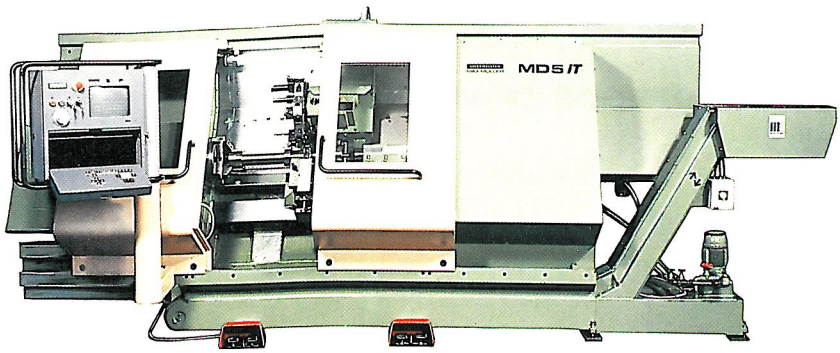
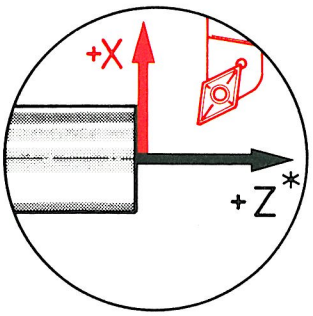
GILDEMEISTER AUTOMATION

Axes and Axis directions

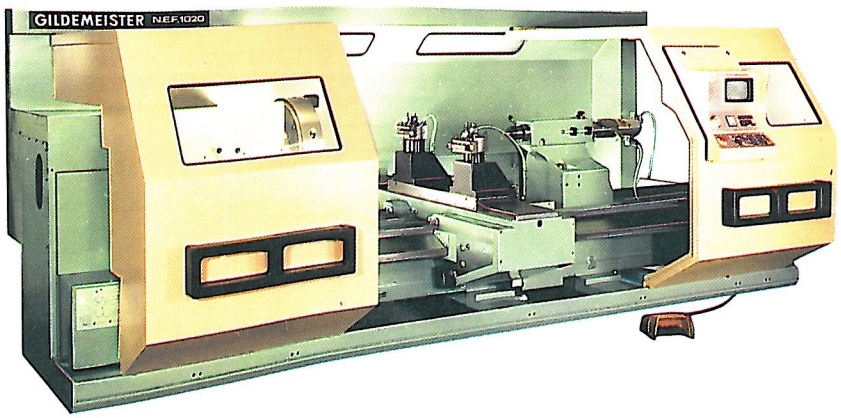
1. tool is behind spindle centre line

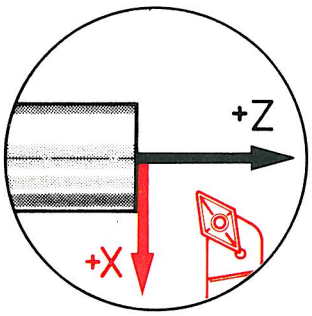




DIN 66217

2. tool is in front of spindle centre line





For both systems:
The **larger** the diamter, the **greater** the **x** value.
The **longer** the length, the **greater** the **z** value.

GILDEMEISTER AUTOMATION

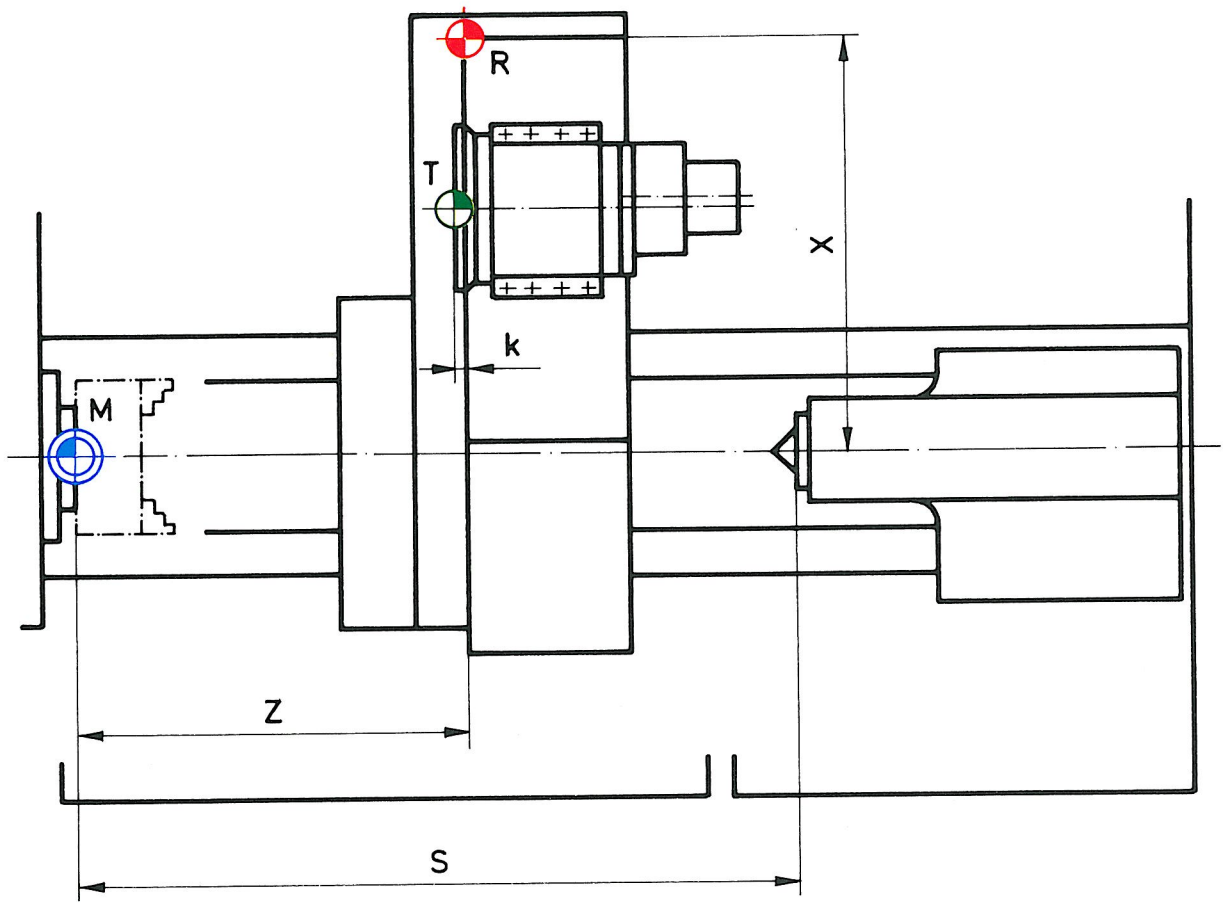
Reference points in the working area

The most important reference points are:

M Machine zero point

R Reference point

T Tool reference point



	X			Z			S	K
	min	max	tra-verse	min	max	tra-verse	max	
CT40	275	535	260	183,5	823,5	640	900	10,5

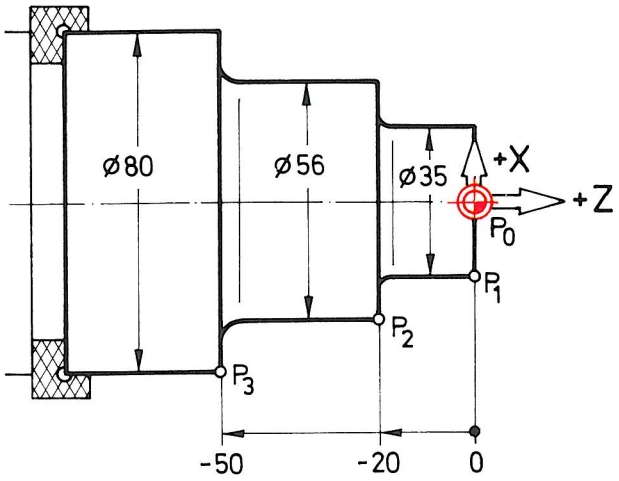
[mm]

GILDEMEISTER AUTOMATION

Component zero point

The component zero point (symbol) is the reference point for the geometried data included in the programme.

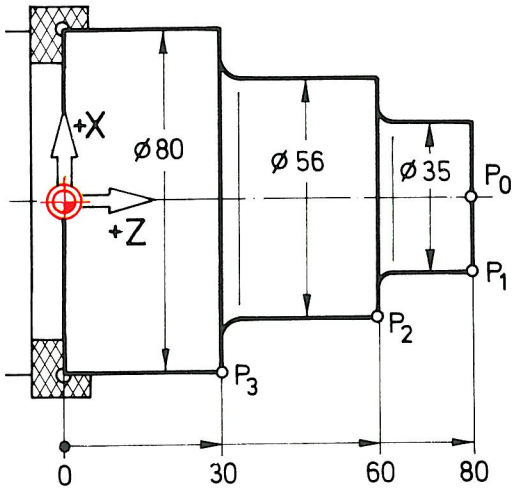
1. Component zero point on the face



	X	Z
P_0	0	0
P_1	35	0
P_2	56	–20
P_3	80	–50

This zero point position is more favourable for programming.

2. Component zero point on the contact surface (base of jaws)

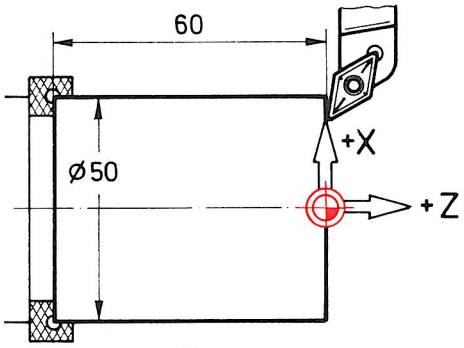


	X	Z
P_0	0	80
P_1	35	80
P_2	56	60
P_3	80	30

GILDEMEISTER AUTOMATION

Reference dimension input (G90 Absolute)

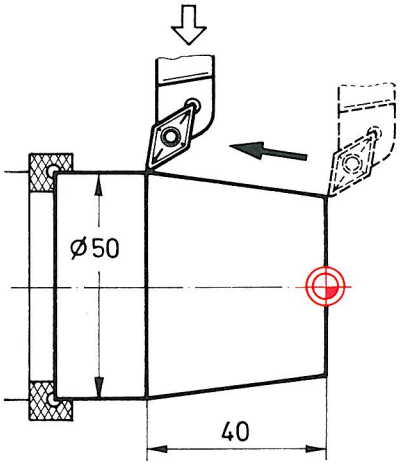
Absolute dimensions always relate to the **component zero point** (hence reference dimension)



Actual position: X40 Z0

input: X50 Z – 40 = **Target** position

START – Press button



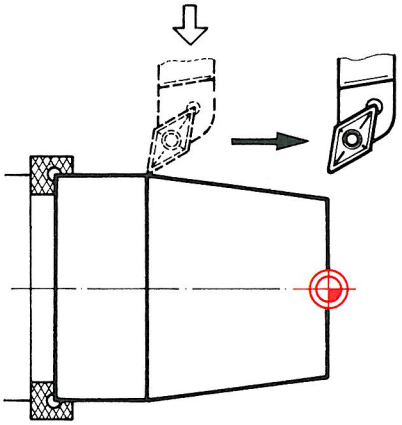
G90* indicates the tool traverses

TO the given position

Actual position: X50 Z – 40

input: Z2 = **Target** position

START – Press button



Actual position: X50 Z2

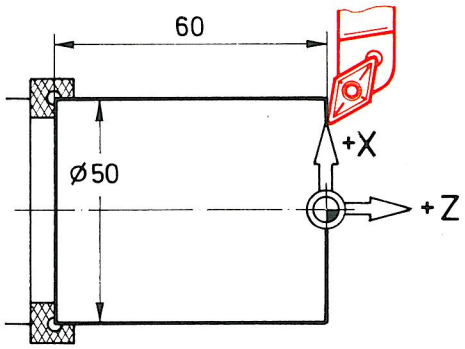
* G90 = effective when stored

GILDEMEISTER AUTOMATION

Chain dimension input (G91 incremental)

With incremental dimensional input, the component zero point is **NOT** used as reference.

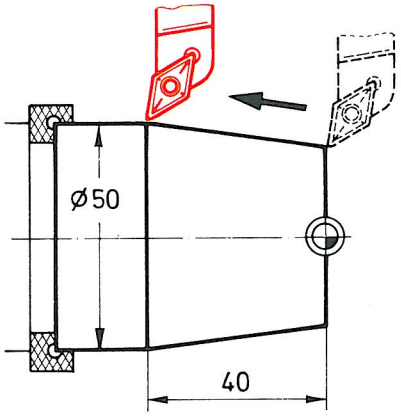
The programmed x and z values relate to the **LAST tool position.**



Actual position:* X40 Z0

Attention:
Radius value input: X5 Z – 40

START – Press button



G91* indicates the tool traverses

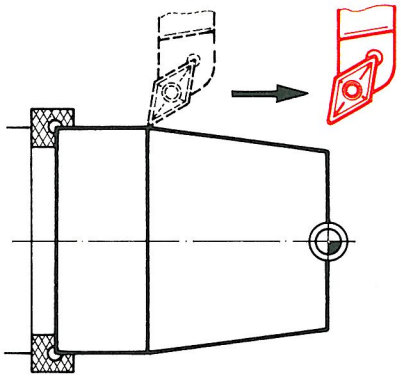
A GIVEN DISTANCE in the direction defined.

Here: X5 mm, + direction
Z40 mm, – direction

Actual position: X50 Z – 40

Input: Z42

START – Press button



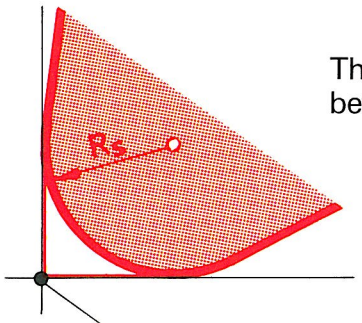
Actual position: X50 Z2

* Even if chain dimensions are programmed, the **actual position** (absolute dimension) appears on the screen after the traverse is completed.

GILDEMEISTER AUTOMATION

Effect of tool nose radius

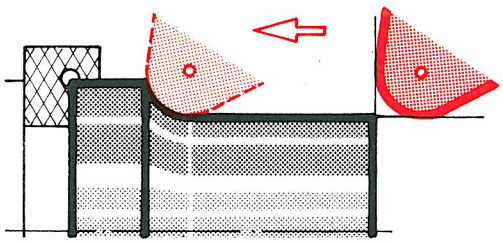
In order that the time the tip is in contact is not too short, the tip of roughing and finishing tools is rounded.



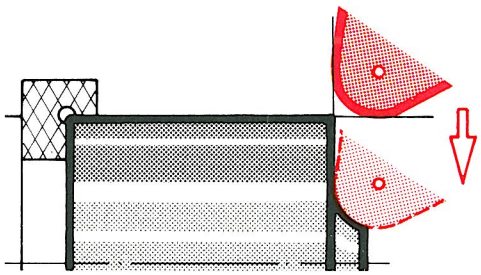
The tool tip radius varies between 0,4 and 1,6 mm.

Theoretical tip of the tool
= **reference point for the control**

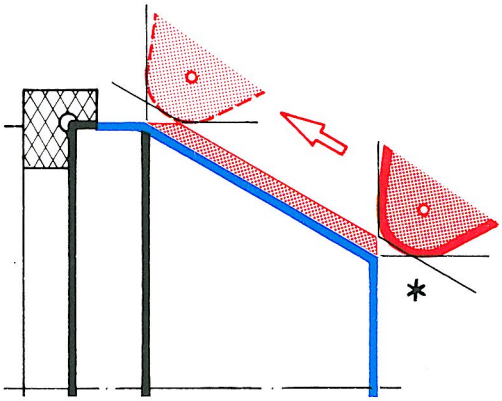
Effect when ...



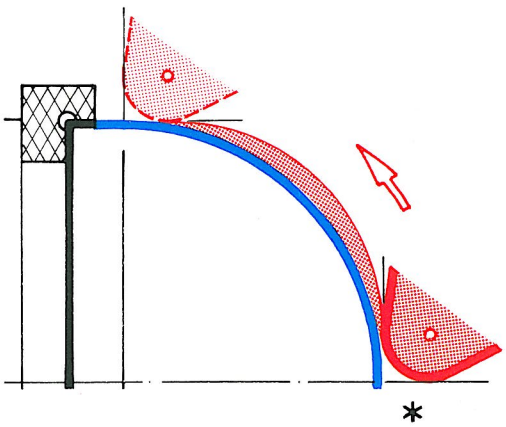
Turning



Facing



Turning a taper



Turning a radius

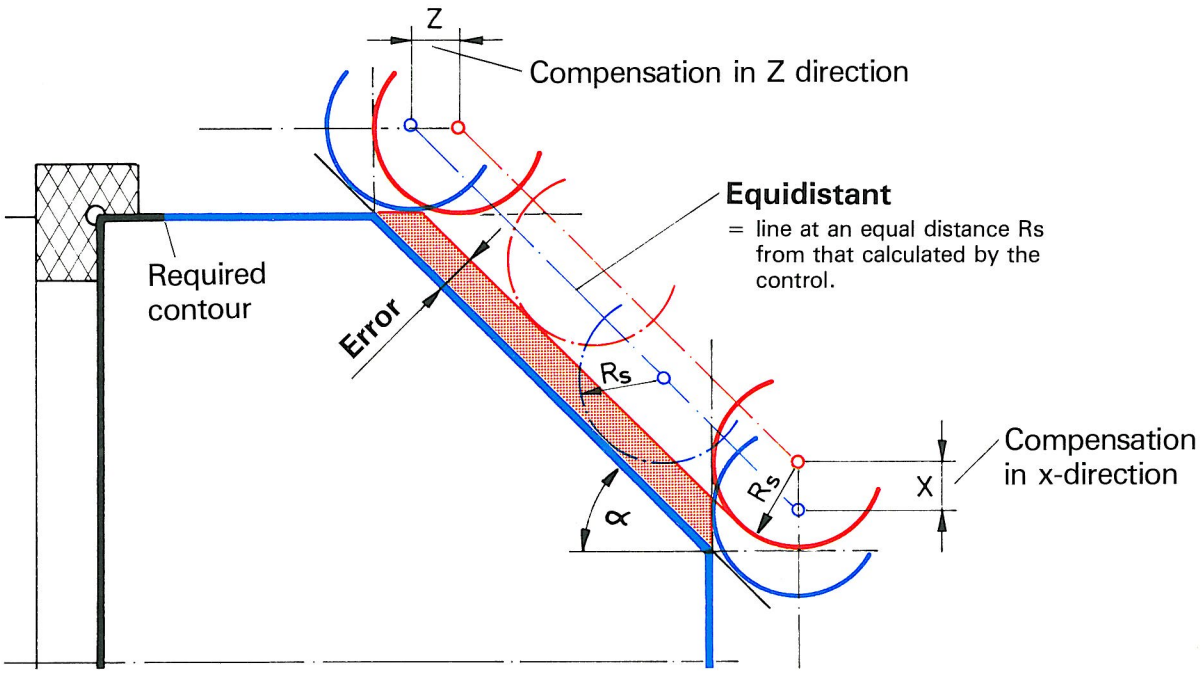
* The larger the tool tip radius, the greater the surplus stock (i.e. in accuracy).

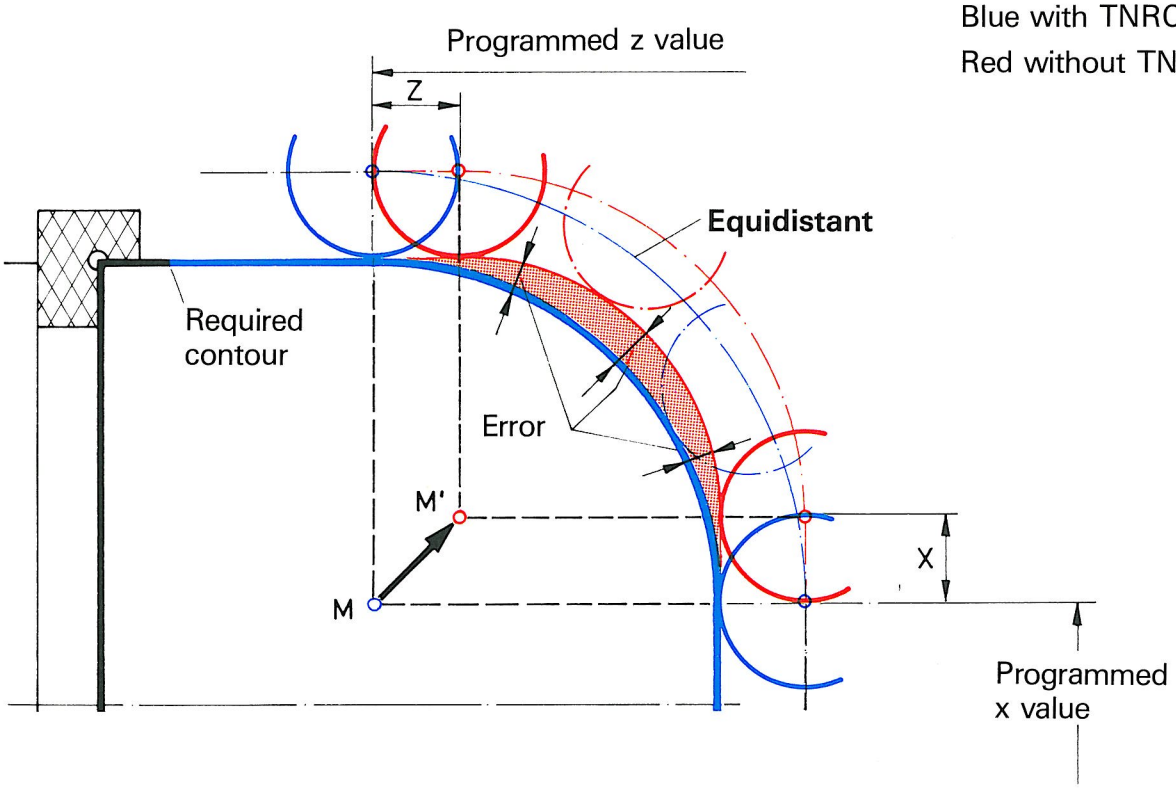
GILDEMEISTER AUTOMATION

Tool nose compensation (T.N.R.C.)

The removal of inaccuracies which result on all contours which are not parallel to the axes, due to the tool nose radius, is called **compensation**.

This compensation is carried out **automatically** on CNC turning machines.



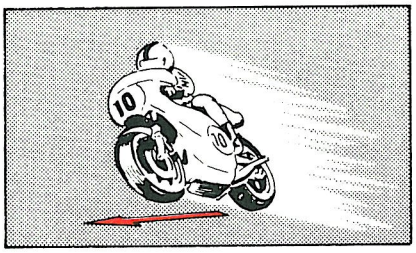


Blue with TNRC

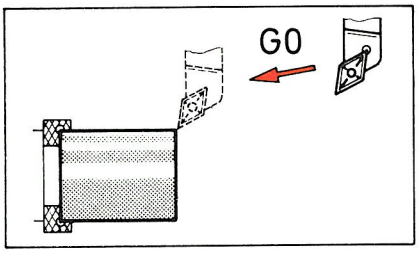
Red without TNRC

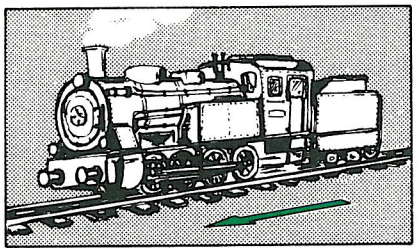
GILDEMEISTER AUTOMATION

G0, G1, G2, G3; G41, G42, G40

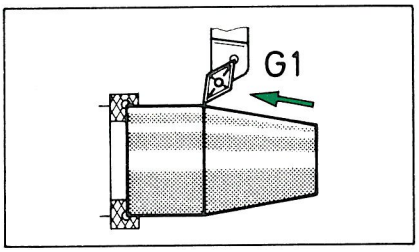


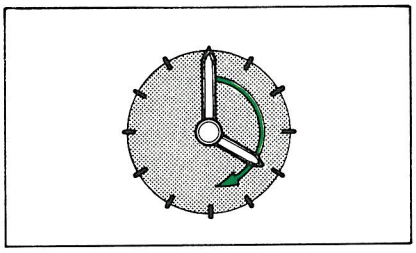
G0
Rapid



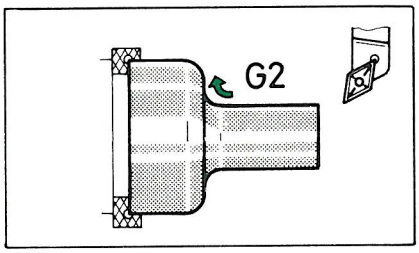


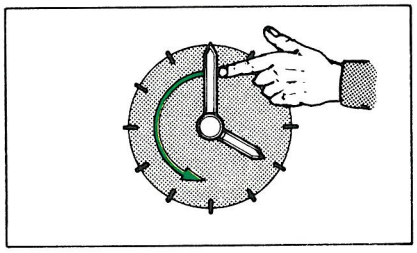
G1
Linear feed



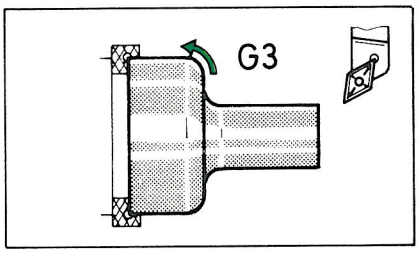


G2
Clockwise arc



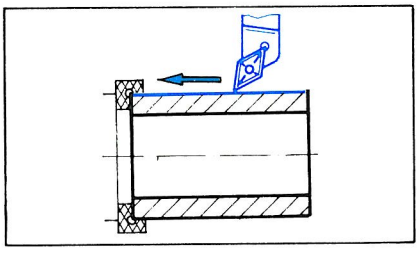


G3
Counter-clockwise arc



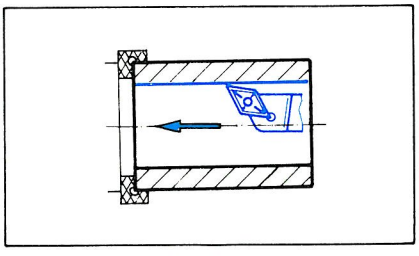
G42 = **R**ight

G42
Tool traversing to the right of the contour looking in the feed direction



G41 = **l**eft

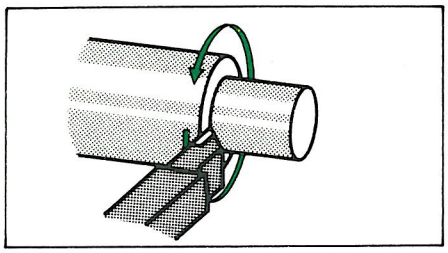
G41
Tool is to the left of the contour



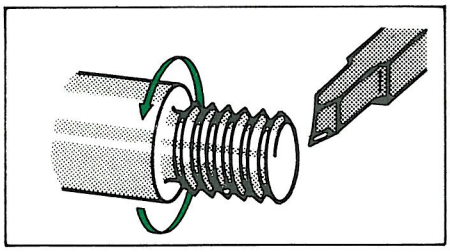
G40
Cancels G41/G42

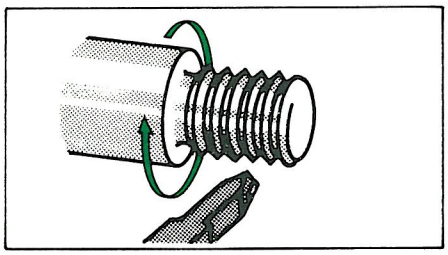
GILDEMEISTER AUTOMATION

M3, M4, M5; M7, M8, M9; M30

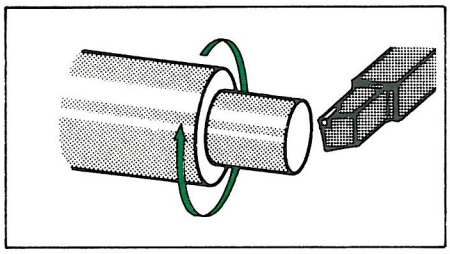


M3
Spindle
clockwise

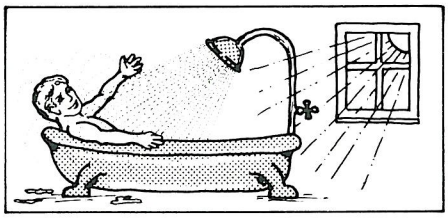




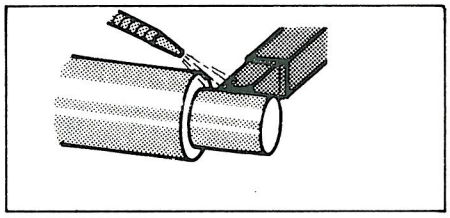
M4
Spindle
counter-clockwise

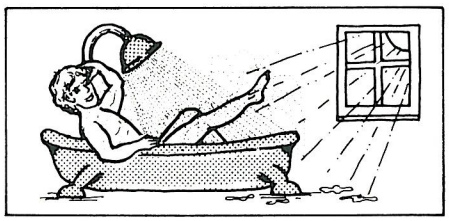


M5
Spindle stop

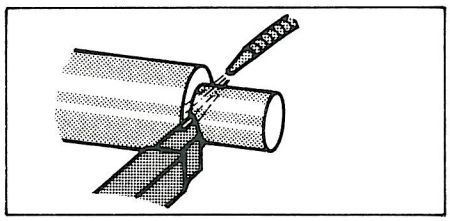


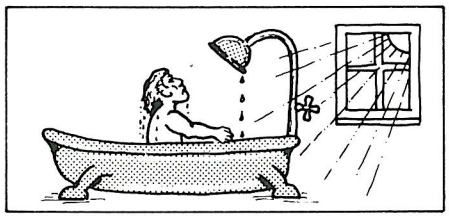
M7
1 Coolant ON



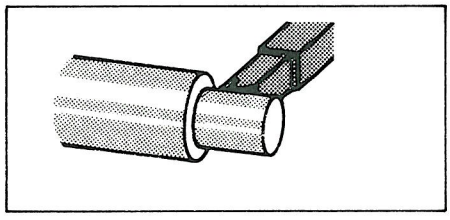


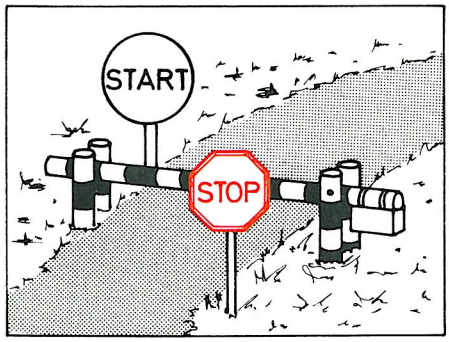
M8
2 Coolant ON





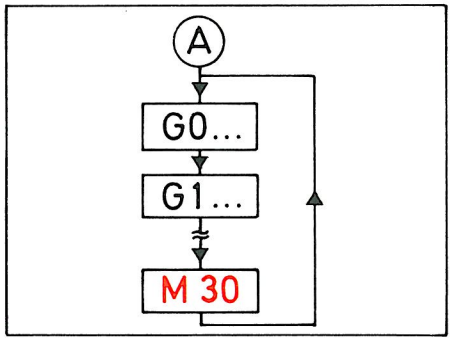
M9
Coolant OFF



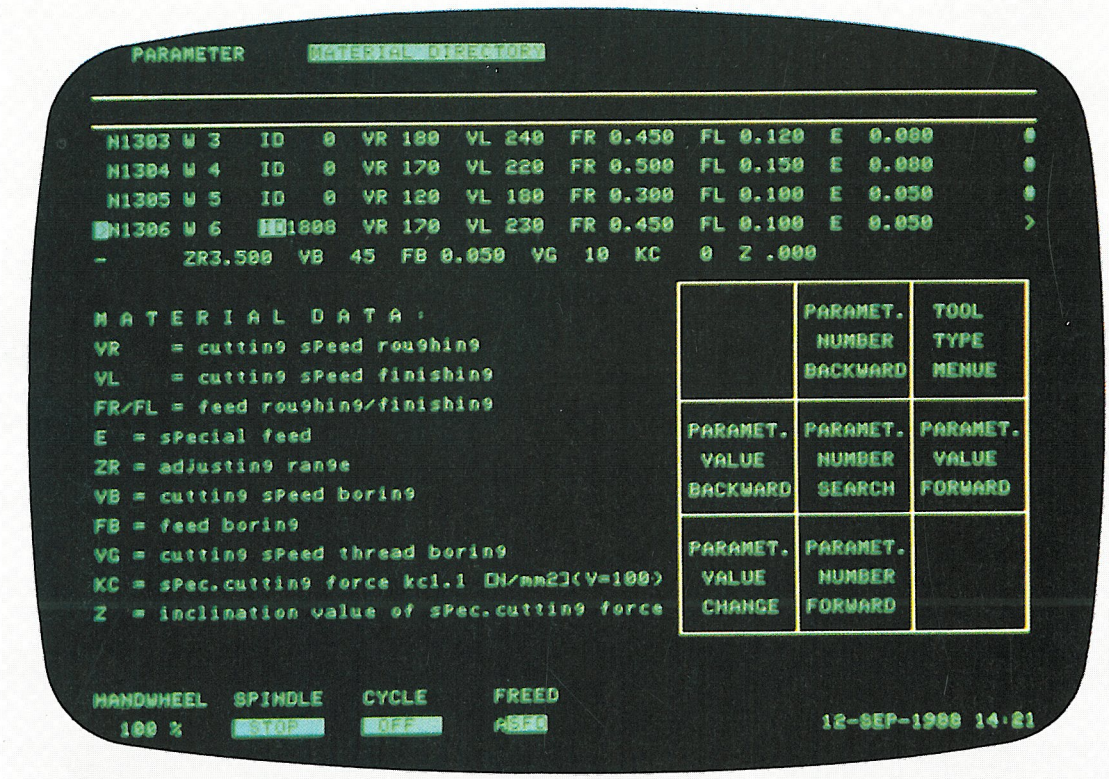


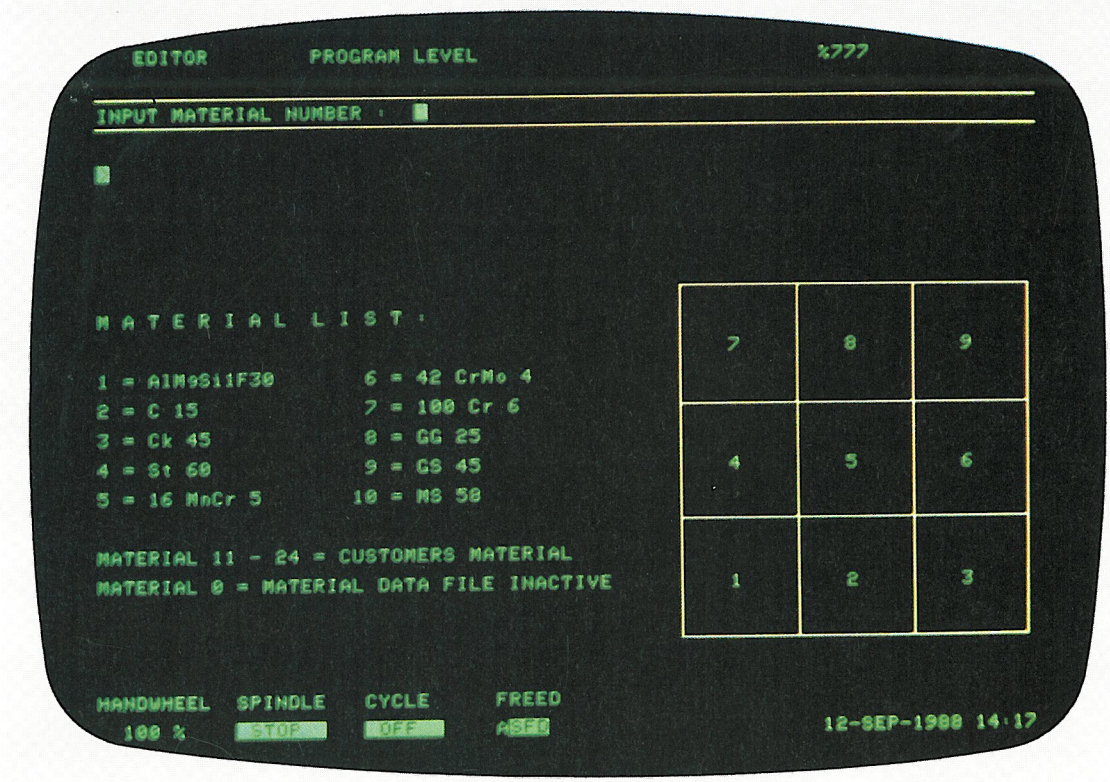
M30

End of programme
+
Return to start of programme

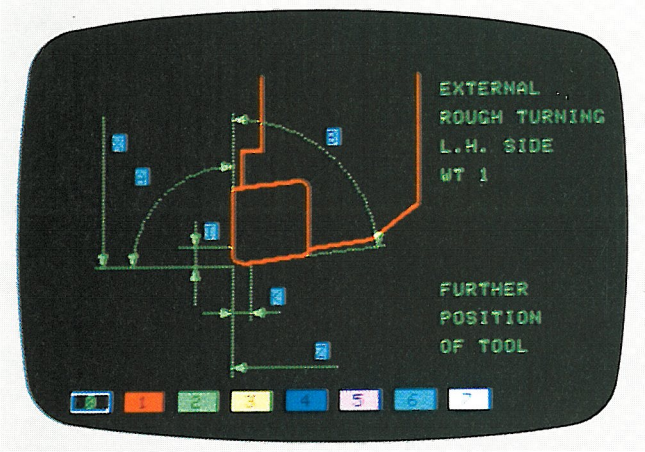


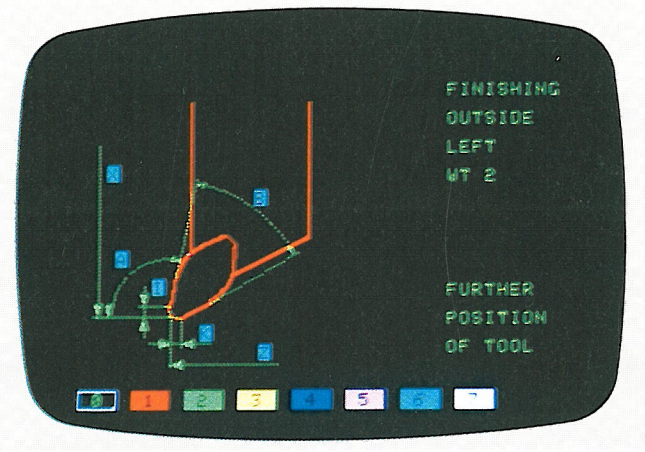
Material library





Tooling library





T = Tool number

WT = Tool type

FC = Colour

X = Setting dimension L (Radial value)

Z = Setting dimension Q

I = Position of the tool centre point in x direction

K = Position of the tool centre point in z direction

A = Setting angle $\varkappa$

B = Included angle ε

D = Diameter of tool

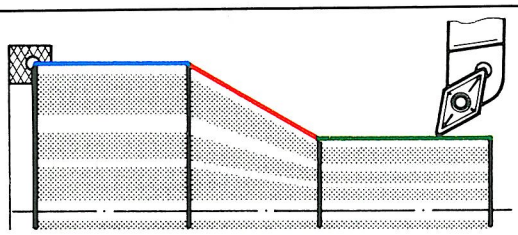
L = Useable length of the tool

GILDEMEISTER AUTOMATION

Cutting speed and spindle speed

1. G96 = constant **cutting speed** in $\frac{m}{min}$

G96 S180



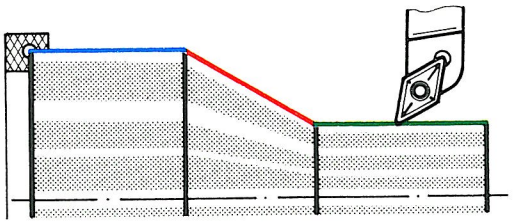
high spindle speed

stepless speed change

low spindle speed

2. G97 = constant **spindle speed** in $\frac{1}{min}$

G97 S2400



all the same spindle speed

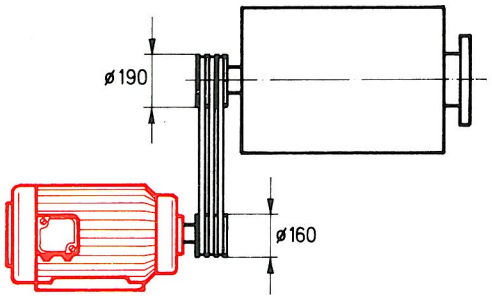
GILDEMEISTER AUTOMATION

Performance curves of a CNC turning machine

CT 40:

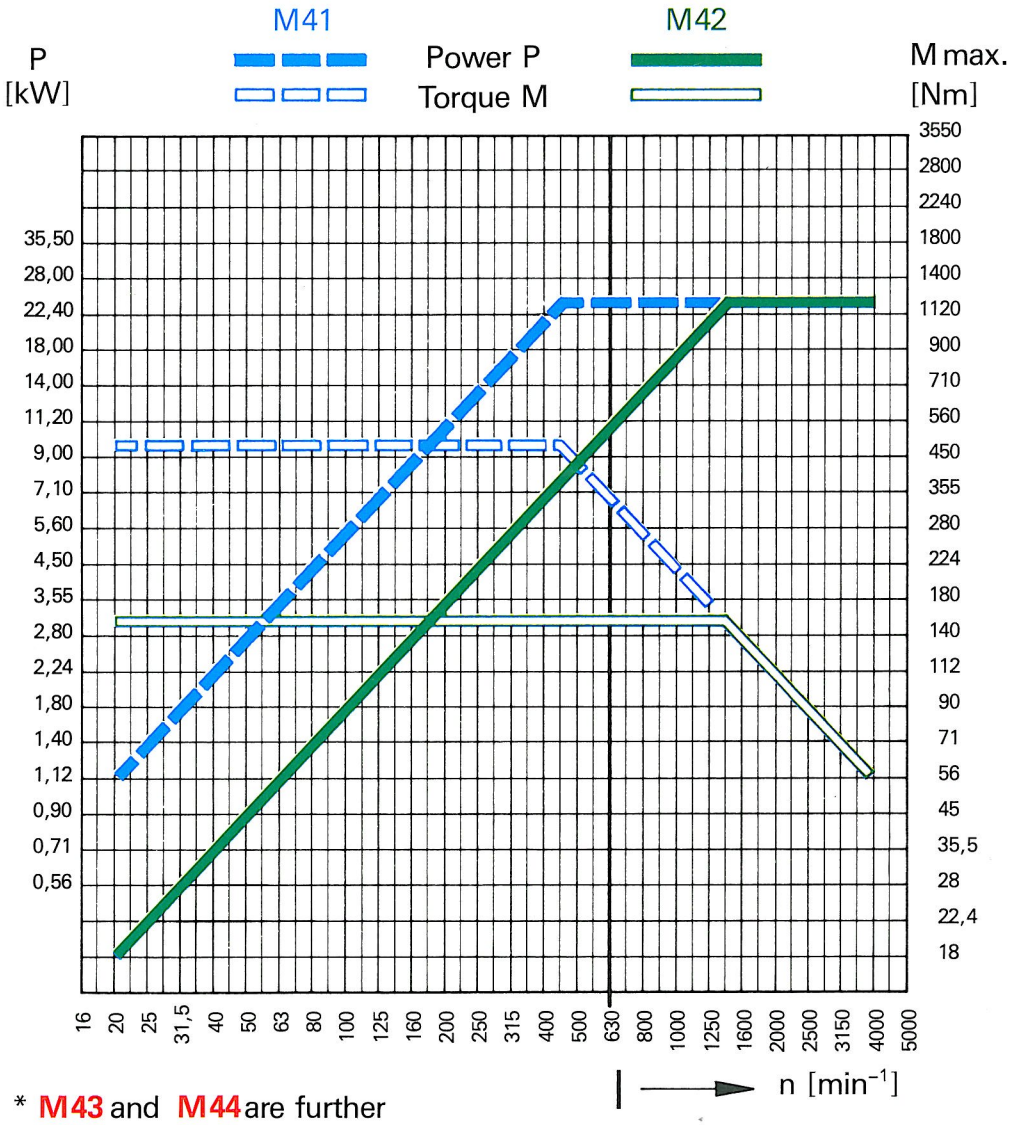
$n_{min} = 20 \frac{1}{min}$

$n_{max} = 4000 \frac{1}{min}$



Range I: $i_1 = 3{,}18 : 1$ **(M41)***

Range II: $i_2 = 1 : 1$ **(M42)**



* **M43** and **M44** are further gear ranges on larger machines

G26 S630 = Spindle speed limit

The GILDEMEISTER-EltroPilot control allows the contour to be displayed on the screen at any stage of programming.

This facility is of considerable advantage in **shop-floor programming**.