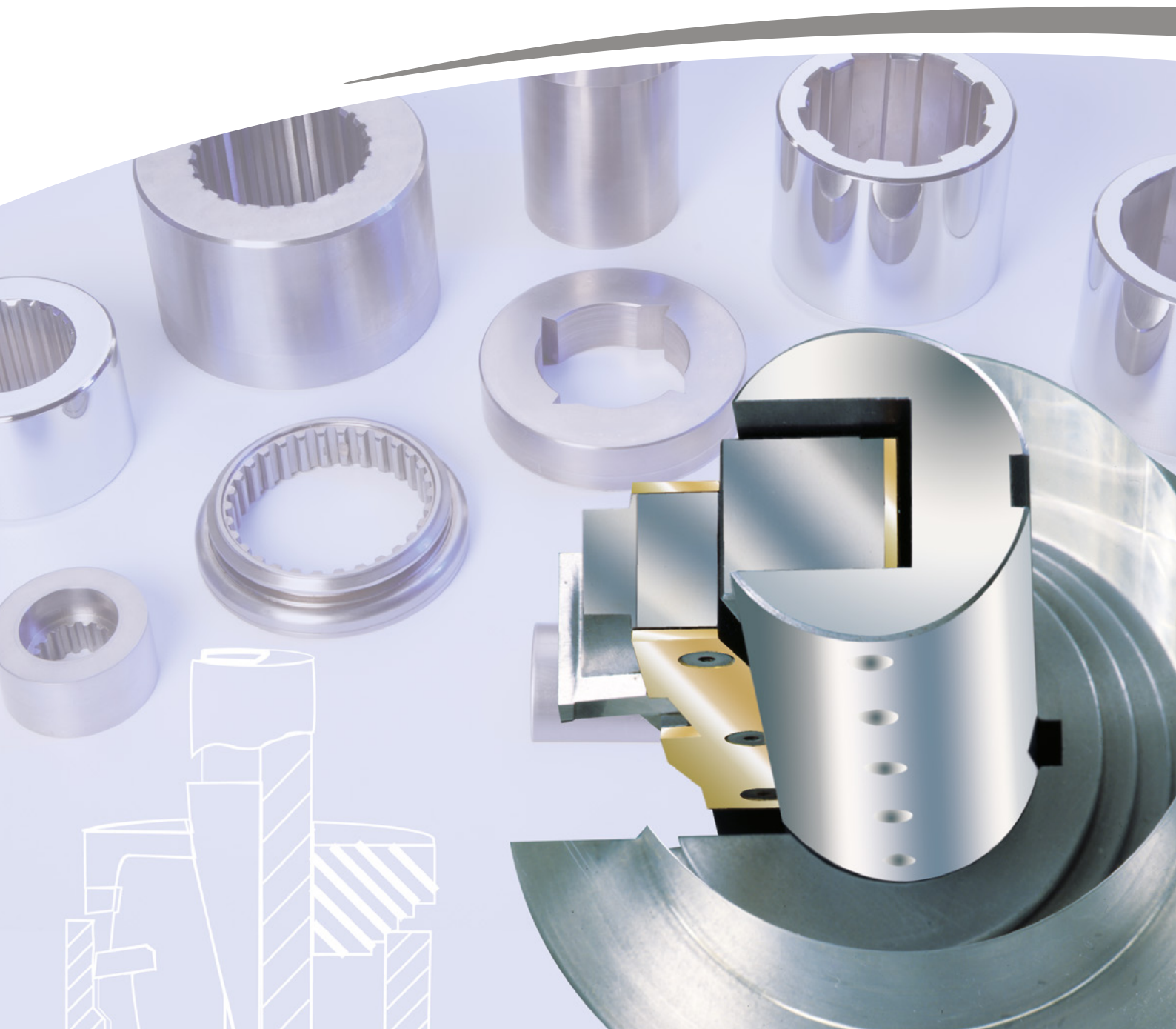# PROFILE AND KEYSEATING *MACHINES*

Machine tools

# APPLICATIONS FOR
KEYSEATING MACHINES

As mechanical engineers with years of experience, we are a competent partner for many different industries: from drive engineering to woodworking – the Leistritz Polymat and Polyjet series of machines are employed in just about every branch.
Our design and manufacture specialists work constantly to advance our technologies. We have continuously improved our profile and keyseating technology over many decades to deliver the highest quality from one source. The customer's benefit is always our top priority. As a reliable partner with a global service and sales organization, we offer a 24-hour tool grinding service and accompany our customers on their path to success.
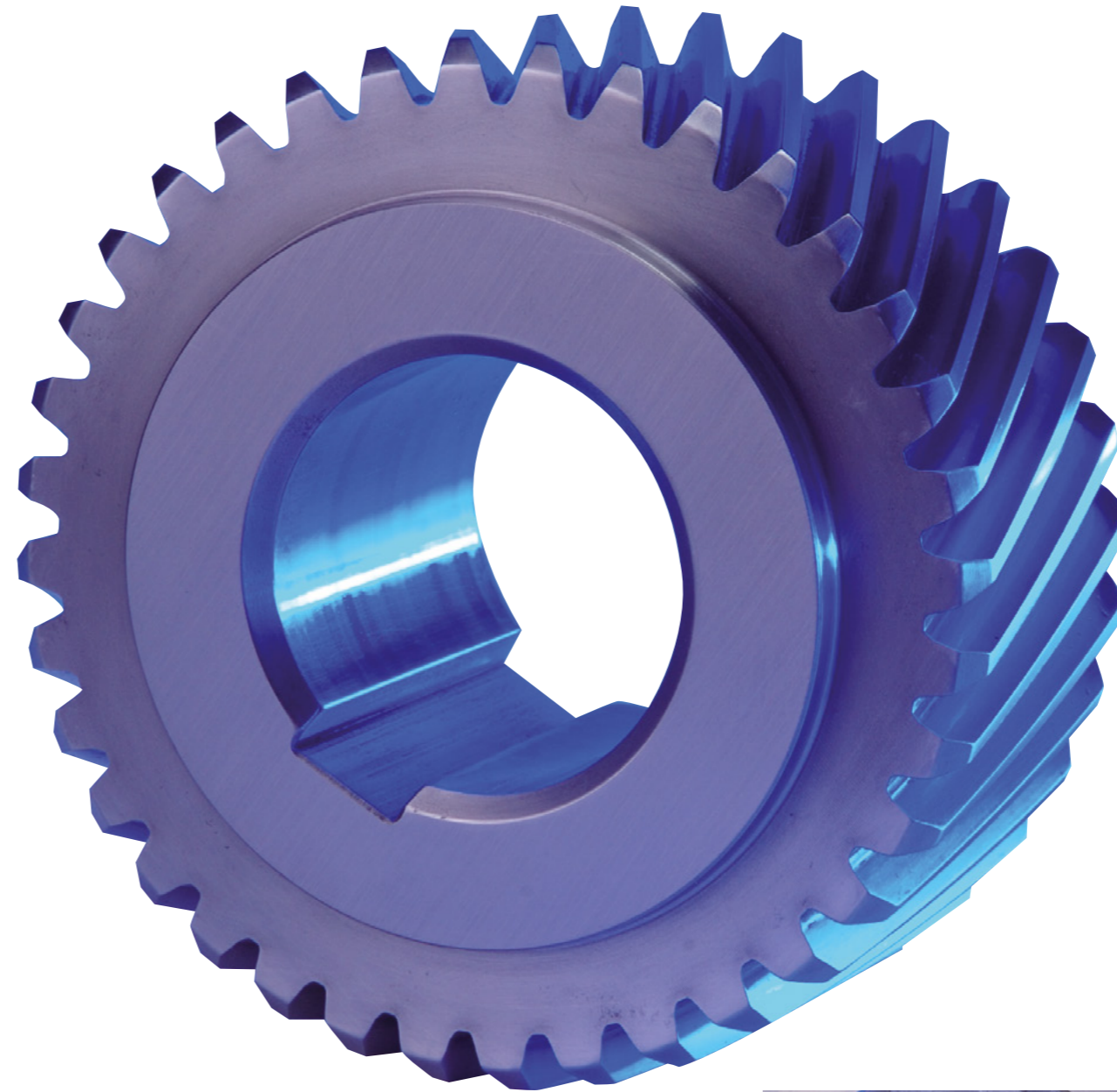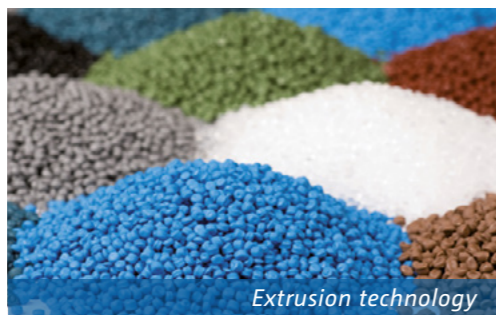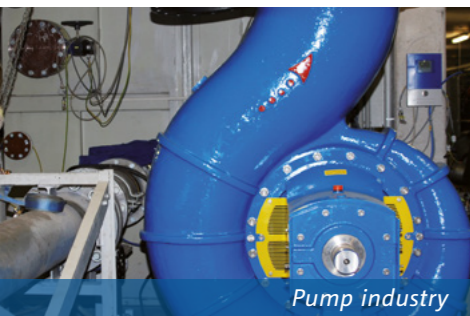
Agriculture

Pipe fittings industry
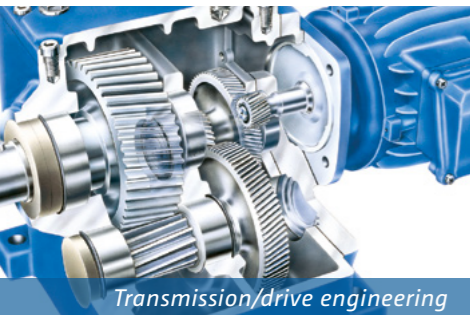
Transmission/drive engineering

Extrusion technology

Pump industry
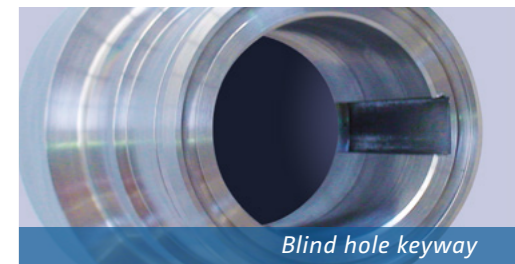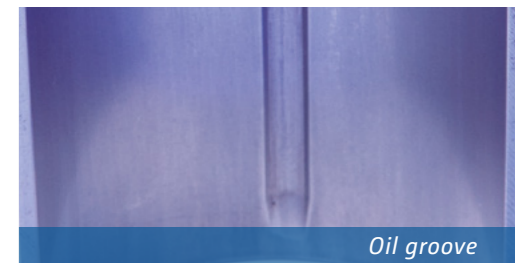
Mechanical engineering
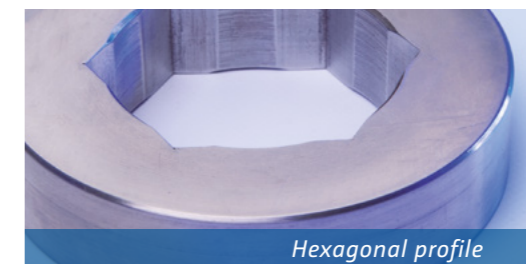
Woodworking machinery

Conveyor/lift engineering

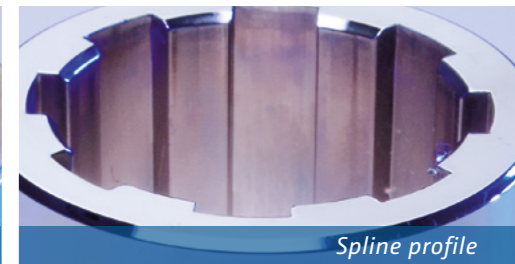*Blind hole keyway*
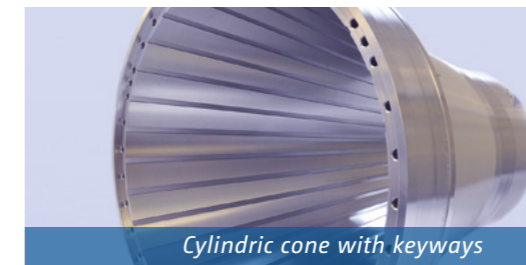
Oil groove

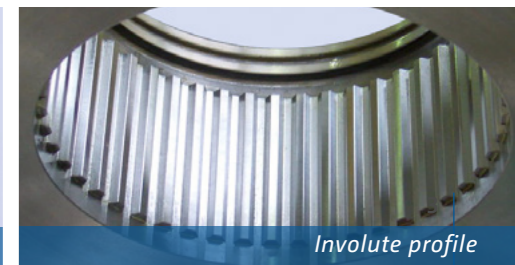*Hexagonal profile*

Feather keyway

Helical keyway

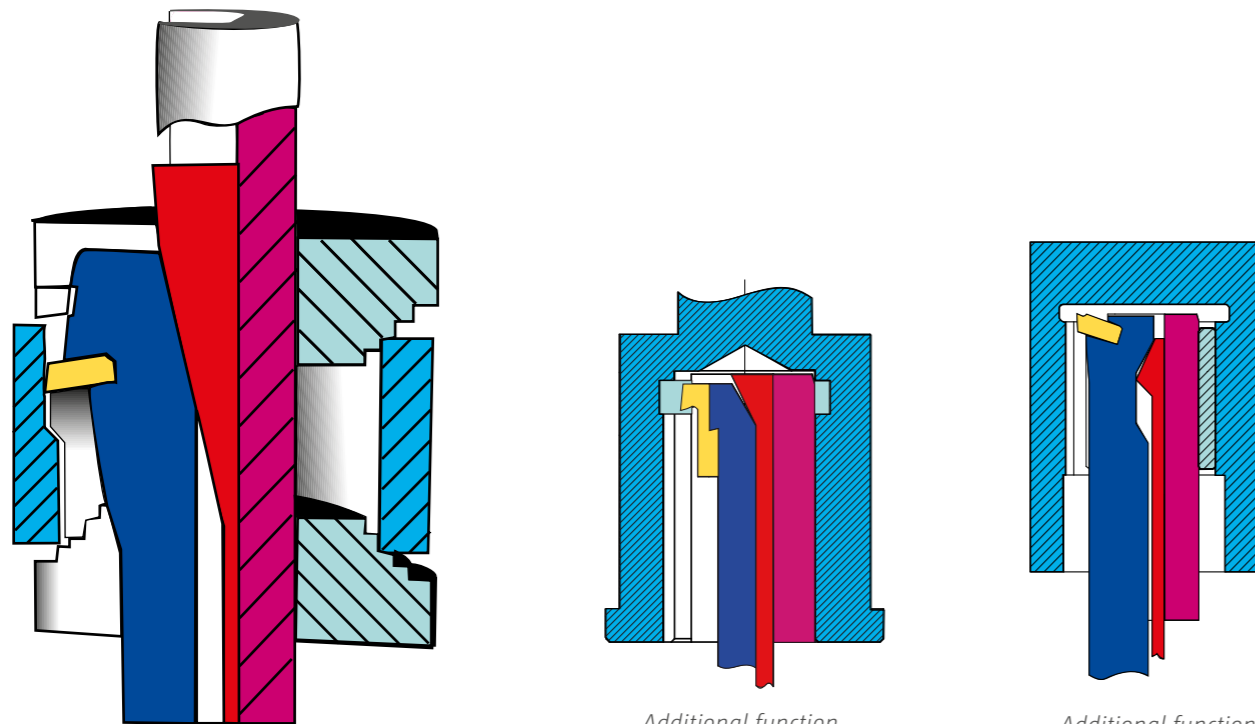*Spline profile*

Cylindric cone with keyways

Involute profile

HOW KEYSEATING
WORKS

The keyseating process cuts a keyway in stepwise manner. A cutter is pulled vertically with a continual stroke movement along the borehole, combined with a horizontal thrust motion. The thrust is delivered after each stroke by a feed bar that thrusts the cutter in steps between the cutter guide bar and cutter bar. To ensure gentle machining for the tool and workpiece, the cutter is automatically lifted off before the upward movement. The keyseating machines are equipped with a twin-column hydraulic guidance system. The in-line arrangement of tool and tool slide creates a fully linear alignment of forces within the tool and machine system. This avoids lateral forces and leverage, so that the machine is extremely long-lasting and virtually free of wear.

ADVANTAGES OVER SLOTTING

PRECISE

↗ Significantly greater precision, since the tool is guided over the entire keyway length (offset, depth, axis parallelism)
↗ Higher surface quality, since the tool and workpiece make one unit due to the centering elements

ECONOMICAL

↗ Higher cutting values, since the cutter cannot deviate from its path while cutting (cutting speed, feed)
↗ Workpiece and tool are clamped into a single unit, resulting in
  → Longer tool lives
  → Optimized process parameters

FLEXIBLE

↗ Significantly wider and longer keyways can be cut (length up to 1500 mm and width up to 125 mm)

ADVANTAGES OVER BROACHING

PRECISE

↗ CNC-controlled machining of
  → Keyways into blind holes
  → Helical keyways
  → Oil grooves
   at superior quality

ECONOMICAL

↗ Low space requirements, even for large keyway lengths or widths
↗ Gentle cutting for the workpiece (no warp)
↗ Low tool costs, since the customer can resharpen the cutters
↗ Short delivery times for tools and reasonable prices for special sizes
↗ Economic elements for workpiece centering and clamping

FLEXIBLE

↗ Easiest automation with integration of quick-clamping units (hydraulic/pneumatic)
↗ Flexibility in adapting tool widths

BASIC FUNCTION - KEYSEATING

Additional function blind hole cutting

Additional function blind hole slotting

- ■ Feed bar
- ■ Cutter guide bar
- ■ Cutter
- ■ Centerings
- ■ Cutter bar/holder
- ■ Workpiece
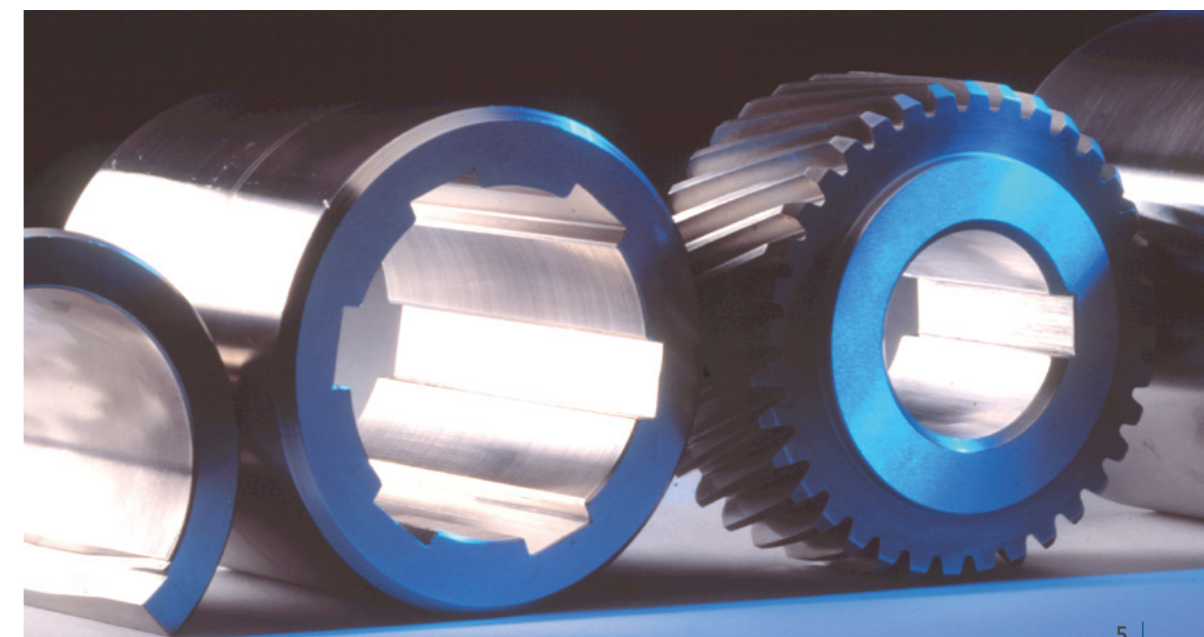
THE MACHINE SERIES

POLYMAT 25/32 NC

Machines in the NC series are an economic solution for the task of:
Cutting through-keyways/profiles into through-holes, either as single keyways or multiple keyways.

Typically, manual indexers are built onto the machine for multiple keyways.
NC machines generally come as 2-axis machines (controlled axes).

POLYMAT 70/100/125 CNC

CNC machines have controlled axes, which allows interpolation of the axes. Accordingly, in addition to the standard feather keyways according to DIN 6885 or custom profiles in through-holes, these machines also cut:

↗ Oblique keyways
↗ Oil grooves
↗ Keyways into blind holes
↗ Helical keyways
↗ Regular and irregular multiple-keyways/profiles (serrated/spline/involute profiles/…)

In addition to manual indexers, automated indexers (3rd CNC axis) can also be used on these machines.
Single copies and small batches are therefore just as economical to produce as large-scale production if, for example, the machine is integrated into a full manufacturing process, is automatically loaded and works over several hours unmanned.

POLYJET

The "hard" keyseating machine POLYJET 50 offers users a new
dimension in profile and keyway cutting. This new machine generation combines the performance of much more complex broaching machines with the flexibility and efficiency of keyseating machines.

The extremely high cutting speed of up to 120 m/min allows hard machining.
The Polyjet can be used for soft machining when short machining times are demanded.

PERFORMANCE DATA OF MACHINE SERIES

		POLYJET	POLYMAT				
		50	25 NC	32 NC	70 CNC	100 CNC	125 CNC
Cutting width	mm	2 - 50	25	32	70	100	125
Cutting length	mm	400	300	400	300/400/500/600 800/1000/1200	400/500/600 800/1000/1200	600/800/1000/ 1200/1500
Cutting force	N	21.000	6.000	7.200	21.000	32.000	44.000
Workpiece weight	kg	10.000	10.000	10.000	20.000	25.000	25.000
Main drive connected load	kW	40	3	4	7,5	11	18
Cutting speed	m/min	0 - 120	0 - 20	0 - 20	0 - 20	0 - 20	0 - 20
Constant return speed	m/min	0 - 120	0 - 20	0 - 20	20/40	20	20
Bore dia. to DIN 6885	mm	10 - 300	10 - 95	10 - 140	10 - 330	10 - 500	10 - 750
Feed rate	mm	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5
Space requirement, incl. electronics	m x m	2,3 x 1,4	1,1 x 1,3	1,1 x 1,3	1,2 x 2,3	1,2 x 2,3	1,4 x 2,7

EXPANSION
STAGES

↗ Manual indexer
↗ Automatic indexer
↗ Remote control for bulky workpieces
↗ Automatic workpiece clamp
↗ Tilting table for conical bores
↗ Automation
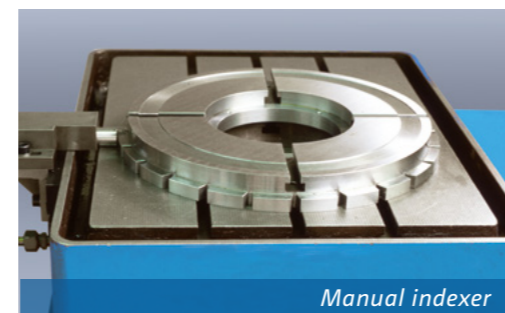↗ Automatic chip removal
↗ Tool lowering

Automation

Automatic workpiece clamp
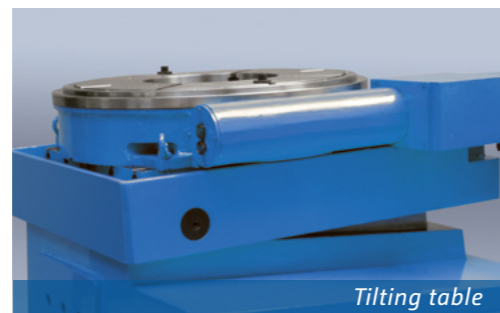
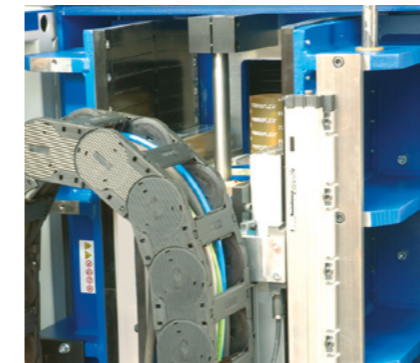*Tilting table*

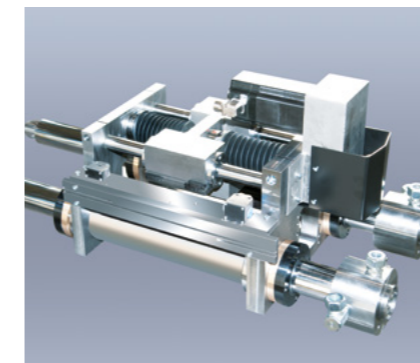*Manual indexer*

Remote control

Automatic indexer

DRIVE

DRIVE- LINEAR

The Polyjet 50 is driven by a high-dynamic linear drive. This low-maintenance and wear-free drive allows cutting speeds of up to 120 m/min.

DRIVE- HYDRAULIC

With precision-made, superfinished piston rods, the twin-column hydraulic guidance system ensures utmost precision in the tool slide. The piston rods and hydraulic oil provide guidance and drive in one unit. The hydraulic oil also ensures permanent lubrication of the system. Accordingly, the machine has no lubrication/maintenance points.

CONTROL

↗ CNC Control SINUMERIK 828d with 10,4"TFT color display
↗ Integrated PLC based on S7-200
↗ Control of up to 5 Axes
↗ CNC full keyboard
↗ Easy and intuitive user interface with graphic display of workpiece data
↗ Language setting can be selected
↗ User storage for up to 1000 manufacturing programmes machining program included in basic configuration, expansion of storage is possible
↗ High-class, robust front panel made from magnesium die casting in system of protection IP65
↗ Ethernet interface for connection to company network
↗ Rremote diagnostics
↗ Maintenance free

TOOL SETS,
CUTTERS AND CENTERING SETS

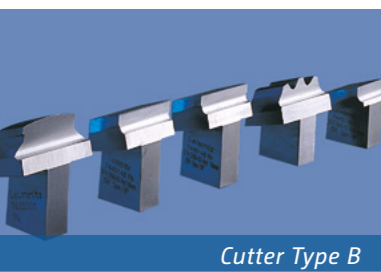Each tool set covers a specific machining range:

- ↗ Keyway width
- ↗ Borehole diameter
- ↗ Keyway length

The respective tool must be selected to match the machining task. The cutter required for the cutting task is selected to match the defined tool set.
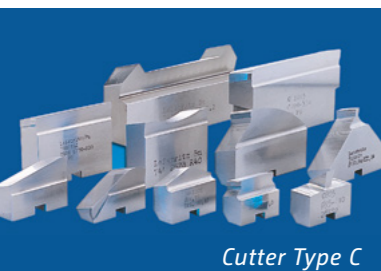
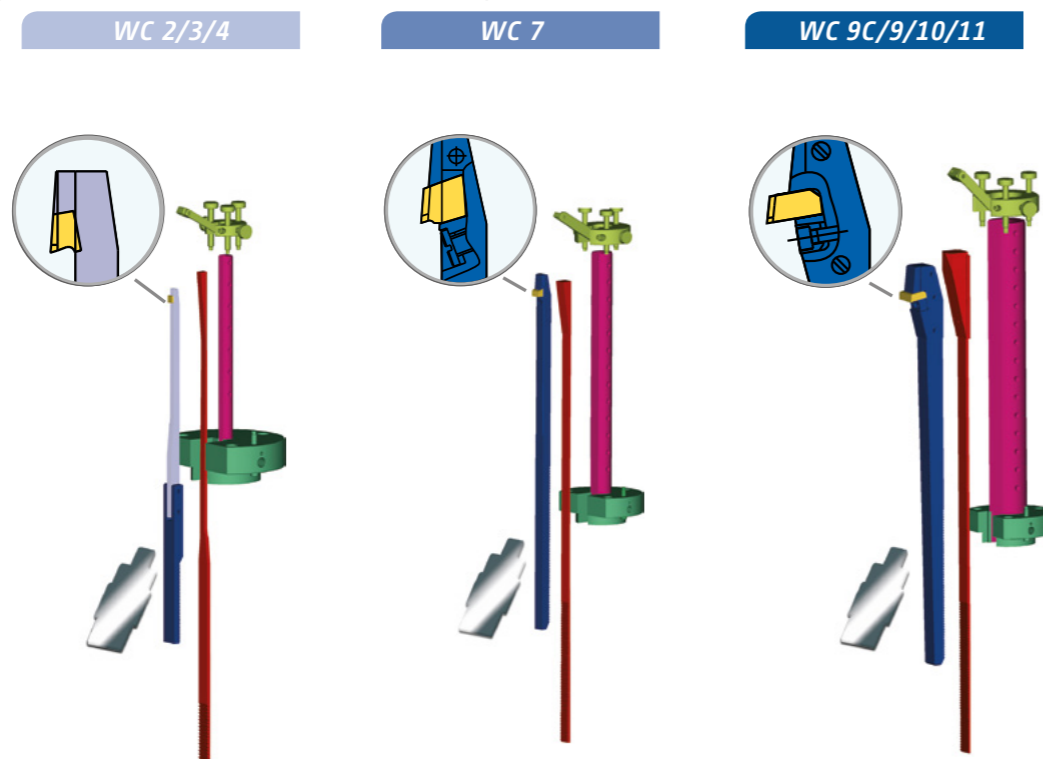## Standard tooling for profile and keyseating machines

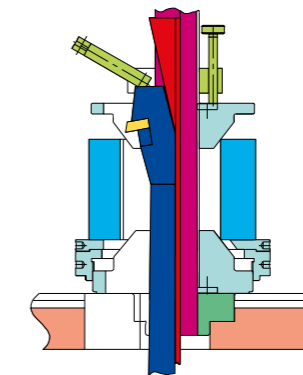| WC 2/3/4 | WC 7 | WC 9C/9/10/11 |
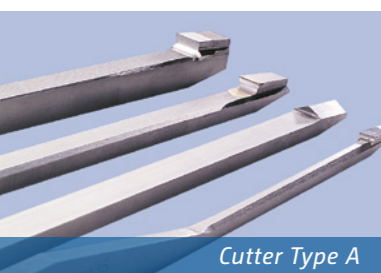
Cutter Type A

Cutter Type B

Cutter Type C

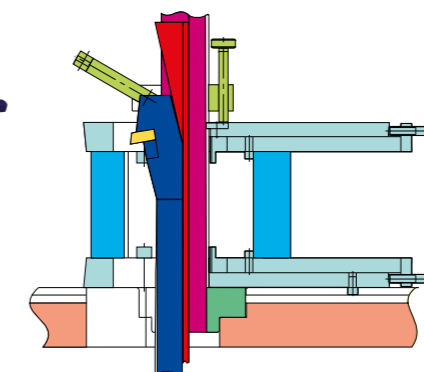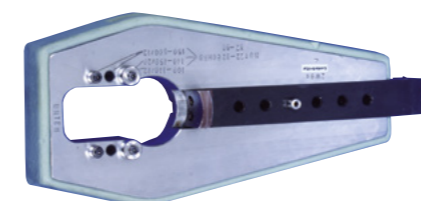| Tool kit, full equipment		WC 2	WC 3	WC 4	WC 7	WC 9c	WC 9	WC 10	WC 11
Keyway length, maximum	(mm)	100	100	150	500	800	1000	1200	1500
Keyway width	(mm)	2 – 3	3 – 6	6 – 12	12 – 22	22 – 50	22 – 50	56 – 100	56 – 125
Borehole diameter	(mm)	10 – 13	13 – 20	20 – 40	40 – 85	80 – 230	85 – 230	200 – 500	230 – 750
Cutter guide bar diameter	(mm)	10	13	20	40	70	85	110	140

CONE

The cone steplessly centers the workpiece against the bore chamfer, positively locating it relative to the cutter tool.

STEPPED BUSH
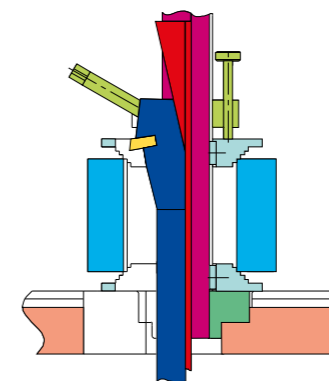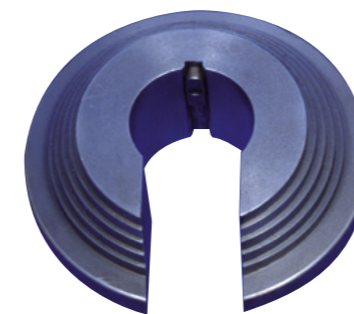
The workpiece is centered by its bore. The stepped bush clamps the top face of the workpiece and positively locates it relative to the cutter tool.

CONTINUOUSLY ADJUSTABLE

A three-point clamping system with fixed and adjustable clamping elements clamps the workpiece eccentrically and firmly by its bore.

APPLICATION OF THE CENTERING SET FOR TOOL BORES

Tool kit, full equipment		WC 2	WC 3	WC 4	WC 7	WC 9c	WC 9	WC 10	WC 11
Cone	(mm)	10,5 - 13	14 - 20	21 - 40	41 - 85	80 - 230	85 - 260	-	-
Stepped bush	(mm)	-	14 - 20	25 - 40	45 - 85	80 - 230	90 - 200	-	-
Continuously adjustable centering	(mm)	-	-	40 - 160	60 - 200	100 - 300	130 - 400	200 - 500	200 - 500 / 230 - 750

- Table insert bush
- Cutter guide bar
- Cutter
- Clamping piece
- Cutter bar/holder
- Feed bar
- Cutter shaft
- Centerings
- Chip remover

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