

# SERIE TEIL 01

Tool Grinding Machine **geminiNGM** from **J. Schneeberger Maschinen AG**

## Grinding with the touch of a button

The Swiss company J. Schneeberger Maschinen AG has divided its tool grinding machines into five series, whereby the Gemini can be classified as a machine type for more complex grinding tasks.

**T**he strengths of the gemini NGM lie in the optimal ratio of working space to floor space, the extensive configuration options in the design modules, the user-friendly, intelligent software for generating new grinding processes, the many automation options for loading/unloading of tools or grinding wheels, as well as the entire engineering support provided by Schneeberger.

### Machine Design

The machine bed is a mineral casting and is delivered by the casting supplier ready and machined for the final assembly. The installed assemblies such as the A-axis and the components of the grinding axis are made of a GGG 50. When setting up and specifying the machine configuration, the customer has free choice and can specify his machine from the extensive

Choice of assembled modular drive components, table assemblies, grinding spindles and handling systems. Schneeberger offers solutions for custom grinding operations with special assemblies developed in-house which can be implemented in the process, for example in gear hob profiling (short-stroke profile grinding).

The cross table contains the X and Y axes moving on linear guides and is installed on the machine bed. The Y-axis carries the workpiece head stock (A-axis) which is equipped with a water cooled direct drive. On the column, utilizing the FEM design system to achieve maximum rigidity, is the vertical slide for the Z-axis with the attached grinding head designed either as a B- or a C-axis including the integrated grinding spindle. If desired, the machine can also be designed with two grinding spindles and



**The gemini NGM is a compact, Floor space-optimized tool grinding machine with a wide range of tools to be ground.**

**In the working area are X/Y/Z Axis travels from ( 500/400/380 mm) realized. Any special assemblies can be installed on the T-slot table.**



the drives for X, Y and Z axis can be equipped with linear motors drives. The grinding spindle axis in relation to the center of rotation in the C-axis has been optimised to have the lowest possible leverage arm in order to maintain the best grinding results. The rotation of the axis is realized by a backlash-free, preloaded worm gear, whereby the preload is always optimally adjusted with a spring assembly. When using grinding wheels with large diameters, they can be automatically balanced in the machine.

The grinding spindles are manufactured by Schneberger, are water cooled, powerful and rigid.

Dressing units, designed either with profiling dressing wheels for plunge dressing or with diamond wheels for profiling, are either installed on the A-axis or on the table. Significant to achieve best quality and accuracy is the chiller system. The cooling during grinding, the cooling of the A-axis housing and the grinding motor maintain a constant temperature.

J. Schneberger Maschinen AG manufactures a high percentage, up to 90%, of mechanical and electrical assemblies and components in-house. The entire electrical wiring of the control cabinet is realized in our own electrical cabinet department.

#### Automation components

Easily accessible, in the front operating area of the machine, a grinding wheel magazine, rotating vertically, is installed. It can store up to 14 grinding wheel sets with a maximum of 3 wheels. A linear handling system brings the wheels into the working area, ➔



#### In my opinion

J. Schneberger AG has extensive expertise in tool grinding technology. Even special solutions such as the "Gear Hob Profiling" are engineered and realized with the customer. Due to the enormous variety of optionally available special assemblies in the machine construction of the gemini NGM, the customer can configure "his machine" and thus grind a wide range of tools. With the user-friendly, comfortable and clearly structured Quinto Qg1 grinding software, new grinding tasks can be generated within minutes. Very advantageous, also with regard to economic grinding, are the automatically exchangeable workpiece chucks, which in special sizes weigh up to 20 kg. In the existing ERP system there is still some potential for further analysis.

*Edwin Neugebauer*



## MACHINENCHECK Results

The extensive and complete list can also be found: <a href="http://www.fertigung.de">www.fertigung.de</a>	Max points	Points for gemini NGM Schneberger
Machine installation	25,00	22,50
Time consumed for 1 job	12,50	10,00
Proof of machining quality	2,50	2,50
Alignment of axis	2,50	2,50
Introduction to Operator	7,50	7,50
<b>Ease of Maintenance</b>	<b>100,00</b>	<b>95,00</b>
Accessibility for maintenance	25,00	0,00
Accessibility machine repair	35,00	35,00
Exchange time Grinding Spindle	15,00	15,00
Exchange time linear axis	15,00	13,50
Automatic maintenance control system	10,00	9,00
<b>Automation</b>	<b>100,00</b>	<b>100,00</b>
Machine start up / referencing	30,00	30,00
Operation / re loading	30,00	40,00
Effort for parts clamping and parts movement	40,00	30,00
<b>Control</b>	<b>50,00</b>	<b>48,00</b>
Control and comfort	30,00	30,00
Collision oversight	20,00	18,00
<b>Re set up friendliness</b>	<b>50,00</b>	<b>50,00</b>
Tool and tool clamping	25,00	25,00
Set up effort	15,00	15,00
Multi clamping / mix of models	10,00	10,00
<b>Service</b>	<b>75,00</b>	<b>68,25</b>
Availability service personnel	30,00	27,00
Spare parts and parts manufacturing	22,50	22,50
Component Drawing and internet availability	15,00	12,00
Service contracts.	7,50	6,75
<b>TCO</b>	<b>85,00</b>	<b>40,80</b>
Analysis of cost justification	34,00	17,00
Assessment and figures: Down time and repair time	34,00	13,60
KVP-Machine builder in case of machine failure	17,00	10,20
<b>Contracts</b>	<b>15,00</b>	<b>10,00</b>
Warranty time	5,00	4,00
Payment terms	5,00	4,00
TCO-Process fix.	5,00	2,00
<b>Total</b>	<b>500,00</b>	<b>434,55</b>

The A axis has a high torque of 218 Nm/800 rpm. Schneberger designed grinding spindles are available up to 24 KW/12,000.

together with the coolant nozzles, which are mounted on the grinding wheel packs and preadjusted to the correct cooling position. The presence of the coolant nozzles are monitored with a sensor.

An articulated robot arm is used for moving the tools/blanks, as well as taking over the loading of the work piece spindles with the corresponding clamping system. The blanks and finish ground tools are stored on a pallet.

The pallets (our Vario pallet) have an intelligent plug-in system for different tool diameters. The differences in diameter are accepted by a spring-loaded pressure finger. If different diameters have to be clamped, the loading gripper can select different clamping sleeves from a range in a magazines and automatically insert the correct sleeve into the chuck.

For grinding tasks that require a larger clamping systems, these systems are stored in an attached enclosure (Robot Area) next on the side of the machine. A robot with a maximum load capacity of 20 kg then supplies the machine. Schneeberger builds their own grinding spindles and as well as the 3D probe system, which is used to probe and establish the actual coordinate positions of the machine. In the production process, a laser marking the ground tools can be applied after unloading the tools from the work area.

### Grinding process

The developed software for generating processes Quinto Qg1 offers a tailored, comfortable platform for process -

design. The functionalities are clearly displayed, quickly activated, and with the functions offered, you can very quickly achieve a finished grinding process. The archive of existing tool data of standard Schneeberger and user-specific tool programs supports creating of new grinding programs.

3D CAD models of a tool can be read in and in a few simple steps, the grinding path with the wheel inserted is finish programmed. Grinding processes generated directly in the software on the control panel, are displayed in a 3D model and are also completed in three quick steps.

The two-part split of the screen is very convenient, showing the tool to be machined and the momentarily newly created program. The operator can design any geometry and has a high degree of freedom. Simulation sequences can be used to display contour violations during generation by the grinding tools used.

### Process

During the machine evaluation, a solid carbide milling cutter was generated on the Qg1 software directly on the machine and then ground. Remarkable was the soft, harmonic grinding and the evenly fine surface finished produced. On a neighboring machine, the high frequency profiling of a gear cutting tool was also demonstrated, a machining operation in which Schneeberger has a great deal of expertise.

## Numbers+FACTS

Machine Specifications gemini NGM from Schneeberger	
Work area (X/Y/Z-Axes) (mm)	500 x 400 x 380
C-Axis, Rotation arc	365°
Grinding spindle interface	HSK 50, HSK 80; HSK 190
Grinding Spindles	10 kW (100%), 13 kW (60%), 24 kW (100%), 32 kW (60%)
A-Axis	360°, Work Gear, 40 rpm, Torque 800 rpm
Tool clamping system interface	ISO 50
Grinding wheel pack loaders	8, 14 Positions; max. 42 Grinding wheel packs
Tool loaders	Robot (load: 6/20 kg)
Tool pallets	max. 4 Pallets 300 x 300; Stack; Enclosure for clamping systems
Control	Fanuc 31i B5
Floor space	1350 x 2304 mm
Weight	7 t
Machine dimensions (mm)	8450 x 5650 x 4850

### At a glance

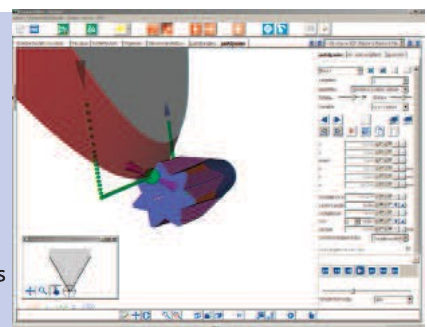
gemini NGM from  
Schneeberger

#### Strength:

- Floor space layout
- Rigid and compact machine design
- Extensive machine options and accessories
- Large usable tool selection range.
- Excellent processes in automation
- Operator friendly and functional software
- Fast generating of new grinding programs
- Extensive offering of grinding spindles.
- High amount of in house manufacturing

#### Weakness:

- No systematically formatted service data evaluations in the



The grinding software Qg1 offers an operator friendly functionality and a clearly organized platform.



During the machine check the special grinding process "Gear Hob Profiling" (below) and the generation and grinding of a solid carbide end mill were shown.





With a robot, ( max load 20 Kg) the automatically off loading / loading of tools can be realized.

Pictures: fertigung



The Fanuc robot, double gripper system can manage a 2 or 4 pallet system with tools..



The wheel loading system with a HSK50 clamping system can handle and manage up to 14 prepared wheel packs.

### Control

Only the Fanuc 31i is used as the control system, with all Fanuc components used throughout the drive systems. The CAD/CAM software Qg1 runs directly in the control.

### Service/TCO

In the main markets, customer service is provided by the local subsidiaries. Standard is a manned hotline during regular office hours. Service visits to customers are logged and recorded in reports and then transferred and entered in a ERP-System. With this, potentially a systematically

and thorough analysis can be implemented, which will improve profitability. A service ticket system entered upon the receipt of a service need from a customer is being planned. Internally, if so necessary, meetings can be arranged at short notice and design measures to remedy any defects can be determined and implemented.

### Contact

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