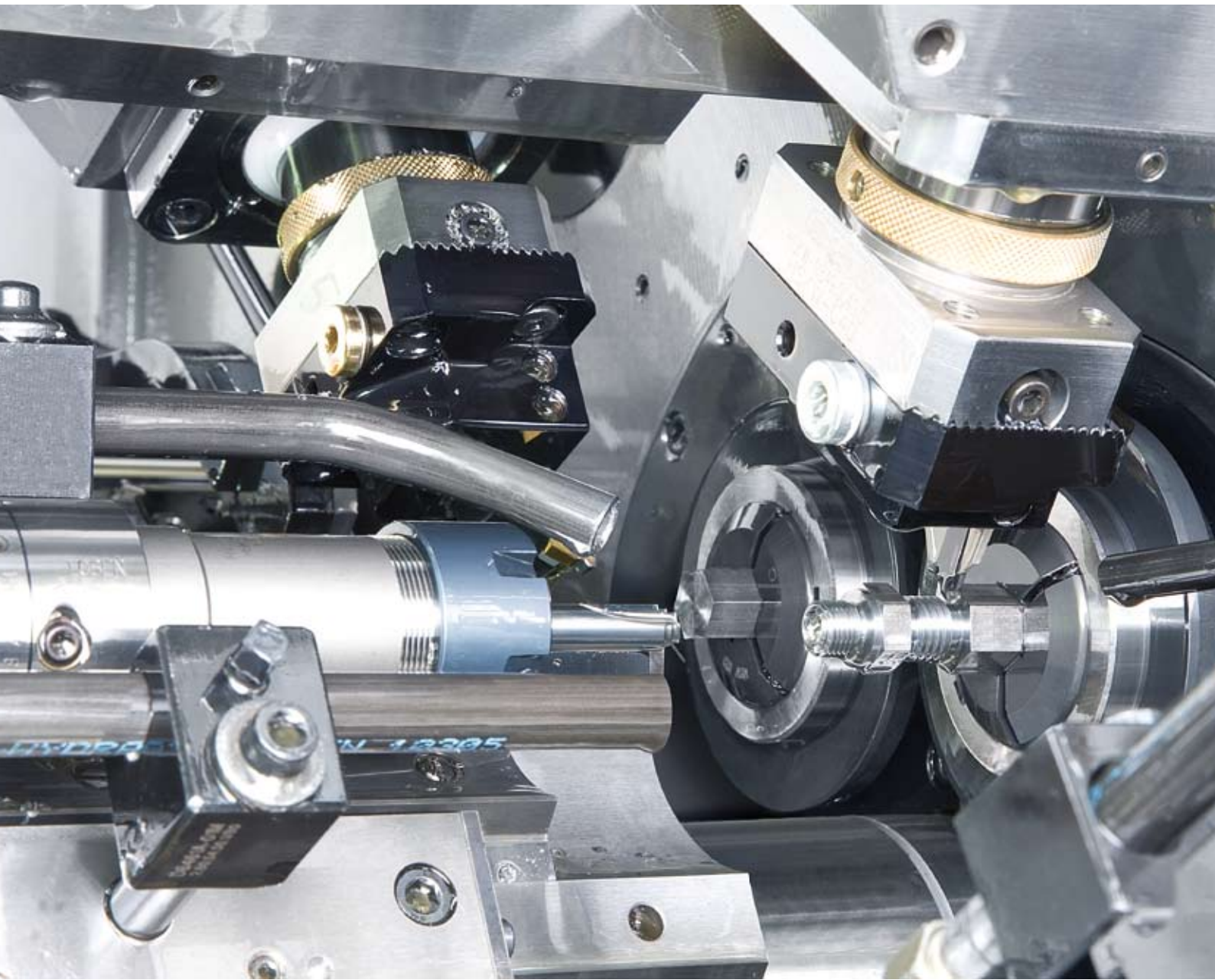


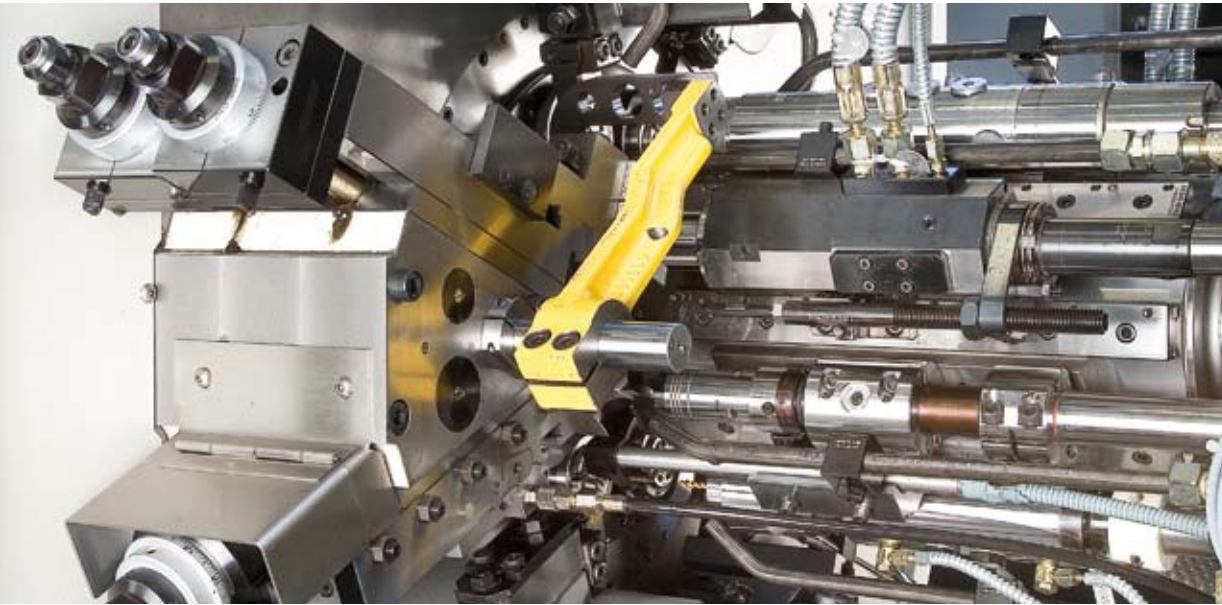


**Fast and compact
up to 20 mm**

SERIES G – CAM AUTOMATICS WITH CNC OPTIONS



Spindle drum of a
six-pindle automatic SG 18



SG 18 and AG 20 –
Cam-controlled multi-spindle
automatics with options
for CNC machining



Strengths unite to form a clever concept

The multi-spindle automatics of the G-series cover the range of small turned parts up to a diameter of 20 mm. These exceptionally fast, cam-controlled machines are ideal for the high-yield mass production of turned parts at short cycle times. However, this particular machine concept offers more – the G-series combines the speed and reliability of cam drives with the flexibility and the accuracy of CNC technology.

The G-series thus opens up a wide range of other applications. From the simple, mass produced turned part machined at high speed, to the precision complete-machining of complex workpieces – the G-series offers technologically sophisticated, economically attractive solutions for the manufacture of a multitude of turned parts. Quick-change interfaces for cams and tools make the machines also suitable for medium-size batch production and the manufacture of component families, with CNC slides reducing setting times still further.

The combination of tried and tested design principles with new technologies gives the performance of the G-series machines some impressive characteristics:

- Attractive cycle times through fast cam drives, extremely short idle times and high spindle speeds
- Outstanding precision, provided by a spindle drum that is locked with great positional repeat accuracy by a Hirth coupling
- Auxiliary functions, e.g. CNC slides and motorised cross slide adjustment allow for turning tolerances equalling those achieved on CNC machines
- High degree of flexibility, utilising a vast range of auxiliary equipment with the possibility – for example – to employ up to 4 CNC compound slides and a CNC pick-off spindle, and to stop and position specific work spindles

- Tried and tested – fast, reliable drive technology using cams; classic basic construction according to the Schütte Design.
- Flexible – contour turning with options such as CNC compound slides, CNC pick-off spindle and independent tool drives.
- Improved – attachments and quick-change systems, spindle stop (optionally also spindle positioning), cam changes.

The G-series opens up a wide range of turned part applications



**PRODUCTIVITY, FLEXIBILITY AND A WIDE RANGE OF APPLICATIONS –
BY COMBINING CAMS WITH CNC**



Endworking slide block of an
eight-spindle automatic AG 20



Basic construction of the
SG 18 according to the
classical Schütte design

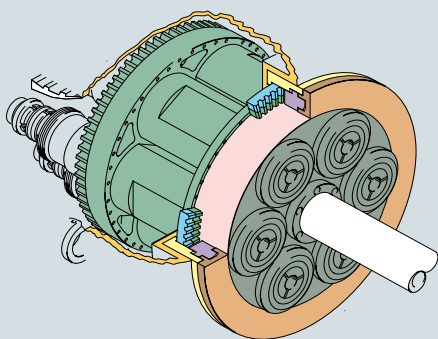
The classical Schütte Design

The basic construction of the G-series follows the classical concept of the cam-controlled automatic, where six or eight spindles index in a precision-made spindle drum that is locked with great repeat accuracy by a robust Hirth coupling. The cross slides for O/D machining are mounted on the spindle head. An endworking slide block ensures accurate guidance of the face-machining tools.

Spindle and drive head are mounted on a torsion- and vibration-resistant mineral cast compound machine base and connected by a robust longitudinal support beam. This creates a closed-loop framework that guarantees optimal force distribution and a high degree of rigidity.

The G-series machines feature a generously proportioned, easily accessible machining area on a small footprint. Endworking and cross slide controls are of compact design. The hydraulics and the lubrication system form an integral part of the machine. The electrical cabinet is attached to the front of the drive housing and easily accessed. A hinged operating panel allows the machine to be operated from both sides.

The G-series offers the user a number of optional attachments to suit different applications. The SG 18 has 6 spindles and a bar capacity of 18 mm diameter; the AG 20 has 8 spindles and a bar capacity of 20 mm diameter.

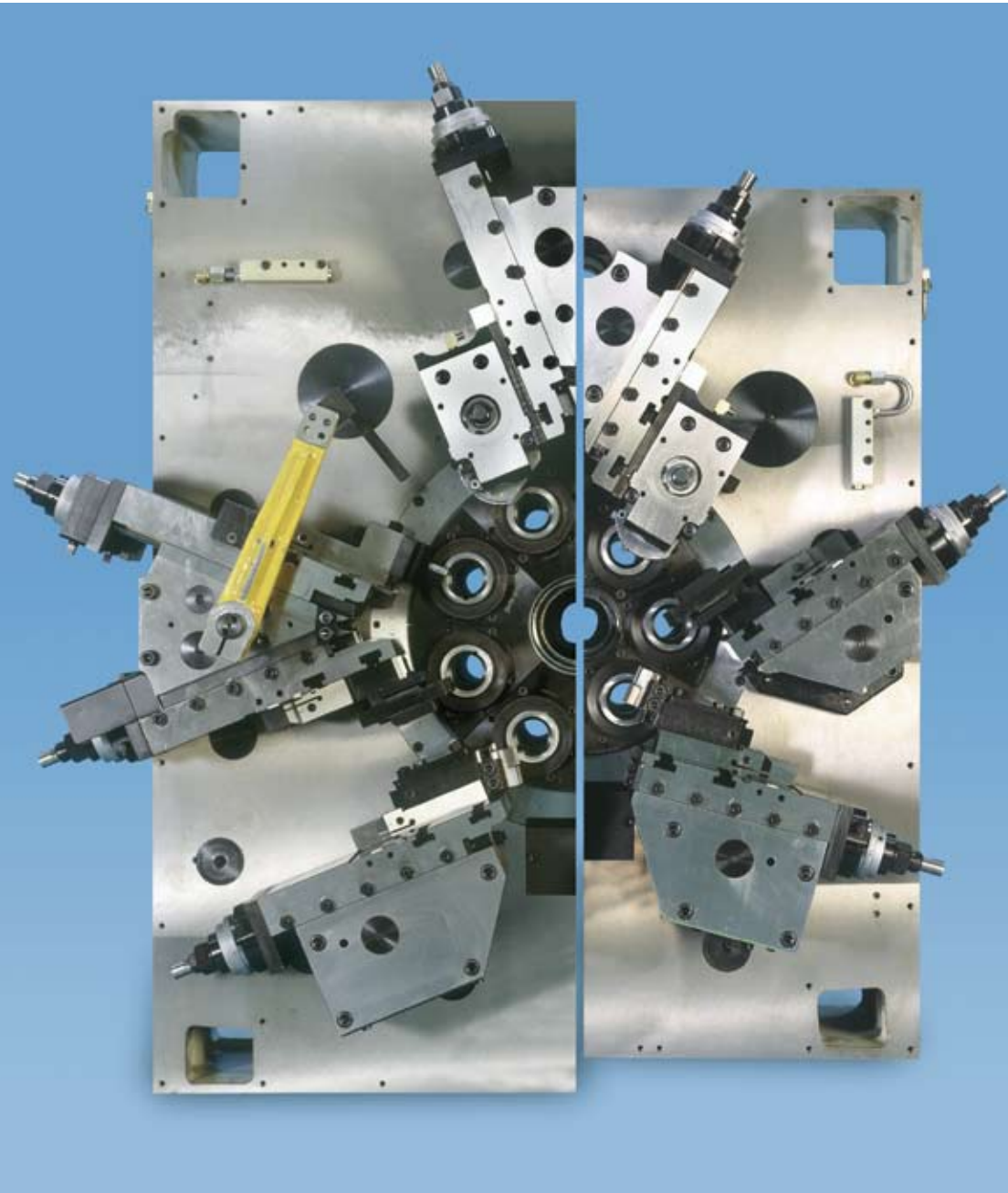


- The sturdy framework construction makes the machine compact and lends it rigidity.
- The vibration-damping, thermo-stable mineral cast compound machine base guarantees a low-vibration machining process.
- Precision-made, sturdy spindle drum that indexes and locks with great repeat accuracy.
- Lifetime lubricated spindle bearings with labyrinth seals to prevent coolant ingress.
- Robust, hydrodynamic guideways for cross and endworking slides
- Independent, optimised spindle speeds and feedrates through two infinitely variable AC motors.

RELIABLE, WELL-PROVEN, ROBUST AND PRECISE



A hinged operating panel serves both sides of the machine



The right equipment for every application:
SG 18 with 6 or 2 x 3 spindles,
AG 20 with 8 or 2 x 4 spindles

Production components with cycle times of
< 1 second are not a rarity on multi-spindle
automatics of the G-series



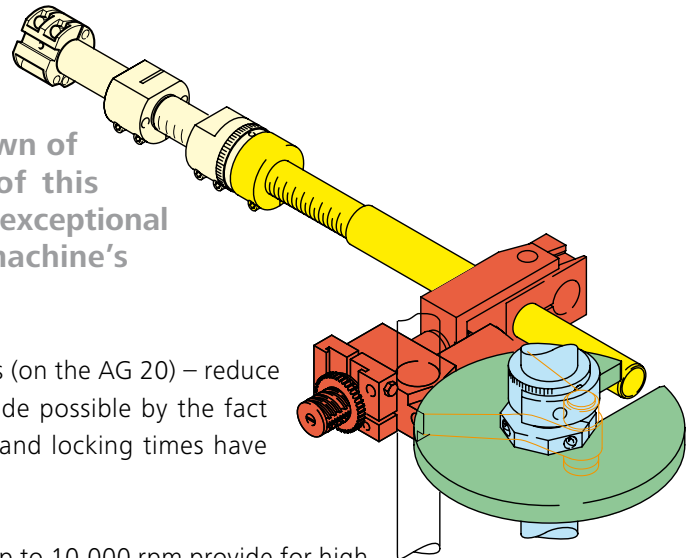
Ahead with speed

To manufacture simple workpieces at short cycle times is one of the strengths of the G-series. Many practical ideas and an attention to detail have contributed to the trimming down of the important performance characteristics of this small, sturdy, compact cam automatic to one of exceptional speed. As a result, the user benefits from the machine's high output rate.

Unequalled idle times – as low as 0.4s (on the SG 18) and 0.5s (on the AG 20) – reduce non-productive times. This extraordinary performance is made possible by the fact that the drum is mechanically controlled and that indexing and locking times have been optimised.

Productivity also at the cutting edge: main spindle speeds of up to 10,000 rpm provide for high cutting speeds also on small diameters.

Thanks to their outstanding performance a large number of machines in the field are producing components at cycle times of less than 1 second. The resulting productivity levels often allow customers to manufacture simple turned parts in high-wage locations. The potential for an increase in the economic viability of these machines can often be found in their use as 2 x 3- or 2 x 4-spindle machines. The G-series offers these alternatives – also including two pick-off spindles and if required, an auxiliary slide for rear-side machining.

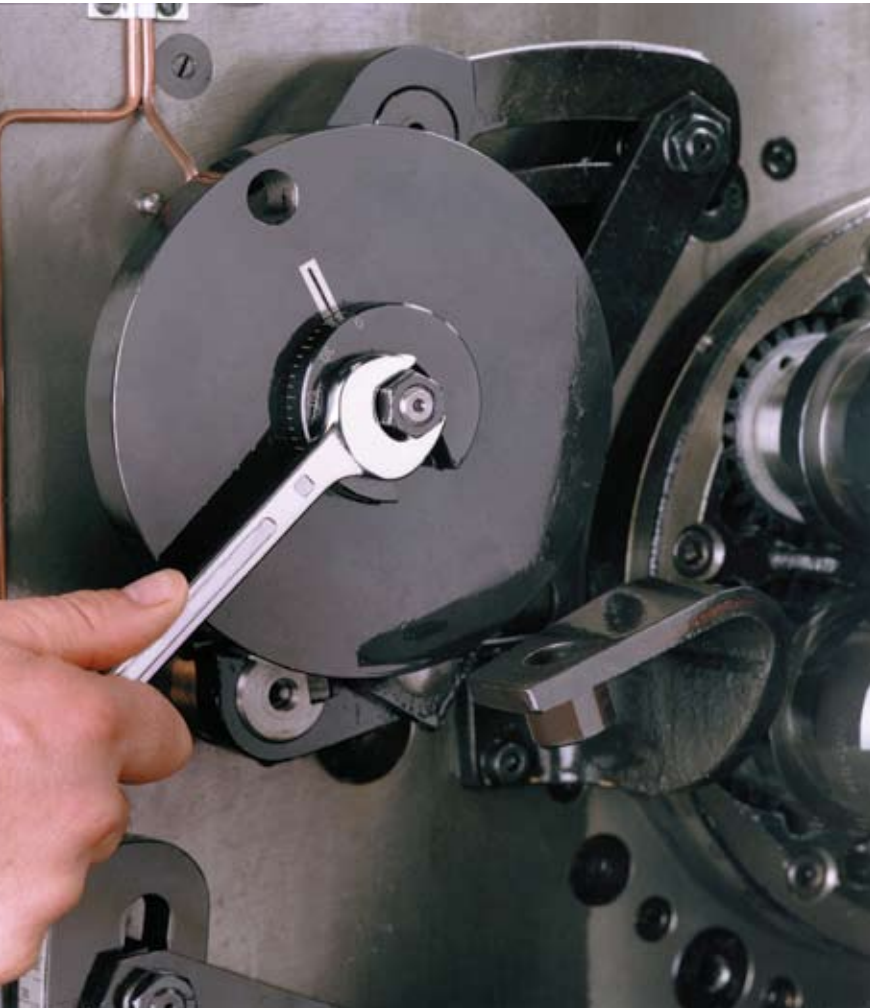


- Main spindle speeds of up to 10,000 min⁻¹
- Short idle times of 0.4 or 0.5s
- Faster still, used as 2 x 3- or 2 x 4-spindle machines, also with pick-off spindle(s) and rear-side machining
- Fast movements with compact, force distribution-optimised drives for cross and endworking slides

SIMPLE TURNED PARTS ECONOMICALLY PRODUCED



Track cams for endworking and cross travels, with serrated section for quick cam changes



Changing a cross slide cam, a cam for working and return travel



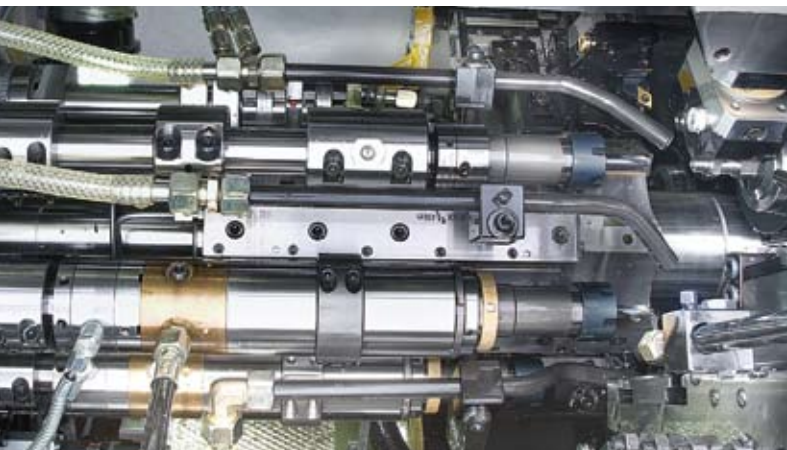
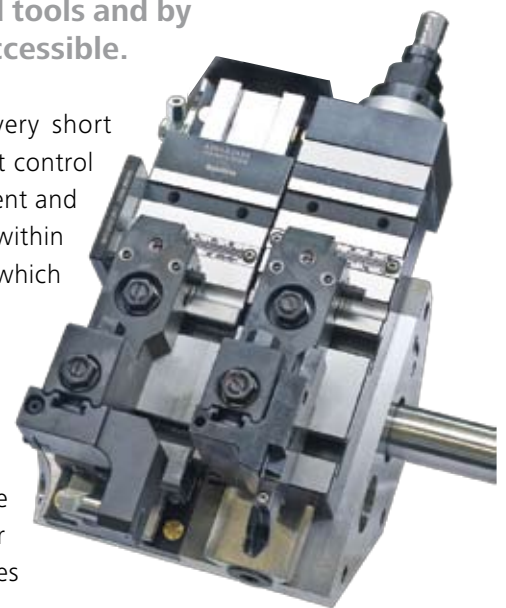
Setting an endworking slide rocker – infinitely adjustable and easily accessible

Resetting – and there is system behind it

To achieve a high level of productivity requires a suitable environment for operating and setting of the machine. The designers of the G-series therefore turned their particular attention to easy operation and simple resetting. They achieved both objectives with the use of quick-change interfaces for cams and tools and by ensuring that the various machine components were easily accessible.

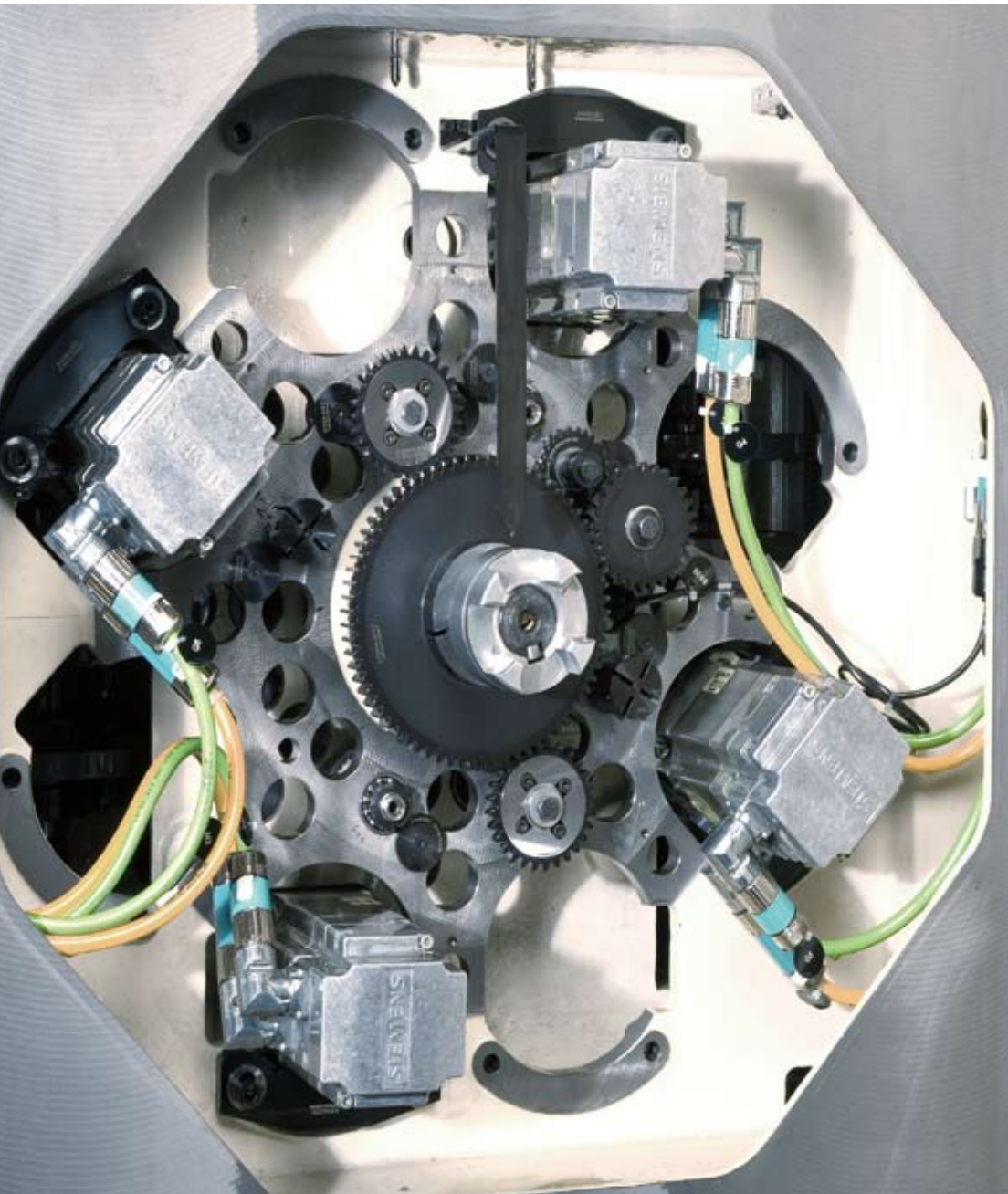
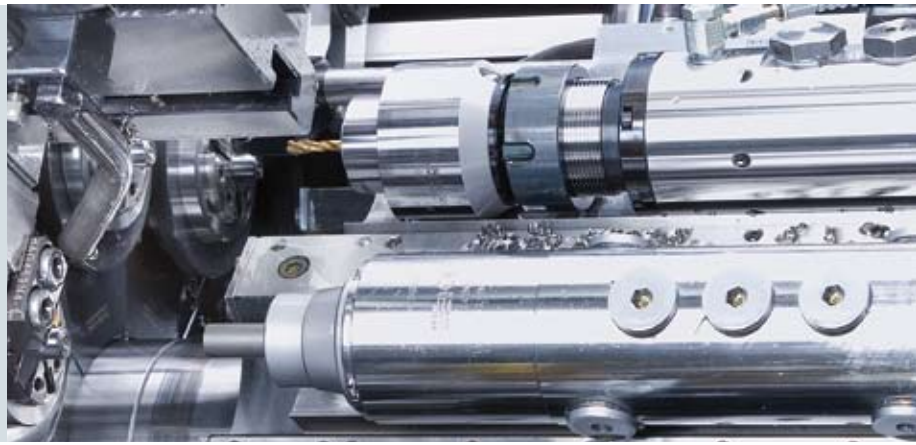
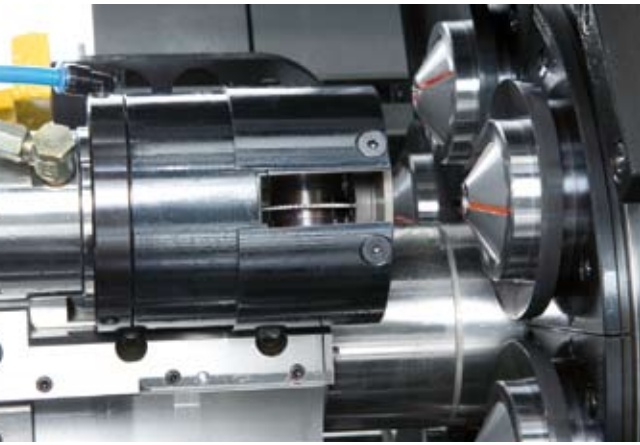
Design and arrangement of the cams on the G-series machines guarantee very short changeover times. Endworking and cross slide cams are one-piece track cams that control working and return travel. They feature a forged-on serrated section for easy fitment and are secured with a ring nut. The infinitely adjustable rockers are set and clamped within easy range of the disc cams. The neatness of the arrangement and the ease with which the components can be accessed are impressive.

The well-known, well-proven Schütte quick-change system SWS400 for turning tools further reduces machine downtimes. The system provides for tool presetting away from the machine and thus ensures that tools can be exchanged quickly and with accuracy. With a centre height of 40 mm and no need for spacer plates, the system is compact and sturdy. The positive taper lock system (HSK) is standard for drilling tools. This system has been standardised, is produced by various manufactures and is a widely used tool clamping system.



- Fast cam changes, owing to the operator-friendly arrangement of quick-change endworking and cross slide cams
- Fast tool changes with accurate positioning of change tool holders and total exchangeability between spindle positions
- Change tool holders can be preset away from the machine; turning tools with height adjustment
- Drilling attachments with HSK interface, optionally live and/or with internal coolant supply

REDUCED DOWNTIMES OWING TO COMFORTABLE OPERATION AND RESETTNG



Wide range of modular equipment, e.g. for rotary milling (top left), tapping and broaching (top right), tangential finish turning (centre right) and polygon turning (Page 11)

AC drives for tool and pick-off spindles, located in the drive housing of the AG 20 – useable in all spindle positions

Auxiliary attachments augment the range of applications

With its extensive range of auxiliary equipment Schütte expands the operative range of its G-series to cover the more complex components too. Optional attachments serve to machine flats, slots, threads, profiles and cross holes. In many cases, this ensures that the components can be economically complete-machined with great precision.

Schütte offers a range of auxiliary equipment for its G-series machines to cover, for example, polygon turning, cross drilling, face milling and profile turning operations. Drilling spindles with internal coolant supply of max. 100 bar are available for deep-hole drilling. Like all endworking attachments they are driven by independent servomotors and can be used in every machining station.

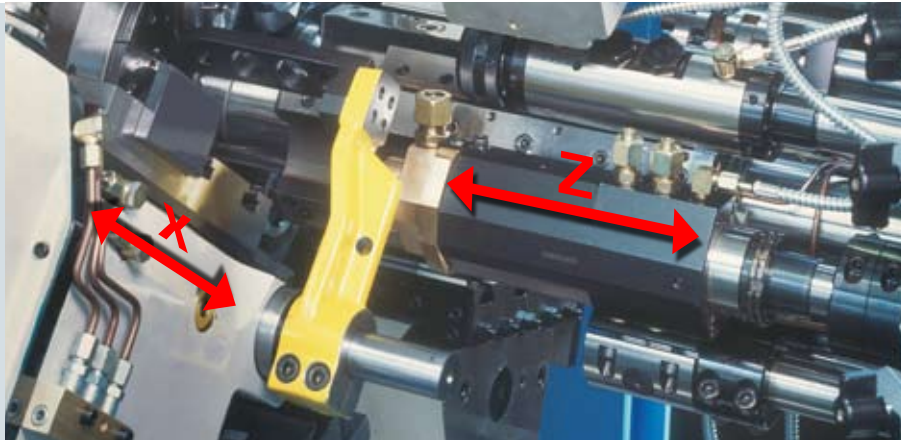
Use of the speed control mode increases flexibility and makes it possible to carry out tapping operations without any need for clutches. It also simplifies the process of stopping the pick-off spindles to carry out rear-side tapping operations.

The drilling of cross holes calls for a spindle stop attachment that slows down and stops the work spindles in selected spindle positions. An extension of this attachment takes the process a step further and locks the spindle in any desired work station at a prescribed angle. This feature is used, for example, to drill cross holes into the flats of a hexagon, or for the drilling – in different spindle positions – of a number of cross holes in alignment to each other.

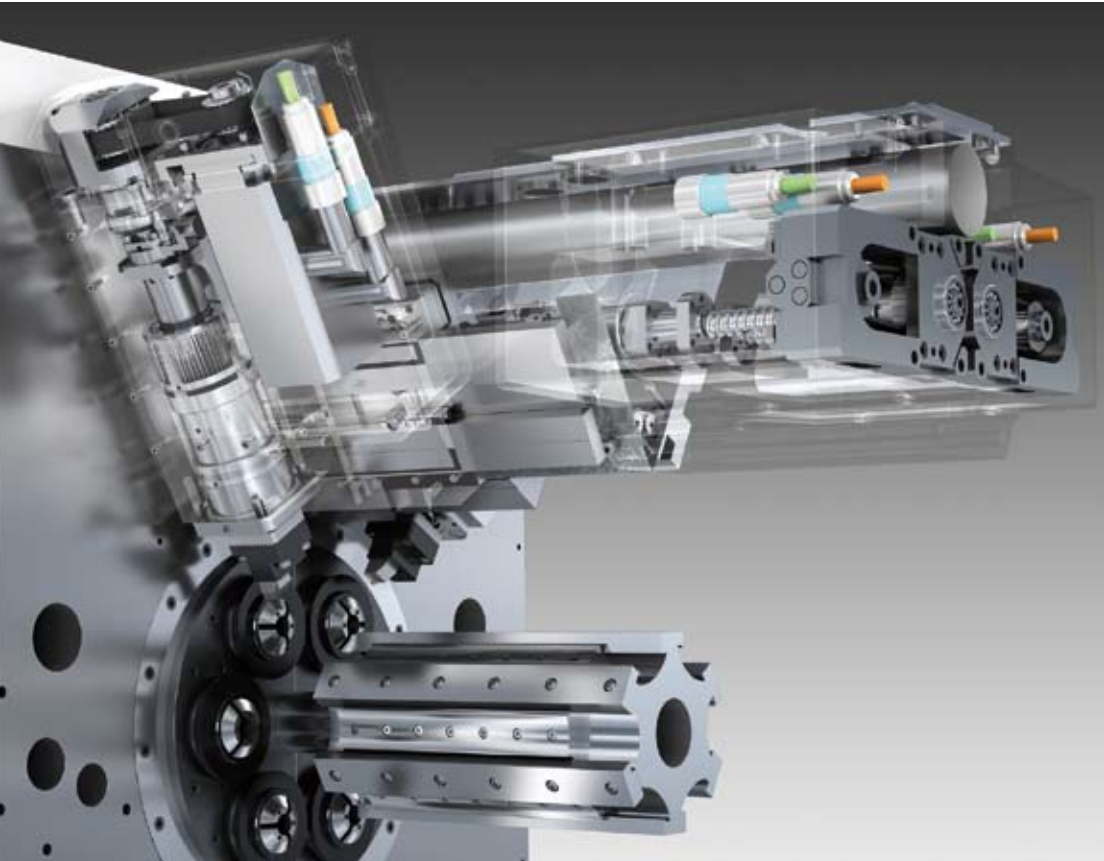


- Drilling, reaming and tapping with independent tool drives
- Deep-hole drilling with internal coolant supply of max. 80 bar on the SG 18 and max. 100 bar on the AG 20
- Four independent feedrates for mechanical longitudinal turning slides
- Cross drilling, also across spindle positions or in alignment to the bar profile
- Threading, polygon turning, profile turning and face milling
- Tangential finish turning tool for tighter tolerances
- Independent pick-off drive for spindle stop and rear-side machining

MORE THAN JUST TURNING – COMPLETE-MACHINING WITH AUXILIARY ATTACHMENTS



SG 18 with CNC pick-off spindle in position 6



CNC compound slides in the upper spindle positions



Motorised cross slide fine adjustment for the correction of dimensional errors and for tool wear offsets

Accuracy and flexibility – using CNC functions

The G-series combines fast, robust cam technology with sensitive, flexible CNC drive technology. The SG 18s and AG 20s offer a choice of up to four CNC compound slides and a CNC pick-off spindle. These CNC functions open up a new range of applications, allow for greater flexibility in resetting and increase the machining accuracy.

With the electromechanically driven CNC compound slides contours can be freely programmed and turned with great geometrical accuracy. The use of standard tool tips reduces tooling costs and resetting times are cut as workpiece changes are handled by NC programs. The precision of the turning operation is improved as spindle errors are corrected automatically. Operating the machine becomes more comfortable as corrective values for dimensional errors and tool wear can be entered via the NC control panel while the machine is in automatic mode.

Alternatively, dimensional corrections and spindle error compensations flagged by the control system can be implemented using the motorised cross slide fine adjustment. This is a cheaper option than a fully-fledged CNC compound slide. It replaces the manual cross slide adjustment with an electronic fine adjustment of the foremost position of the slide.

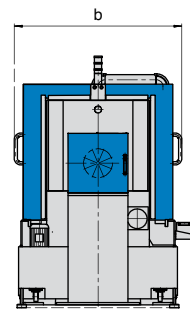
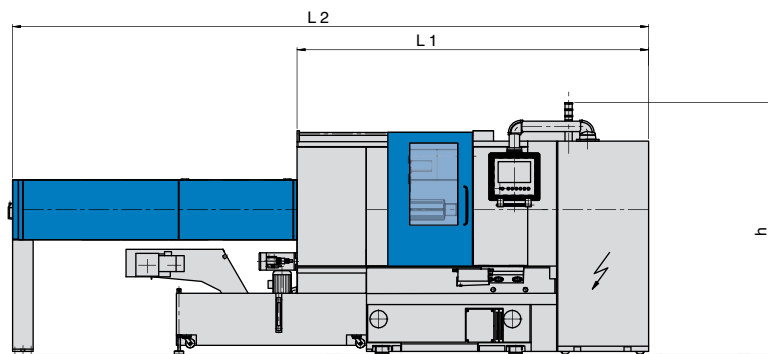
A CNC pick-off spindle offers the complete compound slide function also for rear-side machining. The movement in X is carried out by the auxiliary cross slide, the movement in Z by the pick-off spindle. Both axes are driven by ball screws and servomotors. The pick-off spindle speed is infinitely variable. This opens up a number of possibilities for rear-side machining with up to two (in some cases three) tools. The pick-off spindle can also serve as a C-axis, allowing tapping operations as well as contour turning at constant cutting speeds.



- Flexible contour turning and thread chasing with standard tools – on both sides of the workpiece
- Program-assisted resetting of whole component families
- Increased turning accuracy with automatic spindle error compensation
- Input of tool wear compensation and dimensional error correction values in automatic mode
- Expansion of the machine specification, adding up to 4 CNC compound slides plus a CNC pick-off spindle for every machine
- 2 – 3 tools for rear-side machining, face turning with v_{const} and tapping

**FLEXIBLE MANUFACTURE – WITH CNC TECHNOLOGY ON
CAM-CONTROLLED MULTI-SPINDLE AUTOMATICS**

MACHINE		SG 18	AG 20
Bar capacity, using a solid clamping system:			
standard, round	mm	18	20
hexagon	mm	16	17
Pitch circle diameter	mm	180	250
Bar infeed, max.	mm	80	80
Slide travel			
Endworking slide travel, standard (total travel / working travel), max.	mm	63/50	63/50
Endworking slide travel, special (total travel / working travel), max.	mm	90/72	90/72
Cross slide travel (total travel / working travel)	mm	32/20	32/20
Spindle speeds, infinitely variable	min ⁻¹	800 - 10,000	
Cycle times, min./max., infinitely variable	s	0.24 - 45	0.4 - 56
Idle times	s	0.4	0.5
Nominal power rating of main drive motor	kW	11	15
Nominal torque rating of feed motor	Nm	18	18
Dimensions			
L 1	mm	2950	3053
L 2	mm	5420	5523
b	mm	1230	1456
h	mm	2050	2158



Technical data



MULTI-SPINDLE AUTOMATIC AG 20 – SERIES G



SERIES G

Alfred H. Schütte

Postfach 910752
51077 Köln-Poll
Alfred-Schütte-Allee 76
51105 Köln-Poll

Telefon +49 (0)221 8399-0
Telefax +49 (0)221 8399-422
schuette@schuette.de

www.schuette.de