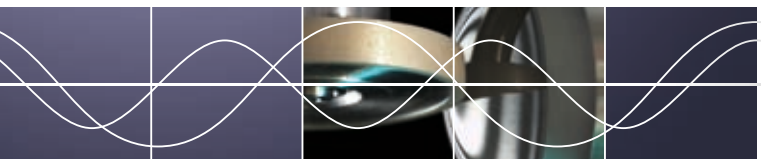
Precision Optics

Surfacing Center SCG 121

Superior grinding of spheres and aspheres



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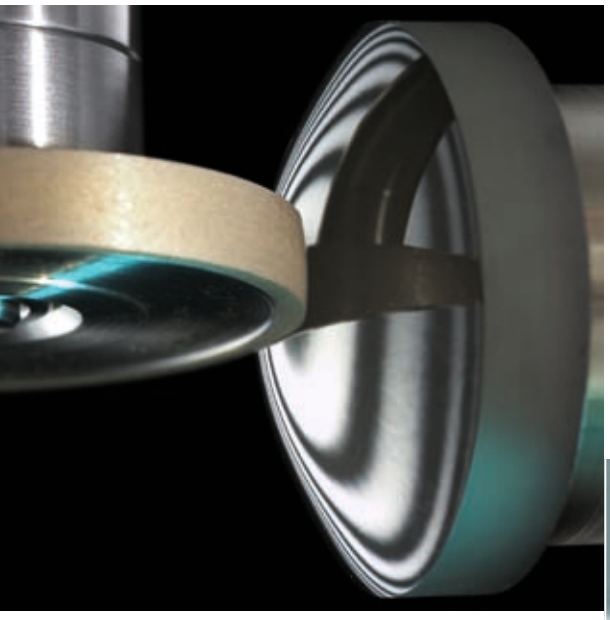


Introducing the Surfacing Center SCG 121

Optics manufacturers are facing an increasingly competitive environment with rapidly changing technical requirements, shorter delivery times, price pressures, smaller batch sizes – to name just a few of the challenges.

The answer to these requirements is the Surfacing Center SCG 121 – a very flexible and highly integrated manufacturing platform. An extensive package of options with tool automation and sophisticated in-process measurement technology enable the optimal configuration even for challenging needs.

Modular kinematics, integrated contour measurement and computer supported setup make it possible to manufacture the whole spectrum of flat surfaces, spheres, prisms and other special geometries as well as complex aspherical lenses in an economical way, depending on the chosen package of options.

The SCG 121 platform combines three key features: double-spindle technology, automated tooling, and on-board measuring technique. The precision grinding technology can be augmented with centering, truncating, drilling, and scooping options. The unique combination of these features ensures a high processing flexibility for the production of all parts, from simple to complex. High utilization of the machine is guaranteed.

The basic modules can be equipped from the beginning or upgraded to become a full fledged aspherical processing center.

Solid foundation
The machine has a very stiff, monolithic polymer concrete base for kinematics with up to 7 axes and 4 spindles. A rapid tool-changing system works in parallel with a CNC controlled carousel or pallet automation to assure minimum auxiliary times and thus maximum cost-effectiveness.

The modern SINUMERIK 840 Digital controller system drives the AC servo drives, enabling high precision and excellent dynamics of the lens processing.

Advanced spindle technology
A special advantage of the SCG 121 is the double-spindle system in combination with the sophisticated automated tool changer. Two independent tool spindles facilitate flexibility and precision in one unit. While one tool spindle is supplied with various tools from the automated tool changer, the second tool spindle works with a stationary mounted tool which guarantees perfect surface quality, form accuracy, and process stability. Also available is an optional high-performance grinding spindle with direct drive whose excellent running characteristics reduce sub-surface damage to a minimum.

Automated tooling
To run complex multi-step processing jobs with ease, the automated tool changer handles up to eight tools. Without operator intervention, the complex grinding tasks consisting of several surface and edge processing steps are performed consistently. Auxiliary times are reduced, too. The result: excellent geometrical accuracy with very competitive cycle times.

Aspheric version SCG_A 121
The SCG_A 121 expands the capabilities of the spheric version SCG 121. The extended axis arrangement of the SCG_A 121 allows optimized, bend-free axis movement which is the precondition for highly precise contour processing of aspherical lenses. It enables the use of wheel grinding and cup wheel grinding as well as edge processing and guarantees therefore the best possible manufacturing processes for convex and concave aspheres. A substantial technology package controls use and frequency behaviour of the tools, measures the form accuracies of the different grinding steps using the integrated geometry measuring technology, calculates the form corrections and guarantees the optimum control of the interdependent process steps.

Rough and fine grinding of spheres using the double spindle technology (version S2/1).

The automated tool changer allows an intelligent tool management including combinations of standard and form tools in one processing cycle.

The CNC-controlled automation enables an efficient automated production even for small batches.

The process control allows the monitoring of the tool wear and its fully automated compensation.

The center-thickness (CT) Control is an integral part of the comprehensive process control package.

In-process metrology
The consistent high performance and tight process control is accomplished with a comprehensive integrated metrology package. Our process control compensates for tool wear and process drift.

- The **CT Control** automatically checks the center thickness of the lens and makes adjustments.
- The **Tool Control** recognizes the grinding tools and reduces significantly the set-up and correction times.
- The **Feed Control Plus** optimizes the first touch of the rough and even the fine grinding tool spindles by analyzing their frequency behaviour as well as the load-dependent grinding process, optimizing the cutting conditions for the material involved.
- The **Curve Control** is a particular innovation allowing for the measurement and correction of the spherical geometry.
- The **Contour Control** of the SCG_A 121 is a 2D surface measuring feature included in the aspheric option package. The Contour Control allows for the measurement and correction of the aspherical geometry including automated set-up and supports secure process control.
- The **Geo Control** is a CNC-controlled fine adjustment of the mutual positions of the workpiece and tool spindles to optimize the spherical quality and form error.

Data communication
The system interfaces to an Ethernet network connection and to the **SCHNEIDER Optical Technology (SOT)** software what enables a smooth and effective data exchange for setup and operation. Service is supported by an intelligent analysis system with remote diagnostic.

A graphical user interface assists the operator for an easy and fast completion of communication tasks with the SCG 121.

The seamless link with the surfacing center SCG 121 with external measuring equipment assures a smooth and flawless processes flow. The corrections are networked into the machine.

When using the Surfacing Center SCG 121, you are sure to surprise your customers by being better, faster and more competitive. The processing capability and the widely automated operation of the SCG 121 make this machine a perfect mate for the SCHNEIDER SCP 121 polisher.

Benefits
- Manufacturing of spheres and aspheres
- High quality and form accuracy
- Aspheric package with cup-wheel and wheel grinding capabilities
- Automated multiple-step processing
- Extended capabilities for processing of flats, prisms, and special geometries
- Optional directly driven high-performance fine-grinding spindle for minimal subsurface damage
- Computer-assisted setup
- Integrated process control for high process stability
- Graphical user interface
- Intelligent analysis system with remote diagnostics
- Modern network connection
- Automated central lubrication

High stock removal and excellent contour accuracy is accomplished in the wheel grinding mode for aspheres.

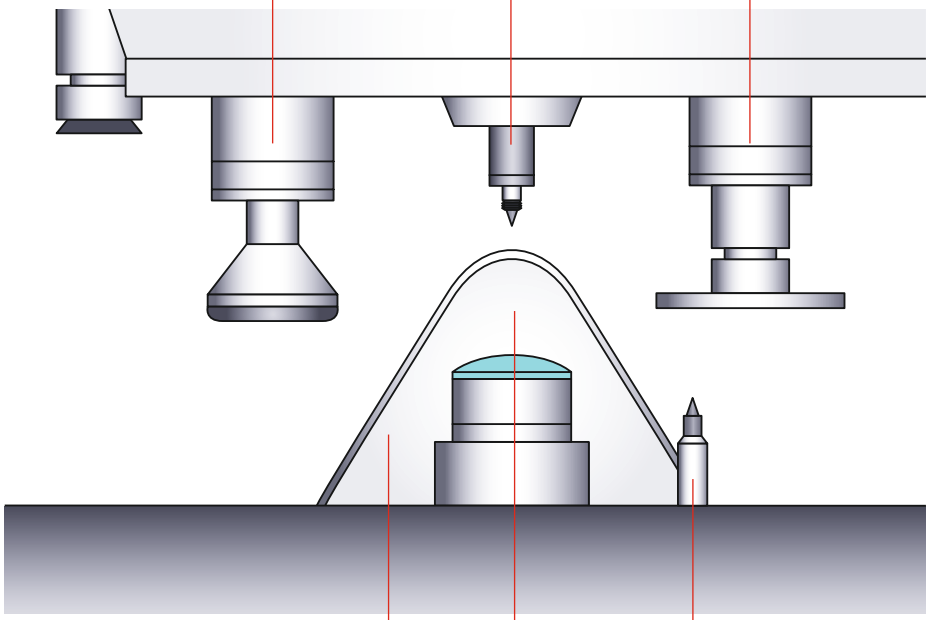
Cup wheel grinding of concave aspheres with standard tools.

The in-process measuring technology (Contour Control) for the measurement of the aspherical lens contour and the automated correction calculation.

The list of processing options includes edging, centering, drilling, truncating and scooping as well as fabrication of prisms, flats and other special geometries.

The monolithic polymer concrete bed is basis for the kinematics with up to 7 axes and the workpiece spindle yoke.

Work space features of the SCG 121



Feed Control PLUS

__ *First-touch technology ensures minimal air cutting passes – also for fine grinding.*
__ *Load-dependent feed-rate control*

CT Control

__ *CNC-controlled measurements ensure precise center thickness control.*
__ *Reduction of setup times*
__ *Process control*

Kinematics

__ *Manufactured on a polymere concrete bed, the double-spindle technology enables high-surface quality.*

Tool Control

__ *CNC-controlled recognition of the grinding tools*
__ *Significant reduction of the setup time*
__ *Ensures flawless tool handling*

Geo Control

__ CNC controlled axis position
__ *Optimization of sphericity and surface quality*

technical data		
working range (max. diameter)	S2/1 spherical	125 mm (180 mm with restrictions)
	aspherical	125 mm (200 mm with restrictions)
	S2/2 spherical	125 mm (150 mm with restrictions)
	with automation	100 mm
working range	radius	10 mm – flat
number of axes		4+4 (X, Y, Z, B, Q1*, Q2*, Z2*, Y2*)
feed rate		
X-axis		0.01 – 30 000 mm/min
Y-axis		0.01 – 1 000 mm/min
Z-axis		0.01 – 7 500 mm/min
positioning and repeat accuracy		
X-, Y-, Z-axis		+/- 0.001 mm
feed rate		
B-axis		0.01 – 4 300 °/min
positioning and repeat accuracy		
B-axis		+/- 4"
tool spindle connection		25 x 42 HD, HSK-A 40 (TC)
speed range		
toolpiece spindle HD		5 – 15 000 min^{-1}
toolpiece spindle HSK		5 – 8 600 min^{-1}
high-speed spindle*		5 – 15 000 min^{-1}
workpiece spindle connection flange	ø	80 mm
speed range workpiece spindle		25 – 2 500 min^{-1}
power consumption		16 kW
compressed air supply	min.	5 bar (75 psi)
vacuum	min.	0.6 bar (9 psi)
weight		4 300 kg (9 480 lb.)
dimensions (w x h x d) without screen		2 090 x 2 020 x 1 690 mm (82 x 80 x 67 inches)

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