

Fast, precise, powerful

CNC MULTI-SPINDLE AUTOMATICS OF THE PC SERIES

Compact design:
hydraulic endworking slide feed unit with
linear measuring system and control valve



Material removal area of a six-spindle
automatic of the PC series

Ready-to-install precision with diameter up to 51 mm

You are machining complex parts made of non-ferrous metal or steel?
Do you require a combination of heavy roughing and accuracy?
Do you wish to combine several production processes on a single machine?
Do you require versatility combined with simple programming?

Automatics in the PC series are machining centres and are used whenever classic cam-controlled automatics reach their limits. Their range of functions goes far beyond that of turning. Tapping, mill cutting, polygon turning and eccentric drilling operations make complete machining of geometrically complex workpieces possible. Six or eight work spindles, endworking and cross slides that can be controlled independently of one another as well as rear-side machining with up to three tools are standard. The Schütte programming system **SICS 2000** can be used for simple control of more than 56 axes.

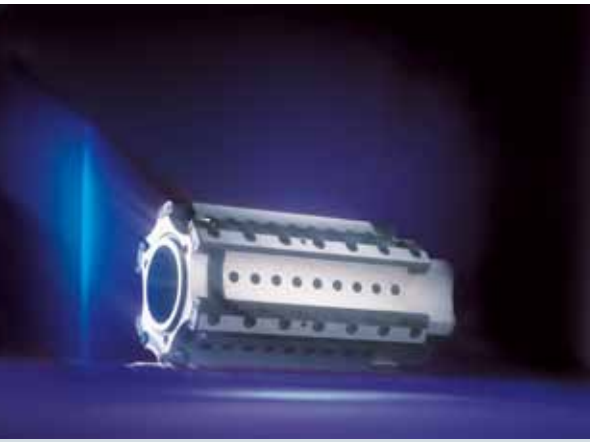
PC multi-spindle automatics are designed for material removal of geometrically sophisticated parts made of hard solid materials. Wide gashes and complex drilling operations are part of your daily production operations. The machines are designed to be robust, durable and technically flexible. They provide ready-to-install precision parts in small and large batch sizes. Main and non-production times are short and cost-effective; conversion times to new parts are short.

Machines in the PC series are used by automobile manufacturers and suppliers, in the fittings, pneumatics and hydraulics sector and in job order production of precision parts.



- Free falling chips, no chip blockage
- Depending on the version, six or (upon request) eight workpiece spindles that can be controlled independently of one another
- Each workpiece spindle has its own endworking and cross slide feed units with direct measuring system
- Rear-side machining with up to three tools
- Short setup, non-production and part-production times
- Over 56 CNC axes can be programmed easily

PC SERIES – VERSATILE, PRECISE AND ECONOMIC



Endworking slide block
of the multi-spindle auto-
matics of the PC series

Cooling lubricant treatment system with
full-flow filter and cooling (optional)



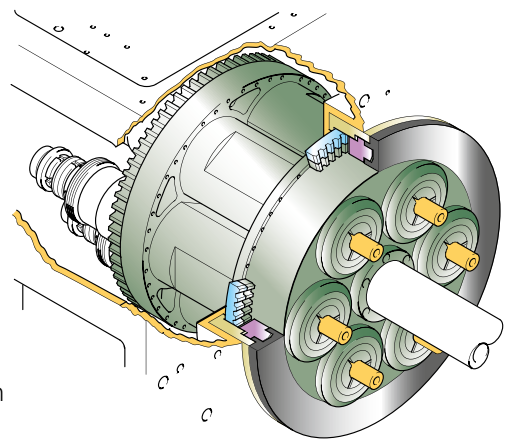
Solid machine construction as the basis

All efficient performances need a foundation. For the integration of different processes, for the removal of tough materials, for speed, precision and reliable processes, this is provided by a robust machine structure. The modular and flexible Schütte concept is based on over 100 years of experience in machine tool construction.

The machine base and headstock made of mineral casting guarantee damping and thermal stability that are required for high-quality workpiece surfaces and long tool lives.

The spindle drum of the PC multi-spindle automatic is locked by means of a hydraulically actuated, three-piece Hirth coupling. The positive locking of the drum ensures stability and high repeat accuracy.

The hydraulic system and (upon request) the cooling lubricant are cooled actively. The machine therefore works even with large material removal volumes at a constant temperature. This results in constantly high production accuracy even with highly complex material removal tasks.



Spindle drum with Hirth coupling, locked in the headstock

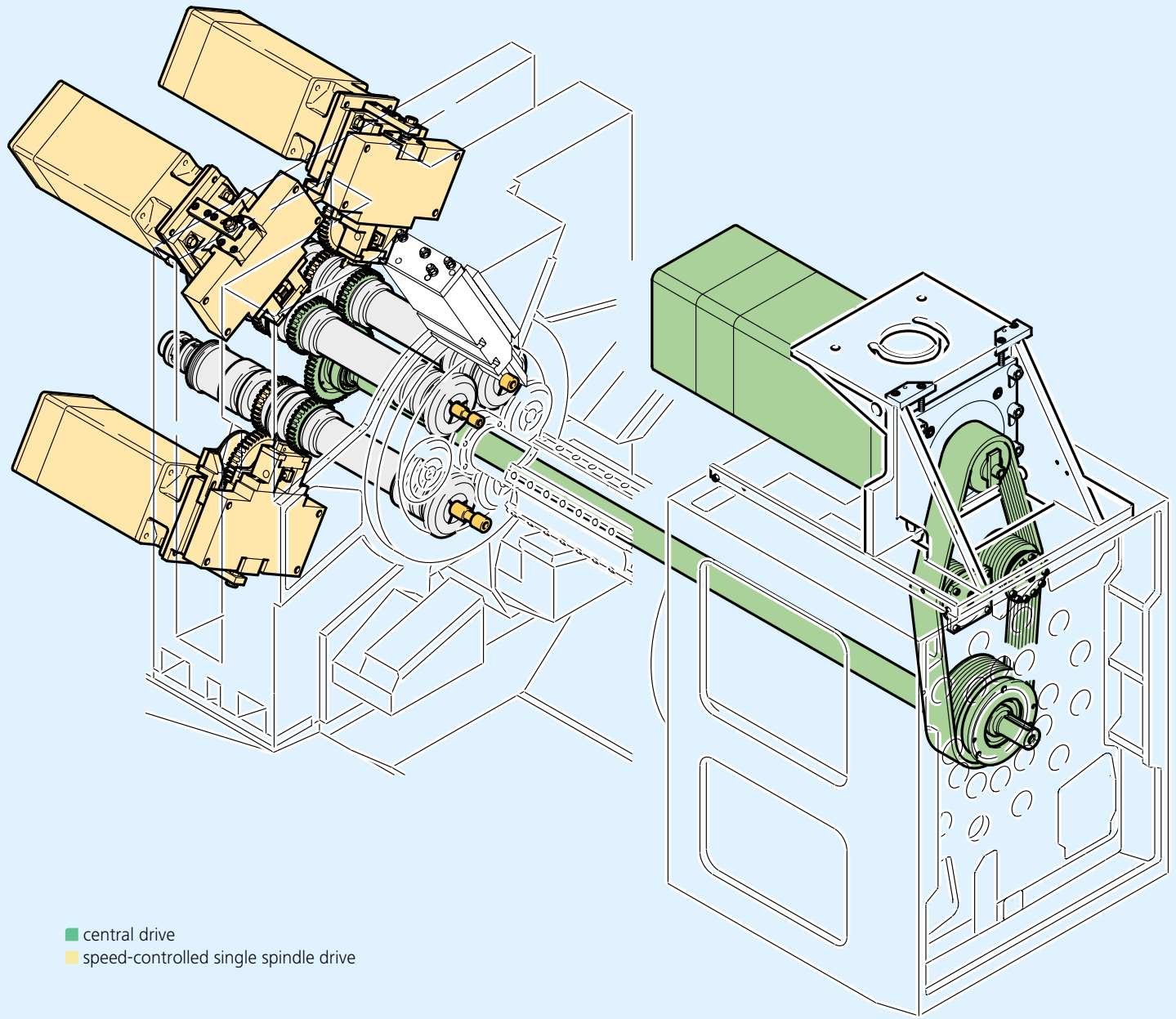


- Robust basic structure thanks to tried-and-tested frame construction
- Base and headstock made of mineral casting guarantee high damping and thermal stability
- Optimum endworking slide guidance up to the material removal point thanks to the Schütte block: The force flows directly through the spindle centre
- Positioning of the spindle drum by three-piece Hirth coupling rings
- Cooling of hydraulics and cooling lubricants (option)

Headstock with cross slide and spindle drum

FOUNDATION FOR PRECISION AND PROCESS RELIABILITY

Drives for controlled
speeds in selected positions



- central drive
- speed-controlled single spindle drive

Drive power meets economy requirement

The effectiveness of a means of production depends essentially on how well the technologies used interact with one another. Schütte has developed a drive concept for the PC multi-spindle automatics that meets the requirements of both high-performance production as well as energy efficiency.

A powerful central drive provides the exact amount of power for each spindle that it needs for recess or plain turning operations.

The production of large bores with high feed forces and torques is also no problem for the powerful spindle and feed drives.

If technologically optimised workpiece speeds that deviate from the basic speed are required, speed-controlled individual spindle drives can be cut in (option). At low additional costs, they make independent speed-controlled operation of each spindle possible.



- Central drive with high torque
- Individual spindle drives that can be cut in for position-specific speed selection
- Freely programmable speed progression
- Optimisation of material removal and part-production time

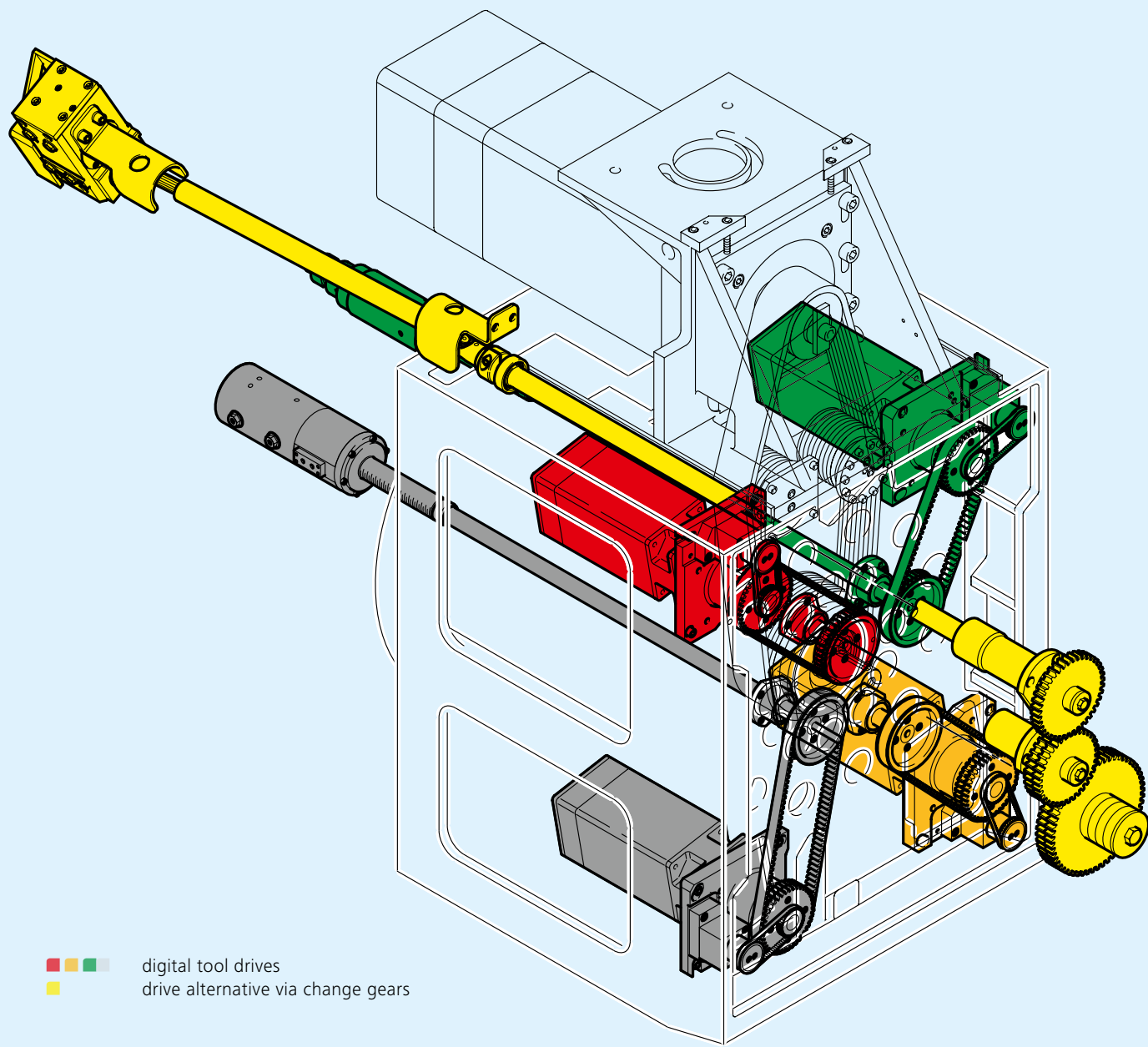
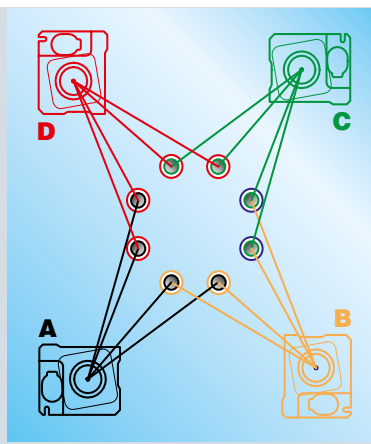
CNC-controlled polygon turning device with direct drive

MODULAR SPINDLE CONCEPT, COST-EFFECTIVE PRODUCTION



Application example: variable tool drive in spindle position 6

Layout diagram of variable tool drives



■ ■ ■ ■ digital tool drives
■ drive alternative via change gears

The matching speed for every process

The speed of the tool spindle can be selected independently and varied in the process: Its operation is thus optimised. For special requirements, the drive shaft of the tool spindles can be shut down (option).

The drive is backlash-free via toothed belts. Thanks to the precise control of speeds and feed, tapping is possible without a compensating chuck. As an alternative, the tool drives can also be tapped by the central drive via change gears.

Typical applications include thread production with taps, formers and dies in an interpolatory group with the longitudinal feed axis, opposed spindle drive with freely programmable speed and control drive for auxiliary devices.



- Individual speed-controlled drive of tool spindles (option)
- Cost-effective drive alternative from central drive via change gears

Opposed spindle for picking up the workpiece from the main spindle and for rear-side machining with precision chuck

Precision and process reliability with complex components: Cross slide unit with standard replaceable holder



Drive box with hydraulic endworking slide feed units and linear measuring systems

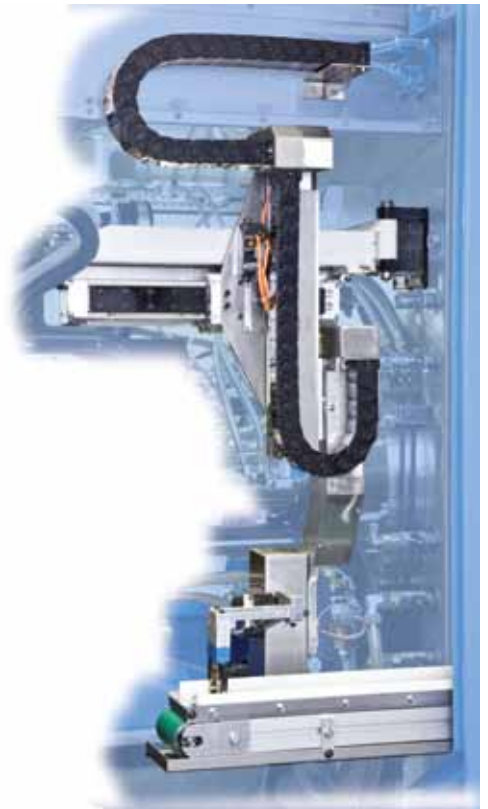


Safe handling of workpiece and tool

All spindle, feed and switch drives of the multi-spindle automatics in the PC series are controlled digitally. The control quality guarantees high contour trueness during copy turning and high quality of surfaces cut with a blade.

Excellent damping of the machines improves the control loop behaviour in dynamic processes. The high force density make compact machine construction possible. In the event of a crash, the hydraulic feed drives are overload-proof.

The quick-change system SWS 400 for the turning tools reduces the non-production times. Already perfectly tested on multi-spindle automatics, the SWS 400 makes presetting of tools outside the machine possible. High accuracy of repeatability is guaranteed.



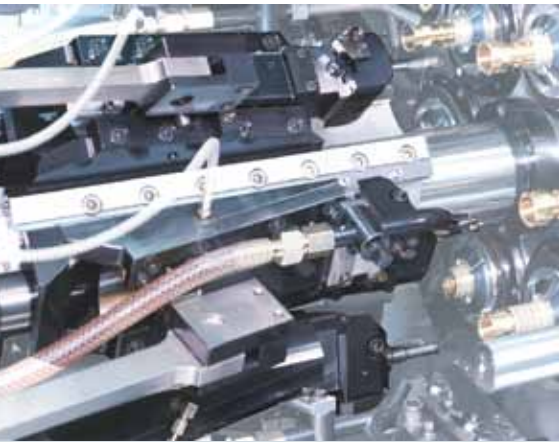
Quick-change system SWS 400



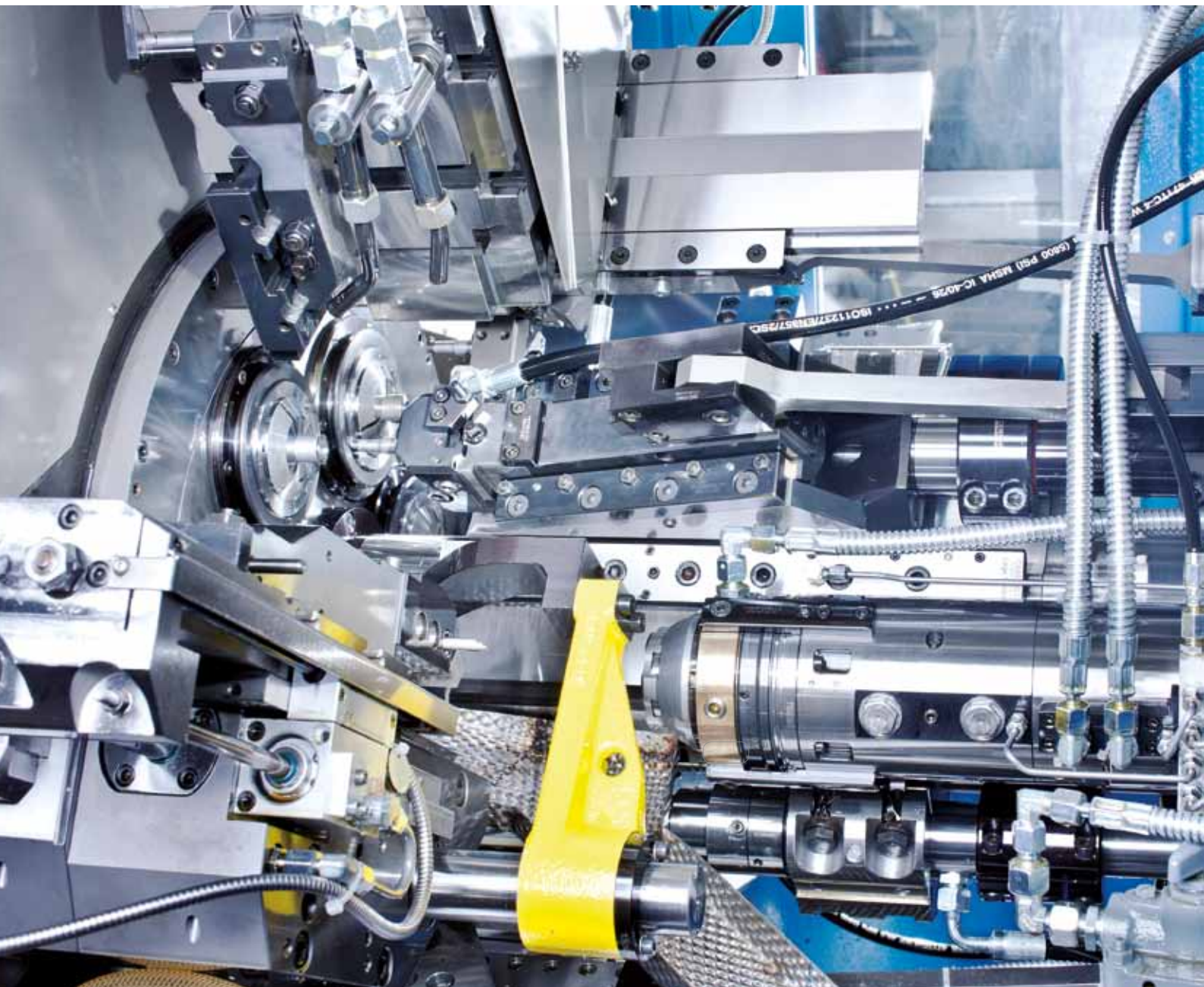
- Direct, high-resolution measuring system
- Interface to quick-change system SWS 400 for lathe tool
- HSK interface for drilling tools
- Compact, powerful hydraulic feed drives
- Integrated handling and discharge device (option)
- Damage-free and aligned discharge of workpieces

Quick-change system SWS 400

FLEXIBILITY THAT GUARANTEES YOUR COMPETITIVE ADVANTAGE



The compound slides, which can be installed on all endworking and cross slides, create any kind of interior and exterior contours you desire using simple, standard tools.



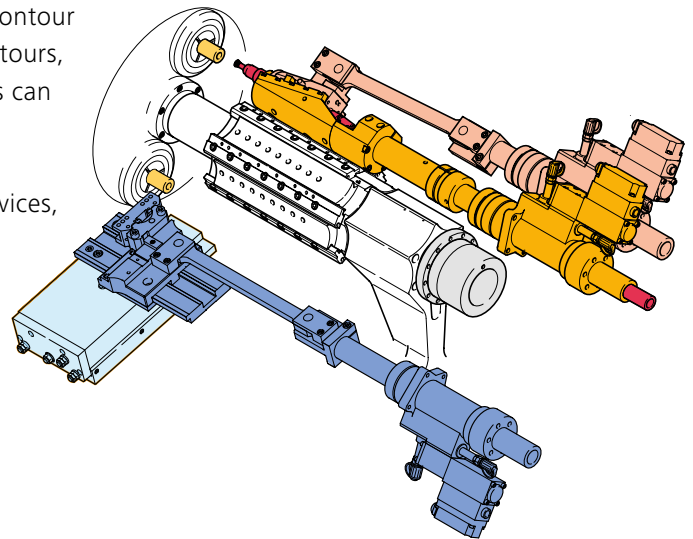
Complex contours

The cross slides in the PC series also make complex contours possible. They can be attached in all endworking and cross positions on the automatics. The contour elements on the part are produced with standard tools with high contour trueness and accuracy.

Typical application fields for compound slide machining are contour turning and thread chasing. Any rotationally symmetrical contours, e.g. tapers, spherical shapes, undercuts and radius transitions can be produced with internal or external contours.

Compound slides are also used in conjunction with driven devices, e.g. for polygon turning, during plain turning, mill cutting or eccentric drilling.

Compound slides can be positioned conveniently via the control system. This helps during conversion, or with a tool correction, or even when changing a lathe cutter or attachments.



Cross slide unit for rear-side machining with a fixed and driven tool



- Up to 15 CNC compound slides per machine type
- CNC compound slide functions also for the rear side of the workpiece
- Simple and convenient to install and retrofit
- CNC compound slides form the basis for attachments, stationary or driven and for the tool holder systems
- Any type of outer and inner contours with simple standard cutting tools
- Hydrodynamic flat guides for the compound slides (cross)
- Hydrodynamic recessed guides for the compound slides (endworking)

Drilling attachment with adjustable eccentricity
from 0 mm to 26 mm and HSK interface



Can be retrofitted at any time for additional tasks

Complete machining often requires the combination of different production processes. The machining of tough and high-strength materials requires perfected, flexible material removal technology. Drives, tool and auxiliary equipment are configured to fully meet the requirements of the customer. The machine can be retrofitted at any time if the application range is extended.

An extensive range of attachments are available for the PC series for equipping the machine to match the machining task. This includes

- CNC opposed spindle with precision chuck
- Drill spindles¹⁾, endworking, with HSK interface
- Drilling attachment¹⁾ with adjustable eccentricity from 0 mm to 26 mm and HSK interface either driven via a gear set or the variable tool drive
- Polygon turning attachment with controllable drive
- Milling attachment with end mill for slot-milling
- Presettable tool system SWS 400
- Workpiece pick-up device for damage-free workpiece removal
- Tapping or thread rolling attachment, axial or radial, and powerful drives with high torque and programmable speed progression
- Y-axis with CNC range of functions and with up to two driven tools.



- Cross drilling attachment¹⁾ also suitable for eccentric drilling and mill cutting.

¹⁾ Internal coolant supply upon request

FURTHER MACHINING OPTIONS UPON REQUEST



A swivellable flat screen on both operator sides of the machine provides the operating elements where they are needed.



Menu screen "Position configuration": spindle drives and slides are selected and programmed.

DIN-ISO programming with supplementary program masks



Programming of virtual cams with preconfigured cam types: Only a few parameters have to be entered.

Programming in practice for practical people

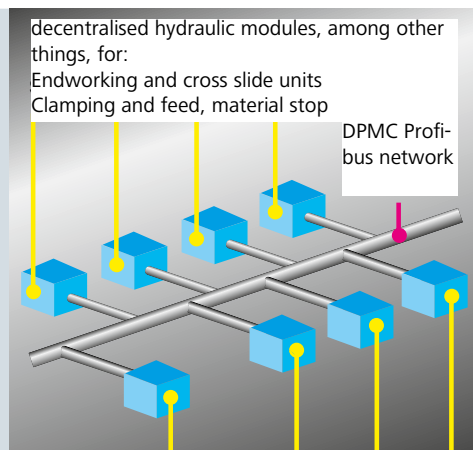
The control of 56 and more axes requires perfected hardware and control engineering. In particular when handling and programming is not to be left to specialists alone.

The hardware basis is a fast industrial PC that co-ordinates all machine functions and thus provides the precondition for expansion as a decentralised system (principle of distributed intelligence). The Profibus is used to communicate with axes, sensors and actuators. The TwinCat operating system unites the CNC and PLC. Configuration and diagnostic tools for PLC, servicing of axes together with the preparation for teleservice are "on board" as standard.

The technology and operator interface "SICS 2000" is designed to make typical features, such as camshaft, cam-operated switchgroup and special machining cycles available. This is supported by a flat, user-friendly operating panel. The operator interface "SICS 2000" is arranged according to operating modes and operator control areas and tuned to the special requirements of a multi-spindle automatic. Interrelated processes are also grouped together in the respective menus. Programming and optimisation can be selected position-specifically according to the technological sequence and can be carried out with a high level of support for the user.

A series of cycles with corresponding visualisation of the movement sequence and query of the input parameters are available for preparation of the machining programs. Users can prepare their machining program in the typical DIN-ISO programming language or combine both languages.

Upon completion, the cycle times of the individual positions can be presented in the graphical movement sequence.



- All drive elements - electric drives, main spindle drive and hydraulic slide drives - are controlled axes
- 56 axes (more as an option) can be programmed with "SICS 2000"
- All machine axes are co-ordinated via a central computer.
- A Profibus system connects the control system, drive controller and control panel
- The programming system guarantees simple and reliable programming
- Machine and program analysis per online service

MACHINE		A 36 PC	S 36 PC	S 51 PC
Maximum bar diameter				
normal, round	mm	36	36	51
Square	mm	25	25	36
Hexagon	mm	30	30	44
Bar length, max.	m	4	4	4.2
Spindle circle diameter	mm	358	300	340
Material feed rate, max.	mm	115	115	140
Endworking slides				
Endworking slide traverse (position)	mm	145 (I...VI, VIII)	145 (I...V)	175 (I...V)
Endworking slide traverse (position)	mm	250 (VII)	250 (VI)	280 (VI)
max. speed	m/min	25	25	25
max. feed force	N	4500	4500	8000
Slide traverse for rear-side machining	mm	130	130	130
Additional feeds				
Number of additional feeds		14	10	10
Auxiliary longitudinal feed traverse	mm	145	145	175
max. speed	m/min	25	25	25
max. feed force	N	4500	4500	8000
Cross slides				
Cross slide traverse (position)	mm	80 (I, II)	90 (I...V)	100 (I...V)
Cross slide traverse (position)	mm	70 (III...VIII)	70 (VI)	70 (VI)
Centre height (position)	mm	60 (I...VIII)	60 (I...V)	60 (I...V)
		-	35 (VI)	35 (VI)
max. speed	m/min	20	20	20
max. feed force	N	4500	4500	6000
Spindle speed (stepless)	rpm	560...4000	560...4000	335...3000
Non-production time, normal	s	1.2	1.2	1.5
Power rating of drive motor	kW	28	28	28
Dimensions				
Length	mm	5830	5780	5900
Width	mm	1900	1576	1766
Height	mm	2580	2400	2550
Transport weight of machine	approx. kg	8500	7500	9300

Technical data



CNC MULTI-SPINDLE AUTOMATICS – PC SERIES



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