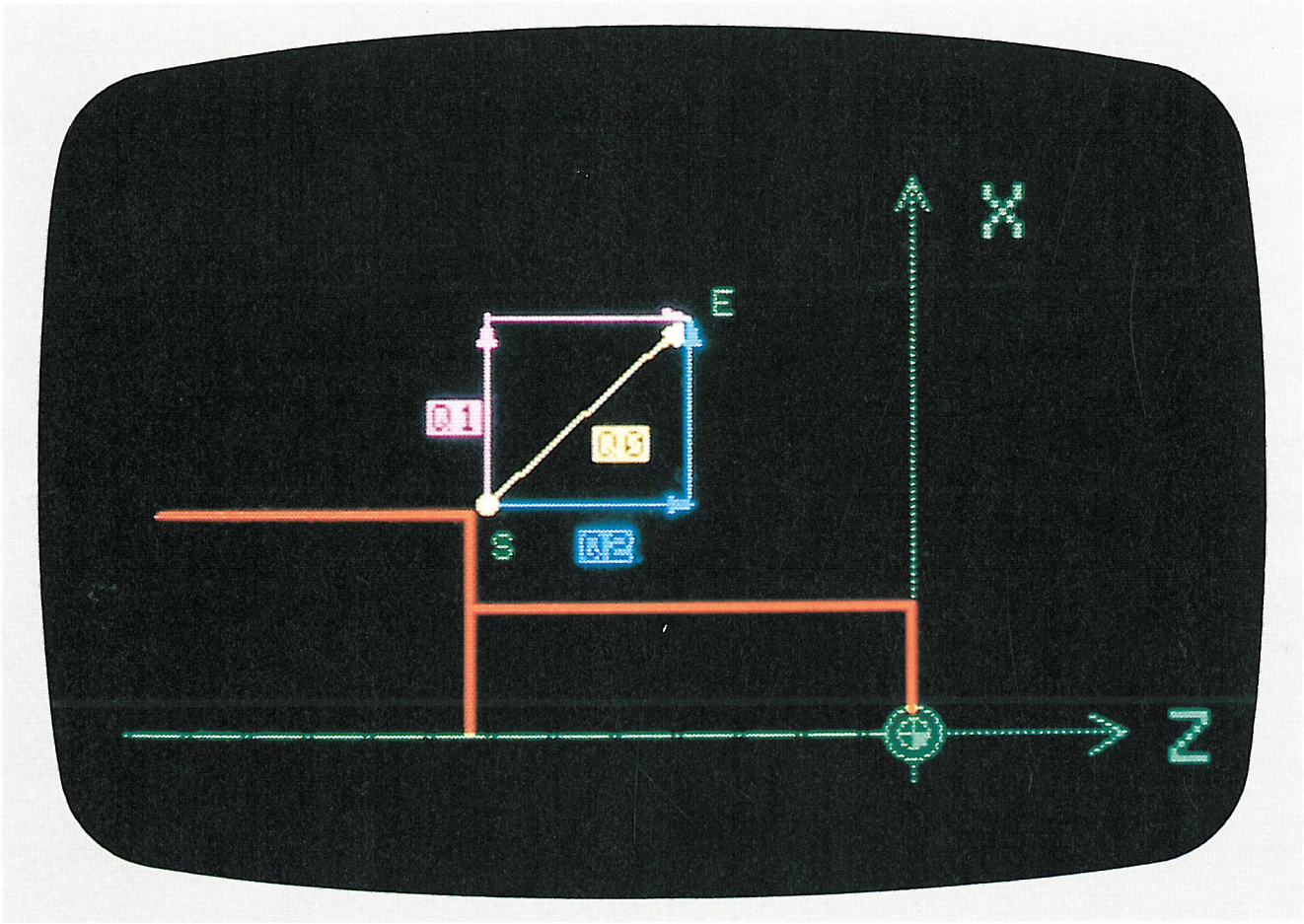


Q0 = Diagonal approach to the tool change position TCP*

Q1 = Approach to the TCP
- first in **X** direction
- then in **Z** direction

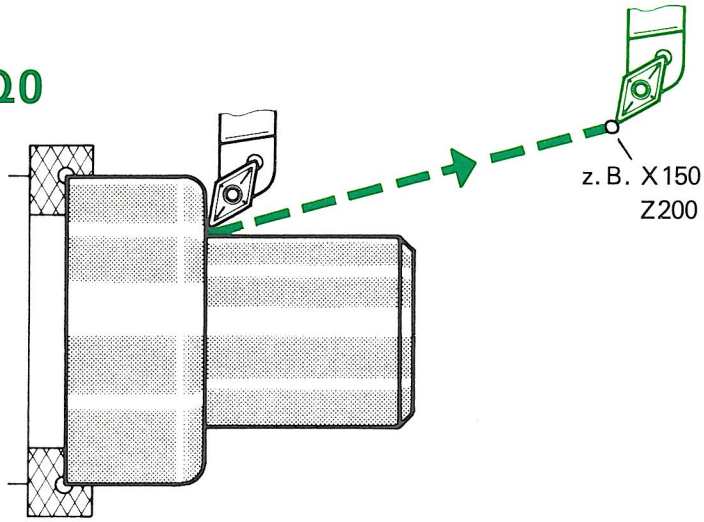
Q2 = Approach to the TCP
- first in **Z** direction
- then in **X** direction

* See chapter 5.5

GILDEMEISTER AUTOMATION

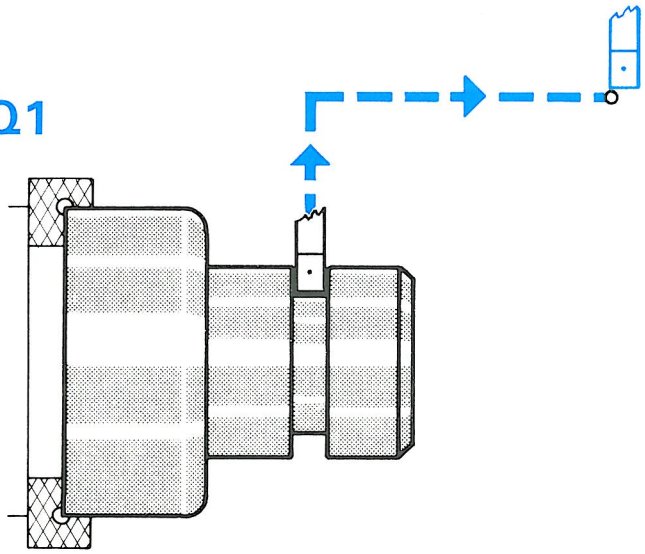
Approach to the tool change position with G14

G14 Q0



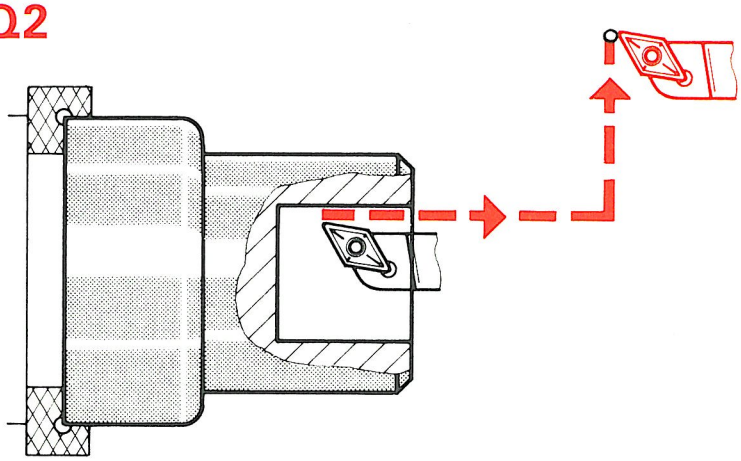
alternative:
N... G0 X150 Z200

G14 Q1



alternative:
N... G0 X150
N... G0 Z200

G14 Q2

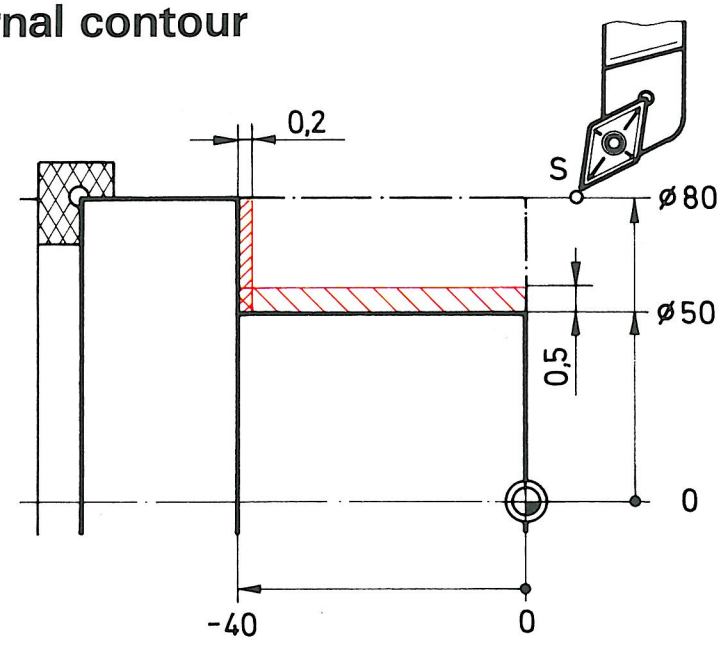


alternative:
N... G0 Z200
N... G0 X150

G57 finish allowance in X and Z

A finish allowance can be programmed with various cycles using G57 in the X and Z directions.

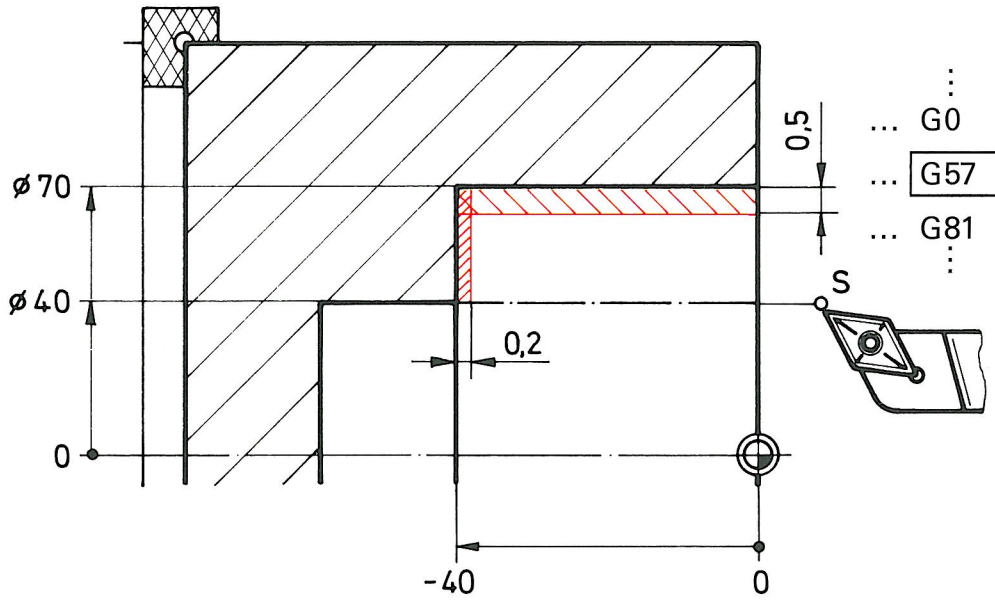
External contour




```
...  G0    X80    Z2
...  G57   X1     Z0.2
...  G81   X50    Z-40   I-3
```

The **X** finish allowance relates to the diameter!

Internal contour



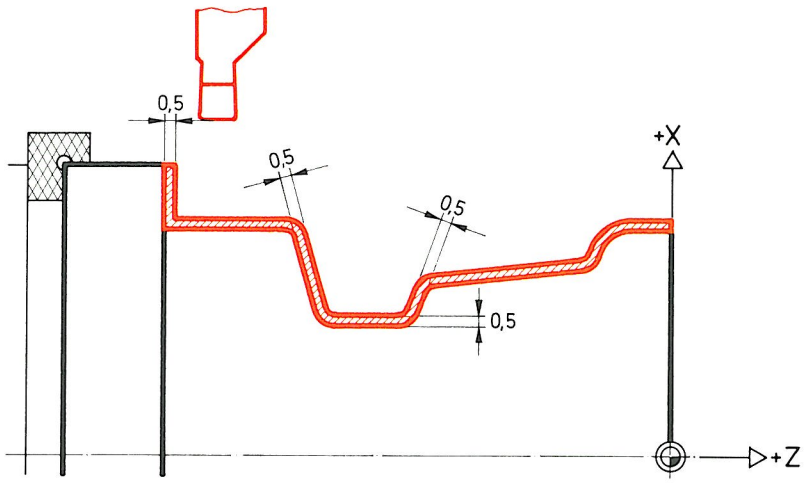

```
...  G0    X40    Z2
...  G57   X-1    Z0.2
...  G81   X70    Z-40   I-2
```

Note:
The finish allowance G57 is **automatically retained** in the cycles and must in certain cases be deleted with G57 X0 Z0.

G58 finish allowance for parallel contours

The same finish allowance in all directions for various cycles can be programmed with G58.

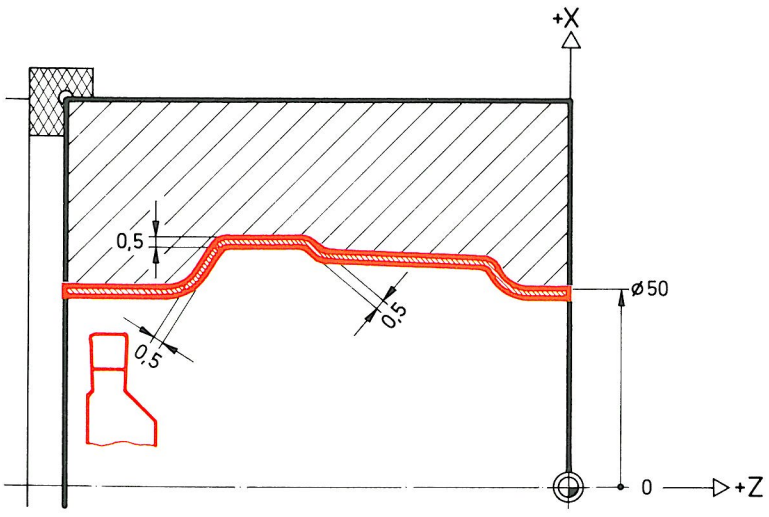
External contour




```
...  G0      X50   Z-55
...  G58                 A0.5
...  G862          Z3
```

Note:
When programming with G58, the **tool nose radius compensation** must be activated, otherwise the control cannot calculate the finish allowance.

Internal contour




```
...  G0      X50   Z-65
...  G58                 A0.5*
...  G862          Z3
```

* In contrast to G57 with an internal contour the finish allowance is **not** programmed with a sign. The control recognises the position from the tooling library.

GILDEMEISTER AUTOMATION

The basis for sub-programming

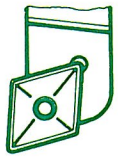
A contour is first to be roughed out and then finish-turned.

Programme structure **without** sub-programme techniques

Main programme (%1)

```
N1   G96 _____T1_____
N2   G0  _____________
N3   G57 _____________
N4   G818____________
N5   G42  G1
N6        G1
N7        G3    Roughing
N8        G2
N9   G40  G1
N10  G80 _____________
N11  G14 _____________
N12  G96 _____T2_____
N13  G0  _____________
N14  G42  G1
N15       G1
N16       G3    Finishing
N17       G2
N18  G40  G1
N19  G14 _____________ M30
```

- **Roughing**
- **Start point** for roughing appraoch
- Finish allowance
- Stock removal cycle to follow a contour



- Cycle end
- Tool change position
- **Finishing**
- **Start point** for finishing approach

- Approach tool change position

Programme structures with sub-programme techniques

Main programme (%1)

```
N0   G96 _____T1_____
N1   G0  _____________
N2   G57 _____________
N3   G818____________
N4   L10
N5   G80 _____________
N6   G0  _____________
N7   G96 _____T2_____
N8   G0  _____________
N9   L10
N10  G0  _____________ M30
```

sub-programme (%10)

```
G42  G1
     G1
     G3
     G2
G40  G1
     M30
```

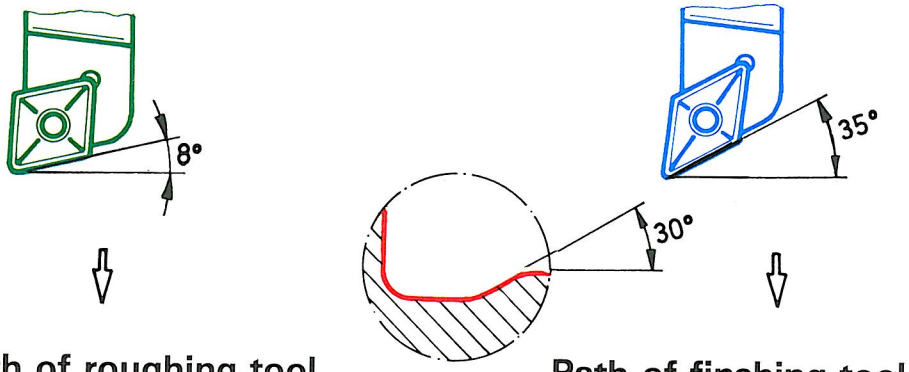
3 x Nesting possible

M30 must stand alone in the last block of the sub-programme.

GILDEMEISTER AUTOMATION

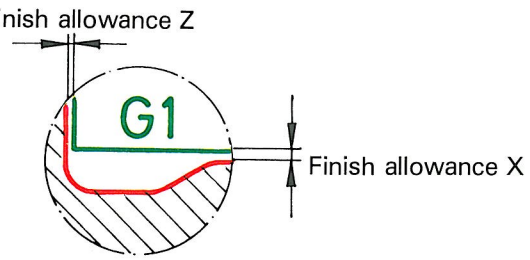
Sub-programmes with delete levels

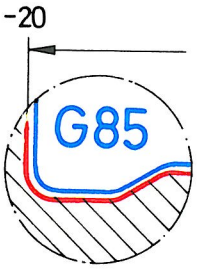
If a contour, which is to be roughed and finished, contains an undercut, delete levels /... **can** be used.



Path of roughing tool

Path of finshing tool



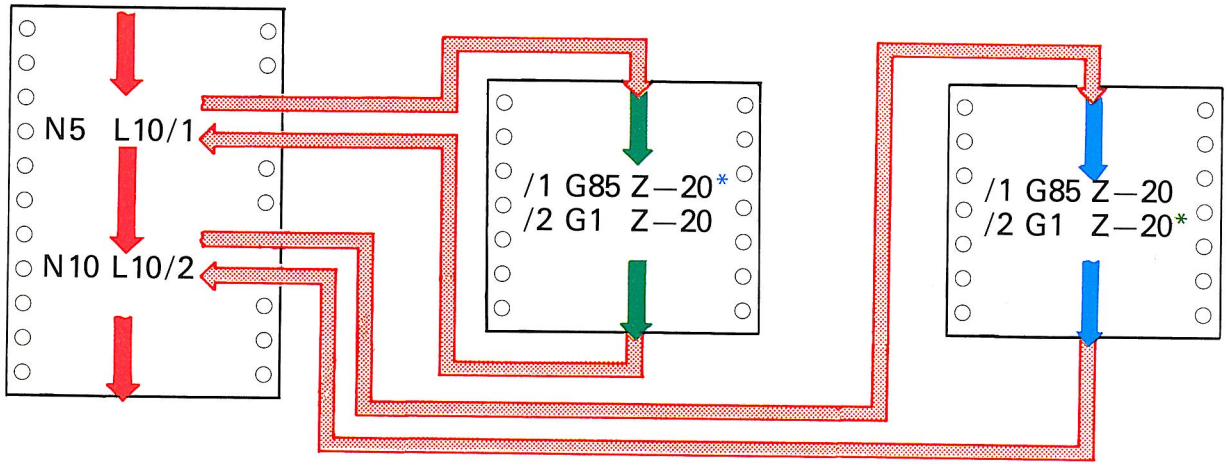


In order to achieve these different tool paths:

- Both tool paths must be defined in sub-programmes, and
- the relevant operation (with the corresponding tool) carried out.

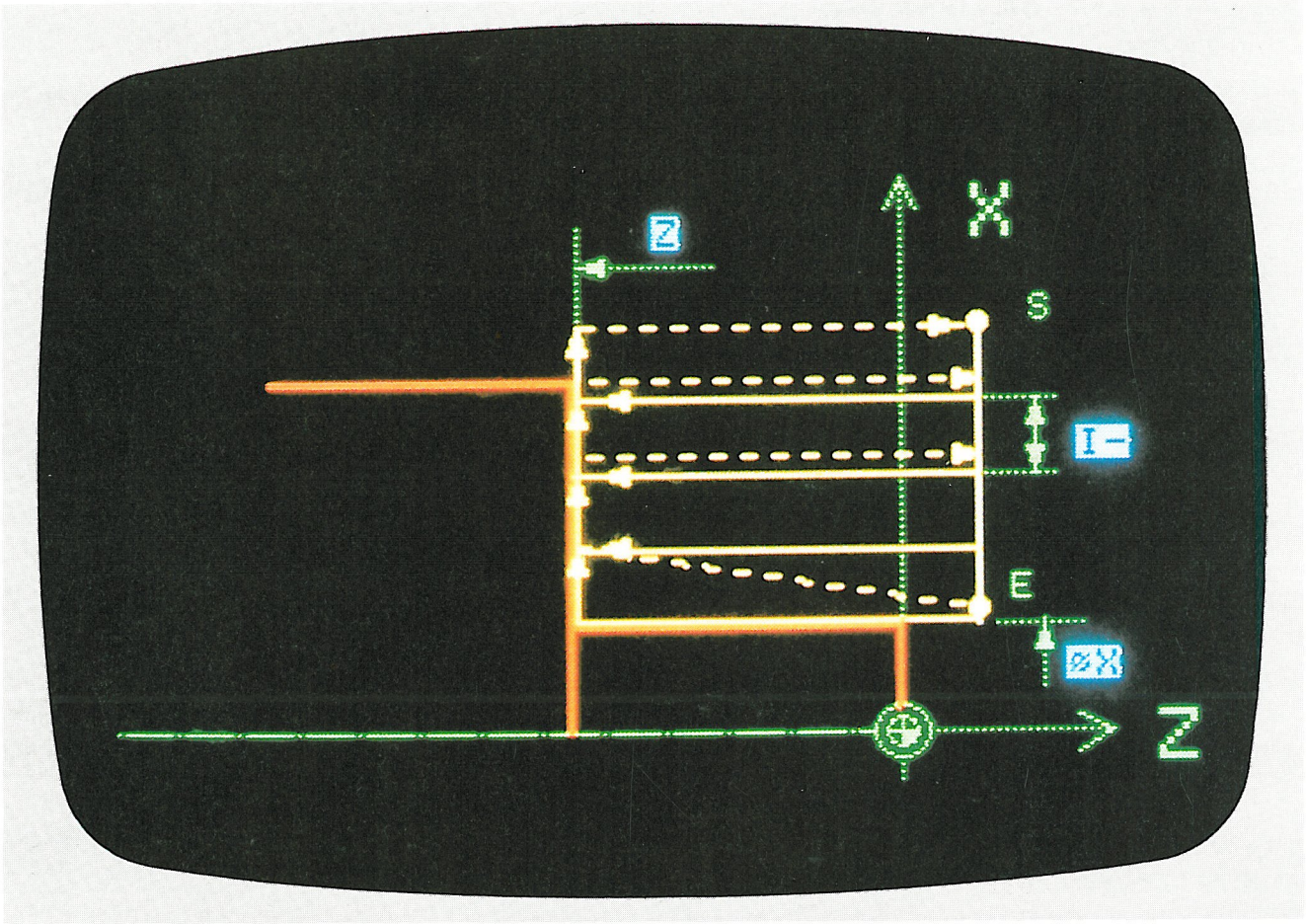
These multi — sided operations are achieved by block deletions:

Main programme (%1) **Sub-programme (%10)**



* Block with deletion level **1** is **not** carried out

* Block with deletion level **2** is **not** carried out



X = Final diameter

Z = Final length

I = Depth of cut

K = shift

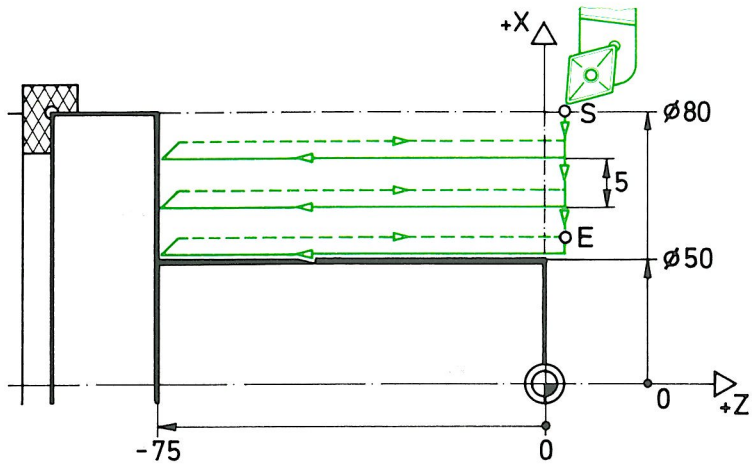
Q0* = Approach in rapid

Q1 = Approach in feed

* With no Q input, Q = 0 is valid for longitudinal and face turning cycles

G81 longitudinal roughing cycle

1. Case: without facing

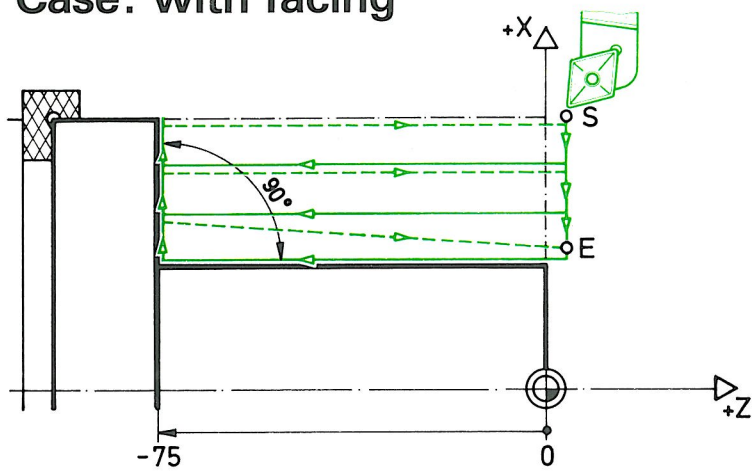


G0 X80 Z2
G81 X50 Z−75 I(+)5

X value: final diameter
Z value: final length
I value: depth of cut

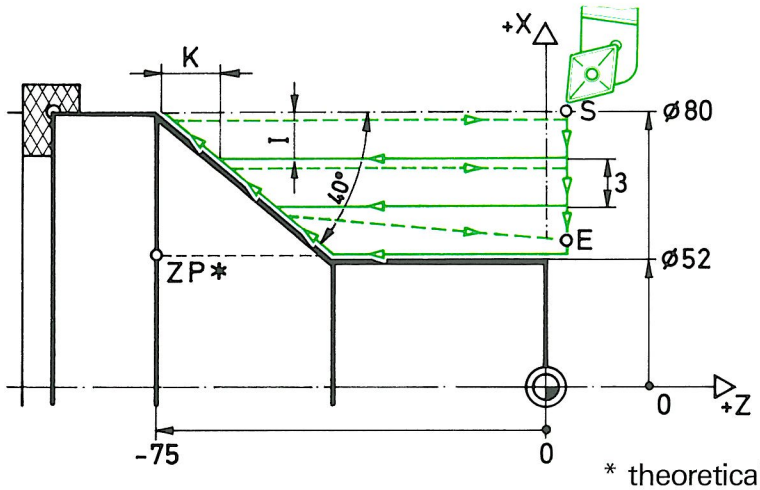
S = start point
E = end point

2. Case: with facing



G0 X80 Z2
G81 X50 Z−75 I−5

3. Case: with taper shift

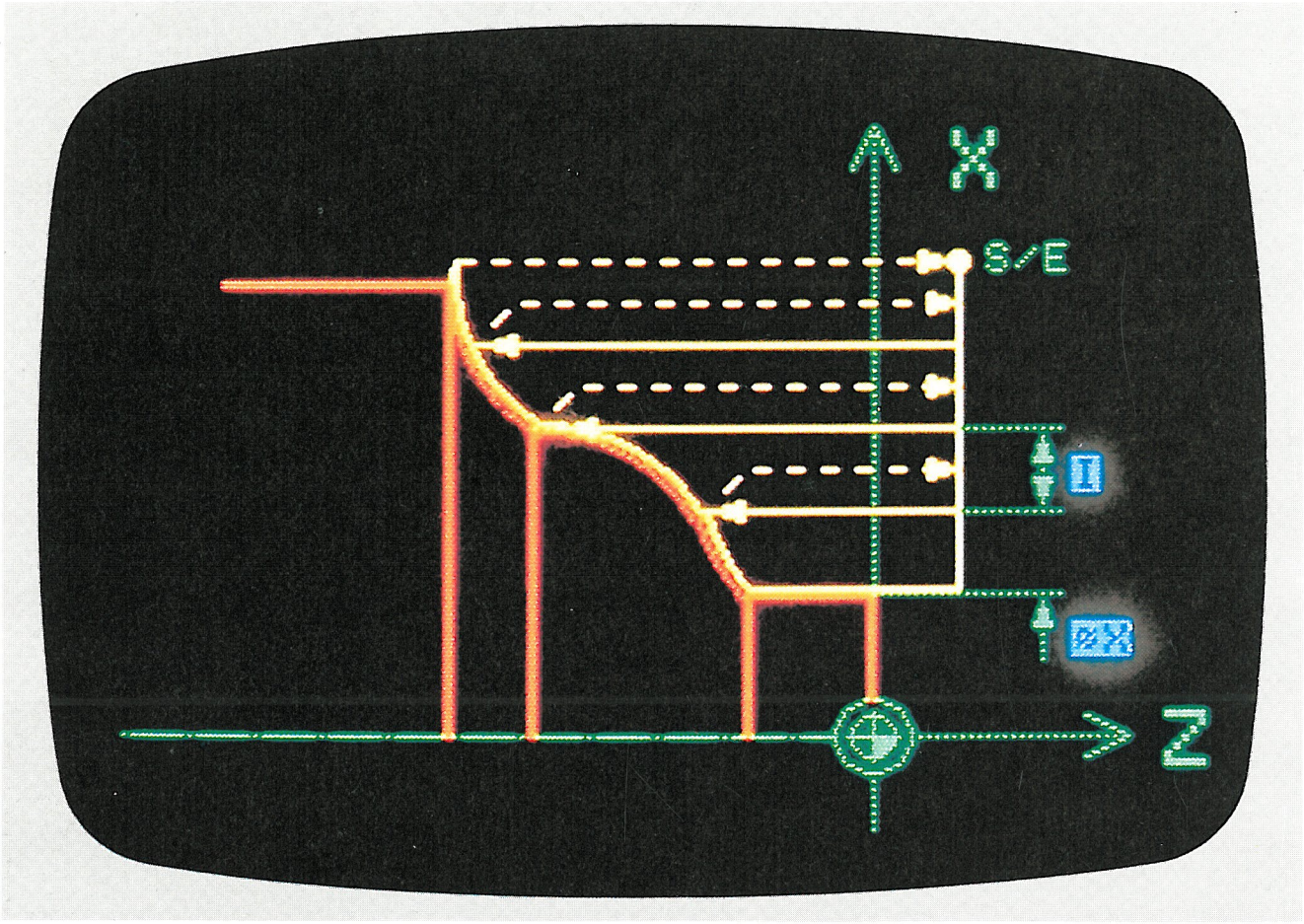


G0 X80 Z2
G81 X52 Z−75 I−3 K3.575

$$\tan\alpha = \frac{I}{K} \rightarrow \boxed{K = \frac{I}{\tan\alpha}}$$

$$K = \frac{3\ \text{mm}}{\tan 40^\circ} = \frac{3\ \text{mm}}{0{,}8391} = 3{,}575\ \text{mm}$$

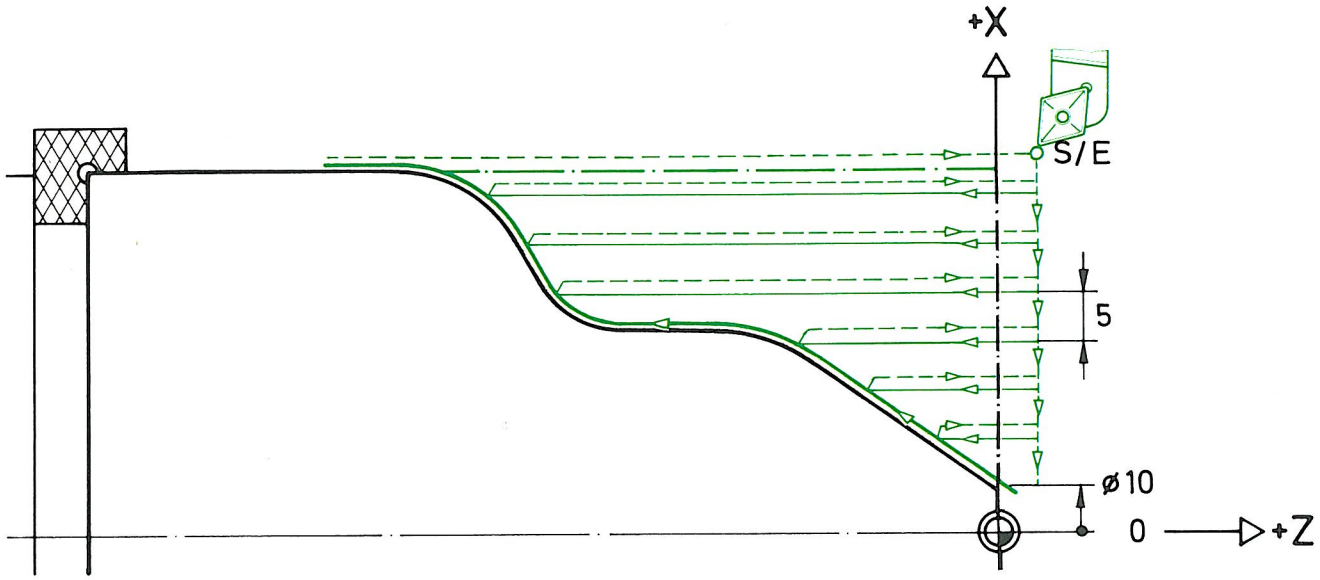
* theoretical target point for X and Z



X = Final diameter

I = Depth of cut (radial value)

G818 longitudinal stock removal cycle to follow a contour

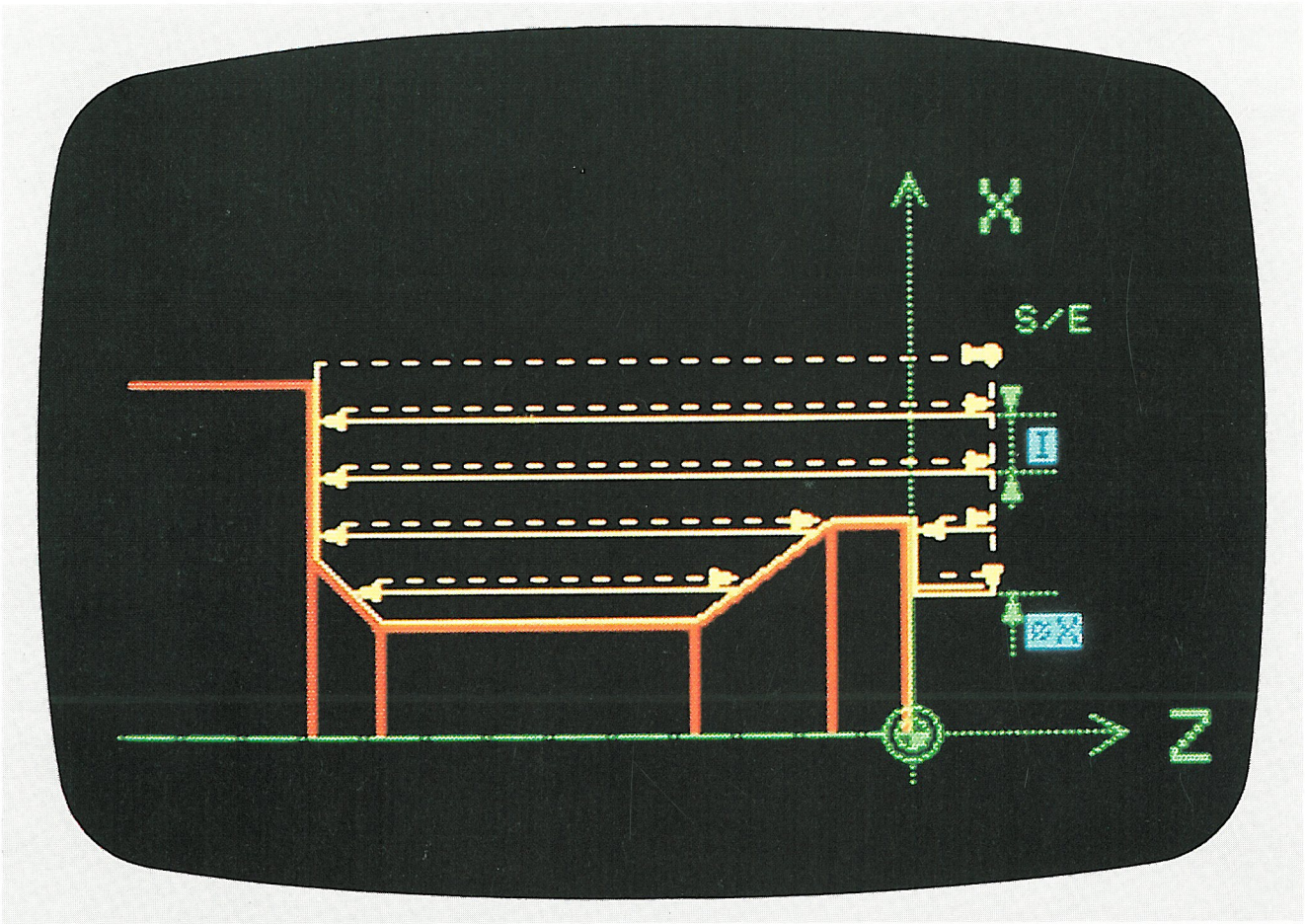


contour dimensions page 35

% 1									
N	G	X	Z	Auxiliary addresses	F	S	T	M	
N1	G96				F0.35	S180	T1	M4	M7
N2	G0	X85	Z2						
N3	G57	X1	Z0.2						
N4	G818	X8		I5					
N5				L1003					
N6	G80								
N7	G14			Q0					
N8	G96				F0.1	S240	T2		
N9	G0	X85	Z2						
N10				L1003					
N11	G14			Q0					
N12								M30	

% 1003									
N	G	X	Z	Auxiliary addresses	F	S	T	M	
N1	G0	X0	Z2						
N2	G42 G1		Z0						
N3	G1	X10							
N4	G1	X?	Z–25	A35 B20 E0.08					
N5	G1		Z–48	B10					
N6	G1	X80	Z?	A60 B15					
N7	G1		Z–75						
N8	G40 G1	X82							
N9								M30	

* Assumes a pre-turned component with finishing allowance on the face.

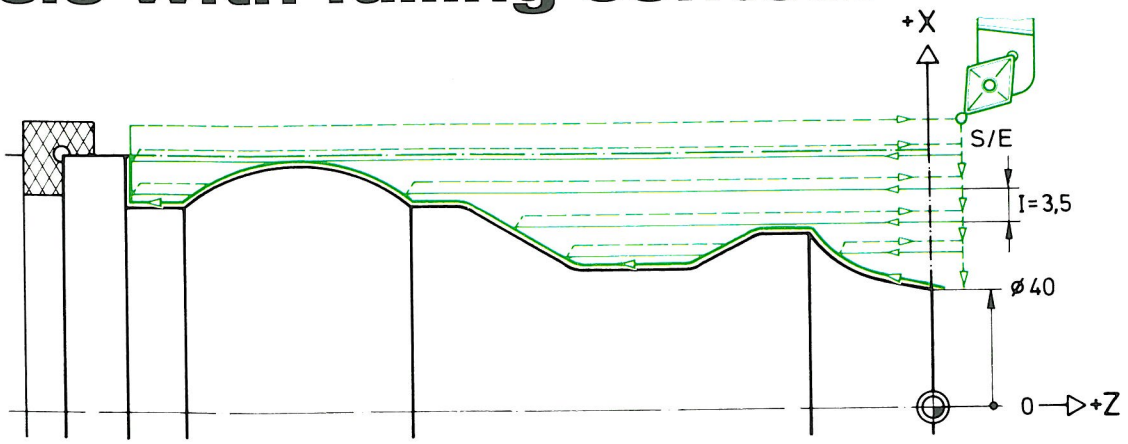


X = Final diameter

I = Depth of cut (radial value)

E = Special feed for falling contour

G819 longitudinal stock removal cycle with falling contour

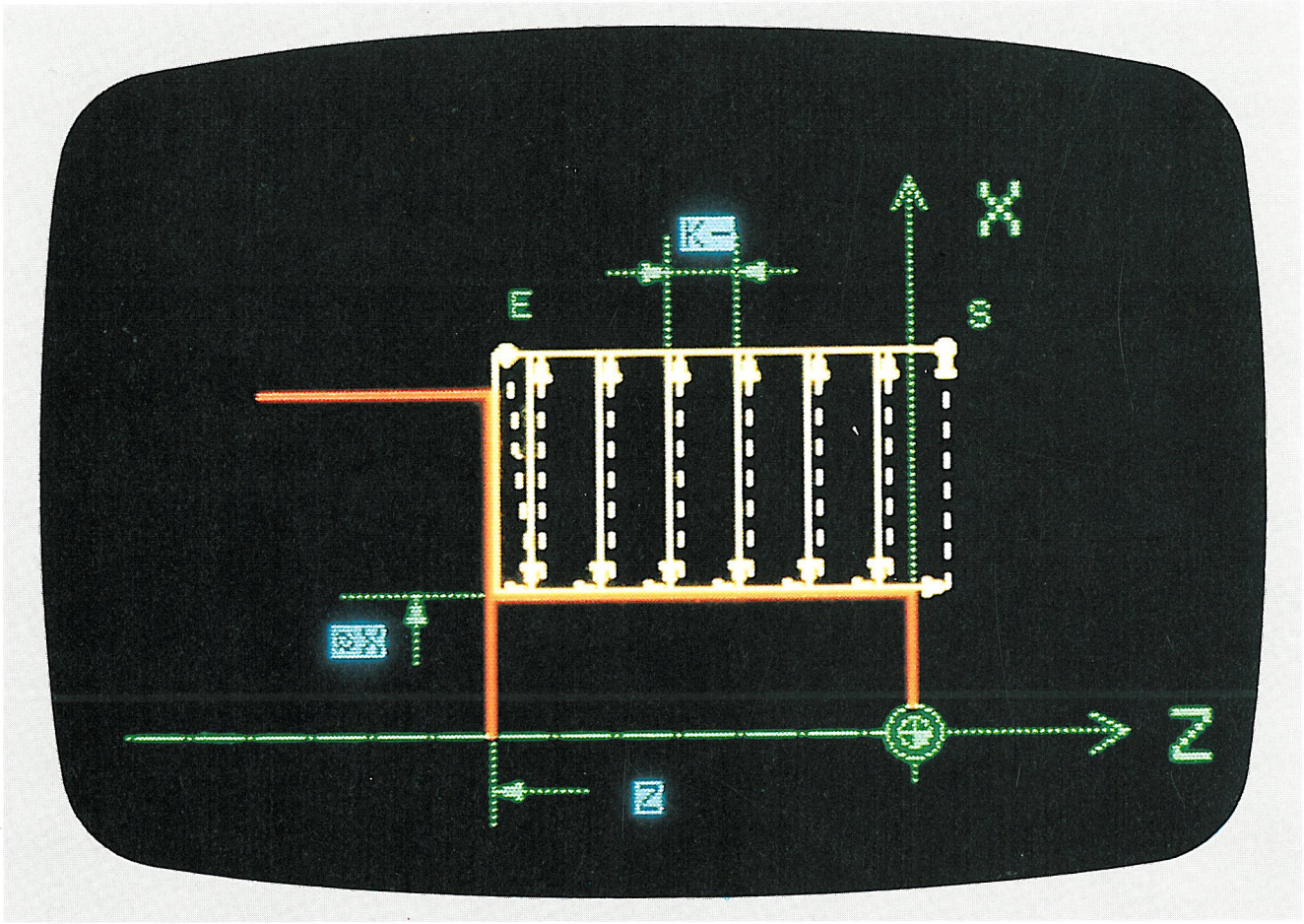


contour dimensions see page 56

% 2						
N	G	X Z	Auxiliary addresses	F S T	M
N1	G96			F0.35 S180 T1	M4 M7
N2	G0	X85 Z2			
N3	G57	X1 Z0.1			
N4	G819	X38	I3.5 E0.2		
N5			L1011		
N6	G80				
N7	G14		Q0		
N8	G96			F0.1 S240 T2	
N9	G0	X85 Z2			
N10			L1011		
N11	G14		Q0		
N12					M30

% 1011						
N	G	X Z	Auxiliary addresses	F S T	M
N1	G0	X38 Z2			
N2	G42 G1	Z0			
N3	G1	X40			
N4	G1	X? Z?	A10		
N5	G2	X60 Z−22	R15 B0		
N6	G1	Z−35	B2 E0.08		
N7	G1	X50 Z?	A−25		
N8	G1	Z?	A0 B2		
N9	G1	X70 Z−100	A25 B2 E0.08		
N10	G1	Z?	A0 B0		
N11	G13	X70 Z?	R27.5 I10 K−130 B0		
N12	G1	Z−160			
N13	G1	X80			
N14	G40 G1	X82			
N15					M30

Note: With this component, a pre-turned blank is assumed.



X = Final diameter

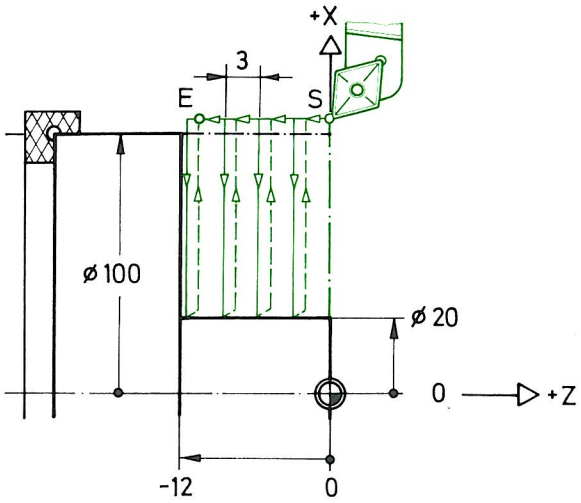
Z = Final length

I = shift

K = Width of cut

G82 roughing cycle for facing

1. Case: without turning

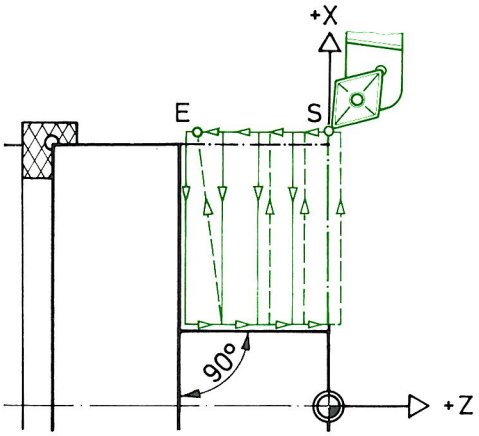



```
...  G0   X104  Z0
...  G82  X20   Z-12   K(+)3
```

X value: final diameter
Z value: final length
K value: width of cut

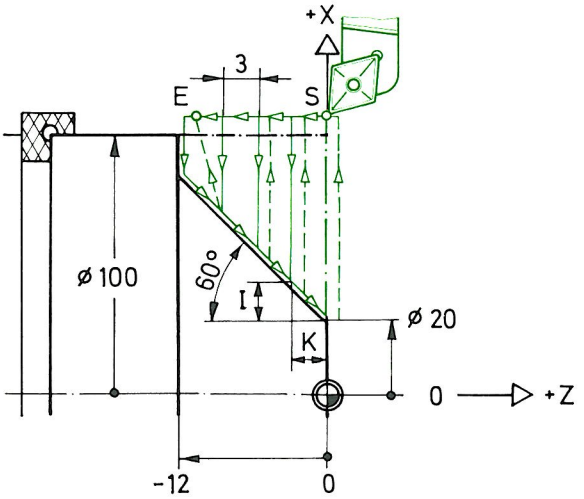
S = start point
E = end point

2. Case: with turning




```
...  G0   X104  Z0
...  G82  X20   Z-12   K-3
```

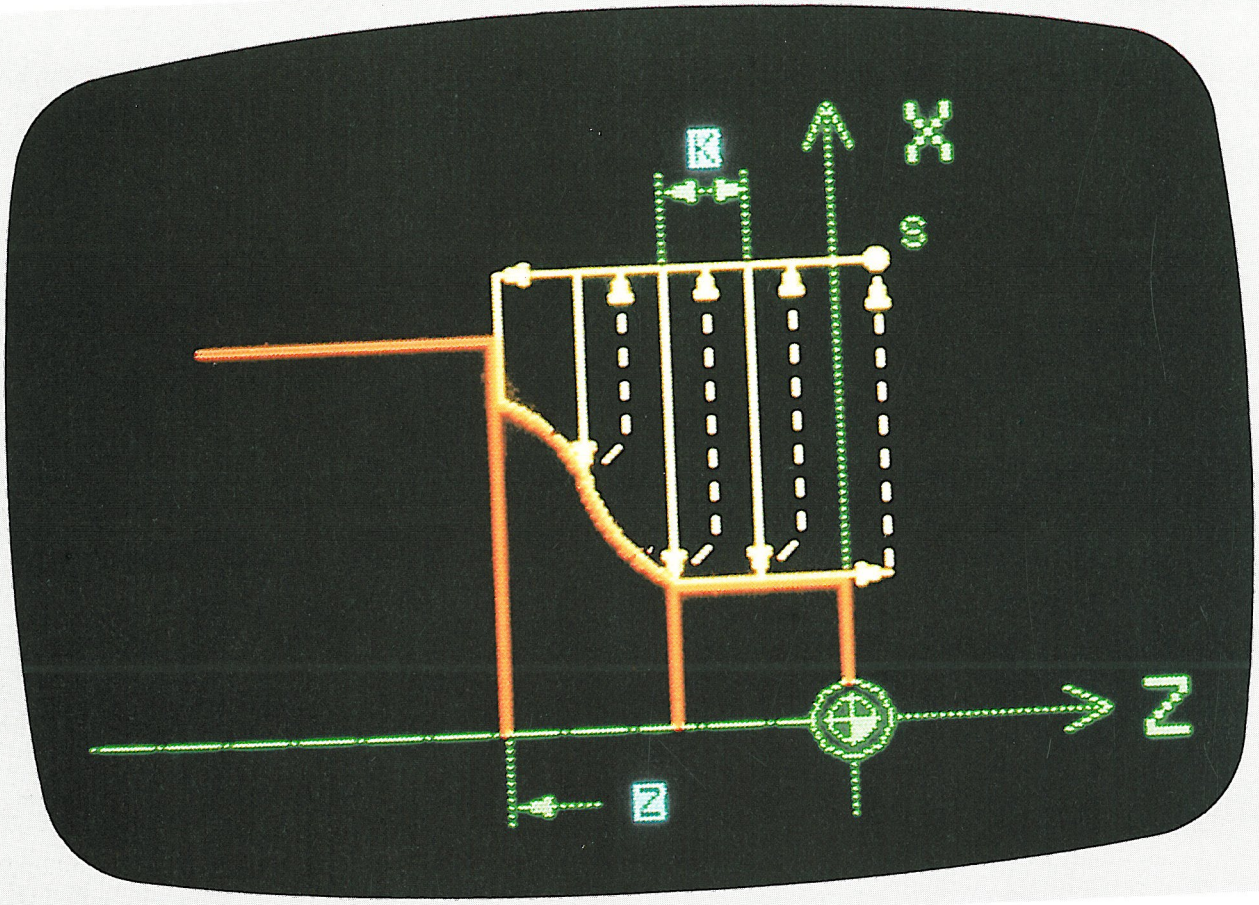
3. Case: with taper shift




```
...  G0   X104  Z0
...  G82  X20   Z-12   I5.196   K-3
```

$\tan \alpha = \frac{I}{K} \rightarrow \boxed{I = K \cdot \tan \alpha}$

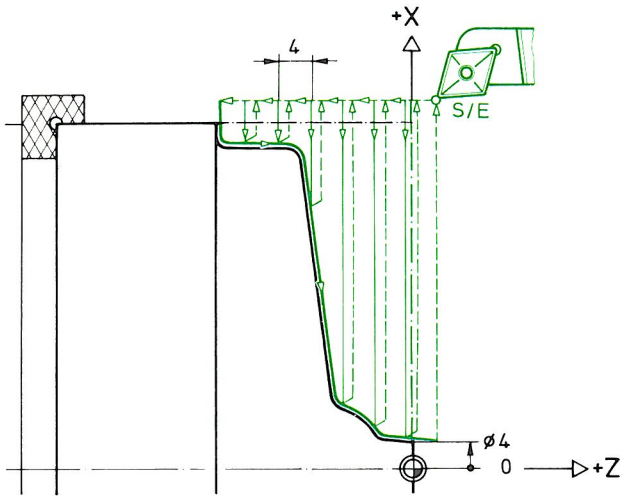
$I = 3\ \text{mm} \cdot \tan 60° = 5{,}196\ \text{mm}$



Z = Final length

K = Width of cut

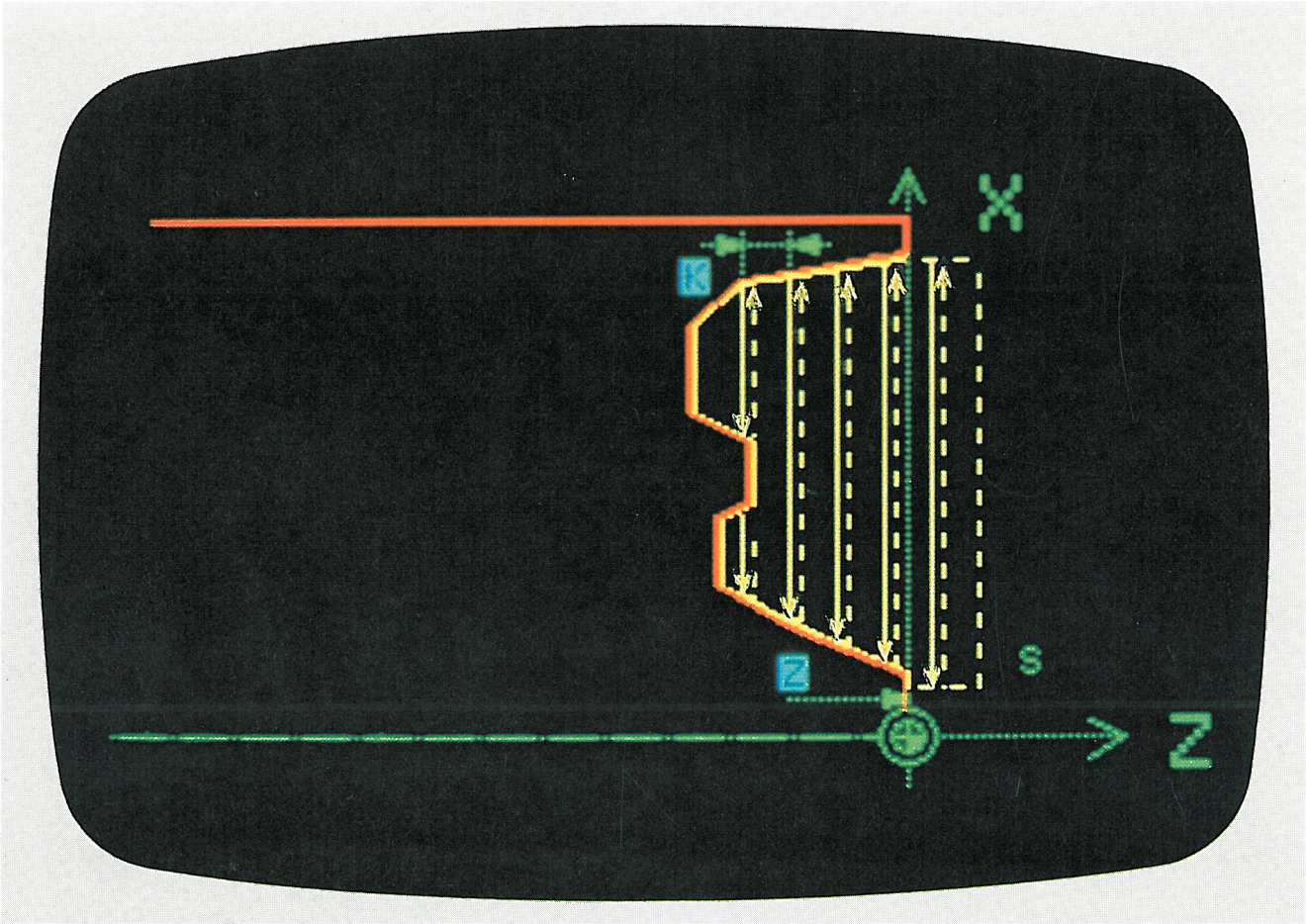
G828 stock removal cycle following a contour on the face



contour dimensions see page 57

% 3								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.3	S160	T8	M4 M7
N2	G0	X100	Z2					
N3	G57	X1	Z0.2					
N4	G828		Z−36	K4				
N5				L1012				
N6	G80							
N7	G14			Q0				
N8	G96				F0.1	S190	T2	
N9	G0	X100	Z2					
N10				L1012				
N11	G14			Q0				
N12								M30

% 1012								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X97	Z−35					
N2	G41 G1	X95						
N3	G1		Z−26.5					
N4	G1	X90.32		B1 E0.05				
N5	G1	X90	Z?	A−179 B3.5 E0.08				
N6	G1	X?	Z?	A−98.5 B2.5				
N7	G12	X?	Z?	I0 K−11.6 R7.5 B1				
N8	G1	X4	Z0	A−175				
N9	G1	X0						
N10	G40 G1		Z2					
N11								M30

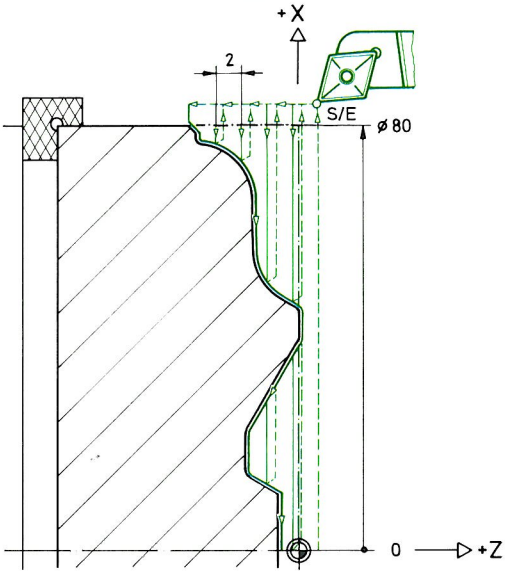


Z = Final length

K = Width of cut

E = Special feed for falling contour

G829 stock removal cycle on the face with a falling contour

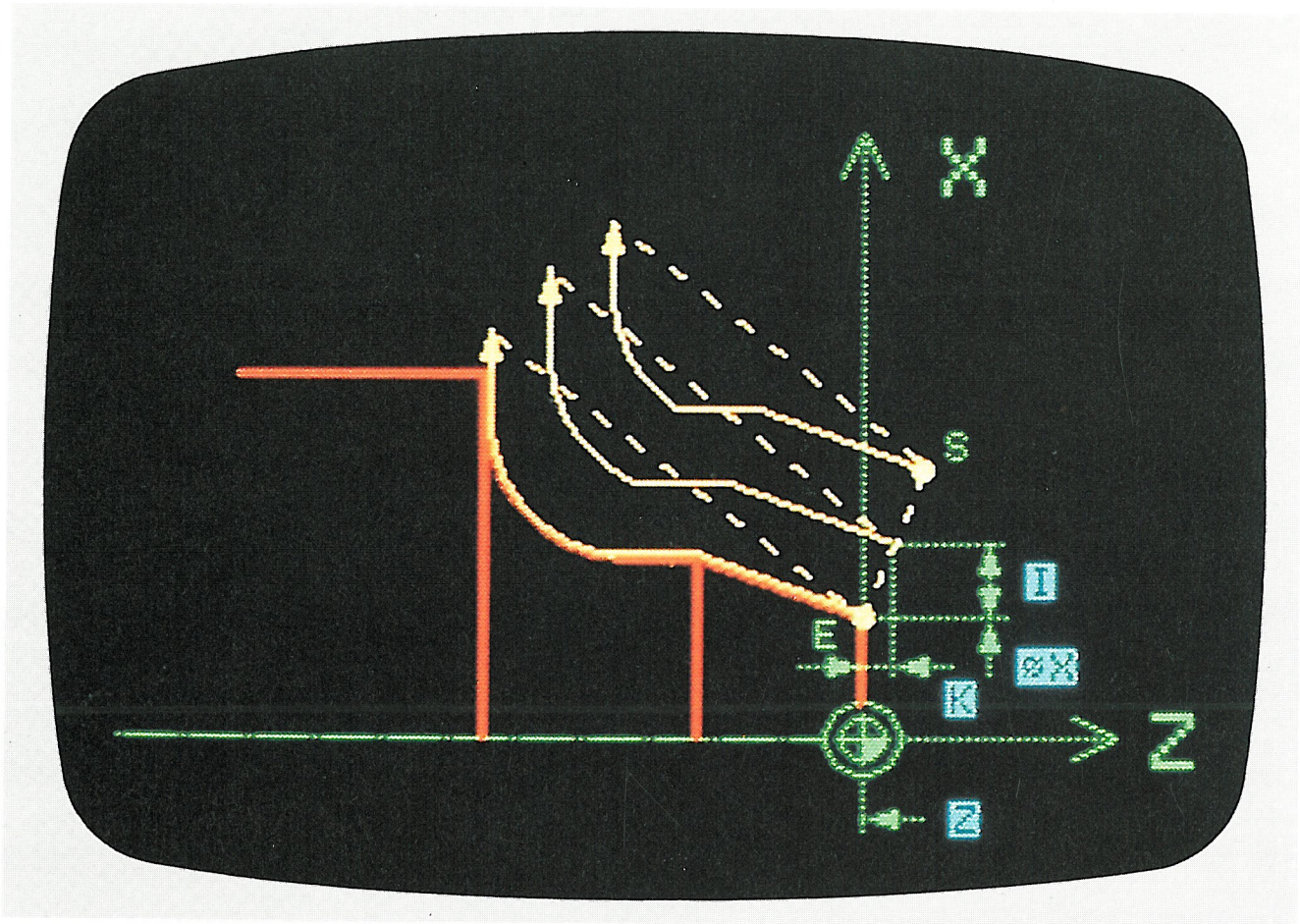


Copy roughing tool
A93°, B55°

contour dimension page 58

% 4							
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.25	S160	T1	M4 M7
N2	G0	X82	Z2					
N3	G57		Z0.5					
N4	G829		Z−11	K2 E0.15				
N5				L1013				
N6	G80							
N7	G14			Q0				
N8	G96				F0.1	S200	T2	
N9	G0	X82	Z2					
N10				L1013				
N11	G14			Q0				
N12								M30

% 1013							
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X82	Z−11					
N2	G41 G1	X80						
N3	G1		Z−9.6	B−0.2				
N4	G1	X76		B1				
N5	G2	X66	Z−4.2	R5				
N6	G1	X55		B5				
N7	G1	X?	Z0	A−150 B1				
N8	G1	X40		B2				
N9	G1	X?	Z−5	A−60 B2				
N10	G1	X15		B1				
N11	G1	X?	Z−2	A−150				
N12	G1	X0						
N13	G40 G1		Z0					
N14								M30



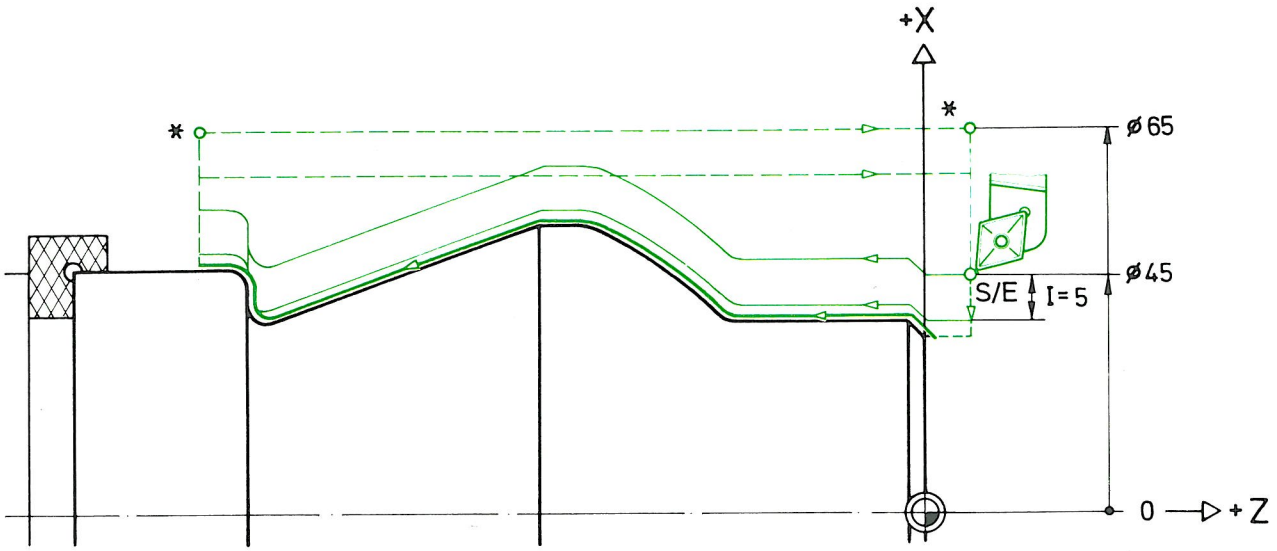
X = Final diameter

Z = Final length

I = Depth of cut (radial value)

K = Width of cut

G83 stock removal cycle

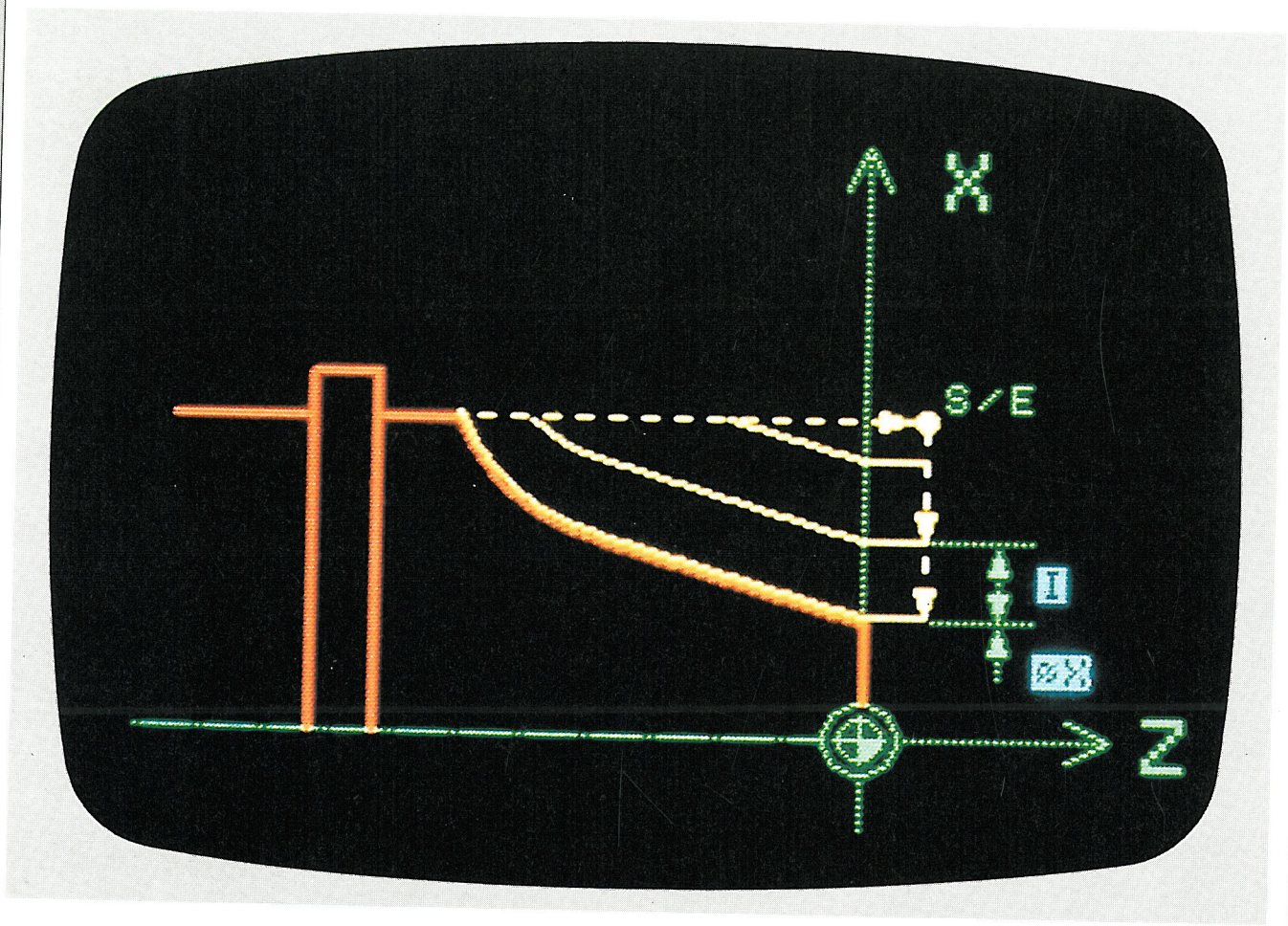


contour dimenson page 59

% 5								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.35	S180	T1	M4 M7
N2	G0	X45	Z10					
N3	G57	X1	Z0.2					
N4	G83	X35		I5				
N5				L1014				
N6	G80							
N7	G14			Q0				
N8	G96				F0.2	S240	T2	
N9	G0	X70	Z2					
N10				L1014				
N11	G14			Q0				
N12								M30

% 1014								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X35	Z2					
N2	G42 G1		Z0					
N3	G1	X40		B–2				
N4	G1		Z–20	B2				
N5	G3	X60	Z–35	R50 B5				
N6	G1		Z–40					
N7	G1	X?	Z–70	A–20 B2				
N8	G1	X50		B2				
N9	G1		Z–75					
N10	G0	X65						
N11	G40 G0		Z2					
N12								M30

* Note: With G83, the return travers must be programmed with two target points in order to avoid a collision between the tool and the component. The component ist already faced; hence X35 in Block 1.



X = Final diameter

Z* = Start length

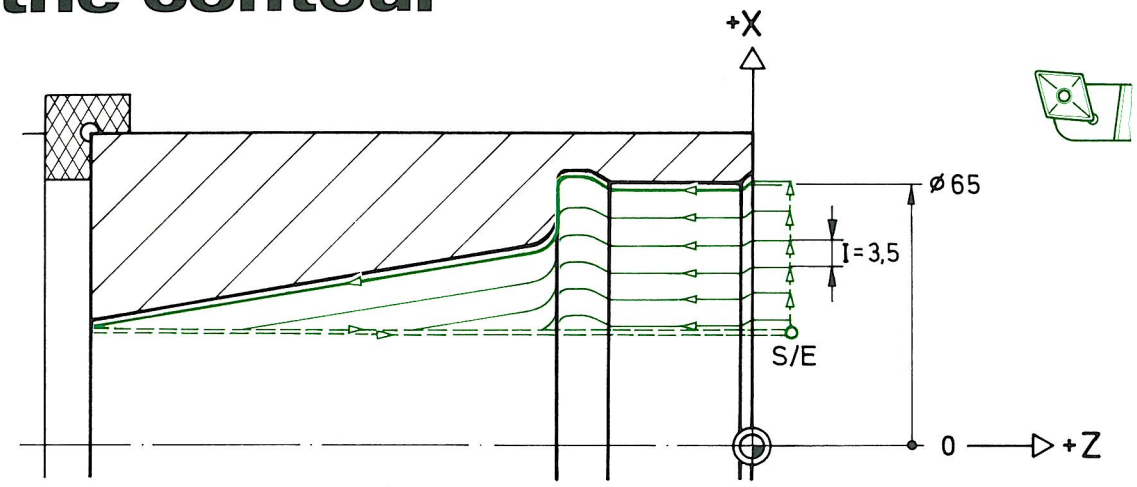
I = Depth of cut

K** = shift

* Only with this cycle must the start length be catered

** Using face roughing cycle: K = depth of cut, I = shift

G836 stock removal cycle parallel to the contour

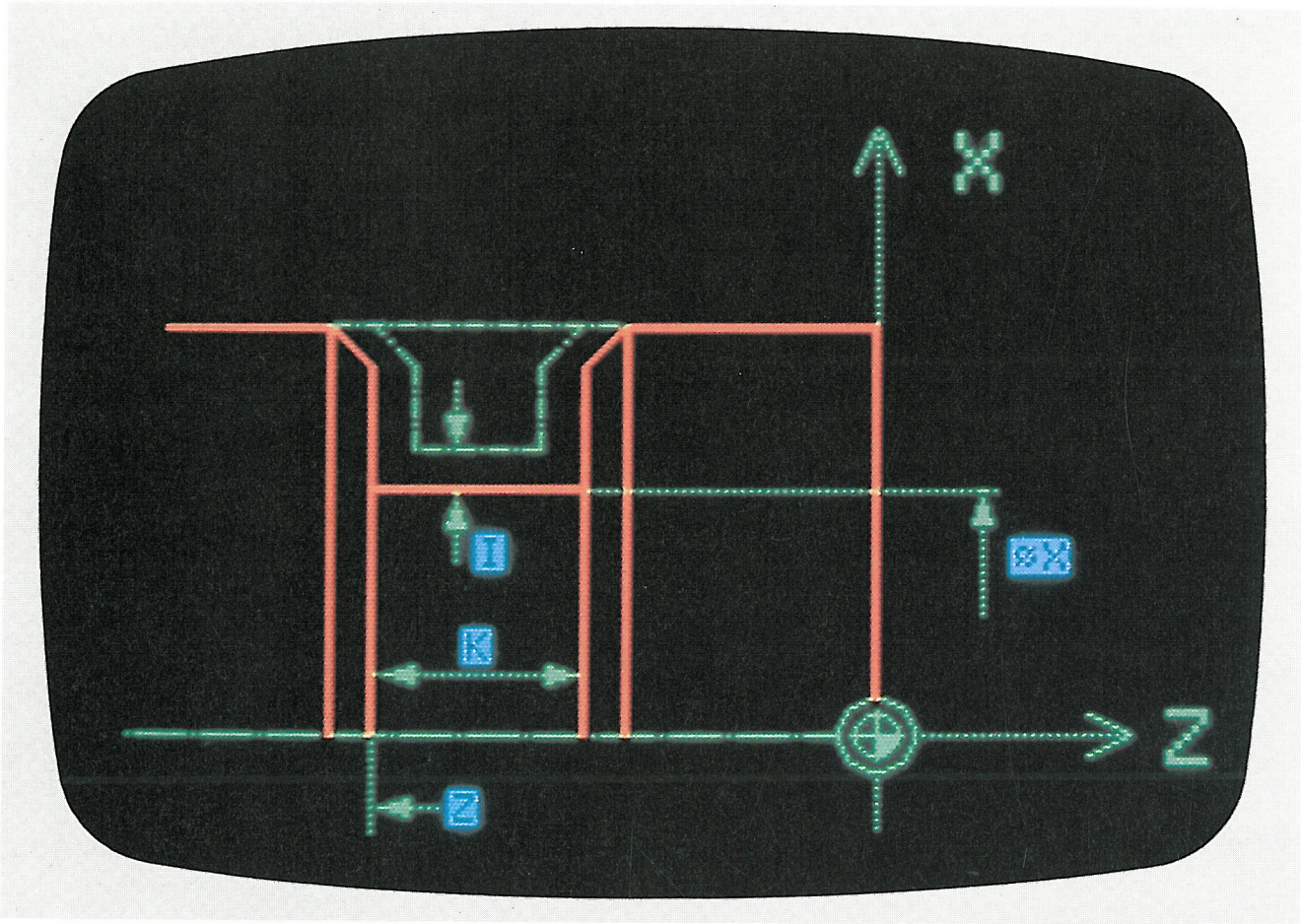


contour dimensions page 60

% 6									
N	G	X	Z	Auxiliary addresses	F	S	T	M	
N1	G97				F0.08	S1000	T5	M3	M7
N2	G0	X0	Z2						
N3	G1		Z−85						
N4	G14			Q2					
N5	G96				F0.35	S140	T7	M4	
N6	G0	X29	Z3						
N7	G57	X−1	Z0.2						
N8	G836	X70	Z2	I3.5					
N9				L1015/1					
N10	G80								
N11	G14			Q2					
N12	G96				F0.1	S160	T9		
N13	G0	X29	Z2						
N14				L1015/2					
N15	G14			Q2					
N16								M30	

% 1015								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X70	Z2					
N2	G41 G1		Z0					
N3	G1	X65		B−1 E0.08				
1/N4	G85		Z−25	Q2 E0.05				
2/N5	G1		Z−25					
N6	G1	X50		B2.5				
N7	G1	X30	Z−85					
N8	G1		Z−87					
N9	G40 G1	X28						
N10								M30

* For turning out small and deep bores



X = Final diameter

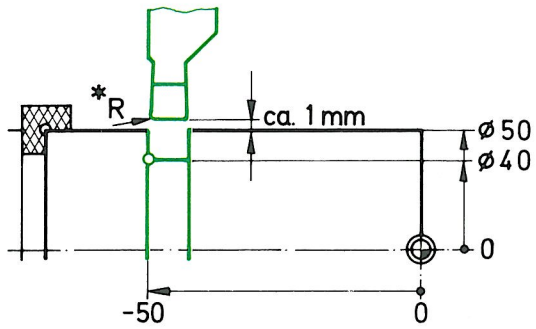
Z = Final length

I = Chamfer and finish allowance

K = Width of groove

G86 standard grooving cycle

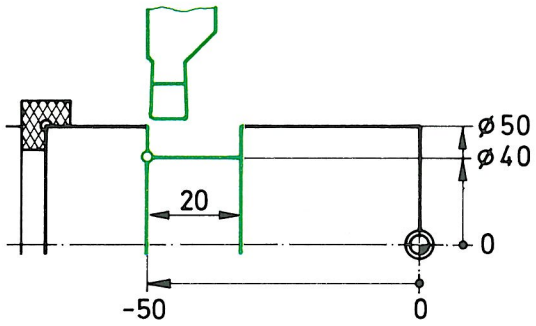
1. Width of groove = width of tool*




```
...
... G0   X52  Z–50
... G86  X40  Z–50
...
```

e.g. for sealing rings to DIN 471 (DIN 472)

2. Groove wider than the tool



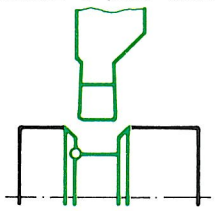

```
...
... G0   X52  Z–50
... G86  X40  Z–50        K20
...
```

K20: width of groove

3. Groove with chamfers

The width of the chamfer b is dependent on distance a:

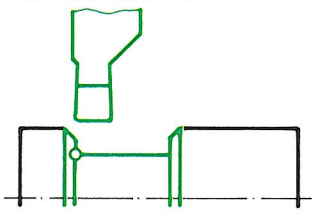
case 1 (see above)



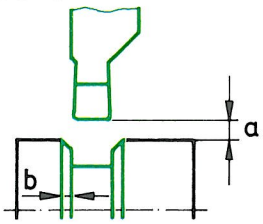
G86 X... Z... I0

with chamfer

case 2 (see above)



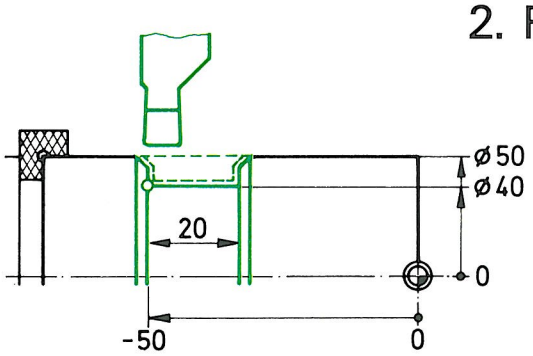
G86 X... Z... I0 K...



b	a
0,1	1,2
0,2	1,1
0,3	1,0
0,4	0,9
0,5	0,8

4. Groove with chamfers

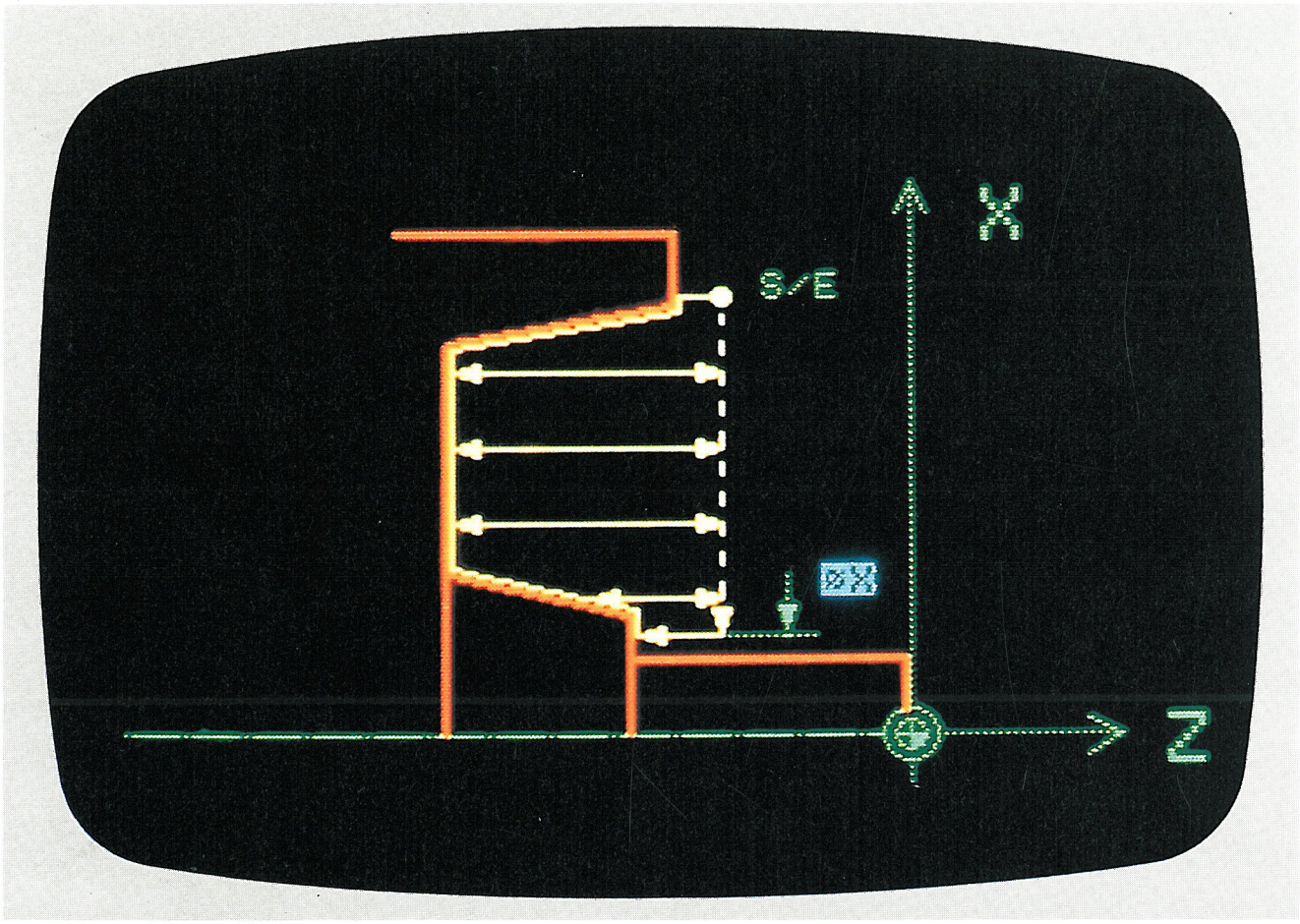
1. Rough turning
2. Finishing




```
...
... G0   X52  Z–50        produces 0.3 mm chamfer
... G86  X40  Z–50  I0.5  K20
...
```

I0.5: with chamfer and finishing allowance

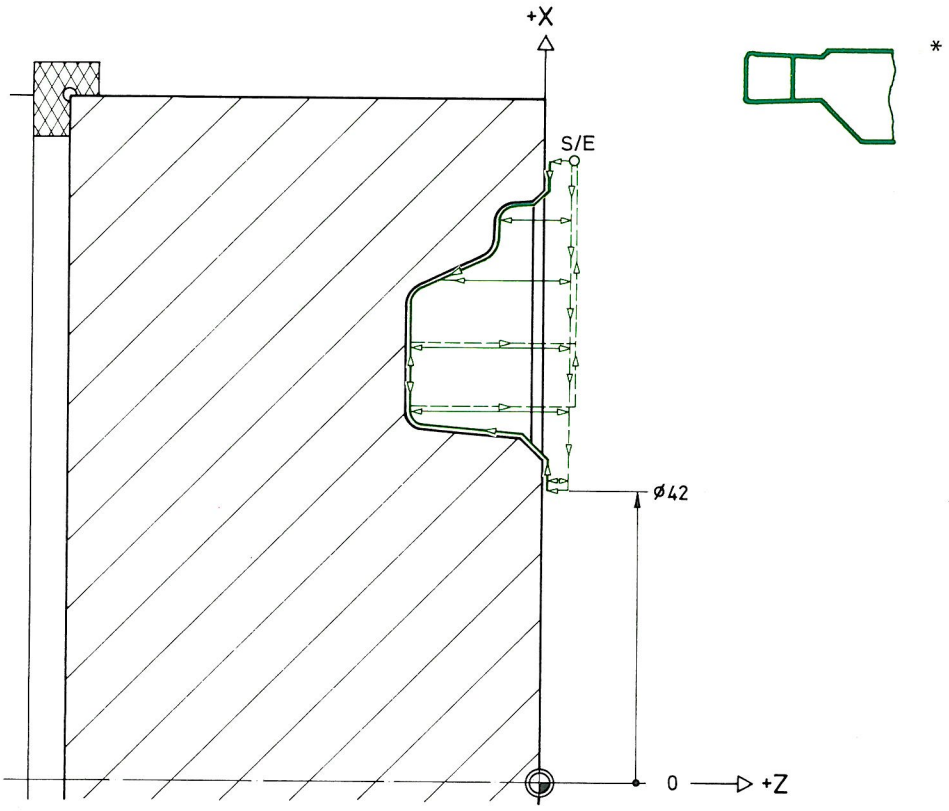
* Tool radius R under I..., Tool width under K... entered in tool memory



X = Final diameter

GILDEMEISTER AUTOMATION

G861 groove in face with contour

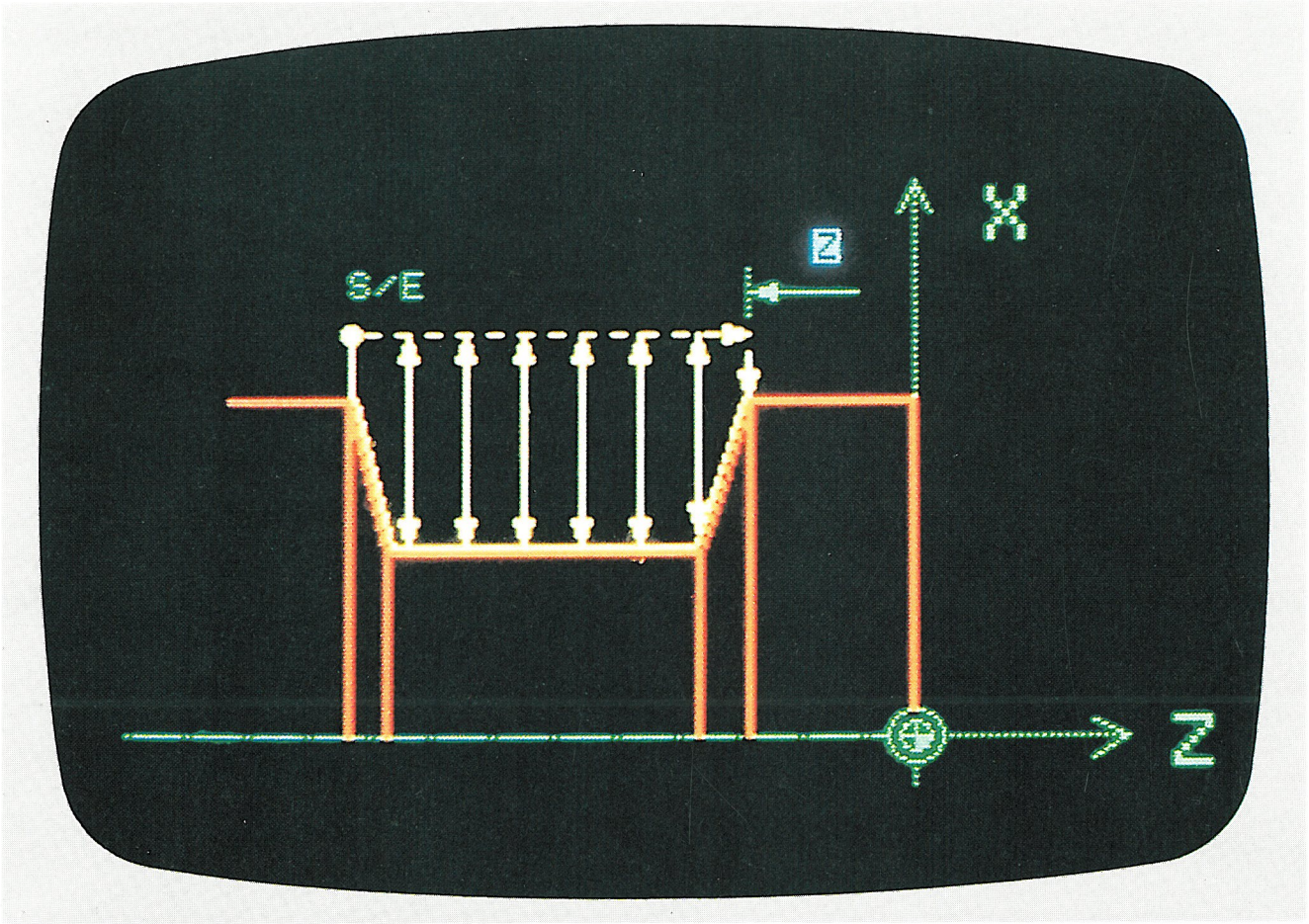


contour dimensions page 64

% 7								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.1	S100	T11	M4 M7
N2	G0	X72	Z2					
N3 N4 N5	G861 G80	X42		 L1019				
N6	G14			Q0				
N7								M30

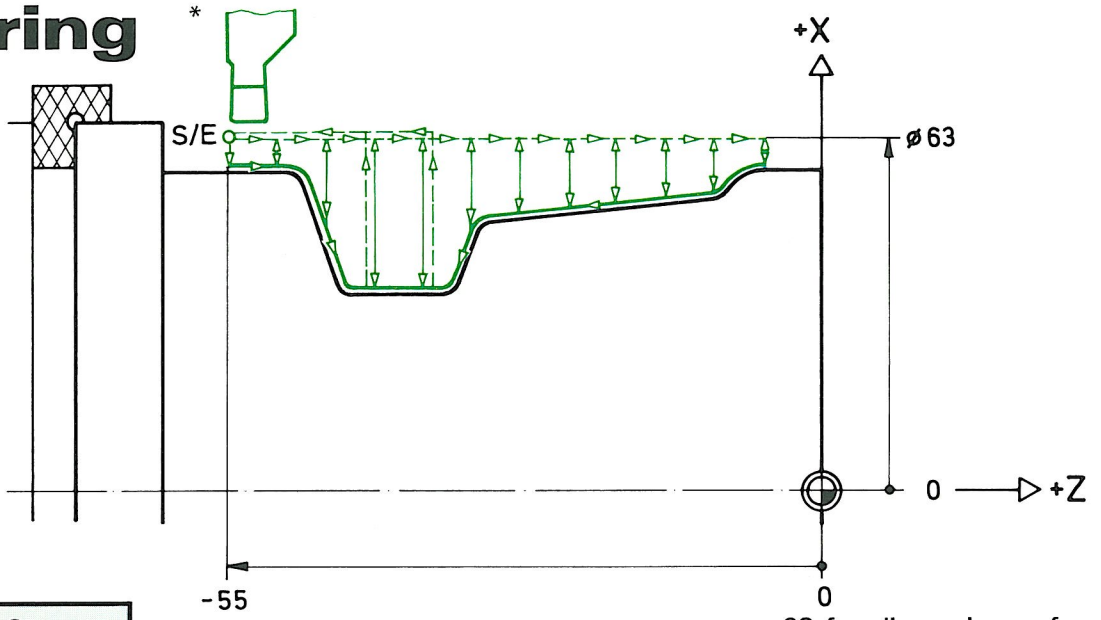
% 1019								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G42 G0	X42	Z1					
N2	G1		Z0					
N3	G1	X45		B–1				
N4	G1	X?	Z–7	A5 B1				
N5	G1	X60		B1				
N6	G1	X65	Z–2	B1				
N7	G1	X70	Z?	A95 B1				
N8	G1	X?	Z0	A177 B–0.5				
N9	G1	X72						
N10	G40 G1		Z1					
N11								M30

* The grooving tool width is 4 mm



Z = Final length

G862 plunge grooving cycle for contouring



see page 62 for dimensions of contour

% 8								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.15	S120	T4	M4 M7
N2	G0	X63	Z−55					
N3	G862		Z−3					
N4				L1017				
N5	G80							
N6	G14			Q0				
N7								M30

% 1017								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G42 G1	X60	Z−3					
N2	G1		Z−5					
N3	G3	X?	Z?	R5 B1.5 E0.05				
N4	G1	X49.5	Z−32	A−6 B1.5 E0.05				
N5	G1	X35	Z−34	B1.5 E0.05				
N6	G1		Z−45	B1.5 E0.05				
N7	G1	X60	Z−49	B1.5 E0.05				
N8	G1		Z−55					
N9	G40 G1	X62						
N10								M30

Note:

Start point in X direction = max. diameter of the final contour + tool tip radius + allowance

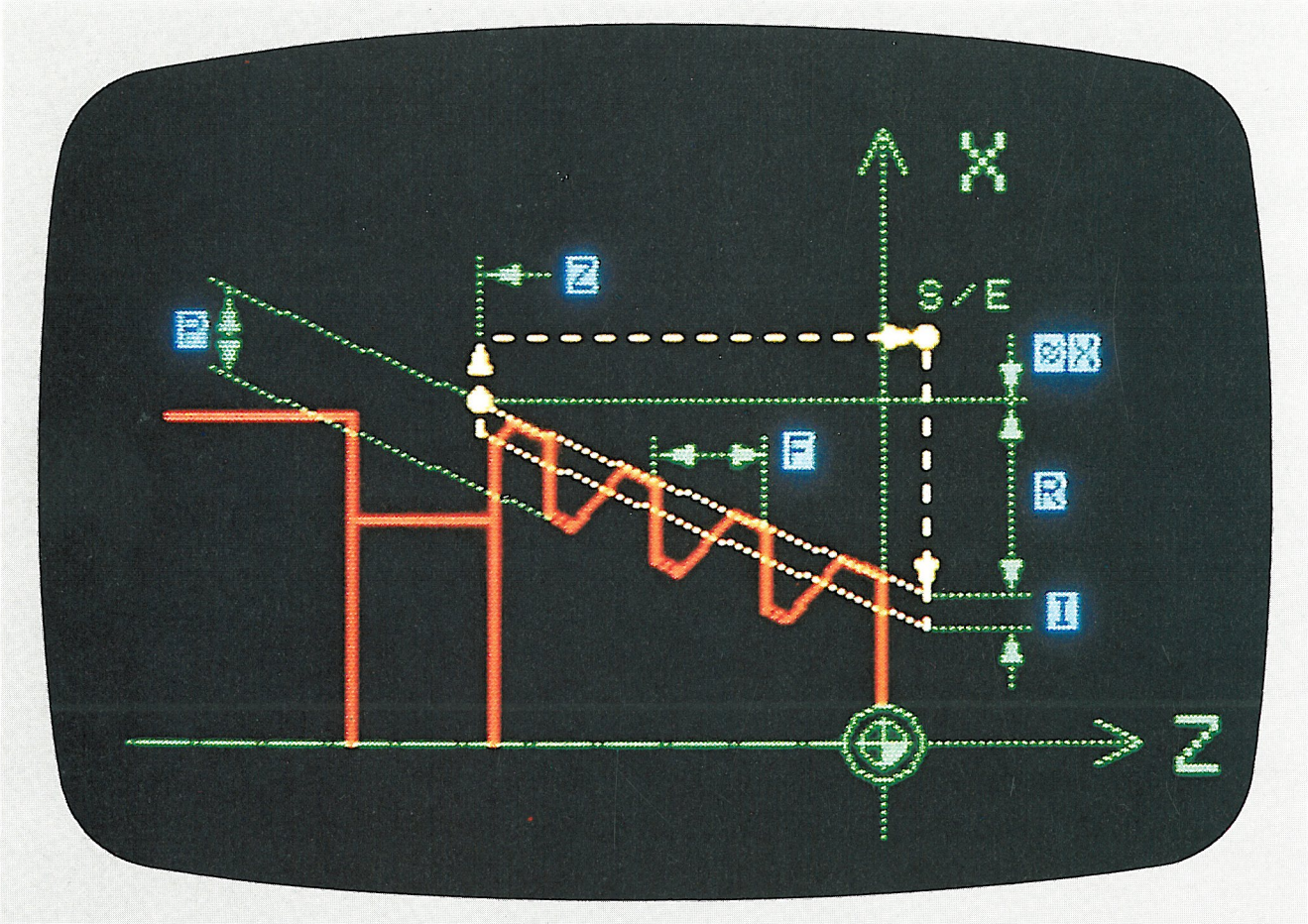
Start point in Z direction = final point of the contour (-allowance), only for G57

With the G862 cycle the Z value = start point of the contour

If finishing is required in a further operation, then before the cycle the finishing allowance is to be programmed with G57 or G58

When grooving, the grooving tool is offset by 0.75 time the tool width.

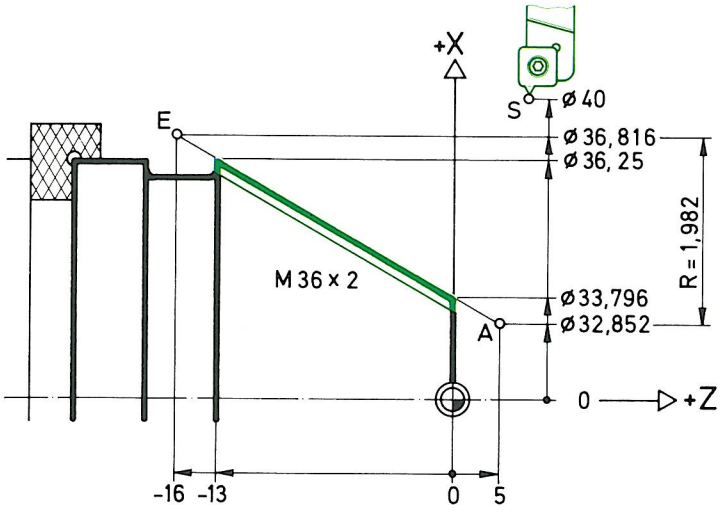
* The width of the grooving tool is 5 mm



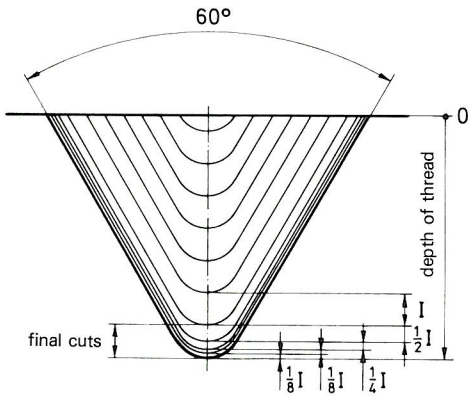
X = Nominal diameter
Z = Final length
I = 1st Approach
K = Feed down the flank
P = Depth of thread
R = Difference in radii of taper
F = Pitch
Q = Number of spring cuts
B1 = Delete final cuts

G31* parallel and taper threads < 45°

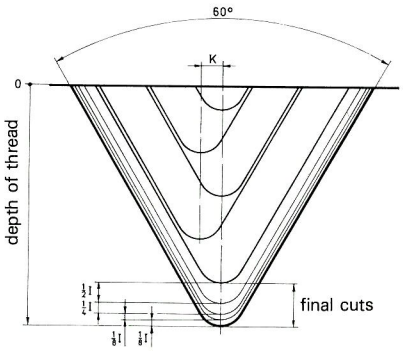
DIN 158 metric external taper thread



Conventional feed.
Radial infeed is recommended with pitch F < 4mm.



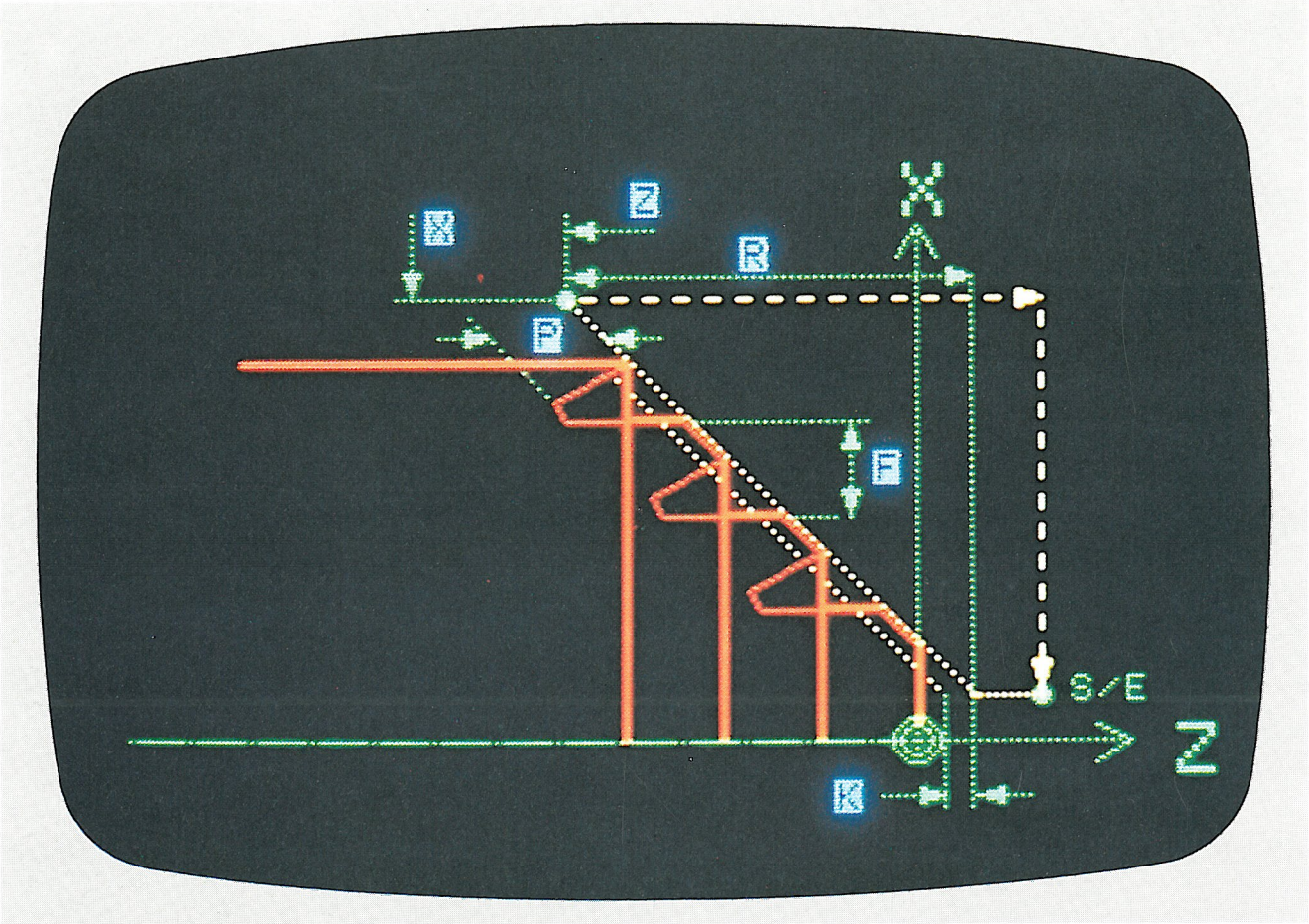
Feed down the flank angle K
left and right hand in succession
This is recommended with pitch F > 4mm



% ...						
N	G	X Z	Auxiliary addresses	F	S T	M
N1 ⋮ N15 N16 N17 N18	G97 G0 G31 G14	X40 Z5 X36.816 Z–16	I0.24 P1.286 R1.982 Q2 F2 Q0		S700 T3	M3 M7
N19						M30

* With this cycle, longitudinal threads can also be turned

Note: Pitch value in numbered threads/inch must be recalculated into metric



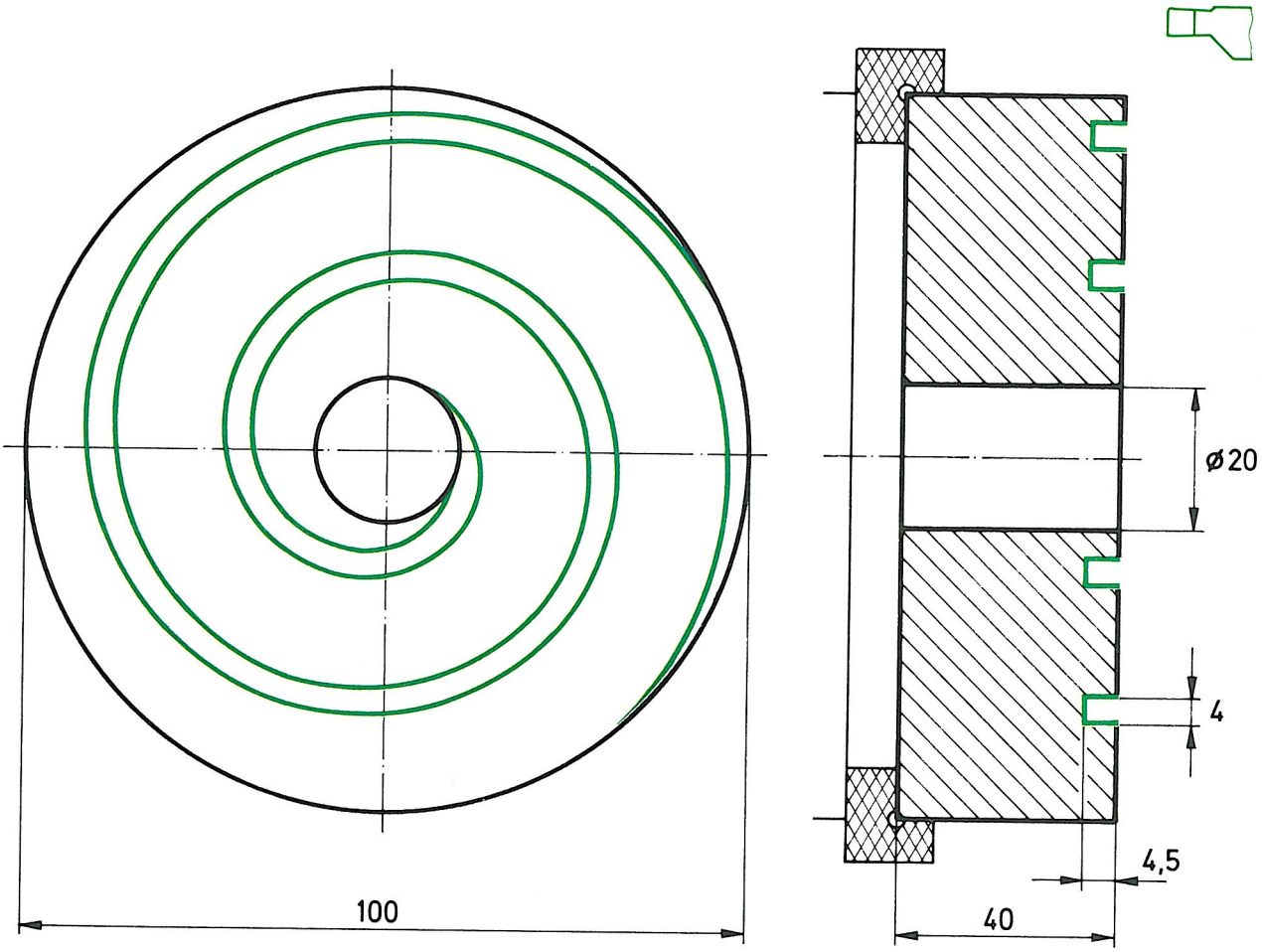
X = Final diameter
Z = Nominal length
I = Feed down the flank
K = 1st Approach
P = Depth of thread
R* = Length of taper-difference
F = Pitch
Q = Number of spring cuts
B1 = Delete final cuts

* Note: Only required for taper threads > 45°

GILDEMEISTER AUTOMATION

G32* thread on the face (scroll) and taper threads > 45°

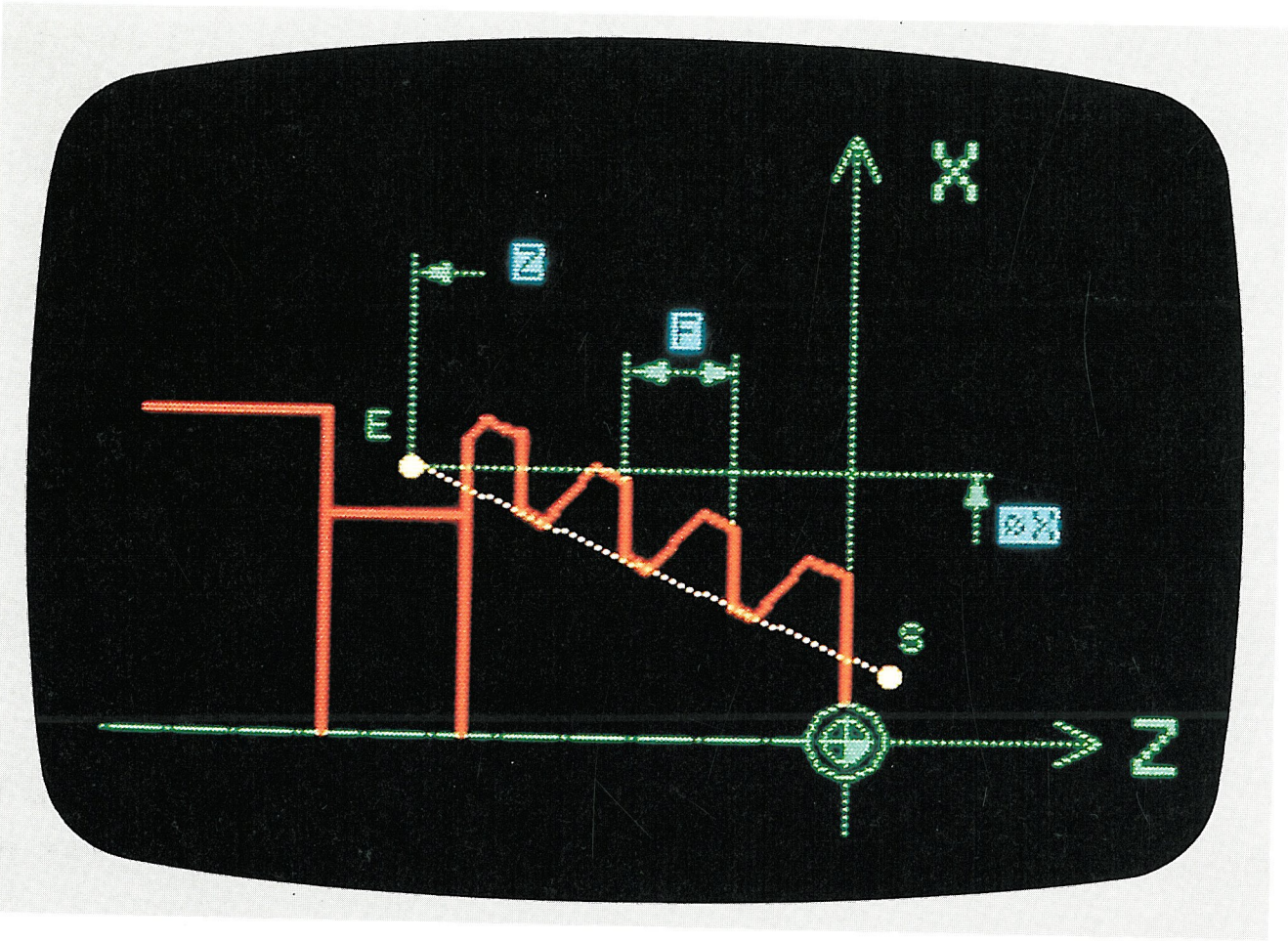
Thread on the face of a chuck**



% ...							
N	G	X Z	Auxiliary addresses	F	S	T	M
N1 ⋮ N15 N16 N17 N18	G97 G0 G32 G14	X110 Z5 X15 Z0	K0.25 P4.5 Q2 F6 Q0		S350	T3	M4 M7
N19							M30

* With this cycle, taper threads > 45° can be turned

** Simplified representation of thread on the face

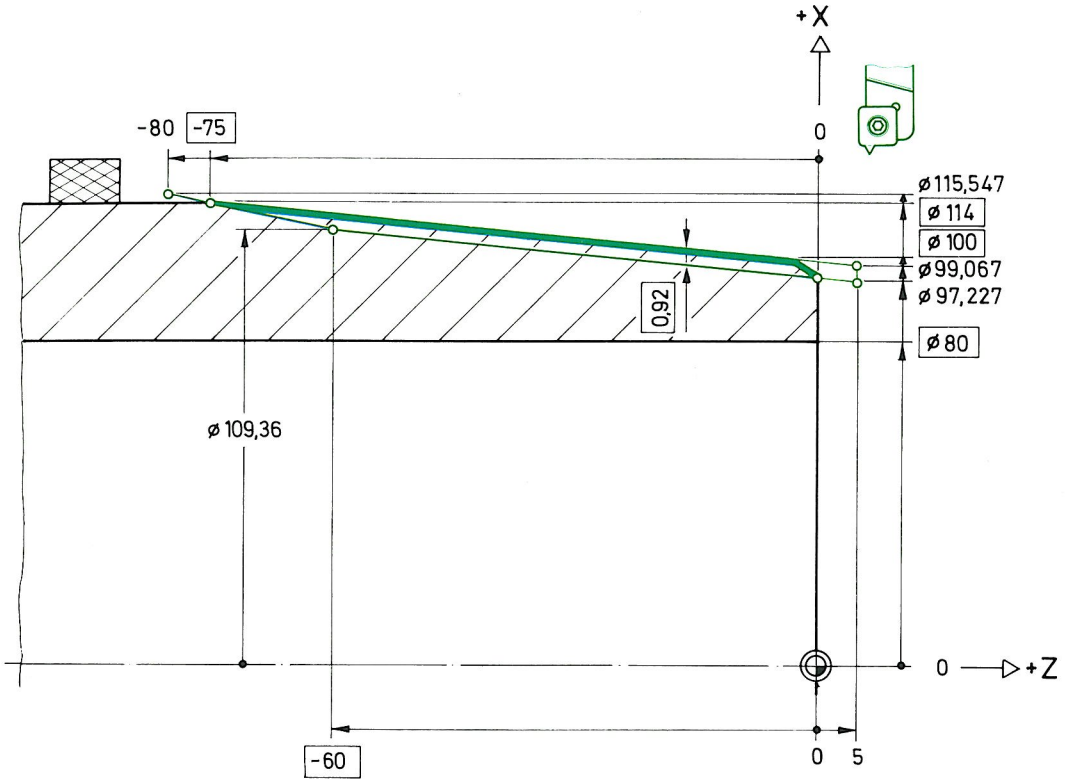


X = Nominal diameter

Z = Final length

F = Pitch

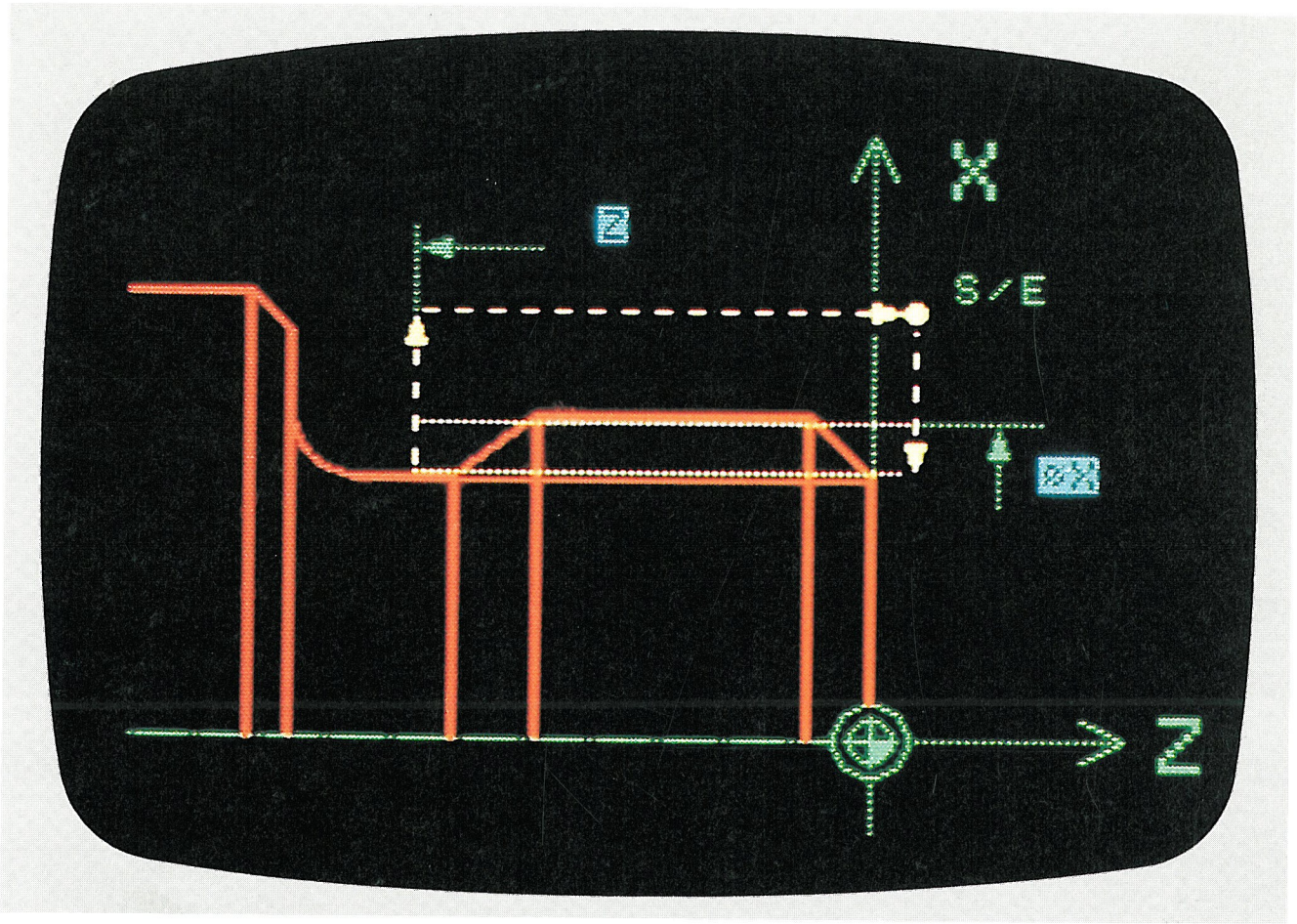
G33 spezial threading cycle



% ...								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1								
⋮								
N15	G97					S355	T3	M3
N16	G0	X120	Z5					
N17	G0	X99.067						
N18	G83	X97.227		I0.15				
N19	G33	X109.36	Z−60		F1.5			
N20	G33	X115.547	Z−80		F1.5			
N21	G0	X120	Z5					
N22	G80							
N23	G14			Q0				
N24								M30

These [dimensions] are drawing dimensions
All other values are computed and assist the programming

Note:
A taper thread with taper run out, and a metric pitch of 1.5 mm are assumed.
With these threads, all values which ar not shown on the drawing must be calculated.
This thread serves as the basis for the machining of API threads for the oil industry.
The corresponding number of threads/inch must be re-calculated in metric.



X = Nominal diameter

Z = Final length

F* = Pitch

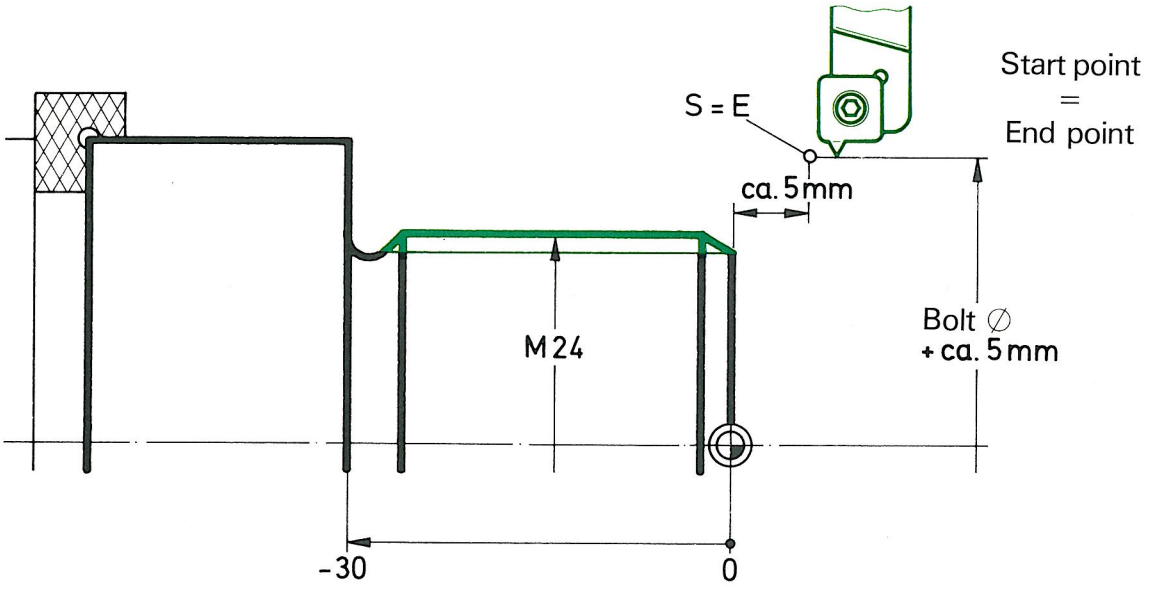
Q = Number of spring cuts

B1 = Delete final cuts

* Note:
Only entered if standard ISO thread is not to be machined.

GILDEMEISTER AUTOMATION

G35 standard ISO metric thread



% ...								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1 ⋮ N15	G97					S800	T3	M3 M7
N16	G0	X30	Z5					
N17*	G35	X24	Z–29					
N18	G14			Q0				
N19								M30

If when programming the pitch F is not entered, then the control automatically takes the pitch of the standard metric ISO thread Series 1.

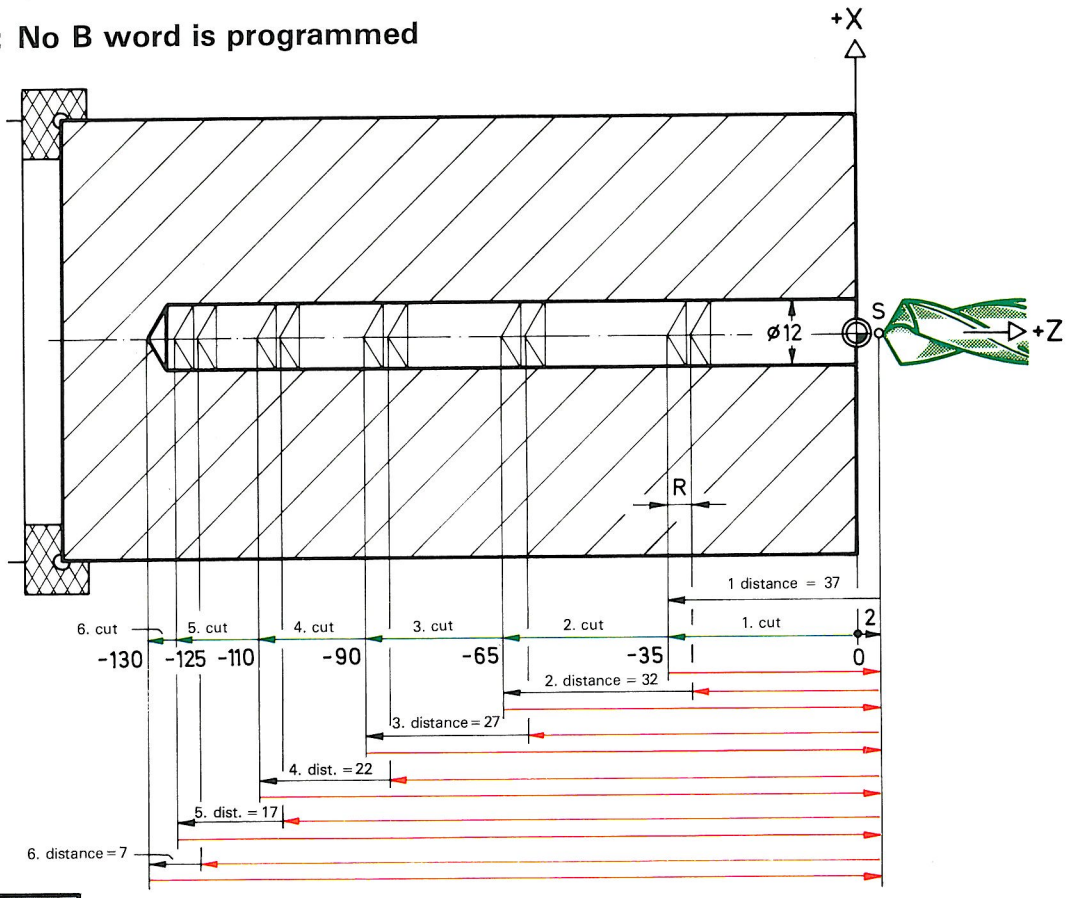
If a non-standard pitch is required, then this is to be programmed using an auxiliary address.

* Pitch **F** to ISO.
Approach **I** takes place automatically.
Feed down the flank **K** takes place automatically.
Number of idle cuts **Q** only if required.
Delete to final cut **B1** only if required.

G74 deep hole boring cycle

with complete retraction out of the bore (swarf removal)

Identification: No B word is programmed



% ...					
N	G	X Z	Auxiliary addresses	F S T	M
N1	G97			F0.1 S800 T5	M3 M7
N2 N3* N4 N5 N6 ⋮	G0 G74 G14	X0 Z2 Z−130	P35 R2 A5 E0.5 Q2		
N					M30

* Addresses

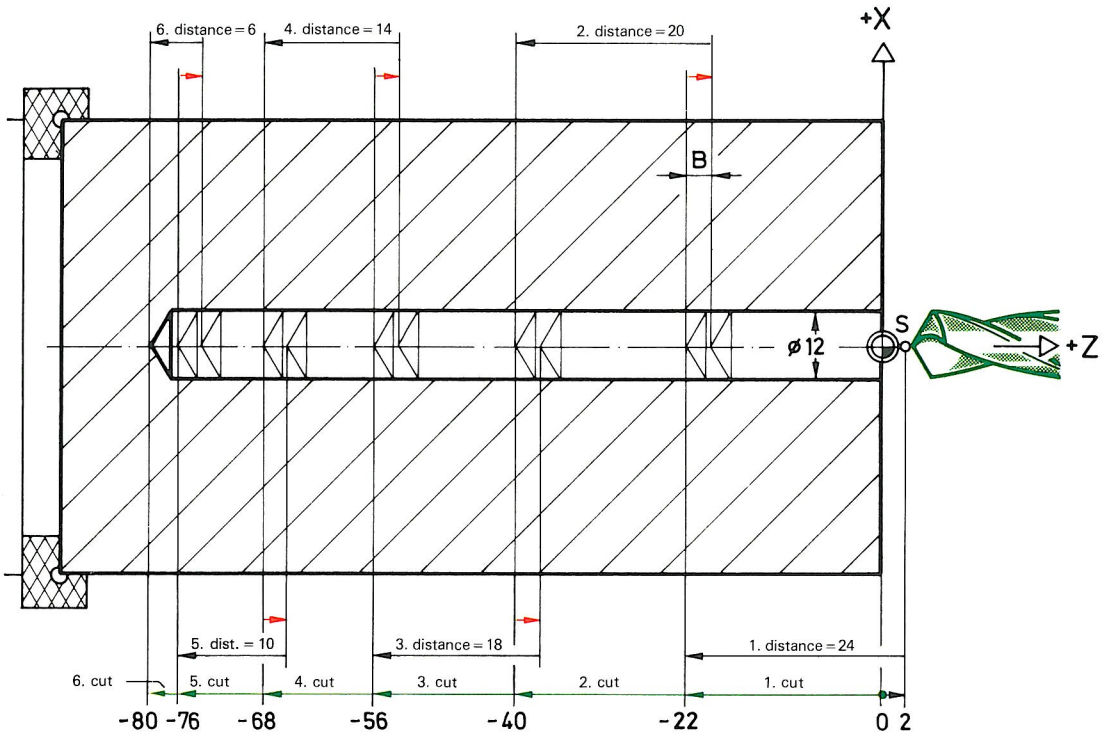
- **X** = Diameter (for driven tools)
- **Z** = Depth of bore
- **P** = 1. Approach
- **R** = Difference in depth in bore for safety
- **A** = Reduction value
- **E** = Dwell Time for free cutting
- **W** = Minimum depth

GILDEMEISTER AUTOMATION

G74 deep hole boring cycle

with partial retraction in the bore (chip breaking)

Identification: No B word is programmed



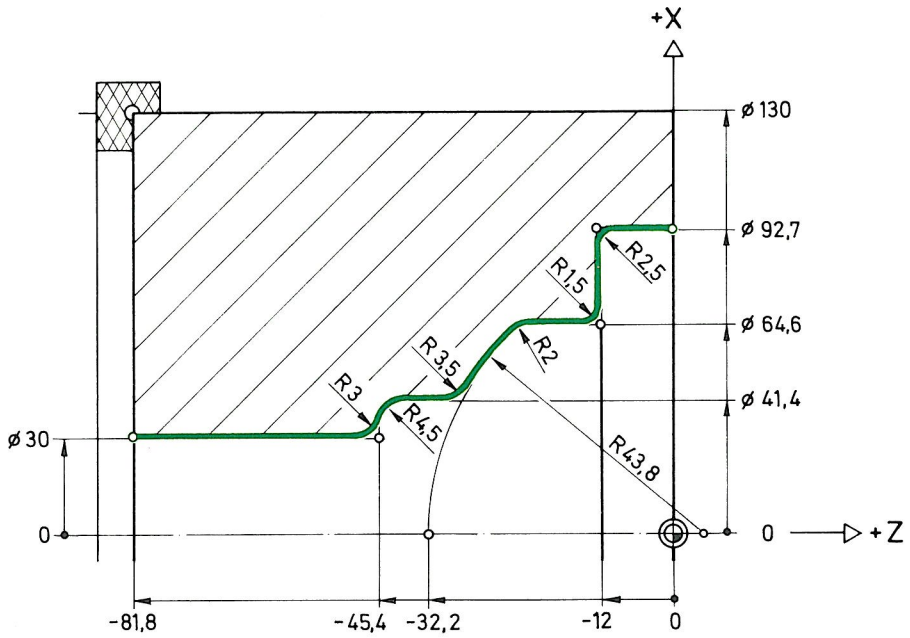
% ...					
N	G	X Z	Auxiliary addresses	F S T	M
N1	G97			F0.08 S800 T5	M3 M7
N2 N3* N4 N5 N6 ⋮	G0 G74 G14	X0 Z2 Z—80	P22 A4 B2 E0.1 Q2		
N					M30

* Addresses

- **X** = Diameter (for driven tools)
- **Z** = Depth of bore
- **P** = 1. Approach
- **A** = Reduction value
- **E** = Dwell time for free cutting
- **B** = Retraction distance
- **W** = Minimum depth

GILDEMEISTER AUTOMATION

Production programme 1 (drawing die)

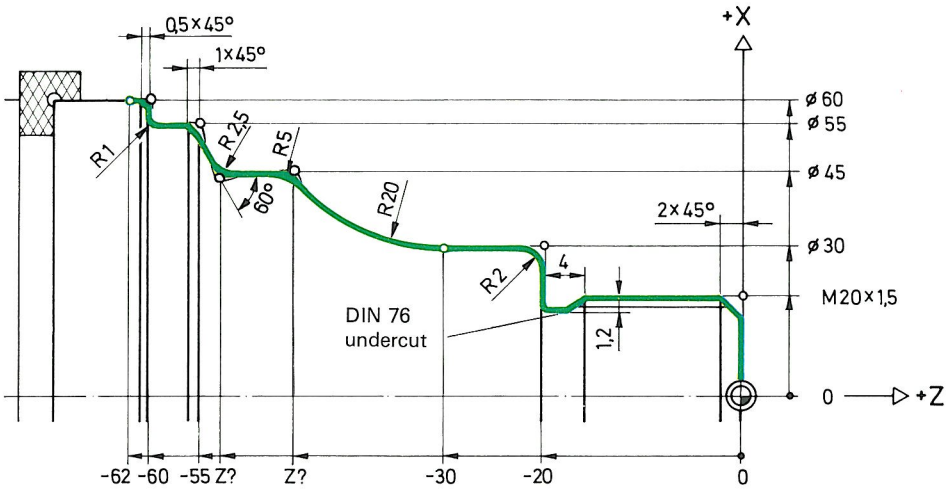


% 20											
N		G		X	Z	Auxiliary addresses			F	S	T	M
N1	G97	G0		X0	Z2				F0.08	S1400	T8	M3 M7
N2		G1			Z−83							
N3		G14				Q2						
N4	G96	G0		X29	Z2				F0.35	S140	T7	M4
N5		G57		X−1	Z0.2							
N6		G818		X94		I5						
N7						L1020						
N8		G80										
N9		G14				Q2						
N10	G96	G0		X29	Z2				F0.12	S170	T9	
N11						L1020						
N12		G14				Q2						
N13												M30

% 1020											
N		G		X	Z	Auxiliary addresses			F	S	T	M
N1		G0		X94	Z2							
N2	G41	G1			Z0							
N3		G1		X92.7								
N4		G1			Z−12			B2.5				
N5		G1		X64.6				B1.5				
N6		G1			Z?	A0	Q0	B2				
N7		G13		X41.4	Z?	I0 K11.6	R43.8	B3.5				
N8		G1			Z?	A0						
N9		G3		X30	Z−45.4		R4.5	B3				
N10		G1			Z−83							
N11	G40	G1		X28								
N12												M30

GILDEMEISTER AUTOMATION

Production programme 2 (stepped shaft)



% 21								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.35	S180	T1	M4 M7
N2	G0	X62	Z2					
N3	G82	X−1.6	Z0.1					
N4	G57	X1	Z0.2					
N5	G818	X15		I3.5				
N6				L1021				
N7	G80							
N8	G14			Q0				
N9	G96				F0.1	S240	T2	
N10	G0	X62	Z2					
N11				L1021				
N12	G14			Q0				
N13	G97					S1000	T3	M3
N14	G0	X25	Z5					
N15	G31	X20	Z−19	I0.2 P0.92 F1.5				
N16	G14			Q0				M30

% 1021								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X0	Z2					
N2	G42 G1		Z0					
N3	G1	X20		B−2				
N4	G85		Z−20	I1.2 K4 Q1				
N5	G1	X30		B2				
N6	G1		Z−30					
N7	G2	X45	Z?	R20 B5				
N8	G1		Z?	A0 B2.5				
N9	G1	X55	Z−55	A60 B−1				
N10	G1		Z−60	B1				
N11	G1	X60		B−0.5 E0.05				
N12	G1		Z−62					
N13	G40 G1	X62						
N14								M30

Production programme 3 (form ring)

Main programme

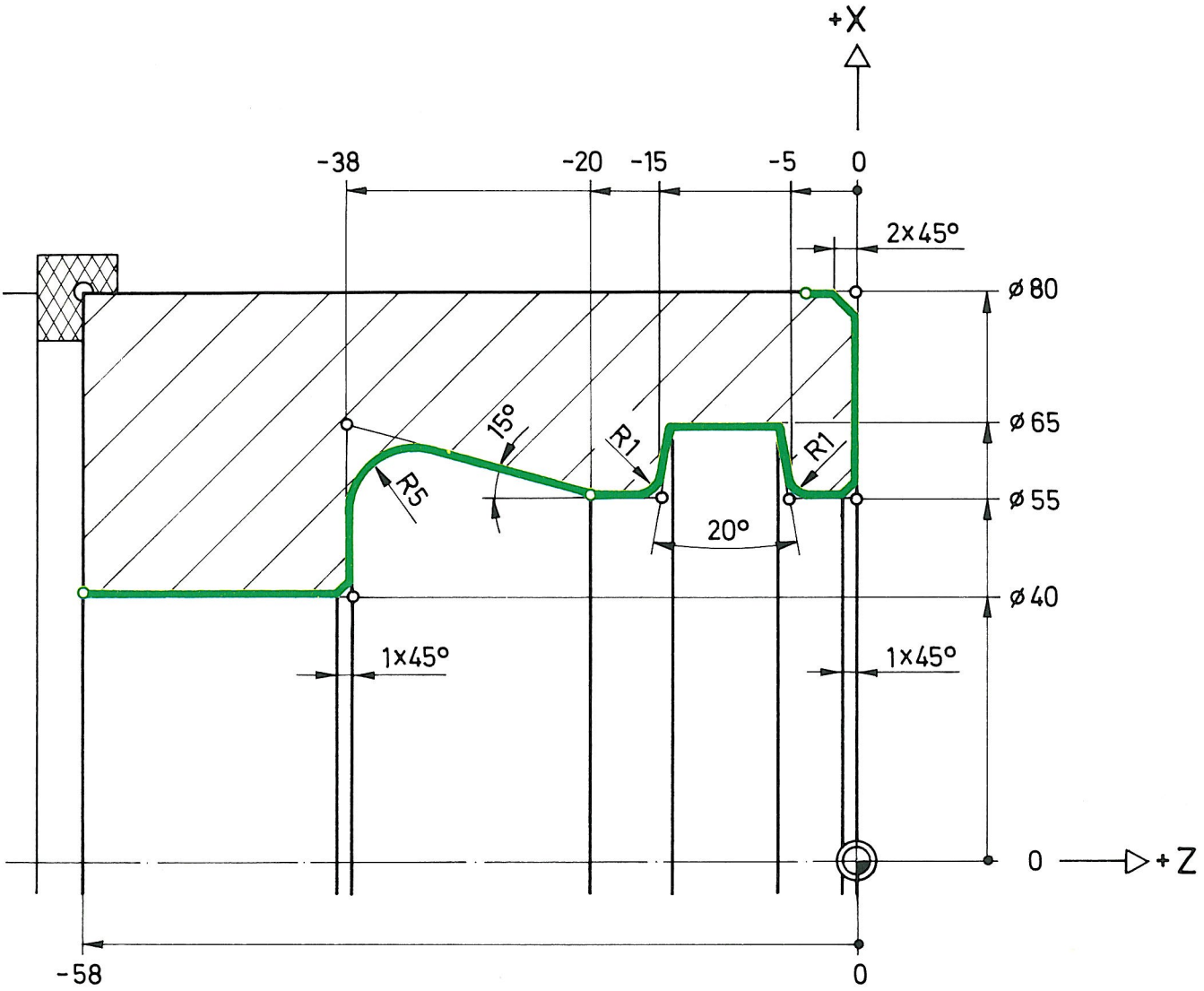
% 22										
N	G	X	Z	Auxiliary addresses	F	S	T	M		
N1	G96				F0.25	S180	T1	M4	M7	
N2	G0	X83	Z2							
N3	G82	X30	Z0							
N4	G0	X75	Z1							
N5	G88	X80	Z0	I2						
N6	G1		Z−3							
N7	G14			Q0						
N8	G97				F0.1	S1200	T5	M3		
N9	G0	X0	Z2							
N10	G1		Z−62							
N11	G14			Q2						
N12	G96				F0.35	S130	T7	M4		
N13	G0	X35	Z2							
N14	G57	X−1	Z0.1							
N15	G819	X58		I3.5 E0.25						
N16				L102						
N17	G80									
N18	G14			Q2						
N19	G96				F0.1	S180	T9			
N20	G0	X35	Z2							
N21				L102						
N22	G14			Q2						
N23	G96				F0.1	S90	T11			
N24	G57	X0	Z0							
N25	G0	X53	Z2							
N26	G0		Z−17							
N27	G862		Z−3							
N28				L1022						
N29	G80									
N30	G14			Q2						
N31								M30		

Sub-programme internal contour

% 102										
N	G	X	Z	Auxiliary addresses	F	S	T	M		
N1	G0	X58	Z2							
N2	G41 G1		Z0							
N3	G1	X55		B−1						
N4	G1		Z−20							
N5	G1	X?	Z−38	A15 B5						
N6	G1	X40		B−1						
N7	G1		Z−60							
N8	G40 G1	X38								
N9								M30		

GILDEMEISTER AUTOMATION

Form ring



Sub-programme plunge cut

% 1022								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G41 G0	X54	Z—3					
N2	G1	X55						
N3	G1		Z—5	B1				
N4	G1	X65	Z?	A80				
N5	G1		Z?	A0				
N6	G1	X55	Z—15	A—80 B1				
N7	G1		Z—17					
N8	G40 G1	X54						
N9								M30

GILDEMEISTER AUTOMATION

Production programme 4 (pressure sleeve)

Main programme

% 23

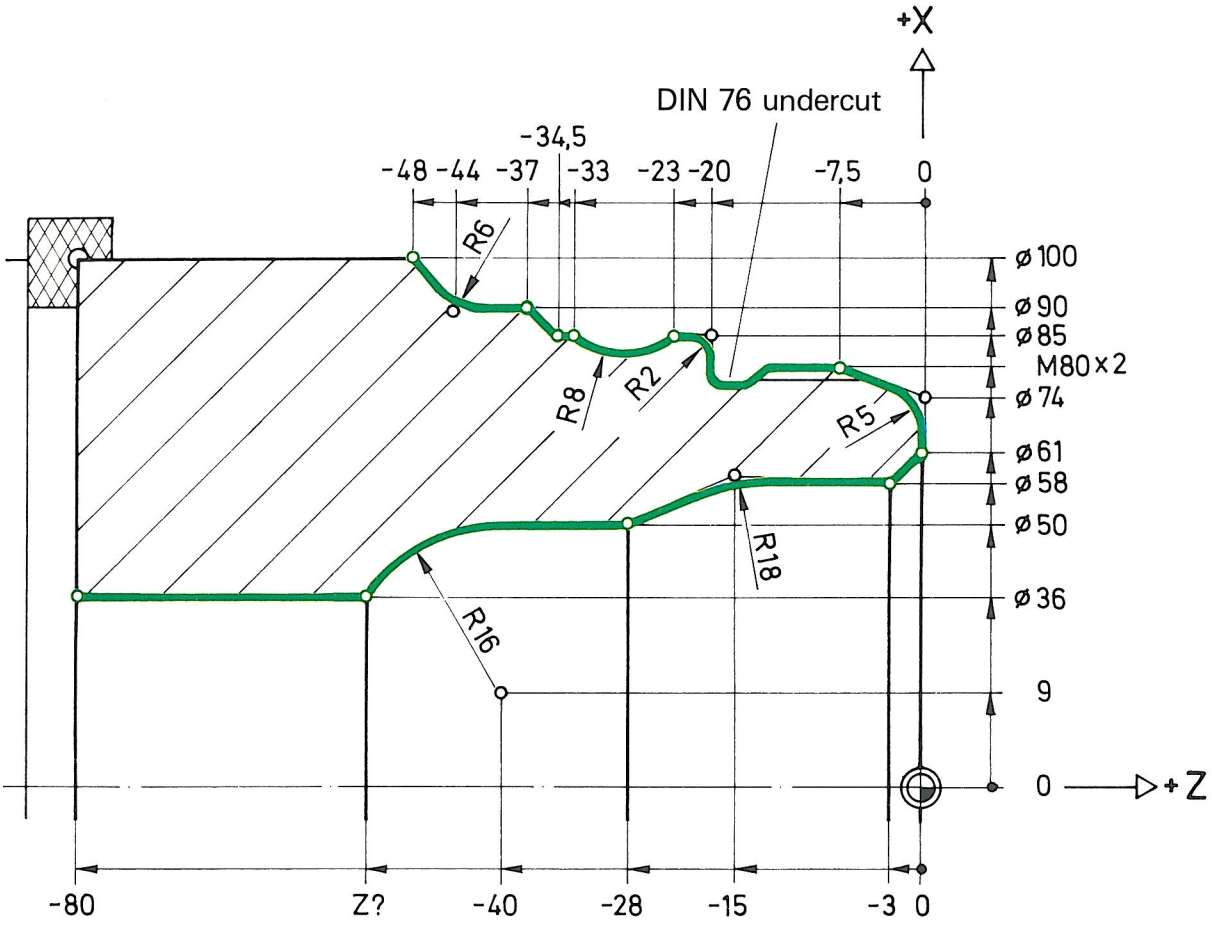
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G97				F0.1	S1200	T5	M3 M7
N2	G0	X0	Z2					
N3	G1		Z–82					
N4	G14		Q2					
N5	G96				F0.3	S150	T7	M4
N6	G0	X30	Z2					
N7	G57	X–1	Z0.2					
N8	G818	X61		I3				
N9				L103				
N10	G80							
N11	G14			Q2				
N12	G96				F0.1	S200	T8	
N13	G0	X62	Z2					
N14				L103				
N15	G14			Q2				
N16	G96				F0.35	S180	T1	
N17	G0	X102	Z2					
N18	G57	X1	Z0.2					
N19	G819	X60		I3 E0.25				
N20				L1023				
N21	G80							
N22	G14			Q0				
N23	G96				F0.1	S240	T2	
N24	G0	X60	Z2					
N25				L1023				
N26	G14			Q0				
N27	G0	X86	Z–2				T3	M3
N28	G31	X80	Z–19	I0.2 P1.25 Q2 F2				
N29	G14			Q0				
N30								M30

Sub-programme internal contour

% 103

N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X62	Z2					
N2	G41 G1		Z0					
N3	G1	X58	Z–3					
N4	G1		Z–15	A0 B18				
N5	G1	X50	Z–28					
N6	G1		Z?	A0				
N7	G13	X36	Z?	I9 K–40 R16 B0				
N8	G1		Z–82					
N9	G40 G1	X34						
N10								M30

Pressure sleeve



Sub-programme external contour

% 1023								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G0	X61	Z2					
N2	G42 G1		Z0					
N3	G1	X74		B5				
N4	G1	X80	Z–7.5					
N5	G85		Z–20	I1.75 K5 Q1				
N6	G1	X85		B2				
N7	G1		Z–23	B0				
N8	G2	X85	Z–33	R8 B0				
N9	G1		Z–34.5					
N10	G1	X90	Z–37					
N11	G1		Z–44	B6				
N12	G1	X100	Z–48					
N13	G40 G1	X102						
N14								M30

GILDEMEISTER AUTOMATION

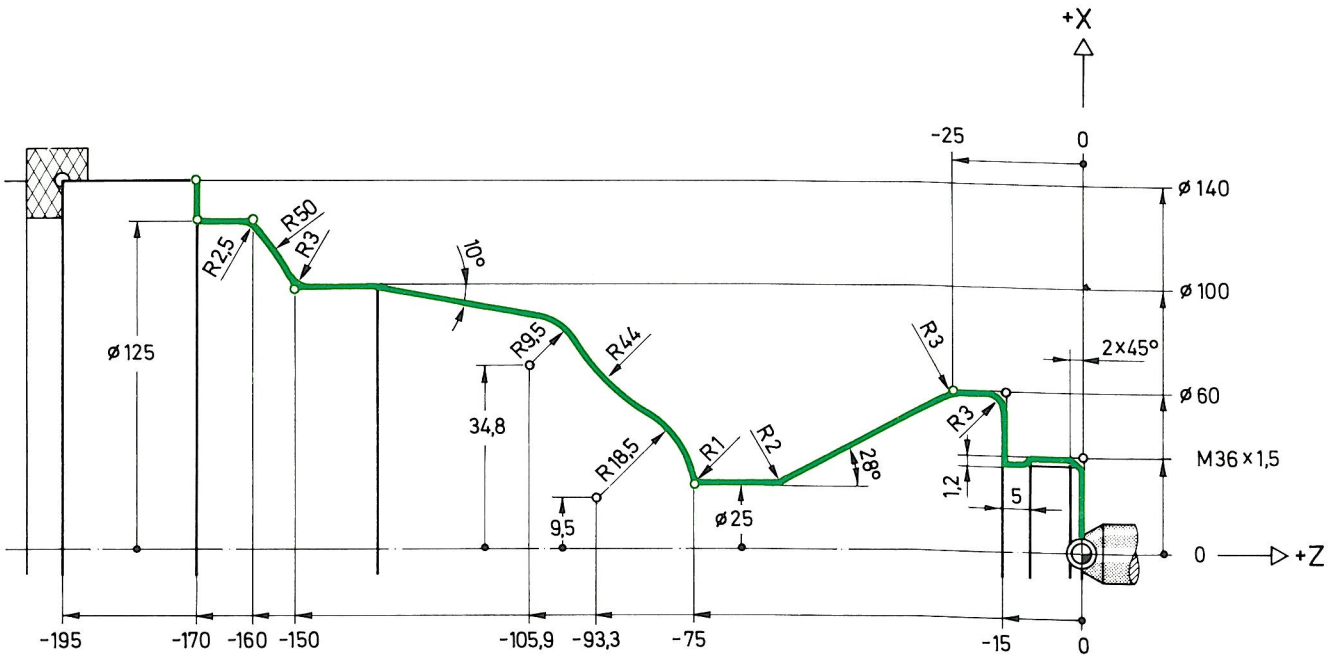
Production programme 5 (form roller)

Main programme

% 24								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.4	S180	T1	M4 M41
N2	G0	X142	Z2					M7
N3	G57	X1	Z0.2					
N4	G819	X30		I6 E0.25				
N5				L1024				
N6	G80							
N7	G14			Q0				
N8	G96				F0.1	S240	T2	
N9	G0	X142	Z2					
N10				L1024				
N11	G14			Q0				
N12	G97					S800	T3	M3
N13	G0	X40	Z5					
N14	G31	X36	Z−14	I0.2 P0.92 F1.5 Q2				
N15	G14			Q0				
N16								M30

GILDEMEISTER AUTOMATION

Form roller

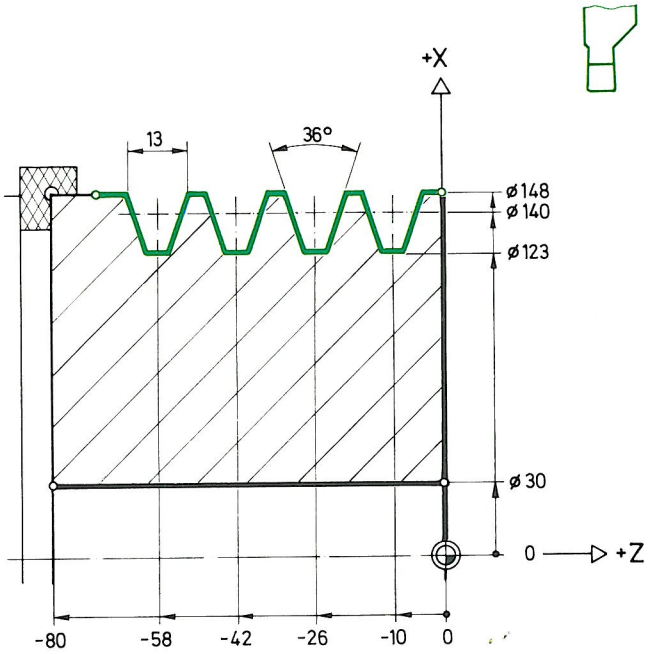


Sub-programme

% 1024									
N	G	X	Z	Auxiliary addresses				F S T	M
N1	G0	X30	Z2						
N2	G42 G1		Z0						
N3	G1	X36				B2	E0.08		
N4	G85		Z−15	I1.2	K5	Q1	E0.05		
N5	G1	X60				B3			
N6	G1		Z−25			B3	E0.1		
N7	G1	X25	Z?	A−28		B2			
N8	G1		Z−75			B1	E0.04		
N9	G13	X?	Z?	I9.5	K−93.3		R18.5		
N10	G2	X?	Z?				R44		
N11	G13	X?	Z?	I34.8	K−105.9		R9.5		
N12	G1	X100	Z?	A10					
N13	G1		Z−150			B3	E0.05		
N14	G3	X125	Z−160		R50	B2.5			
N15	G1		Z−170						
N16	G1	X140							
N17	G40 G1	X142							
N18									M30

GILDEMEISTER AUTOMATION

Production programme 6 (pulley)



Main programme repeat of machining

% 25								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1				L105 Q4				
N2	G14			Q0				M30

Sub-programme machining the grooves

% 105								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G96				F0.08	S100	T4	M4 M7
N2	G0	X151	Z−17.5					
N3	G862		Z−2.5					
N4				L1025				
N5	G80							
N6	G56		Z−16					
N7								M30

Sub-programme groove

% 1025								
N	G	X	Z	Auxiliary addresses	F	S	T	M
N1	G42 G1	X148	Z−2.5					
N2	G1		Z−3.5					
N3	G1	X123	Z?	A−72				
N4	G1		Z?	A0				
N5	G1	X148	Z−16.5	A72				
N6	G1		Z−17.5					
N7	G40 G1	X150						
N8								M30

Note: This programme provides an example of nesting of sub-programmes (see page 70)