



/ ECONOMIC SERIES PRODUCTION WITH THREE  
AUTOMATED CNC HIGH-PERFORMANCE TURNING CENTRES HT 45 G3



MSG Mechatronic Systems  
GmbH relies on EMCO's  
HYPERTURN 45 G3 CNC  
high-performance turning  
centre for production  
machining of tappet guides



## Brief description

- / **Task:** Production machining of tappet guides for an internal combustion engine
- / **Solution:** HYPERTURN 45 G3 CNC high-performance turning centre from EMCO
- / **Benefits:** Solution ideally suited for the process, highly accurate, compact system, highly flexible, productivity and cost-effectiveness

## Complex challenges

The challenges faced by the automotive supply industry are not getting any smaller. Generally speaking, the margins on manufactured components are not all that large, and the shift in driving concepts towards electromobility is doing the rest. Know-how, productivity, and flexibility are all the more in demand. MSG Mechatronic Systems GmbH impressively demonstrates how problem-solving ability, strength in innovating, and the highest product quality can be convincing. The latter is ensured not least by three automated HYPERTURN 45 G3 CNC high-performance turning centres by EMCO. MSG Mechatronic Systems GmbH ('MSG') specialises in the development and production of high-quality mechatronic components for the automotive industry. In particular, these are camshaft adjustment units, cooling water valves, proportional valves, radial fans, or linear switching actuators. These are produced in annual batches of between 150,000 and 6,000,000 million parts. "We are not a classic contract manufacturer, but a development partner," explains DI Dr. techn. Mario Kleindienst, Sales Manager at MSG, adding: "As a company oriented towards the future, we satisfy our customers with problem-solving ability, strength in innovation, and the highest product quality." Currently, product development at MSG is moving increasingly towards more complex, software-based systems – rotary valves for thermal management, for example.

## Highest quality requirements

Founded in 2005, MSG now employs 240 people at its sites in Wies and Hörmsdorf, with an annual turnover of approximately 50 million euros. The company also operates a joint venture in Jiaxing (China) with another 150 employees. As a tier 1 or tier 2 supplier, the company's clientele includes primarily the large German premium manufacturers. "Absolute



According to MSG, the HYPERTURN 45 G3 impresses with its very compact design, powerful main and counter spindles, highly dynamic drives in all axes and two BMT45P tool turrets with driven tools.

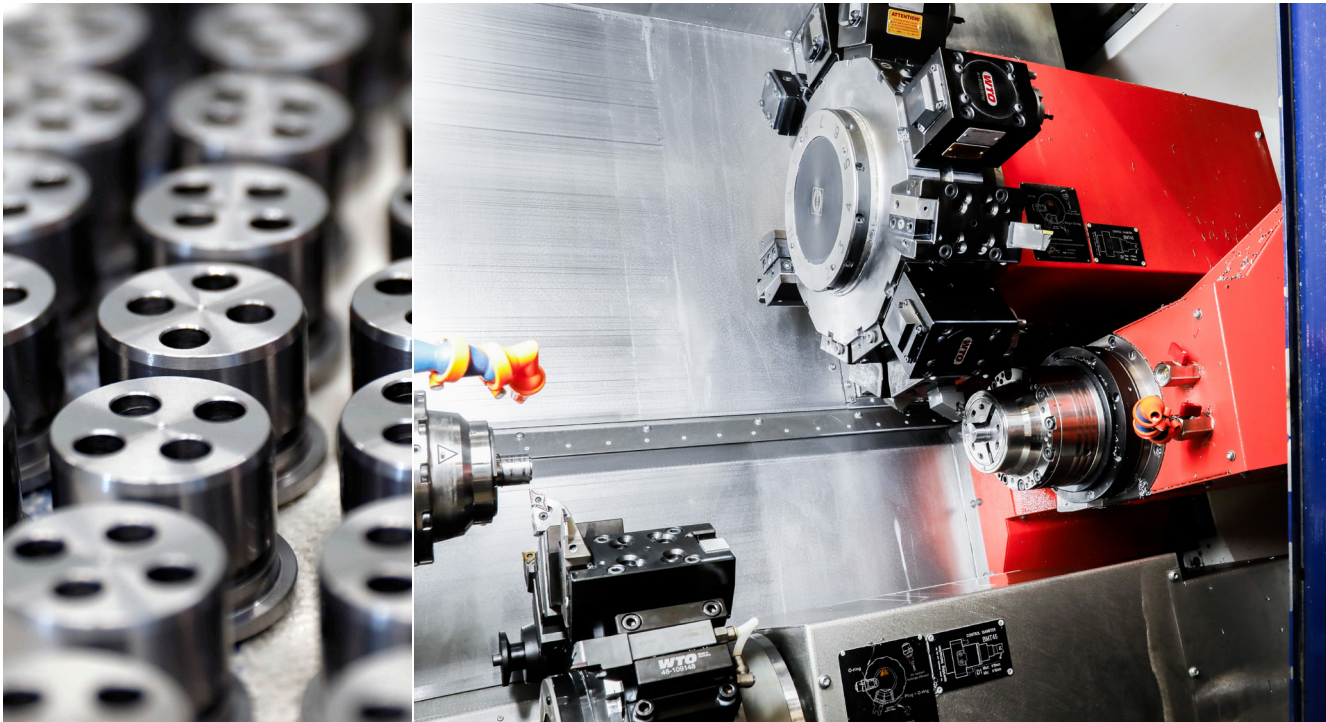
precision, zero tolerance for defects, maximum reliability and 100 per cent traceability are a must, therefore, and are the foundation of our production," says Kleindienst, summing up the challenges of an automotive supplier. As such, well-trained specialists and the best possible automated logistics, manufacturing and production processes are important. "We subject every single item we produce to a comprehensive final inspection with specially coordinated test procedures," Kleindienst continues.

## Cover internal capacities

To offer greater flexibility and responsiveness when it comes to mechanical production, the company founded its own machining department in Hörmsdorf three years ago, and has successively expanded it since with 19 people currently employed there: "Our focus is on the economic machining of complex components, both in turning and milling," Christian Orthaber, Production Engineering at MSG, adds. In addition to classic contract manufacturing, the company acts as a supplier for its own production in Wies. "One strategic goal is to cover the internal capacities as much as possible in the future," Orthaber continues.

## Flexible horizontal machining

A very good example of this is the ram guidance project. "This component is used in internal combustion engine camshaft valves to be able to perform cylinder deactivations in tenths of a second," explains the MSG machining technician. Incidentally, the vacuum-hardened components are made of a case-hardened steel: 16MnCr55 (1.7139). For the production of the ram guide with series of up to 1,000,000 pieces per year, there were several options to choose from, whereby MSG ultimately opted for the concept of the Hallein-based machine tool manufacturer EMCO with three identical third-generation HYPERTURN 45 CNC high-performance turning centres. "In addition to external production, a concept with a vertical lathe that included automation was also up for discussion. However, due to its far greater flexibility, we were more convinced by the horizontal solution with bar feeder," says Orthaber, explaining the decision. This proved to be the right decision from the start, as the ram guide tube is also produced in large quantities on one of the three HYPERTURN 45 G3 machines. "The great advantage of horizontal machining is the very simple feeding of the raw material via bar feeders. The finished machined components are unloaded via a collecting tray and can be



**High accuracy required:** Position tolerances of  $+0.025$  mm to the cylinder or a maximum roughness depth of  $Rz = 8.0$   $\mu\text{m}$  must be maintained for the two fitting holes of the tappet guide (note: the other two holes are oil compensation holes).

#### Key data of the component:

- / Plunger guide
- / Quantity 1,000,000
- / Material 16MnCr55 (1.7139)
- / Vacuum hardened 320 to 450 HV10

checked immediately by the employee," summarises Andreas Pichler, Area Sales Manager at EMCO GmbH.

#### HYPERTURN 45 G3 with the best overall package

MSG did not make the selection easy, as maximum productivity plays a decisive role in the automotive industry. "EMCO provided us with excellent support during the development process. In addition to the corresponding time studies, we also optimised the machining process together," says Orthaber of EMCO's very good support, and adds: "EMCO persuaded us with the best overall concept of all the suppliers in question!"

One of the decisive factors was certainly the very compact design of the HYPERTURN 45 G3 and the resulting small footprint. "The three turning centres, including the 3-metre bar feeder, fit perfectly into our production hall. MSG also appreciates the high flexibility of the EMCO machine concept. "We will remain very flexible in the future and can quickly process new components, if necessary," emphasises Christian Orthaber.



#### DI Dr. techn. Mario Kleindienst, Sales Management MSG Mechatronic Systems GmbH

*For an automotive supplier, productivity is the top priority. In the area of mechanical production, we have found the right partner in EMCO.*

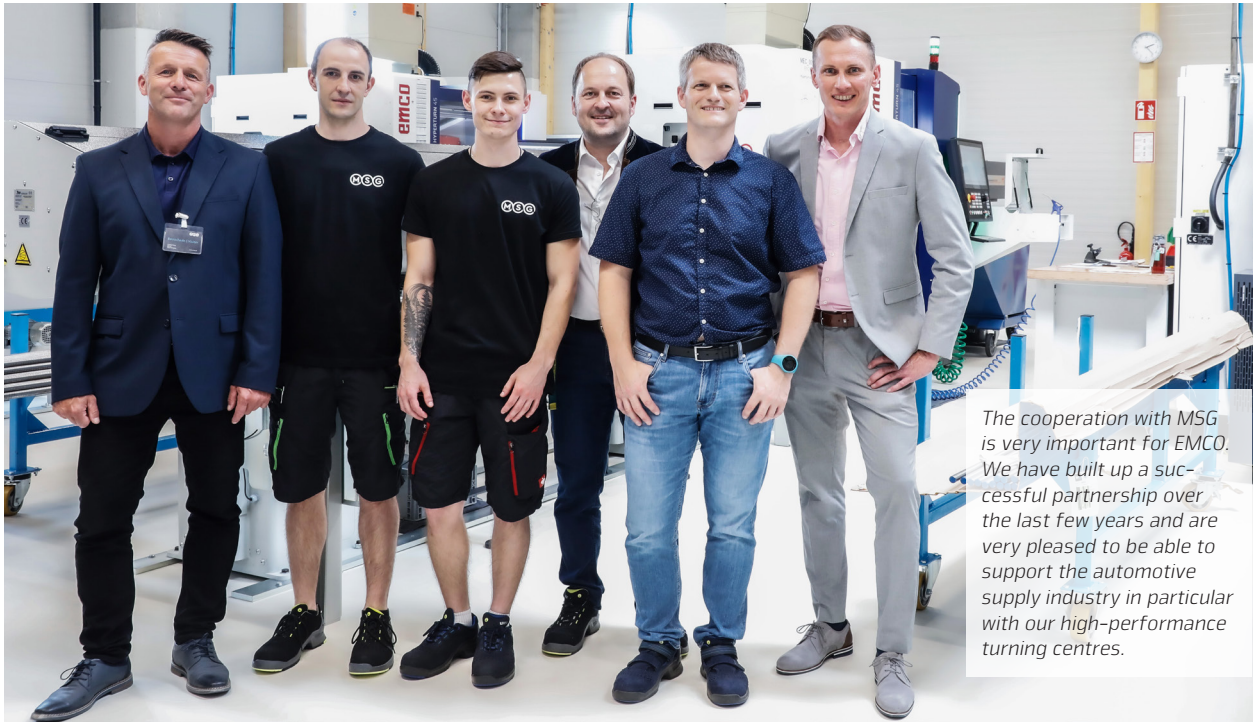


The set-up machine concept of the HYPERTURN 45 G3 with a  $72^\circ$  inclined bed ensures a good chip fall.

#### Positioning accuracy is crucial

"With the HYPERTURN 45 Generation 3, we offer a high-performance turning centre with powerful main and counter spindles and two BMT45P tool turrets with driven tools. The X and Y axes are also equipped with a glass scale," says Andreas Pichler, summarising the features of the Emco turning centre. In addition, the set-up machine concept with a  $72^\circ$  inclined bed ensures good chip fall. High precision was a pre-condition to purchase, since the components to be produced are required to be of high quality: "For the two fitting bores of the ram guide, we have to maintain position tolerances of  $+0.025$  mm to the cylinder or a maximum roughness depth of  $Rz = 8.0$   $\mu\text{m}$ . And we manage to do this reliably with our three HYPERTURN 45 G3 machines," says Orthaber, confirming the precision of the EMCO machines.

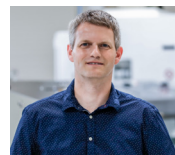
As already mentioned, the machining process was designed to be stable: "A 3-metre bar feeder simply causes vibrations. That's why we machined the component upside down. Only pre-machining is carried out on the main spindle – the finishing processes or the high-precision final bore machining is done on the counter spindle," explains Orthaber. Equally important is



*The cooperation with MSG is very important for EMCO. We have built up a successful partnership over the last few years and are very pleased to be able to support the automotive supply industry in particular with our high-performance turning centres.*

**The successful project team** (from left to right): Kurt Aichmaier (Sales EMCO), Erich Jammerneegg, Florian Gross, MSG Production Manager Franz Gutschy, Christian Orthaber (all MSG) and Andreas Pichler (Area Sales Manager EMCO GmbH).

the high positioning accuracy of the HYPERTURN 45 G3, which is ensured among other things by a direct rotary encoder in the C-axis. Most of the tools used are internally cooled. A belt filter system with 600 litres is available for optimum cooling and lubrication.



**Christian Orthaber, Production Engineering  
MSG Mechatronic Systems GmbH**

*Both the technical support and the after-sales service from EMCO are excellent. In addition, the machine concept of the HYPERTURN 45 G3 fits perfectly to our requirements.*

**Cycle times improved again**

Due to tool optimisations, the machining time of the component could be reduced from the initially calculated 88 to 72 seconds. "But we haven't reached the end of the line yet," Orthaber is convinced, "because, of course, every second counts when dealing with such large quantities. MSG also uses EMCO's EMCONNECT digital process assistant. According to Orthaber, this makes the machine control panel the central platform for all the operator's necessary functions: "It also gives us direct access to the machines from our location in Wies. This connection to our ERP system is a great advantage for us."

**Investment has paid off**

In conclusion, MSG is convinced that it did everything right: "The cooperation with EMCO and the support are excellent. The systems have been productive since day one. The investment has absolutely paid off and the next project is already in the pipeline," says Christian Orthaber, already looking to the future.  
www.emco-world.com



MSG Mechatronic Systems GmbH (MSG) supplies high-quality mechatronic components for the automotive industry. In particular camshaft adjustment units, cooling water valves, proportional valves, radial fans as well as linear switching actuators in quantities of 150,000 to 6,000,000 million parts per year. Customers are mainly large German premium manufacturers.

- / Year of foundation: 2005
- / Locations: Wies, Hörmsdorf, Jiaxing
- / 240 employees
- / 50 million euros annual turnover
- / 100 % automotive industry

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# TECHNICAL DATA HYPERTURN 45 G3

## Working area

Swing over bed	Ø 430 mm
Swing over cross slide	Ø 300 mm
Distance from main spindle to counter spindle	760 mm
Max. turning diameter	Ø 300 mm
Max. part length	480 mm
Max. bar capacity	Ø 45 (51 / 65) mm

## Travel

Slide travel in X / X2	175 / 175 mm
Slide travel in Z / Z2 / Z3	510 / 510 / 510 mm
Travel in Y	+40 / -40 mm

## Main spindle

Speed range	0 – 7000 (5000) rpm
Max. torque on the spindle	100 (150) Nm
Spindle nose DIN 55026	KK5 (KK6) / A2-5 (A2-6)
Spindle bearing (inner diameter at front)	Ø 85 mm
Spindle bore	Ø 53 mm

## Counter spindle

Speed range	0 – 7000 rpm
Max. torque on the spindle	100 Nm
Spindle nose DIN 55026	KK5 / A2-5
Spindle bearing (inner diameter at front)	Ø 85 (105) mm
Spindle bore	Ø 53 (73) mm

## C-axes

Resolution of the rotary axis	0,001°
Rapid motion speed	1000 rpm
Spindle indexing (disc brake)	0,01°

## Drive power

Main spindle	15 (18) kW
Counter spindle	15 kW

\*werden nicht aufgelöst

## Tool turrets, VDI / BMT

Number of tool positions	2 x 12 / 2 x 12 (16)
Tool holders	VDI 25 / BMT45 P
Tool cross section for square tools	16 x 16 / 20 x 20 (25 x 25) mm
Shank diameter for boring bars	Ø 25 / Ø 32 (40) mm
Revolver switch time	0.2 / 0.2 sec

## Driven tools, VDI / BMT

Speed range	0 – 8000 / 0 – 12000 rpm
Torque	16 / 21 Nm
Drive performance	4 / 8,8 kW
Number of driven tools	2 x 12 / 2 x 12 (16)

## Feed drives

Rapid motion speed X / Y / Z	30 / 15 / 45 m/min
Feed force in the X-axis / Y-axis	4000 N
Feed force in the Z-axes	5000 N
Feed force in the Z-axes, counter spindle	6000 N
Position variation Ps (VDI 3441) X / Y / Z	3 / 3 / 3 µm

## Coolant system

Tank volume	230 (730) l
Coolant pumps for the tool turrets	2 x 14 bar
Flushing pumps for the work area	2 x 3,7 bar

## Power consumption

Connected load	49 kVA
Supply pressure	6 bar

## Dimensions/weight

Height of center above floor	1240 mm
Machine height	2340 mm
Space occupied BxT (not including chip conveyor and coolant)	2930 x 2480 mm
Total weight of machine	5900 kg

## Safety devices CE compliant

beyond standard /

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