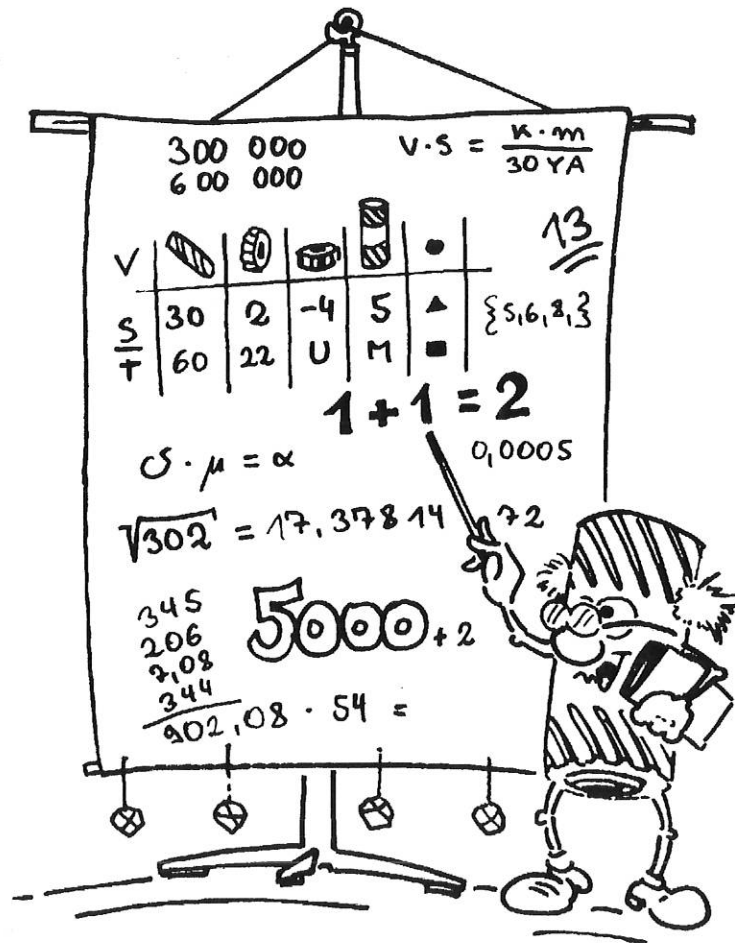


TECHNICAL DESCRIPTION

3.



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3.1 SURVEY OF THE MACHINE COMPONENTS

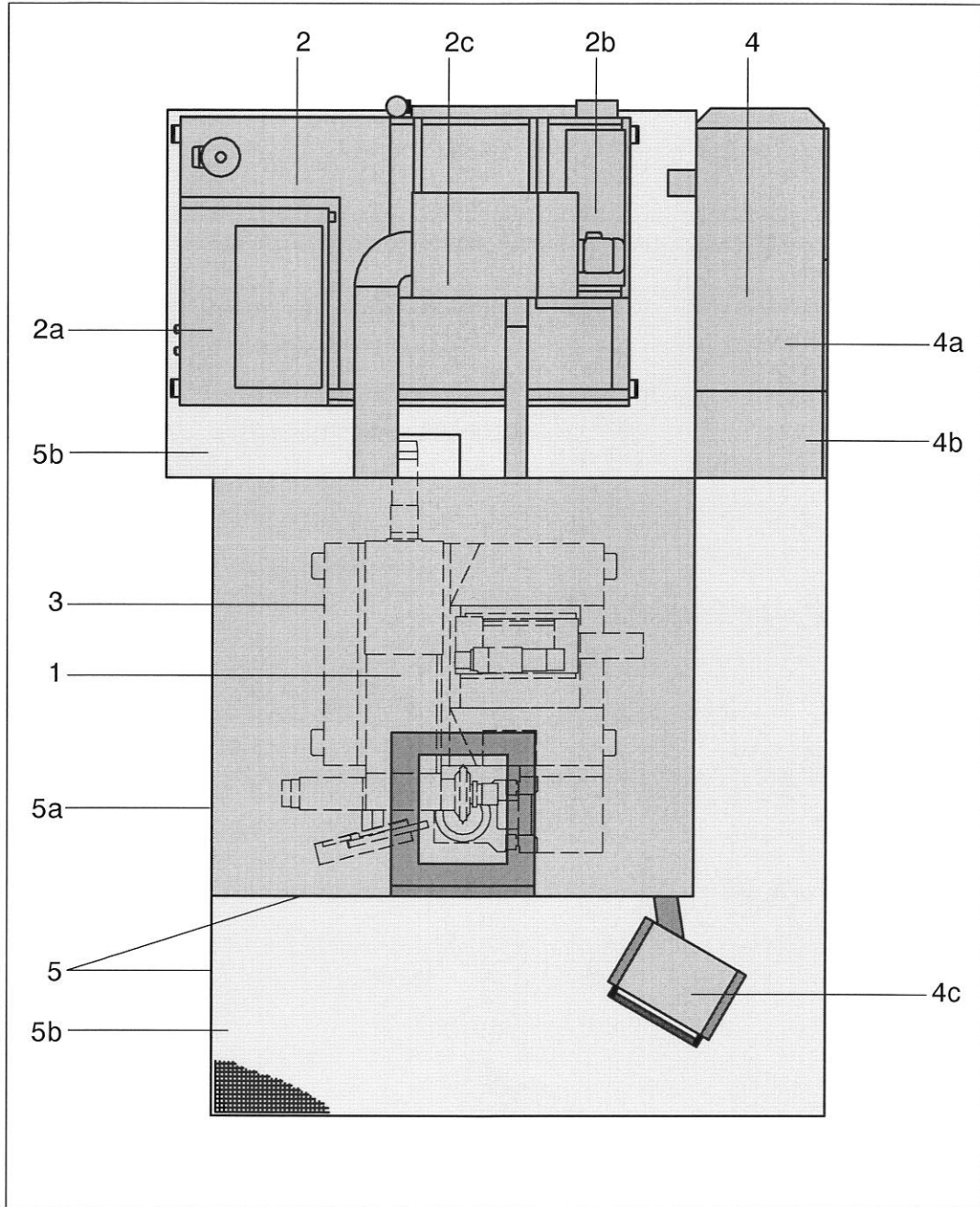


Fig.3-1 Survey of machine

| 1. Machine - see Fig. 3 - 2 | |
|------------------------------------|----------------------------------|
| No. | Component |
| 1a | Machine bed |
| 1b | Workpiece slide |
| 1c | Drive for workpiece slide |
| 1d | Indexing axis |
| 1e | Dressing slide |
| 1f | Dressing spindle |
| 1g | Diamond roll |
| 1h | Tool slide |
| 1i | Grinding wheel mount |
| 1k | Balancing unit |
| 1l | Swivelling unit |
| 1m | Measuring system workpiece slide |
| not shown | Hydraulic clamping device |
| | Inductive threading-in device |
| | Counter support |

| 2. Grinding oil filtration - see Fig. 3 - 1 | |
|--|-----------------------------|
| No. | Component |
| 2a | Grinding oil cooling unit |
| 2b | Grinding oil filtering unit |
| 2c | Oil mist exhaust unit |
| not shown | Grinding oil supply |
| | Line routing |

| 3. Hydraulics, lubrication, pneumatics - see Fig. 3 - 1 | |
|--|------------------|
| No. | Component |
| 3 | Hydraulics |
| | Lubrication |
| | Pneumatics |

| 4. Electrical system - see Fig. 3 - 1 | |
|--|------------------|
| No. | Component |
| 4a | Electric cabinet |

| No. | Component |
|-----|-----------------|
| 4b | Cable cabinet |
| 4c | Operating panel |

| 5. Machine cover - see Fig. 3 - 1 | |
|-----------------------------------|---------------|
| No. | Component |
| 5a | Machine cover |
| 5b | Oil pans |

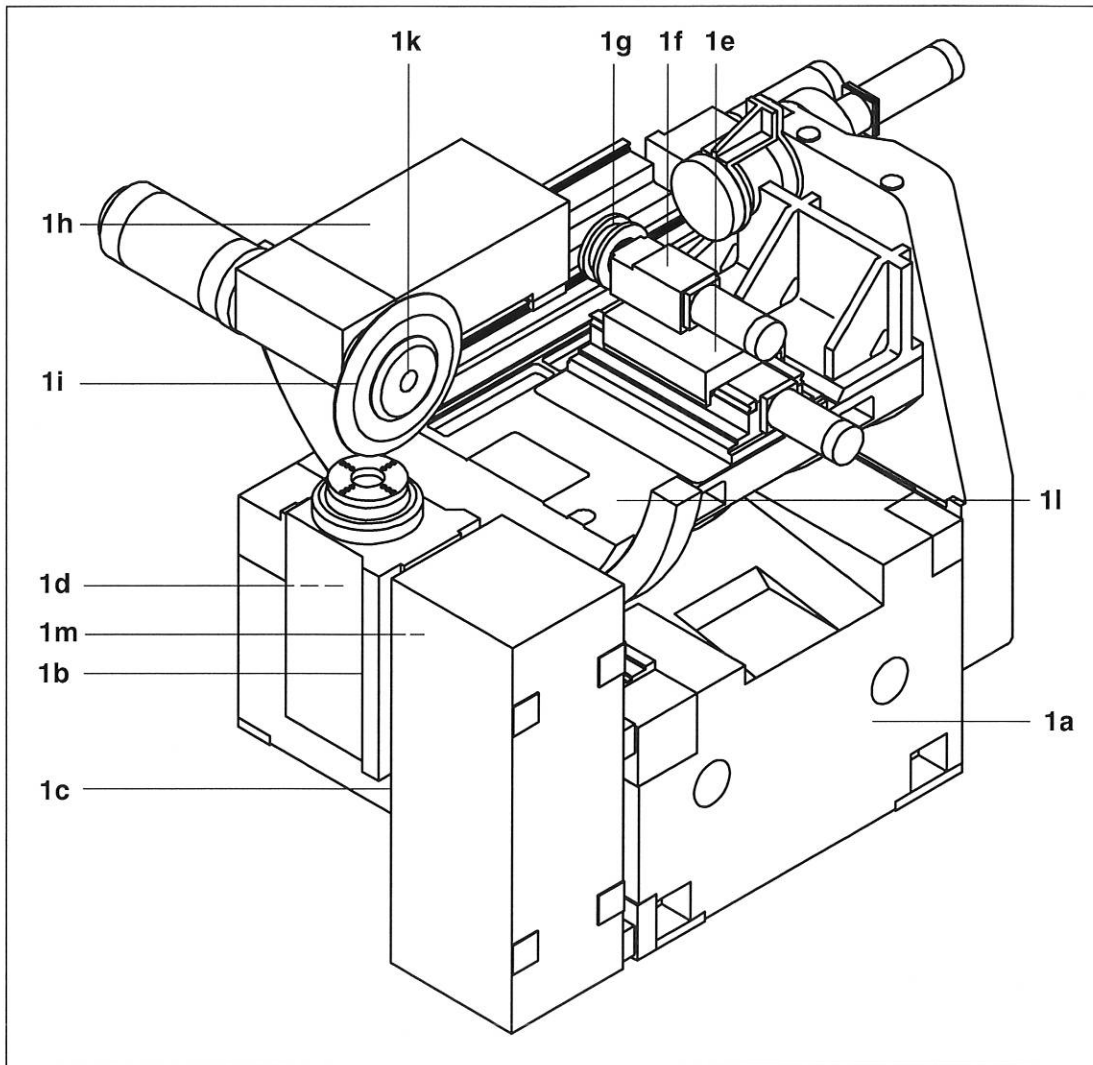


Fig.3-2 Assembly groups

3.2 FUNCTIONAL DESCRIPTION

3.2.1 CNC AXES

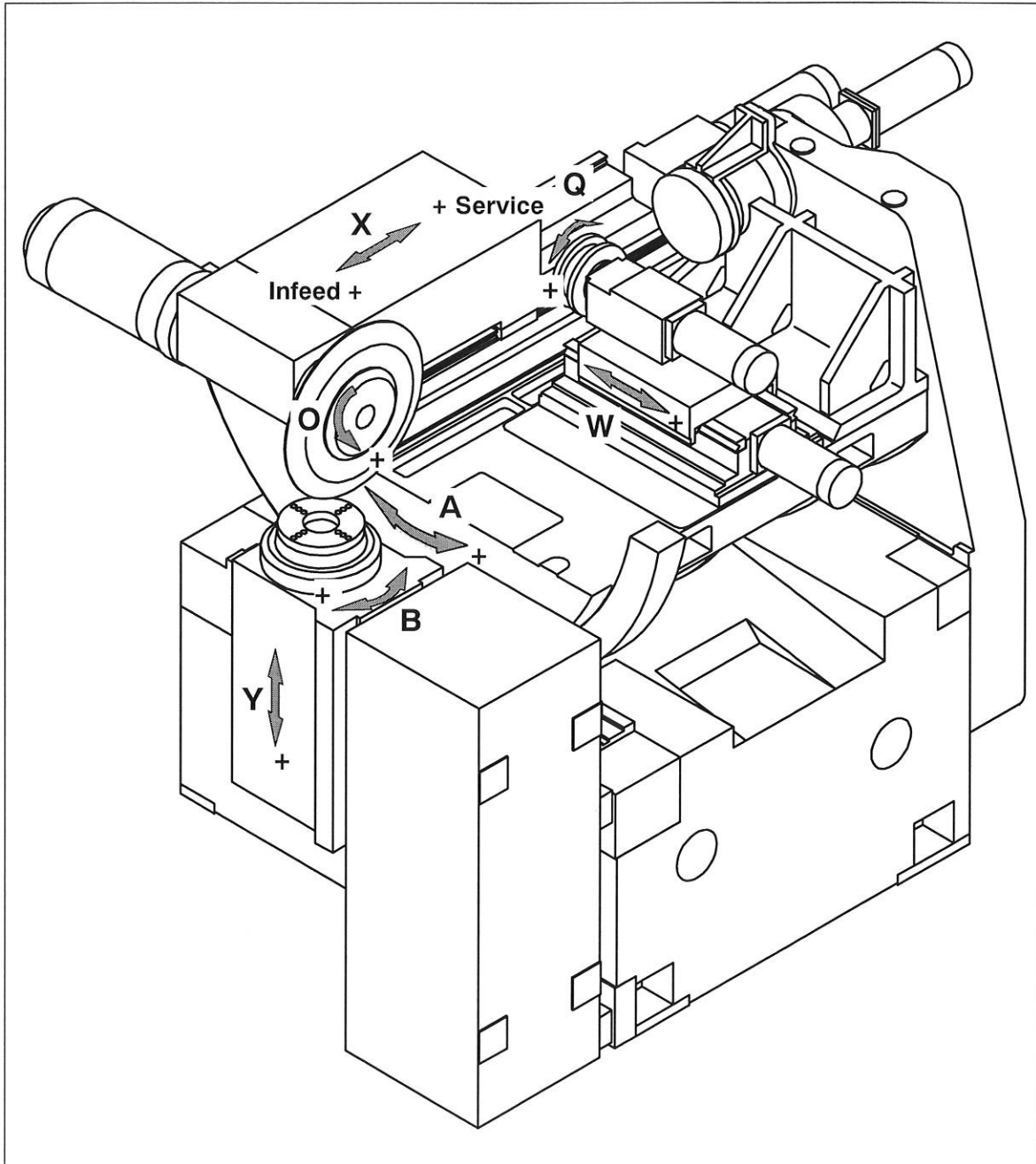


Fig.3-3 CNC-axes

TECHNICAL DESCRIPTION

| Axis description | | |
|------------------|------------------|---|
| Axis | Component | Function |
| A | Swivelling axis | Swivelling-in the grinding wheel at the helix angle |
| B | Indexing axis | Positioning, individual indexing, continuous indexing, lead modification, infeed |
| O | Grinding spindle | Rotary movement of the grinding spindle |
| Q | Dressing spindle | Rotary movement of the dressing roll |
| W | Dressing slide | Producing the tool profile |
| X | Tool slide | Radial infeed movement, diameter adjustment, grinding-wheel wear compensation, lead modifications |
| Y | Workpiece slide | Stroke movement |



WARNING At X-axis the control distinguishes between feed motions and general positioning motions!

Feed motions: Motions of the axis in the grinding program (during threading-in and touch grinding), “+” in direction to the workpiece.

General positioning motions (service): Motions of the axis in the service mode (in Höfler mode), “+” in direction away of the workpiece.

(For signs of the axes please refer to Fig. 3-3 Axes)

3.2.2 GRINDING METHODS

The **HELIX** can be operated in the single or double-flank grinding mode. Selection of the machining method is determined by the geometrical shape of the workpiece including the heat treatment distortion and the required lead modifications.

SINGLE FLANK GRINDING MODE

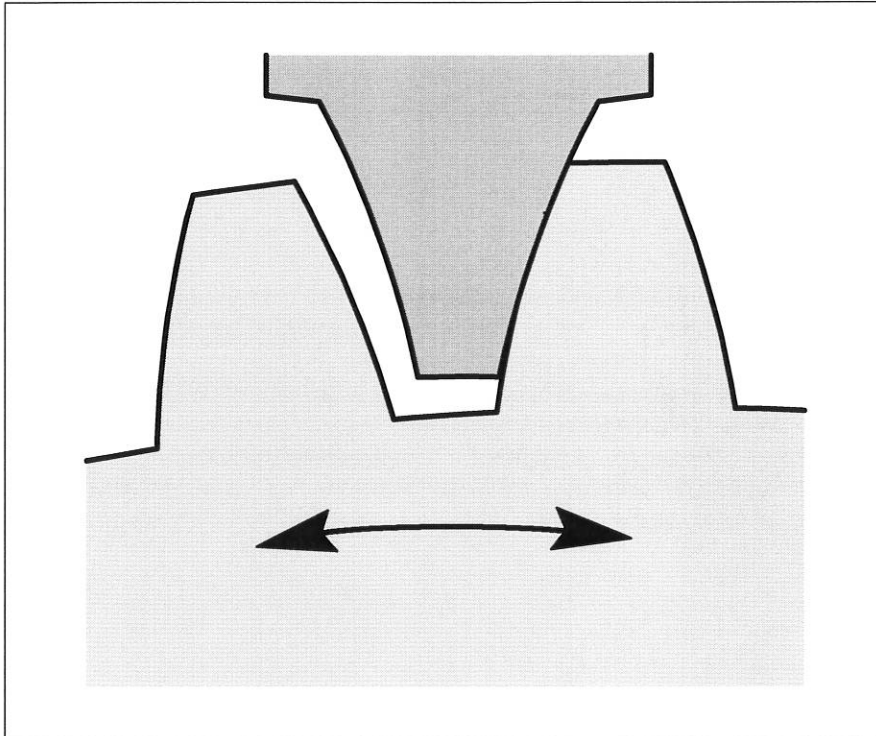


Fig.3-4 Single flank grinding mode

In the single flank grinding mode the two flanks of the tooth gap are ground consecutively.

This process allows

- ▶ different infeeds for the left and the right flank depending on the heat-treatment distortion.
- ▶ Different lead modifications can be ground on the left and right flank (load grinding).

Infeed for stock removal is in the tangential direction through rotation of the workpiece table in accordance with the infeed dimension. When grinding lead modifications, the involute is retained over the entire width of the gearwheel.

DOUBLE FLANK GRINDING MODE

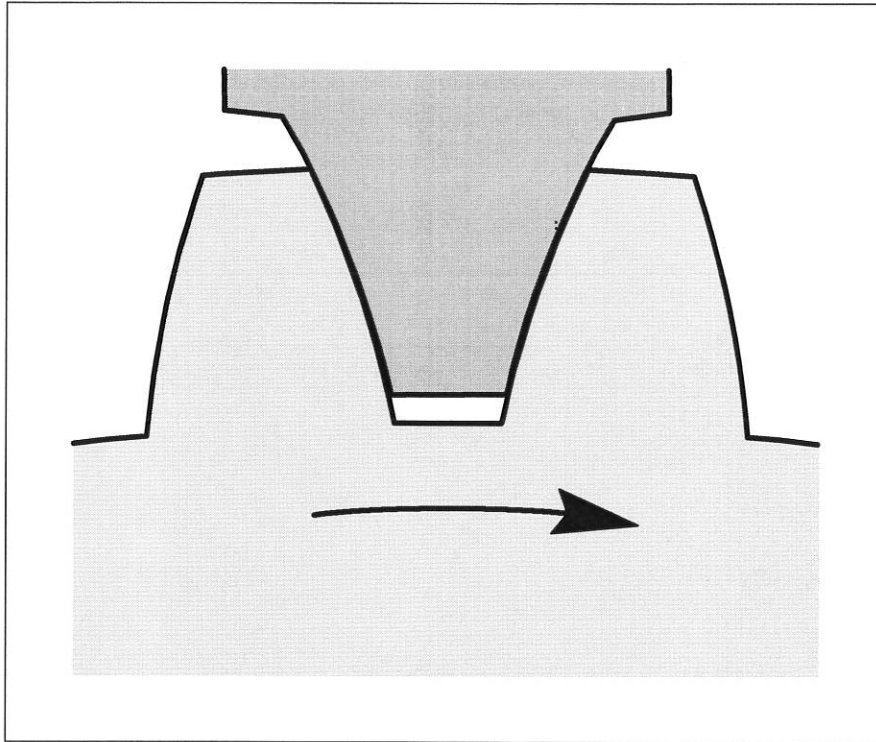


Fig.3-5 Double flank grinding mode

In the double flank grinding mode both flanks of a tooth gap are ground simultaneously. As a result, the grinding wheel is given the exact negative profile of the tooth gap. Infeed during grinding and for lead modifications (crowning) is in the radial direction with the tool slide. The involutes are shifted toward the center of the gearwheel in the area of the modifications.

3.3 TECHNICAL DATA

3.3.1 DATA SHEET

| Workpiece | | | | |
|---|--------------------------|---------|-------------|-------------------|
| Tip diameter | da | max. | mm | 400 |
| Root diameter | df | min. | mm | 20 |
| No. of teeth | | | | freely selectable |
| Module | | min. | mm | 1 |
| | | max. | mm | 10 |
| Gearwheel width | | max. | mm | 200 |
| Helix angle L+R | | max. | deg | 45 |
| Tool | | | | |
| Grinding wheel diameter: dressable | | min. | mm | 240 |
| | | max. | mm | 400 |
| Width of grinding wheel | | | mm | 30 (20/35/40/45) |
| Grinding wheel drive power | | | kW | 15 |
| Circumferential speed of grinding wheel | | max. | m/s | 60 |
| Other data | | | | |
| Counter support (Adjustable) | Distance between centers | max. | mm | 600 |
| | Passage | | mm | 400 |
| | Regulating range | | mm | 210 |
| Workpiece weight | | max. | kg | 80 |
| Total weight of machine | | approx. | kg | 8500 |
| Operating capacity | | approx. | kVA | 30 |
| Compressed air supply | Pre-pressure | | bar | 6-8 |
| | | | Consumption | m ³ /h |
| Noise level | | ≦ | dB[A] | 80 |

3.3.2 CLAMPING RANGE

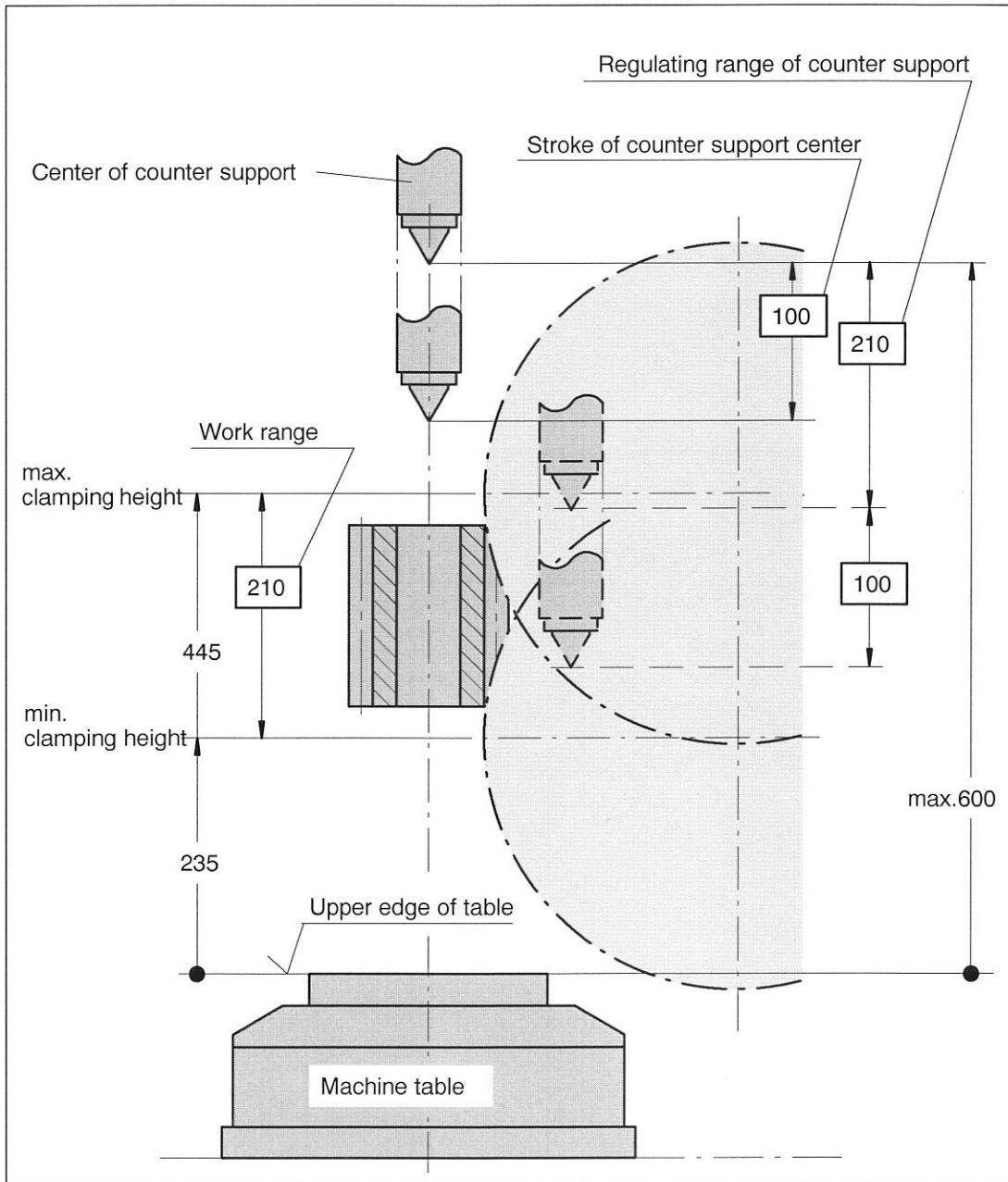


Fig.3-6 Clamping range with counter support

3.3.3 TABLE CONSTRUCTION

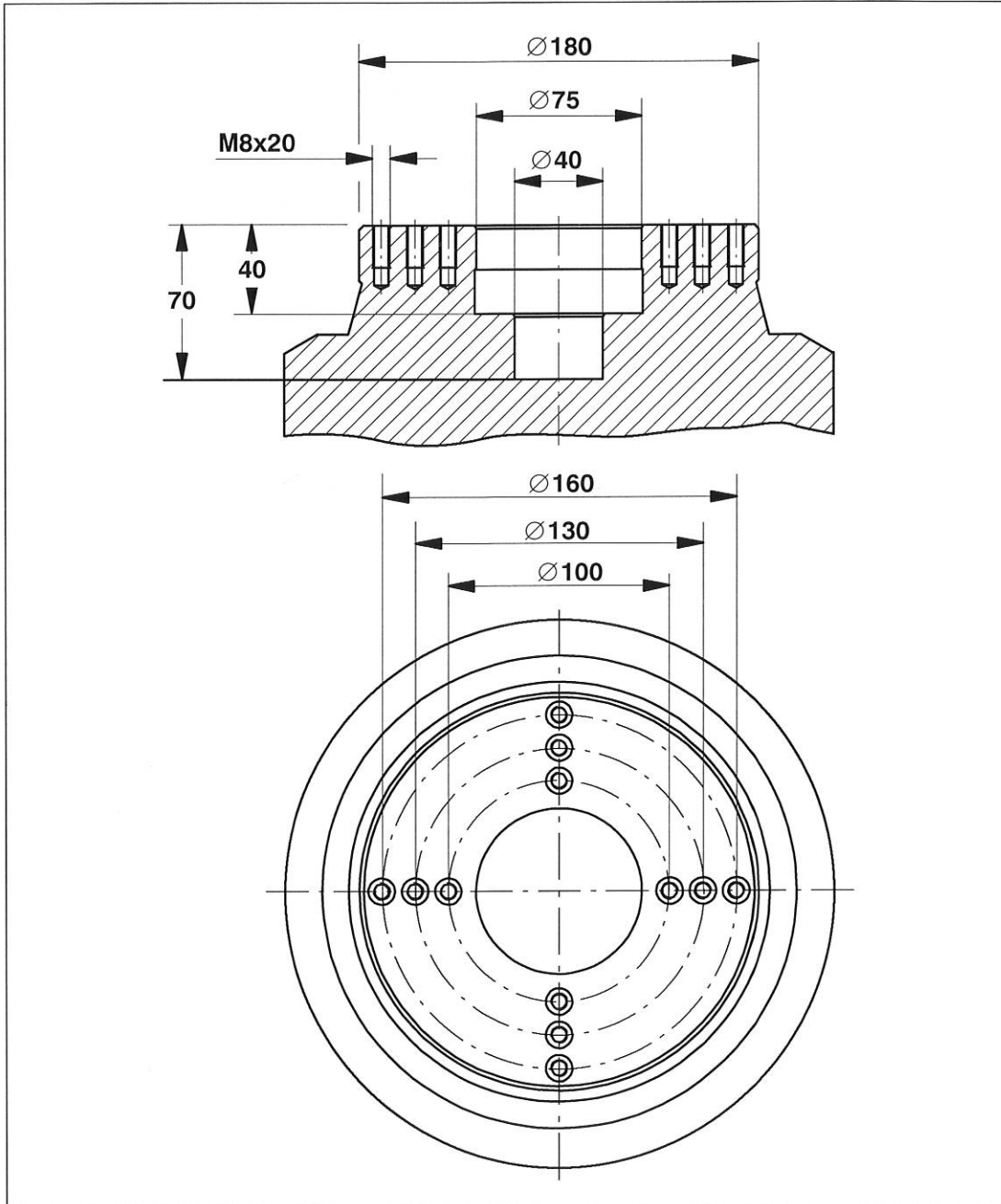


Fig.3-7 Table construction

3.3.4 TABLE WITH HYDRAULIC CLAMPING DEVICE

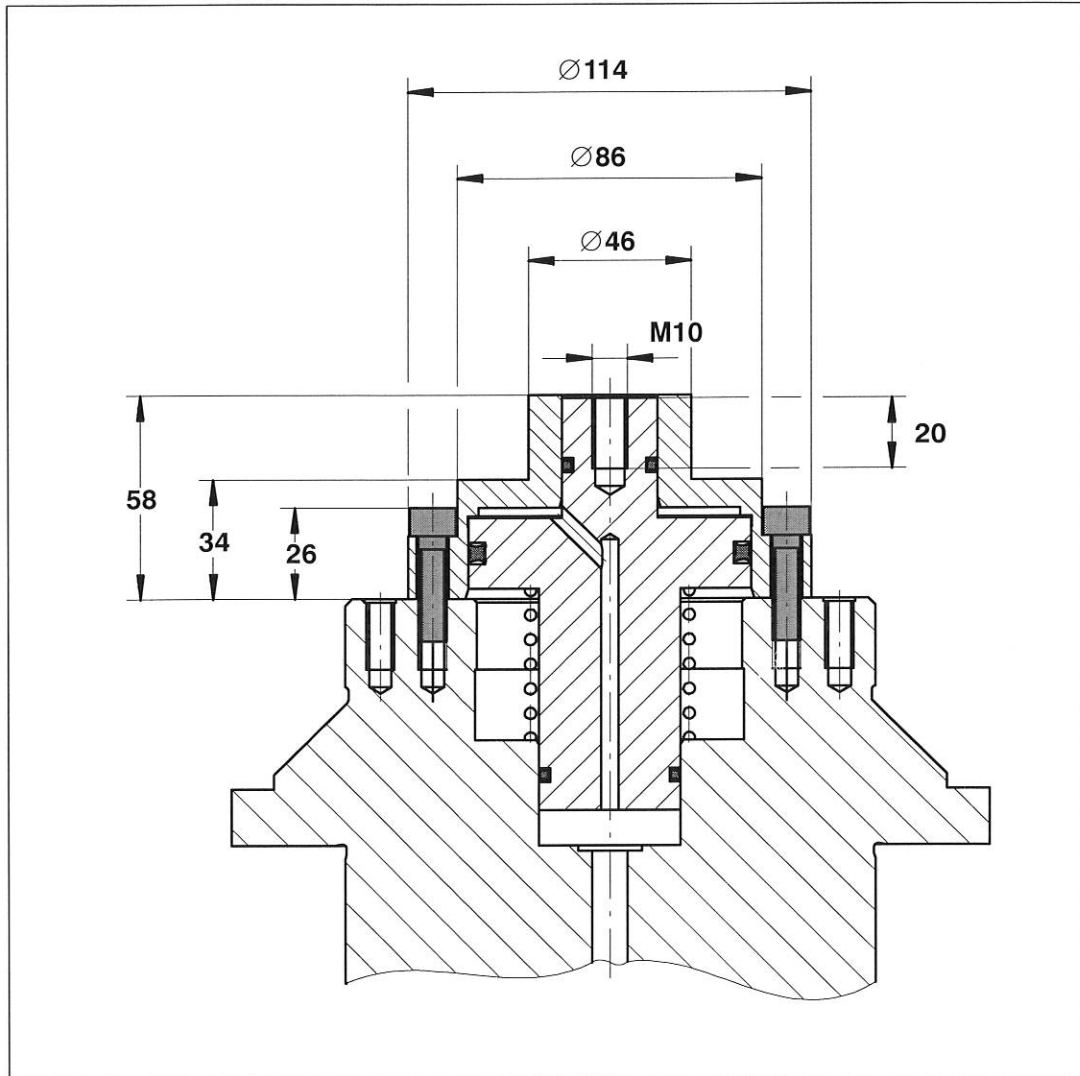


Fig.3-8 Table with hydraulic clamping device