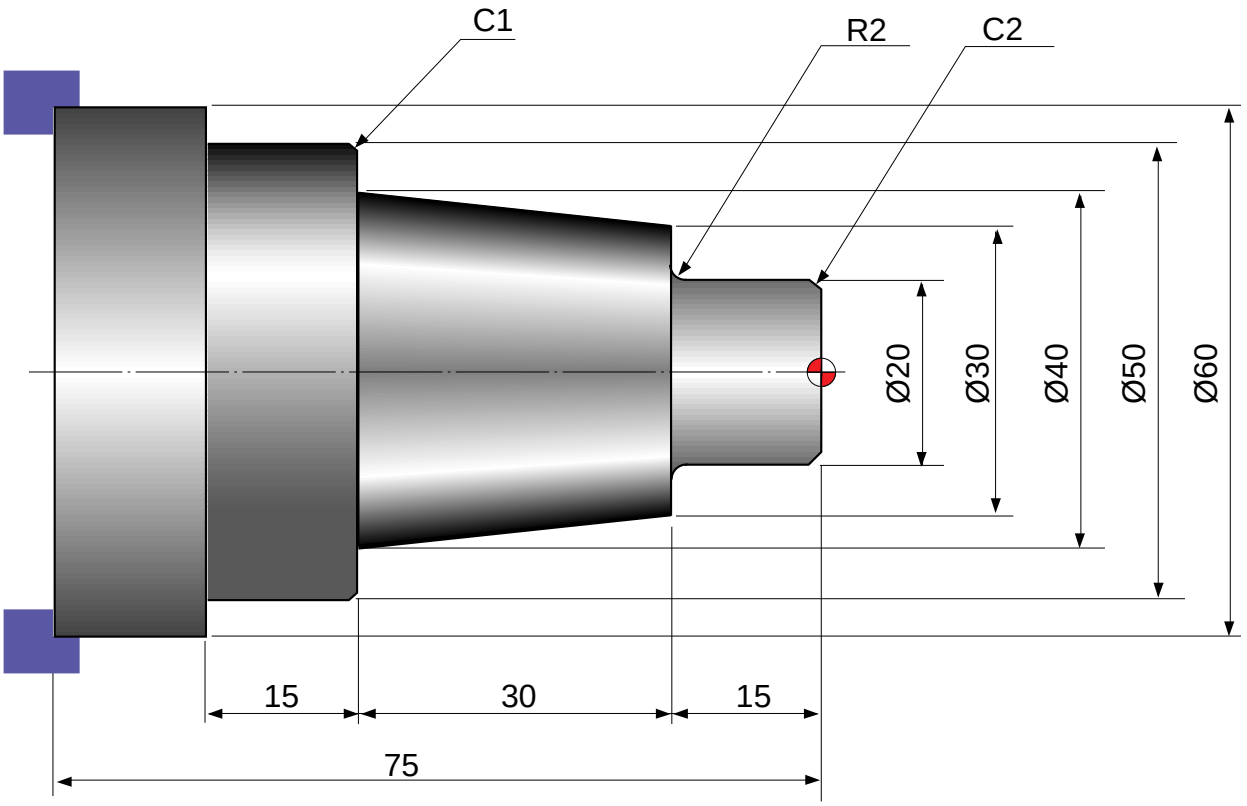
TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

(Example3)

Process	Facing process, Outside diameter taper process(Chamfering, R process)
Dimension	ø 60 x 75L
Material	S45C



Condition of using tool

Facing process

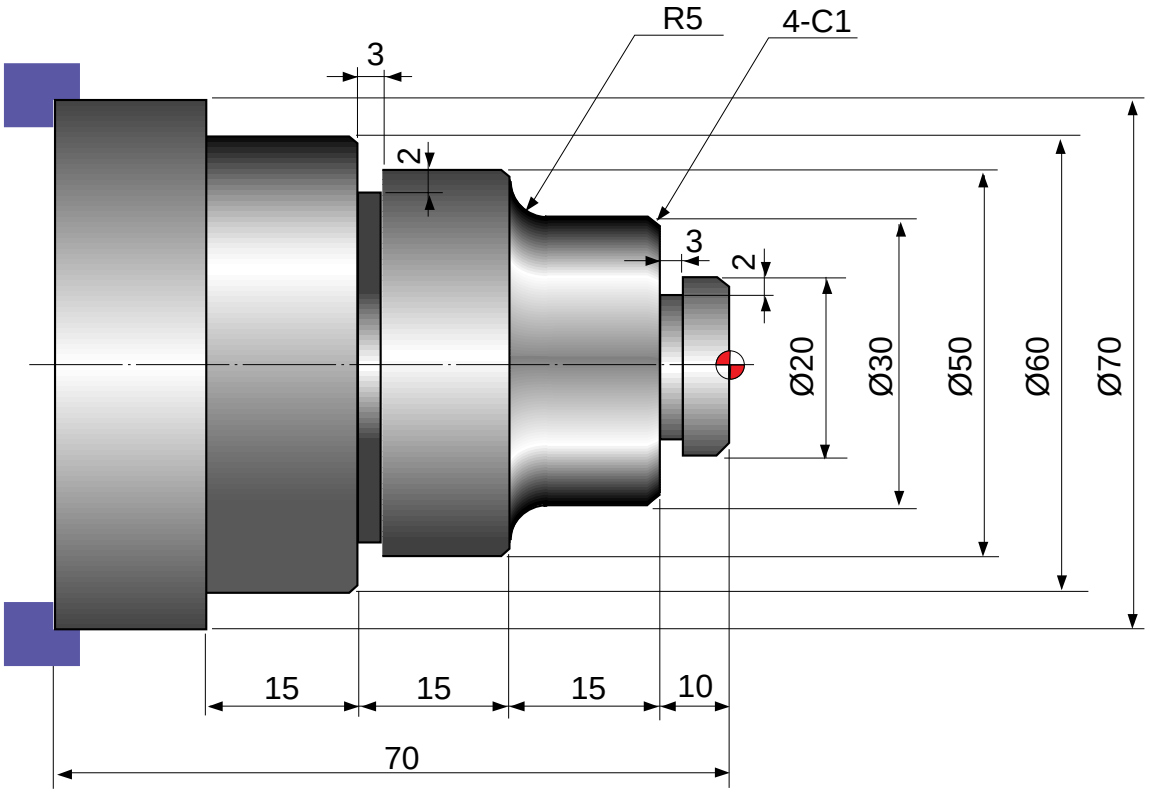
TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

(Example4)

Process	Facing process, Outside diameter(Groove process, Chamfering R process)
Dimension	ø 70 x 70L
Material	S45C



Condition of using tool

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

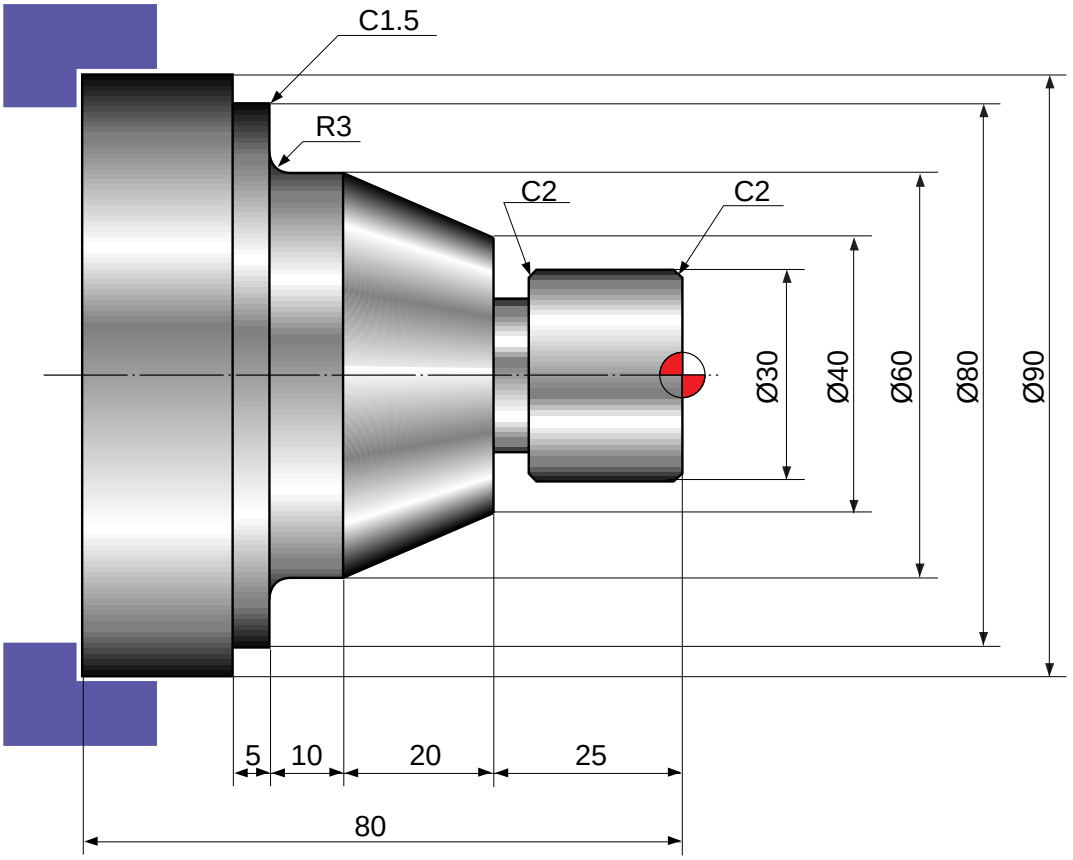
TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Groove process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal + Finishing
PCLNR/L–1	

(Example5)

Process	Facing process, Outside diameter(Groove process, Chamfering R process, Thread process)
Dimension	ø 90 x 80L
Material	S45C



Condition of using tool

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Groove process

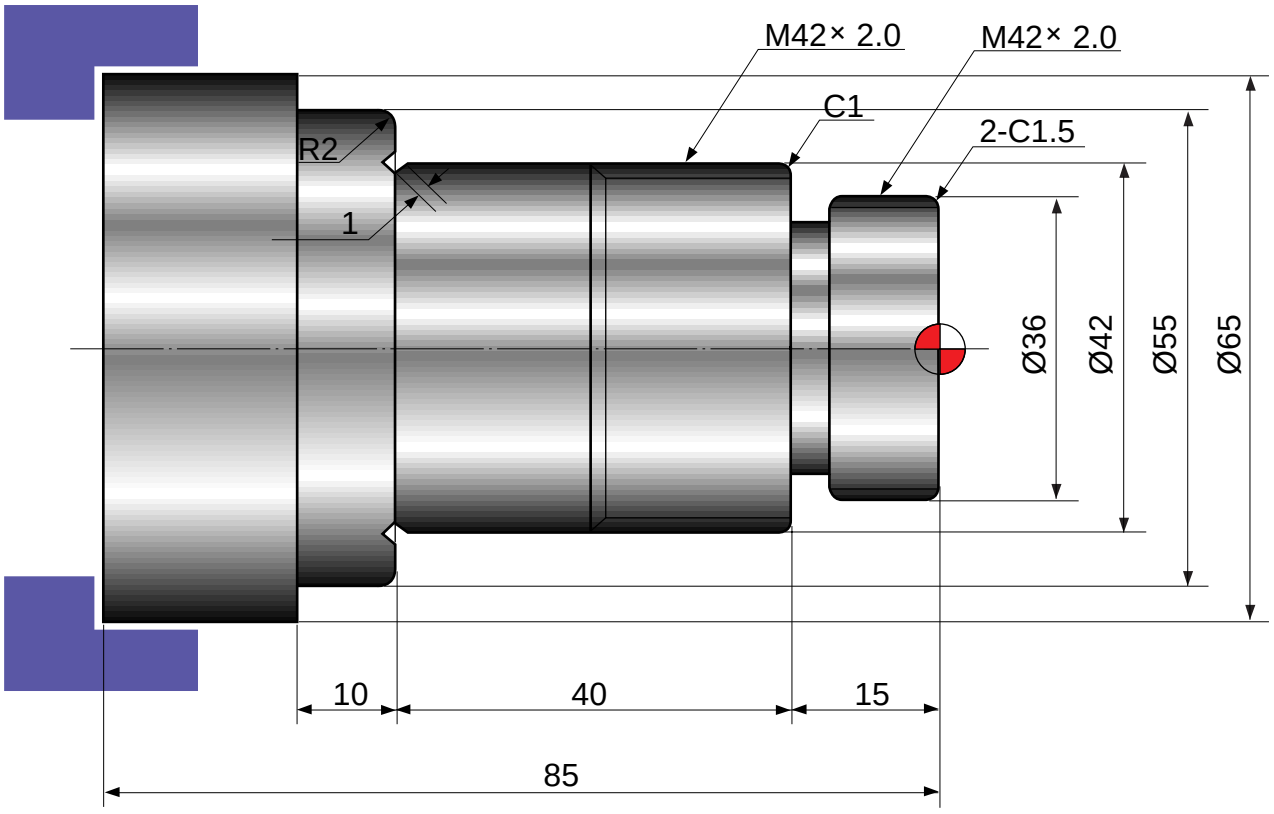
TOOL	PROCESS TYPE
R/L 154.91	Stock remova + Finishing

Thread process

TOOL	PROCESS TYPE
R/L 166.0	Stock remova + Finishing

(Example6)

Process	Facing process, Outside diameter(Groove process, Thread process, Relief)
Dimension	ø 65 x 88L
Material	S45C



Condition of using tool

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Groove process

TOOL	PROCESS TYPE
R/L 154.91	Stock removal + Finishing

Facing process

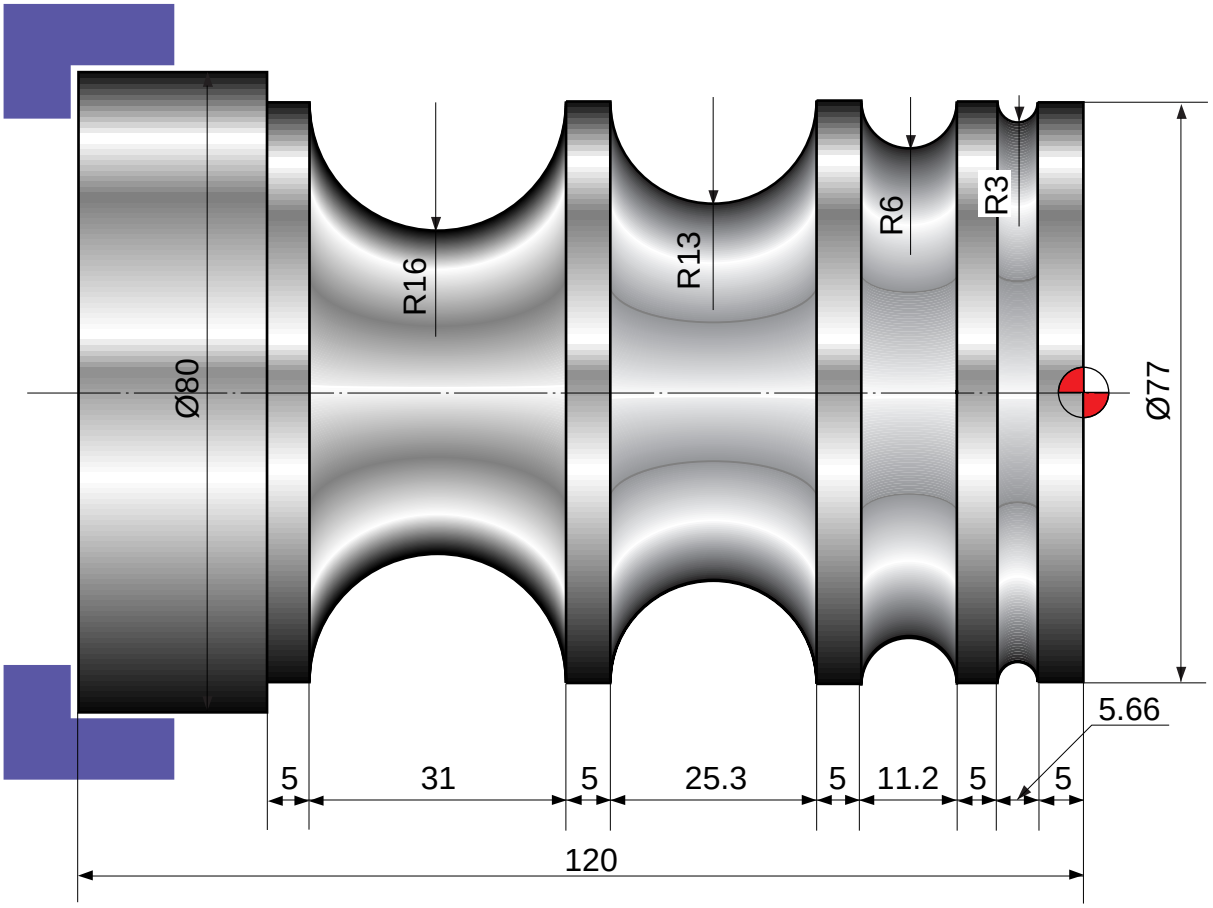
TOOL	PROCESS TYPE
Relief	Stock remova + Finishing

Thread process

TOOL	PROCESS TYPE
R/L 166.0	Stock remova + Finishing

(Example7)

Process	Outside diameter R process
Dimension	ø 80 x 120L
Material	S45C



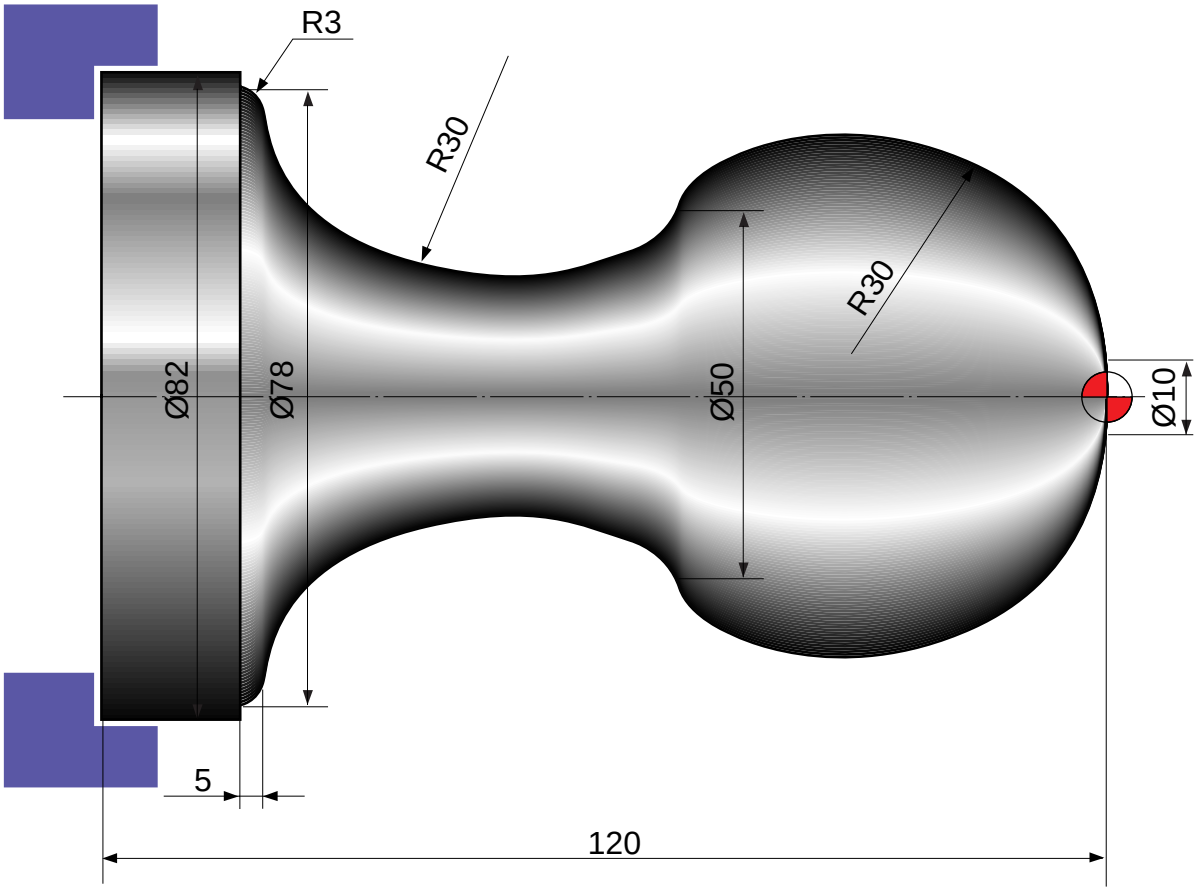
Condition of using tool

Outside diameter process

TOOL	PROCESS TYPE
SVVBN	Stock removal + Finishing

(Example8)

Process	Outside diameter circumference process
Dimension	ø 82 x 120L
Material	S45C



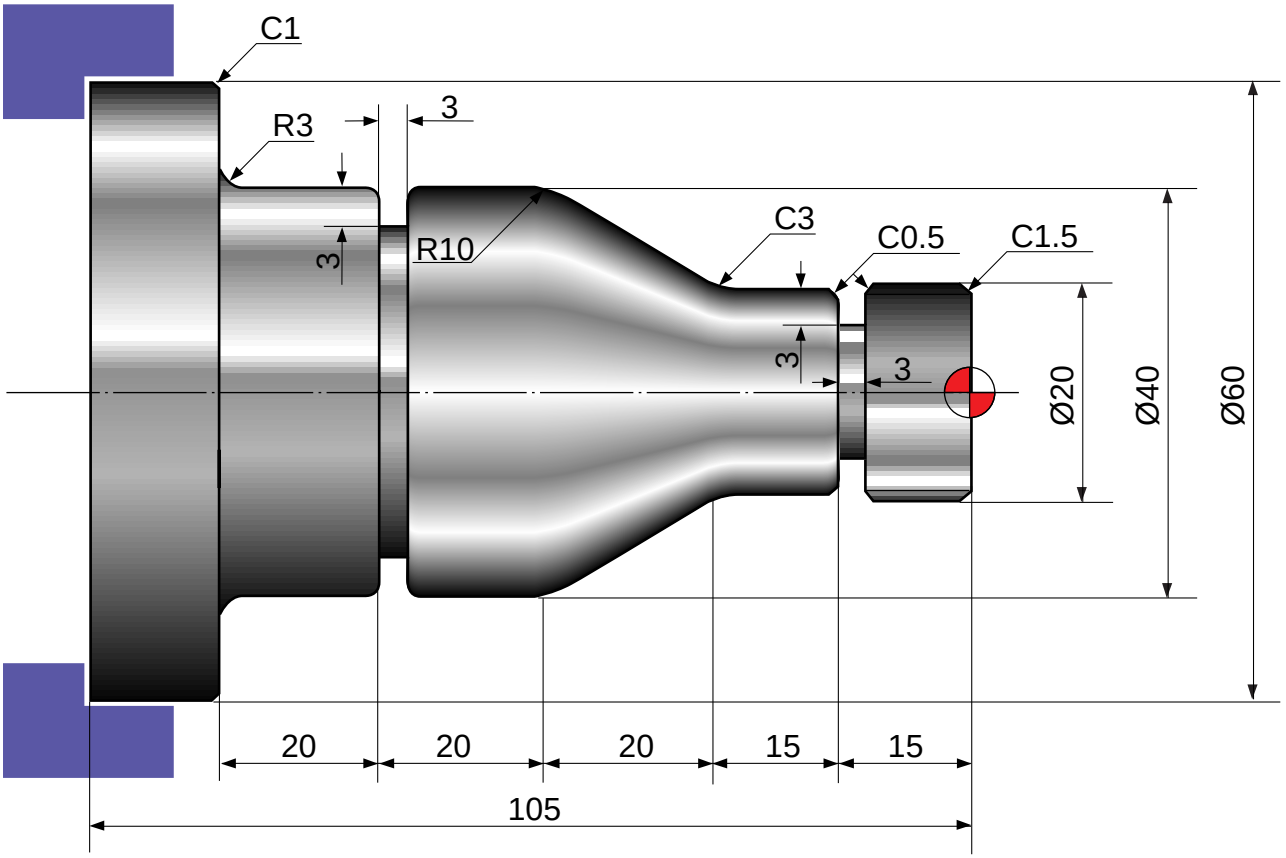
Condition of using tool

Outside diameter circumference process

TOOL	PROCESS TYPE
SVVBN	Stock removal + Finishing

(Example9)

Process	Outside diameter(Groove process, Thread process, Chamfering R process)
Dimension	ø 60 x 110L
Material	S45C



Condition of using tool

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Groove process

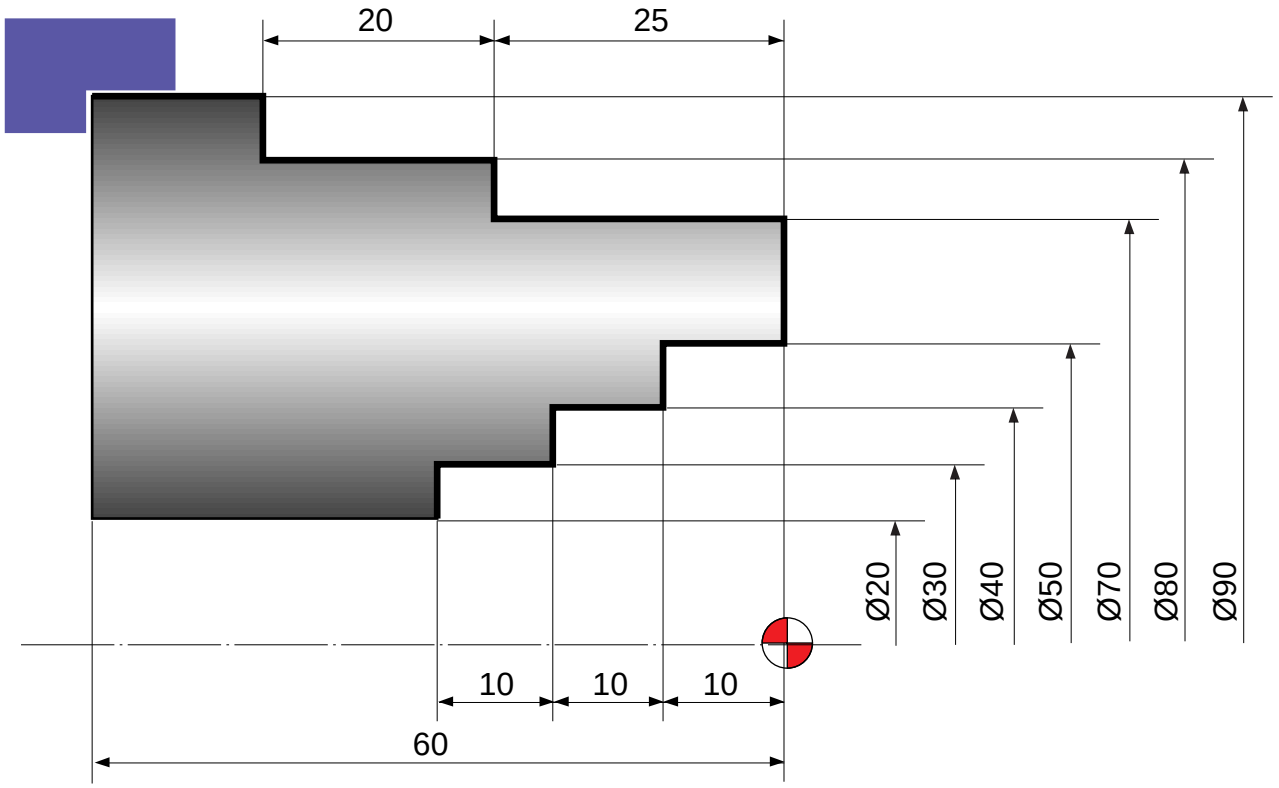
TOOL	PROCESS TYPE
R/L 154.91	Stock remova + Finishing

Thread process

TOOL	PROCESS TYPE
R/L 166.0	Stock remova + Finishing

(Example10)

Process	Outside diameter process, Inside diameter process
Dimension	ø60 x 110L
Material	S45C



Condition of using tools

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

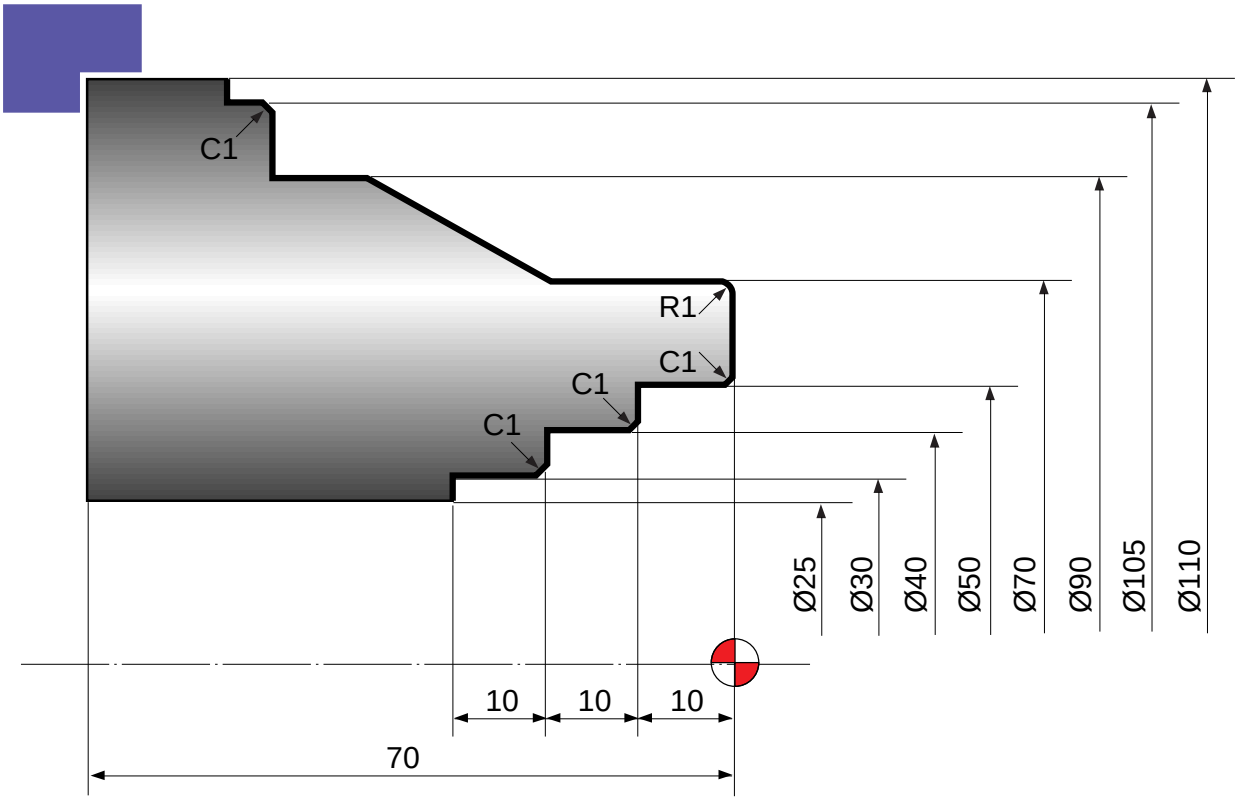
TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Inside diameter process

TOOL	PROCESS TYPE
S-20S PCLNR/L	Stock removal
S-20S PCNR/L-1	Finishing

(Example11)

Process	Outside diameter process, Inside diameter process
Dimension	ø110 x 75L x ø25(Pipe)
Material	S45C



Problem 1) Program when the material is pipe

Problem 2) Program when the material is a round bar

Condition of using tools

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

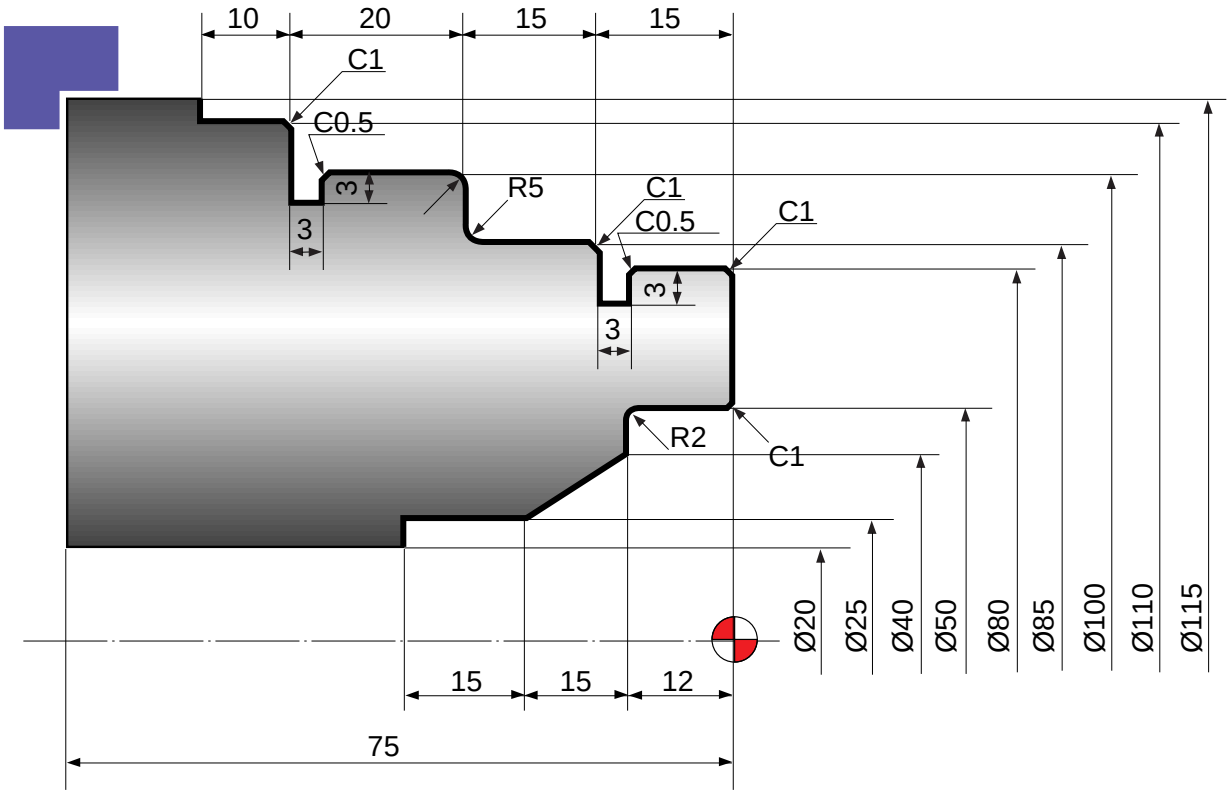
TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Inside diameter process

TOOL	PROCESS TYPE
S-20S PCLNR/L	Stock removal
S-20S PCNR/L-1	Finishing

(Example12)

Process	Outside diameter process, Inside diameter process
Dimension	ø 110 x 75L x ø 25(Pipe)
Material	S45C



Condition of using tool

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Groove process

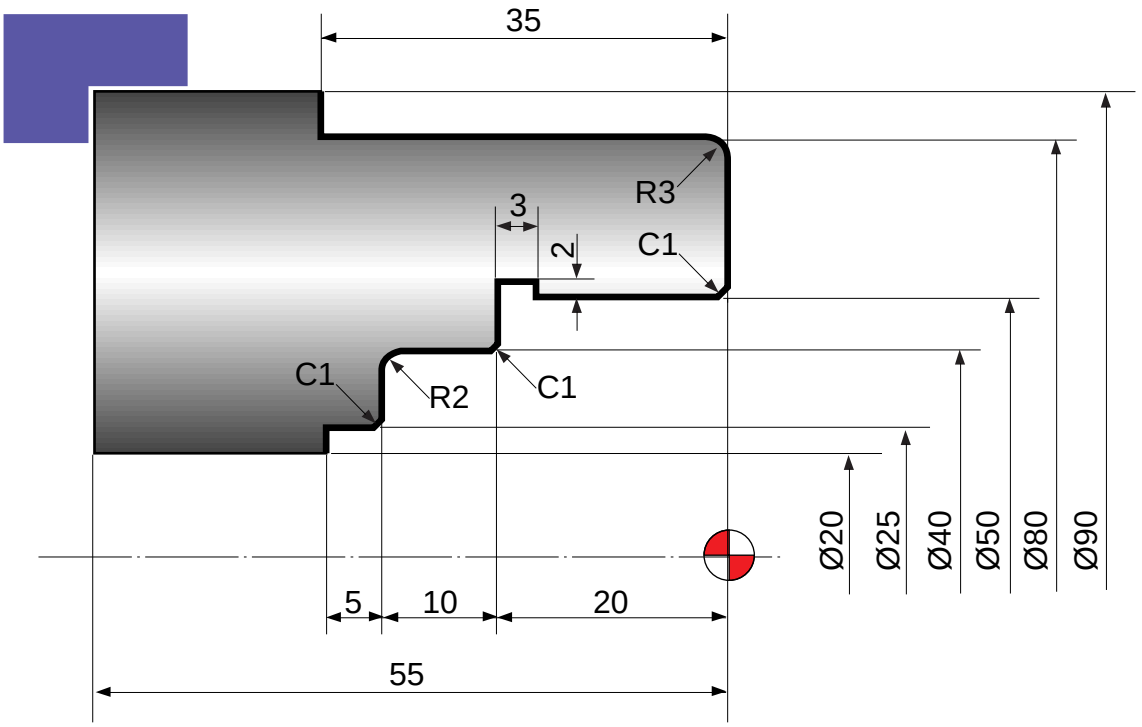
TOOL	PROCESS TYPE
PCLNR/L	Stock remova + Finishing
PCLNR/L–1	

Inside diameter process

TOOL	PROCESS TYPE
S-20S PCLNR/L	Stock remova
S-20S PCLNRL-1	Finishing

(Example13)

Process	Outside diameter process, Inside diameter process(Chamfering, R, Groove)
Dimension	ø90 x 60L x ø20(Pipe)
Material	S45C



Problem 1) Program when the material is pipe

Problem 2) Program when the material is a round bar

Condition of using tool

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Inside diameter Groove process

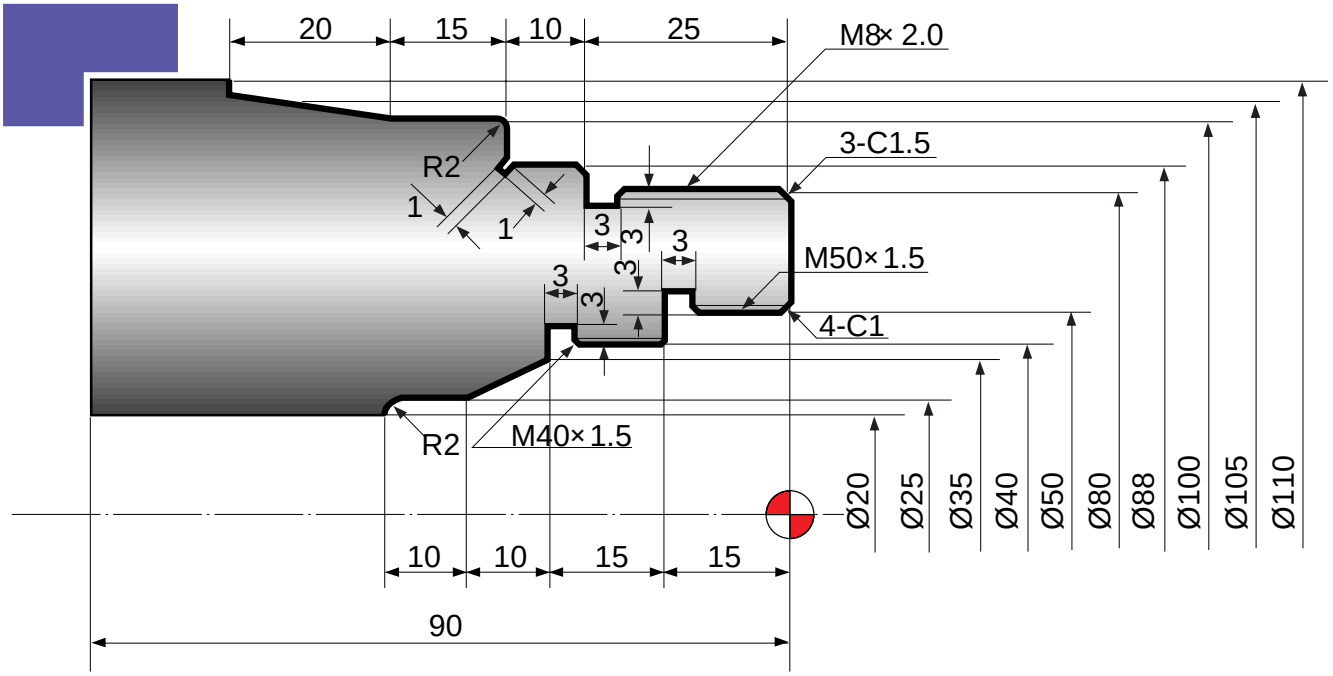
TOOL	PROCESS TYPE
PCLNR/L	Stock remova + Finishing
PCLNR/L–1	

Inside diameter process

TOOL	PROCESS TYPE
S-20S PCLNR/L	Stock remova
S-20S PCLNRL-1	Finishing

(Example14)

Process	Outside diameter process(Chamfering, R, Groove, Thread, Relief process)
Dimension	ø110 x 90L x ø20(Pipe)
Material	S45C



Problem 1) Program when the material is pipe

Problem 2) Program when the material is a round bar

Condition of using tools

Facing process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Inside diameter process

TOOL	PROCESS TYPE
S-20S PCLNR/L	Stock removal
S-20S PCNR/L-1	Finishing

Inside diameter Groove process

TOOL	PROCESS TYPE
R/L 154.3	Stock removal + Finishing

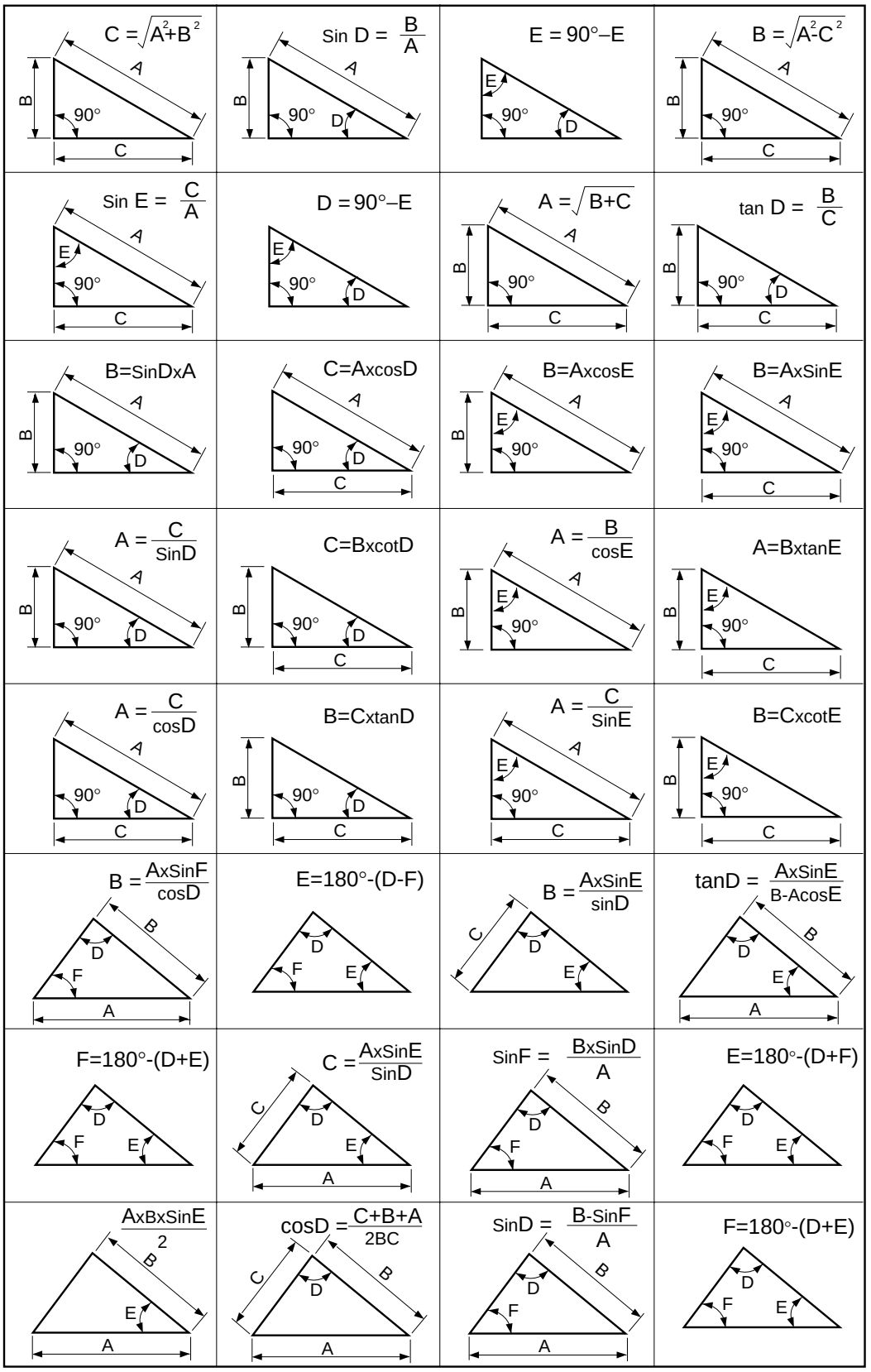
Vutsude diameter relief process

TOOL	PROCESS TYPE
PCLNR/L	Stock removal
PCLNR/L–1	Finishing

Outside diameter Groove process

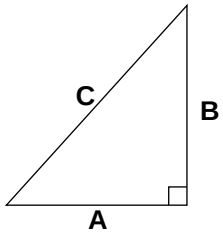
TOOL	PROCESS TYPE
R/L 154.91	Stock removal + Finishing

Calesslating table of trigonometric function



FORMULA

1. The puthagorean theorem

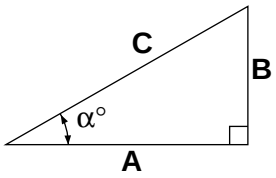


$C^2 = A^2 + B^2$ $\quad C = \sqrt{A^2 + B^2}$

$A^2 = C^2 - B^2$ $\quad A = \sqrt{C^2 - B^2}$

$B^2 = C^2 - A^2$ $\quad B = \sqrt{C^2 - A^2}$

2. Trigonometric function



$\text{SIN}\alpha^\circ = \frac{B}{C}$, $\text{COS}\alpha^\circ = \frac{A}{C}$, $\text{TAN}\alpha^\circ = \frac{B}{A}$

$A = C \times \text{COS}\alpha^\circ$ $\quad A = \frac{B}{\text{TAN}\alpha^\circ}$

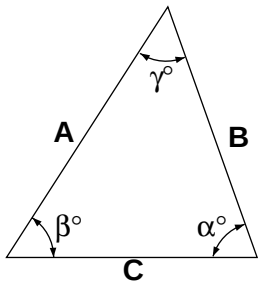
$B = C \times \text{SIN}\alpha^\circ$ $\quad B = A \times \text{TAN}\alpha^\circ$

$C = \frac{B}{\text{SIN}\alpha^\circ}$ $\quad C = \frac{A}{\text{COS}\alpha^\circ}$

3. SIN law

When finding the length of the two sides(Oneside and two angles are known)

When finding the other angle(Two sides and one angle are know)

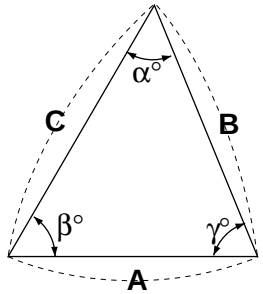


$$\frac{A}{\text{SIN}\alpha^\circ} = \frac{B}{\text{SIN}\beta^\circ} = \frac{C}{\text{SIN}\gamma^\circ}$$

4. COS law

When finding the other side(Two sides and one angle are known)

When finding the other angle(Lengthsof three sides are known)



$A^2 = B^2 + C^2 - 2B.C\ \text{COS}\alpha^\circ$ $\quad \text{COS}\alpha^\circ = \frac{B^2 + C^2 - A^2}{2BC}$

$B^2 = C^2 + A^2 - 2C.A\ \text{COS}\beta^\circ$ $\quad \text{COS}\beta^\circ = \frac{C^2 + A^2 - B^2}{2CA}$

$C^2 = A^2 + B^2 - 2A.B\ \text{COS}\gamma^\circ$ $\quad \text{COS}\gamma^\circ = \frac{A^2 + B^2 - C^2}{2AB}$

♠ **DECHNICAL GUIDE**

CALCULATING FORMULA

♠ Drocess time(sec/ea) = $\frac{¥\ D.\ L \times 60}{100V \times F} = \frac{\text{Cutting length} \times 60}{\text{Arerage of rotating time}}$ = sec

♠ Output(8Hrs/day) = 8Hrs x 60 x 60 = ea

Required time per unit

♠ Required day for process = $\frac{\text{Object time} \times \text{Quantity to be processed}}{\frac{8 \times 60}{60}}$ =Day

♠ Surface roughress = $\frac{\text{Feed volume}^2}{8 \times \text{NOSER}}$ x 1000 = R.t μm

♠ Cutting volume = cm^3/min

V. F.D = LT

$\frac{ft \times W \times D}{1000}$ = ML

V = Cutting speed

F = Feed volume(mm/rev)

D = Depth of cutting

ft = Feedrate(mm/min)

W= Width of cutting

♠ Cutting condition(Material : AL)

∗ EXTREME – FINISHING V = 870

F = 0.05~0.15

t = 0.025~2.0

∠ FINISHING V = 720

F = 0.1~0.3

t = 0.5~2.0

∠ LIGHT V = 600

ROUGHING F = 0.2~0.5

t = 2.20~4.0

Cutting condition

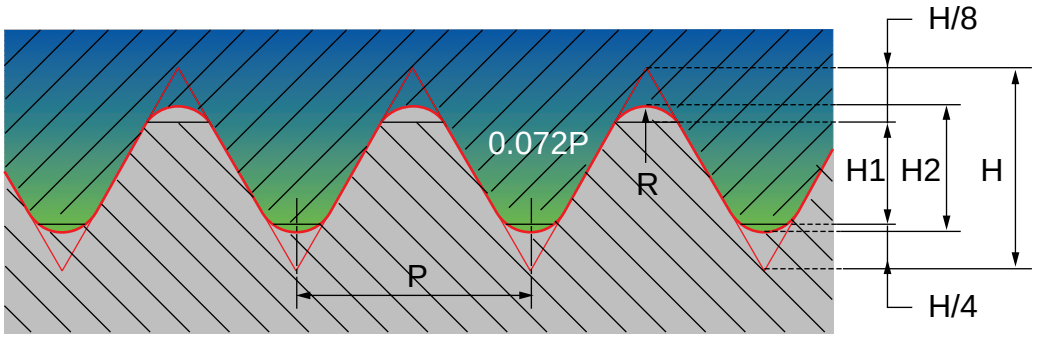
1. Cutting condition

Material	Classification	Depth of cutting d(mm)	Cutting speed v (m/min)	Feedrate F (mm/rev.)	Material of tool
Carbon steel 60kg/mm (Tensile strength)	Stock vemoval	3 ~ 5	180 ~ 200	0.3 ~ 0.4	P 10 ~ 20
		2 ~ 3	200 ~ 250	0.3 ~ 0.4	P 10 ~ 20
	Finishing	0.2 ~ 0.5	250 ~ 280	0.1 ~ 0.2	P 01 ~ 10
	Thread		124 ~ 125		P 10 ~ 20
	Grooving		90 ~ 110	0.08 ~ 0.2	P 10 ~ 20
	Center drill		1000 ~ 1600 rpm	0.08 ~ 0.15	SKH 2
	Drill		~ 25	0.08 ~ 0.2	SKH9
Alloy steel 140kg/mm^2	Stock removal	3 ~ 4	150 ~ 180	0.3 ~ 0.4	P10 ~ 20
	Finishing	0.2 ~ 0.5	200 ~ 250	0.1 ~ 0.2	P 10 ~ 20
	Grooving		70 ~ 100	0.08 ~ 0.2	P 10 ~ 20
Castiron HB 150	Stock removal	3 ~ 4	200 ~ 250	0.3 ~ 0.5	K 10 ~ 20
	Finishing	0.2 ~ 0.5	250 ~ 280	0.1 ~ 0.2	K 10 ~ 20
	Grooving		100 ~ 125	0.08 ~ 0.2	K 10 ~ 20
Aluminum	Stock removal	2 ~ 4	400 ~ 1000	0.3 ~ 0.5	K 10
	Finishing	0.2 ~ 0.5	700 ~ 1600	0.1 ~ 0.2	K 10
	Grooving		350 ~ 1000	0.1 ~ 0.2	K 10
Bronge Brass	Stock removal	3 ~ 5	150 ~ 300	0.2 ~ 0.4	K 10
	Finishing	0.2 ~ 0.5	200 ~ 500	0.1 ~ 0.2	K 10
	Grooving		150 ~ 200	0.1 ~ 0.2	K 10
Staialess steel	Stock removal	2 ~ 3	150 ~ 180	0.2 ~ 0.35	P 10 ~ 20
	Finishing	0.2 ~ 0.5	180 ~ 200	0.1 ~ 0.2	P 01 ~ 10
	Grooving		60 ~ 90	~ 0.15	P 10 ~ 20

(Note) 1) Conditions for tools coated

2) Cutting condition shall be changed by the shape and angle of tools

2. Cutting time of thread process(For thread precessing with the S 45 C)



PITCH	P1.0	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0
CUTTING DEPT	H2	0.6	0.74	0.89	1.05	1.19	1.49	1.79	2.08	2.38	2.68	2.98
CORNER ROUND	R	0.07	0.09	0.11	0.13	0.14	0.18	0.22	0.25	0.29	0.32	0.36
SCREW CUTTING NUMBER OF TIMES	1	0.25	0.30	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.40	0.45
	2	0.20	0.20	0.20	0.25	0.25	0.28	0.30	0.35	0.35	0.35	0.35
	3	0.10	0.11	0.14	0.16	0.20	0.24	0.26	0.30	0.30	0.30	0.32
	4	0.05	0.08	0.12	0.12	0.14	0.20	0.22	0.25	0.26	0.28	0.30
	5		0.05	0.08	0.10	0.11	0.15	0.18	0.20	0.23	0.25	0.25
	6			0.05	0.07	0.08	0.11	0.13	0.15	0.20	0.22	0.25
	7				0.05	0.06	0.09	0.10	0.12	0.17	0.20	0.20
	8					0.05	0.07	0.08	0.10	0.14	0.15	0.17
	9						0.05	0.07	0.08	0.10	0.12	0.15
	10							0.05	0.05	0.10	0.10	0.15
	11							0.05	0.05	0.08	0.08	0.10
	12								0.05	0.05	0.08	0.10
	13									0.05	0.05	0.08
	14										0.05	0.06
	15										0.05	0.06

M-FUNCTION
M00 : PROGRAM DURDURMA
M00 kullanildigi zaman(MDI or MEM mode),bu komutun oldugu satirda program durur. tekrar cycle start ile program kaldigi satirdan devam eder. .
NOT1)
M00 komutundan sonra duran spindle acma kapama islemlerini mode degistirmeden manuel olarak yapabiliriz.
M01 : SARTLI DURDURMA
Bu komut kullanildiginda eger kontrol paneli uzerindeki OPTIONEL STOP switch aktif ise program M01 satirinda durur.tekrar cycle start a basildiginda program devam eder
M02 : PROGRAM SONU
bu komut kullanildigi zaman program durur ancak basa donmez.
M03:ANA FENERMILI SAAT YONU DONMESI
M03 komutu kullanildiginda fener mili saat yonunde donmeye baslar ancak ozel S komutu ile beraber kullanilmalidir. eger ayna ayaklari aciksa M03 komutu kullanildiginda alarm verecektir.
M04 ::ANA FENERMILI SAAT YONU TERSINDE DONMESI
M04 komutu kullanildiginda fener mili saat yonu tersinde donmeye baslar ancak ozel S komutu ile beraber kullanilmalidir. eger ayna ayaklari aciksa M04 komutu kullanildiginda alarm verecektir.
M05 : ANA FENERMILI DURDURMA
M07 : YUSEK BASINCTA SOGUTMA SUYUNU ACMA(opsiyon)
M08 SOGUTMA SUYU ACMA
M09 : SOGUTMA SUYU KAPAMA
M10: PARCA YAKALAMA KOU ASAGI(opsiyonl)

M11 : PARCA YAKALAMA KOLU YUKARI (opsiyon)
.
M13:TARET ICIN HAVA AKIMI (opsiyon)
M14 : ANA FENERMILI ICIN HAVA AKIMI (opsiyon)
M15 : HAVA AKIMI IPTALI (opsiyon)
M17 : MAKINA EKSENLERI KILITLEME
M18 : MAKINA EKSEN KILITLERINI ACMA
M19 : ANA FENER MILI ORYANTASYON(KILIT) (opsiyon)
M24 : CHIP KONVEYOR CALISTIRMA (opsiyon)
M25 : CHIP KONVEYOR DURDURMA (opsiyon)
M30 : PROGRAM SONU VE BASA DONME
M30 komutu kullanildiginda program durur ve basa doner. tekrar calistirmak icin cycle start a basmak yeterlidir.
M31: BY-PASS (ana fenermili ve punta)
M32 : ANA FENER MILI DONERKEN ARA YATAKLARI ACMA VE KAPAMA
M33 : DONER TAKIM SAAT YONU DONDERME
M34 : DONER TAKIM SAAT YONU TERSINDE DONDERME
M35 : DONER TAKIM DURDURMA

M38 : ARA YATAK SIKMA(opsiyon-sag taraf), M58 :ARA YATAK SIKMA(opsiyon-sag taraf)
M39 : ARA YATAK ACMA(opsiyon-sag taraf), M59 :ARA YATAK ACMA(opsiyon-sag taraf)
M40 : DISLI DEGISTIRME NATUREL
M41 : DISLI DEGISTIRME DUSUK
M42 : DISLI DEGISTIRME ORTA
M43 : DISLI DEGISTIRME YUKSEK
M46 : Prog. PUNTA GOVDE ACMA & PINOL ILERI (opsiyon)
M47 : Prog. PUNTA GOVDE KAPAMA & PINOL GERI (opsiyon)
M50 : CUBUK SURUCU (opsiyon)
M52 : OTOMATIK KAPI ACMA (Opsiyon)
M53: OTOMATIK KAPI KAPAMA (opsiyon)
M54 : PARCA SAYMA(opsiyon)
M61 : DUSUK HIZ SWITCH (sadece aP60)
aP60 TIP spindle motor kullanildiginda,cikis torku ve hizini ayarlar. rpm(Y-CONNECTION). 400 ~ 500 rpm(18.5kw)
M62 : YUKSEK HIZ SWITCH (only aP60)
rpm(-CONNECTION). 750 ~ 4500 rpm(22kw)
M63 : ANA FENERMILI SAAT YONUNDE & SOGUTMA SUYUNU ACMA
M64 : ANA FENERMILI SAAT YONU TERSINDE & SOGUTMA SUYUNU ACMA

M65 : ANA FENERMILI & SOGUTMA SUYU DURDURMA
M66 : YARDIMCI AYNA DUSUK SIKMA (optional)
M67 : YARDIMCI AYNA YUKSEK SIKMA (optional)
M68 : ANA FENERMILI SIKMA
M69 : ANA FENERMILI ACMA
M70 : DUSUK BASINCTA YARDIMCI PUNTA ILERI (optional)
.
M74 : HATA ALGILAMA ACIK
M75 : HATA ALGILAMA KAPALI
M76 : PAHT AKTIF
Bu komut kullanildiginda G76 ve G92 sonunda paht kirma aktiflenir.
M77 : PAH IPTAL
M78 : PUNTA PINOLU ILERI
M79 : PUNTA PINOLU GERI
M80 : TAKIM OLCME KOLU ASAGI(optional)
M81 : TAKIM OLCME KOLU YUKARI (optional)

M82 : AYNALAMA AKTIF
M83 : AYNALAMA KAPALI
M84 : TARET SAAT YONUNDE CEVIRME
M85 : TARET SAAT YONU TERSINDE CEVIRME
M86 : TORK KONTROLU AKTIF
_____ _____ _____ _____
M87 : TORK KONTROLU AKTIF DEGIL
M88 : C-EKSENI DUSUK BASINCLA SIKMA
M89 : C-EKSENI YUKSEK BASINCLA SIKMA
M90 : C-EKSEN ACMA
M91,M92,M93,M94 : ILAVE KULLANILABILECEK M-KOMUTLARI (opsiyon)
M98 : ALT PROG CAGIRMA
M99 : ALT PROGRAM SONU

M103 : SUB-SPINDLE ILERI YON
M104 : SUB-SPINDLE GERI YON
M105 : SUB-SPINDLE DURDURMA
M110 : PARCA YAKALAMA KOLU2 ASAGI (optional)
M111 : PARCA YAKALAMA KOLU2 ASAGI (optional)
M114 : SUB-SPINDLE HAVA UFLEME (optional)
M119 : SUB-SPINDLE ORYANTASYON (optional)
M131 : SUB-SPINDLE ICIN INTERLOCK BY-PASS
M163 : SUB-SPINDLE SAAT YONU DONME&SOGUTMA SUYU ACIK
M164 : SUB-SPINDLE SAAT YONU TERSINDE DONME&SOGUTMA SUYU ACIK
M165 : SUB-SPINDLE &SOGUTMA SUYU DURDURMA
M168 : SUB-SPINDLE SIKMA

M169 : SUB-SPINDLE ACMA
M203 : ILERI SENKRENIZASYON KOMUTU
M204: GERI SENKRENIZASYON KOMUTU
M205 : SENKRENIZASYON KOMUTU DURDURMA
M206 : SPINDLE ROTATION AYRILMA