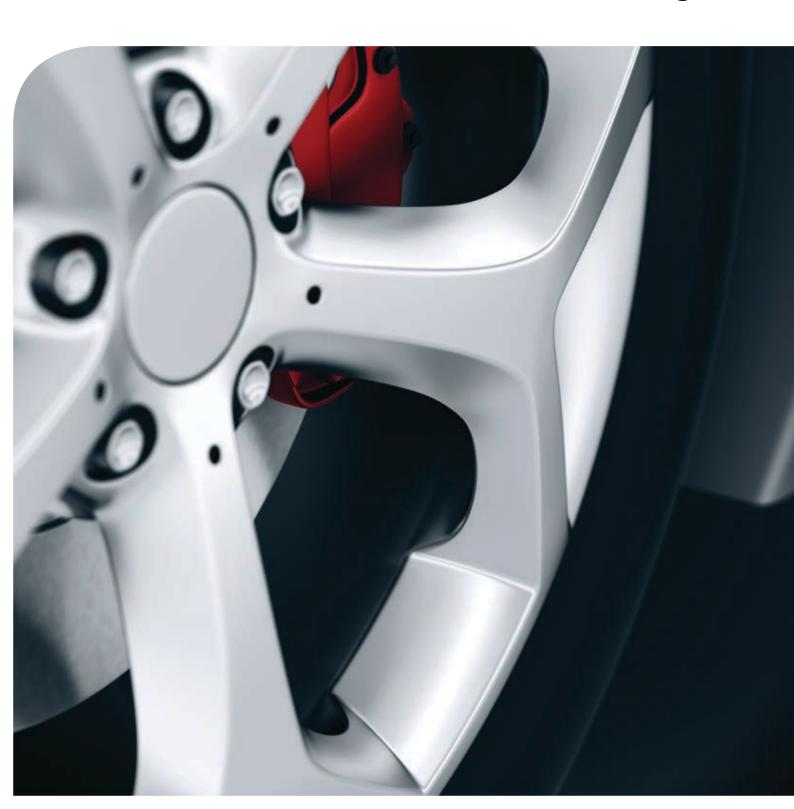


DMG / MORI SEIKI Automotive Technologies

Competence for automotive production Machines Automation System competence Services energy solutions

World class production thanks to latest technologies



Con	npetence for automotive production
Mad	chines
Aut	omation
Syst	tem competence
Serv	vices
ene	rgy solutions





Competence for automotive production	
Machines	
Automation	
System competence	
Services	
energy solutions	

Competence for automotive production

DMG / MORI SEIKI – Competence for automotive production.

DMG / MORI SEIKI machine tools are indispensable in the process chain of automotive production. The compact, space-saving construction and high rigidity as well as short non-productive times and high reliability and user-friendliness guarantee robust processes.

Engine parts
Crank case /
DMC 80 H linear

04



Chassis Stub axle / DMC 60 H *linear*



Drive trainGearbox housing /
DMC 60 H *linear*



Engine parts
Compressor wheel / HSC 20





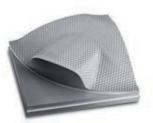
Interior Honeycomb structure for steering wheel cap / LASERTEC 80

Engine parts Cylinder head / DMC 60 H *linear*

Chassis Mould for alloy rim / HSC 105 *linear*



Drive trainTripod joint / CTV 250





Interior Centre console / **ULTRASONIC 85**

Engine parts Drive shaft / GMC 20



Drive train Gearbox shaft / SPRINT 42|8



Engine parts Mould for engine cover / LASERTEC 210



Drive train Sliding sleeve for gearbox / CTV 160



Chassis Ceramic brake disc /



ULTRASONIC 80



Engine parts Camshaft / CTX beta 1250 TC 4A

Exterior Mould for bumper / DMU 600 P



Drive train Ball hub / CTV 250 DF













Turning technology

- + CTV
- + GMC
- + CTX TC
- + NZX
- + SPRINT
- + NTX

Milling technology

- + DMC H linear
- + NHX
- + duoBLOCK®
- + Portal machines
- + HSC





Advanced technologies

+ LASERTEC

+ ULTRASONIC

Competence for automotive production

Machines
Turning technology

Automation

System competence

Services energy solutions

Turning technology

Vertical turning

In the turning sector, DMG / MORI SEIKI offers a complete spectrum of all machines and configurations, which are required for our automotive customers. From highly precise camshaft manufacturing, via efficient complete machining of parts in the field of steering technology to series production of gears.

CTV

- + **Highest stability and precision** right into the µm-range, thanks to best hard turning characteristics
- + Highest productivity and long-term precision in series production
- + Long Z-axis travel resulting in fast machining set-up of short and long workpieces, part heights of 5 to 210 mm, ø up to 160 / 220 mm
- + Automation as standard, simple and flexible; up to 20 positions – easy height adjustment for different workpiece lengths



linear IIIDRIVE





CTV DF

- + **Highest dynamics** thanks to the drive of the turn-mill swing arm (DF) being a direct drive, swivel range +105 / -45°
- + **DF swing arm for up to two milling spindles** HSK-C63-F80, 6,000 rpm, 14.5 kW and 46 Nm (one milling spindle as standard)
- + Additional Capto C5 holder for multiple tools with up to four cutting edges
- + **Longest service life** thanks to stainless steel covers in the working area
- + Machine-integrated automation in the form of a metal link conveyor for feeding and removing workpieces





Turning technology

Multiple spindle turning



GMC

- + **65** % **reduced set-up times** compared to cam-controlled automatic lathes
- + Bar diameter up to 25 mm (optional, standard 20 mm)
- + Reduction of machine life cycle costs no cams and special tools, but mechanical equipment
- + Machine configuration suitable for the production of **complex workpieces** in medium batch sizes
- + Maximum precision (CpK: 1.67 in h6)
- + Drum indexing with **Hirth serration**

Competence for automotive production

Machines

Turning technology

Automation

System competence

Services

energy solutions







Turning technology

Horizontal turning / turn-milling

CTX / CTX TC

- + Highest flexibility 5-axis interpolation with turn-milling spindle with 12,000 rpm
- + Highest material removal rate: 12-station VDI 40 direct drive turret maximum speed: 10,000 rpm, up to 34 Nm torque
- + Reduction of set-up time up to 80 % thanks to TRIFIX® precision quick change system
- + Y-axis, turret slide (±40 mm) for demanding complete machining







3: Machining of a camshaft



NZX S1500

- + Symmetrical structure in relation to the centre of the spindle in order to ensure an even heat distribution and thereby optimal machining precision
- + Two optional distances between centres: 500 / 1000 mm
- + Milling tools can optionally be mounted on turret 1 and turret 2
- Excellent access and easy set-up with 275 mm distance to the workpiece
- + Compact housing, achieved due to the drastic reduction of machine height, compared to the conventional model
- + Machine height of only 1.50 m

10







4: 0.9 second run-up time for the main and counter spindle from 0 to 4,000 rpm 5: 0.8 second chip-to-chip time thanks to highly dynamic turret drive for 16 % shorter non-productive times 6: Complete machining with three turrets and up to three Y-axes



SPRINT

- + Three-turret version: with up to three Y-axes and B-axis
- + TRIFIX® precision quick change system, set-up time reduced by 35 %
- + Highly dynamic, liquid-cooled main and counter spindle
- Patented working space concept (TWIN concept) with cross stroke of the counter spindle and tail stock combination
- + **Optimal chip discharge** thanks to the vertical machine bed with 3-point arrangement for wet, oil and dry machining
- + Space-saving, production-optimised design
- + Permanent lubrication suitable for production with oil / air on all bearings

linear IIIDRIVE



7: Machining of an impeller with the NTX1000

NTX

- + With the **swivelling counter spindle**, parts can be machined on the inside up to a length of 150 mm
- + **5-axis machining and 6-side machining** for small, demanding workpieces
- + **Y-axis** ±105 mm for highest machining flexibility
- + **Highly flexible B-axis** with a rotation range of ±120°



Competence for automotive production

Machines

Milling technology

Automation

System competence

Services energy solutions





1: Fine-machining of a cylinder head combustion chamber side 2: 5-axis machining of a crankshaft housing with a 200 Nm motor spindle 3: Machining an engine block with a 18,000 rpm motor spindle 4: Workpieces up to Ø 1,000 x 900 mm,





Milling technology

Horizontal milling

The modern automotive industry demands ever more precise and complex parts. In order to be able to produce these parts quickly and efficiently, our customers depend on highly precise, dynamic and flexible machining centres. With more than 30 years experience, DMG / MORI SEIKI is the world-wide leader in the field of 4- and 5-axis milling. From mass production to highly flexible single part production – you will find the right machine with the latest technology for every application field and for every task in our range of products. The choice is yours. We have the ideal machine programme.

DMC H linear

- + 25 % more productivity and precision thanks to linear drives
- Linear drives: Maximum long-term accuracy, minimum maintenance costs and a 60-month warranty for the linear drives
- + **Dynamics:** Up to 100 m/min. rapid traverse and up to 1 g acceleration
- + **Precision:** < 4 μm circularity and < 6 μm roundness
- + 5-axis capability: integrated swivelling rotary table
- + **Powertrain version:** direct loading from above or from the front
- + Long-term accuracy and life cycle cost savings thanks to **linear drive technology**





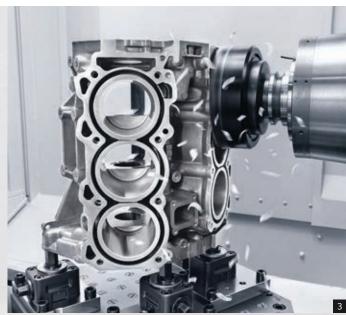








1: Powerful motor spindle
(12,000 rpm) as standard 2: Quick
pallet changer with 8 seconds change
time for workpieces up to 500 kg
3: Pre-machining of a prototype
cylinder block





NHX

- + SIEMENS 840D solutionline or MAPPS IV
- + Pallet for workpieces up to 500 kg
- + 2.8 seconds chip-to-chip time (minimum value)
- + **3-point arrangement** thanks to an inherently rigid single-cast machine bed
- + 12.1 m² space requirement
- 9 m/s² acceleration in the Y-axis;
 60 m/min. rapid traverse and feed in the X-, Y- and Z-axis

Competence for automotive production

Machines

Milling technology

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System competence

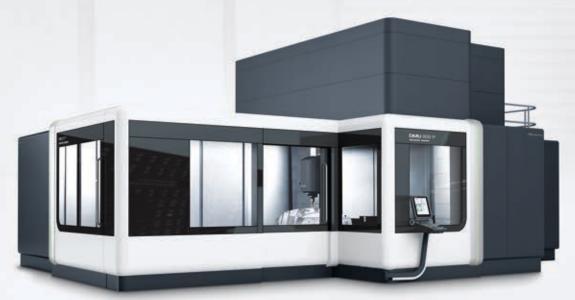
Services

14

energy solutions

Milling technology

Portal machines



DMU 600 P



1: Machining of a mould for bumpers

DMU P

- + Modular concept for automotive tool and mould manufacture, machine construction and energy industry with constant precision
- + Portal construction for highest **precision and dynamics** up to 2 m/s²
- + Substructure / **bed** as **single-cast** (GGG60)
- + Portal attached to foundation and fixed to machine bed for 20 % more rigidity
- + Workpiece weights of up to 40 t

15

Pre-milling of a steel construction
 part for production facilities
 Machining of a mould for alloy
 wheels



Milling technology

Heavy-duty machining



duoBLOCK®

- + Patented duoBLOCK® construction principle for highest stability and long-term precision
- + Large working space and high pallet loading up to 3,000 kg
- + Powerful and high-torque spindles
- + Motor spindle 10,000 rpm, 288 Nm, 44 kW as standard, optional 12,000 rpm, 430 Nm and 52 kW (SK50) or optionally HSK-A100
- + **Short non-productive times** due to latest pallet and tool changing technology
- + **Best accessibility to the working space,** set-up area and maintenance equipment
- + Version with pallet changer for **loading directly into the** working area



Milling technology

High speed cutting

HSC linear

- + Thermo-symmetrical portal construction for high long-term precision
- + High dynamics thanks to direct drive in all axes
- + 5-axis version with swivelling spindle and NC table
- + Excellent access to the working area, also in conjunction with automation solutions



Competence for automotive production Machines

Advanced technologies

Automation

System competence

Services

energy solutions





1: ULTRASONIC operating principle
2: Mounting in CFRP
3: Carbon-ceramic brake disc
4: CFRP centre console





Advanced technologies



With machines of the ULTRASONIC series, DMG / MORI SEIKI sets new standards for machining of high performance high-tech materials in the automotive sector.

As a result of the kinematic combination of tool rotation and an additional oscillation in the axial direction, difficult to machine high performance materials from CFRP / GFRP to ceramics can be machined economically with the highest quality and utmost part precision.

ULTRASONIC

- + Reduced process forces for excellent surface quality $Ra < 0.2 \ \mu m$, minimised micro-cracks in the material, longer tool service life
- + Economical grinding of difficult to machine materials like silicon nitride (Si₃N_a) and silicon carbide (SiC)
- + **Up to double material removal rates** compared to conventional grinding
- + Self-sharpening effect of the tool cutting edge thanks to micro-chipping of the diamond grit
- + **Dual feeds** possible thanks to ULTRASONIC
- + Up to **40** % **reduced process forces** in composites allow dual feeds and prevent edge build-up on tools
- + Excellent part quality in CFRP, GFRP, CMC: Sharp edges, clean exposure of individual laminate layers, perfect surfaces







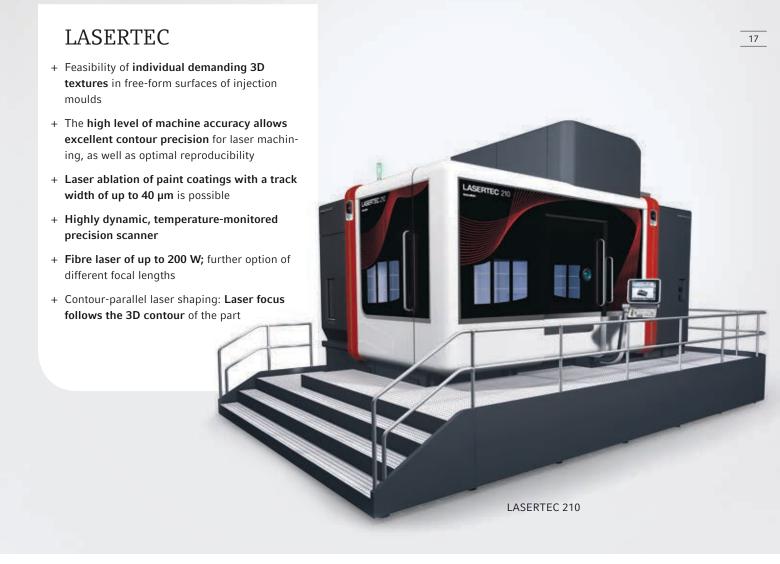
1: Mould for steering wheel caps with honeycomb structure 2: Laser-structured negative mould for engine cover 3: Honeycomb structure of a steering wheel cap

Advanced technologies

LASERTEC

Thanks to the innovative technology of 5-axis laser texturing on the highly precise and long-term stable high-tech machines of the LASERTEC Shape series of DMG / MORI SEIKI, designers of demanding exposed surfaces are no longer limited in what they can achieve.

Geometrically defined surface structures in 3D free-form areas for interior automotive components such as fittings, steering wheel caps or engine covers, can be manufactured with the highest contour precision in reproducible quality.



Competence for automotive production
Machines
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energy solutions

Automation

Machine tools and automation technology from a single source.

Perfect workflows and highest efficiency for your production: DMG / MORI SEIKI offers you the perfect combination of know-how and technology.

From planning of the material flow via the manufacture of automation components to the implementation of the concept that must be created – we offer everything from a single source. Irrespective of whether the relevant machine is configured with integrated automation, standard automation, flexible manufacturing cells or complete turn-key applications specially for the requirements of our automotive customers – matched solutions guarantee the lowest tools costs and the highest quality.



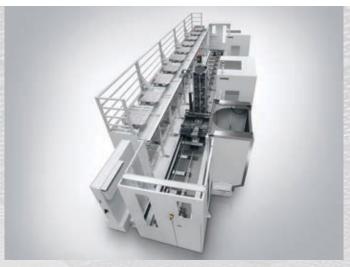


Machine-integrated automation

Rotary and linear storage

As an addition to the machine, we have a selection of automation options, which be factory fitted to the machine.

Number of machines that can be integrated: 1



Standard automation

Workpiece or pallet handling

Efficient robot or portal solutions with additional modules as plug and play solutions or available as customised versions.

Number of machines that can be integrated: $\mathbf{1} - \mathbf{2}$



Flexible manufacturing cells

Linking of multiple process sequences

Portal solutions, fixed or mobile robots and additional modules for multi-machine loading with integration of additional operations.

Number of machines that can be integrated: $\mathbf{3} - \mathbf{10}$



Production lines

Overall solutions in a line production

Planning and implementation of pallet- and robot-handling to form production line.

Number of machines that can be integrated: > 10

Competence for automotive production
Machines
Automation
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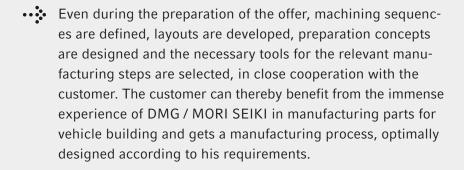
1: Process development 2: Clamping device for a cylinder crankshaft housing 3: Excerpt of time study 4: Tool design 5: Commissioning of a crankcase-process

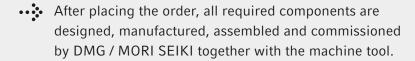


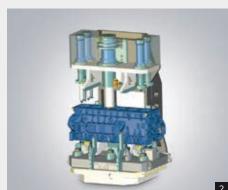
System competence

Turnkey solutions for the highest demands.

Besides the wide range of products, DMG / MORI SEIKI offer their customers proven competence in the engineering of technology applications and the implementation of complex projects of all sizes.

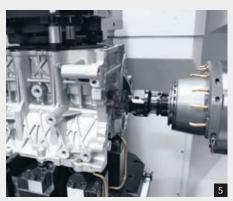












After to successful pre-acceptance at DMG / MORI SEIKI, the manufacturing system is shipped to the customer's factory, installed and handed over to the customer after final acceptance.



- During the entire duration of the project, the customer has a dedicated Project Manager assigned to him as contact person. In this way, DMG / MORI SEIKI follow a "one-face-to-the-customer" strategy for handling technology projects and thereby provide optimal support. Essentially the project management tasks comprise the following:
 - + Monitoring of deadlines
 - + Monitoring of costs
 - + Interface management
 - + Progress monitoring
 - + Supplier management
 - + Technical coordination
 - + Change management
 - + Reporting



6: Manual loading and offloading device **7:** Cylinder block production line

Competence for automotive production
Machines
Automation
System competence
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energy solutions

Our service for you

Globally linked - quickly on site!

DMG / MORI SEIKI always offers you a multitude of opportunities to maximise your productivity, whether it be training, software, service and support, optimisation, retrofitting and reconditioning solutions, or used machines that are available at short notice.







Service

Highly qualified DMG / MORI SEIKI employees with fast response times and efficient procedures ensure an excellent service for YOU. We are available 24 hours per day, 7 days per week, in order to find a solution for you, whenever you require it. We are there for you – worldwide.

- + More than 2,500 employees worldwide
- + Fastest availability and operational capability thanks to a worldwide service network
- + Proximity to the customer thanks to local service companies
- + More than 100 technology and service centres

Spare parts

Original spare parts from the manufacturer guarantee maximum performance and service life of your DMG and MORI SEIKI machines! Highly motivated employees in our service centres constantly ensure that original replacement parts for your machines are provided quickly and reliably.

- + More than 100,000 different spare parts available
- + Spare part availability rate of over 95 %
- + Fastest and reliable delivery, worldwide
- + Maximum availability of spare parts even for older machine series

24 / 7 service hotline

Problems can happen at any time. Therefore our service experts are available by phone 24 hours a day, 7 days a week. Whenever problems arise, call us!

Our service numbers in Europe





Tool set-up

Whether it is set-up, shrinking, balancing or testing – we offer you perfect solutions for all tool sizes and machine environments. Improve the quality and precision of your workpieces with our know-how and a wide range of products.

- + Increase in precision and economic efficiency
- + Improved quality of tool provision
- + Optimisation of set-up times
- + Significant reduction of machine down-times

Training

Competence in the field of CNC means productivity and competitiveness. The DMG / MORI SEIKI Academy is an international leader for passing on CNC technical knowledge – in industry or in educational institutions. Take advantage of our comprehensive expertise in CNC knowledge transfer, which we make available to our customers worldwide.

- + CNC-Training
- + FollowUp Training
- + Training Plus
- + CNC Training Projects
- + Train the trainer

Software

From the idea to the finished work-piece: design, programming, simulation, production – all from a single source. The NC programme as well as all other 3D data are exported via the supplied post processor and a defined interface. Initial import to the DMG Virtual Machine allows comprehensive simulation – and thereafter the programme is transferred directly to your DMG machine with the highest level of security.

- + DMG Process Chain
- + DMG Process Chain "light" (without DMG Virtual Machine)
- + DMG Virtual Machine
- + MORI SEIKI NET Global Edition
- + DMG Netservice
- + DMG Service Agent
- + DMG / MORI SEIKI Messenger

Competence for automotive production



EFFICIENT USE OF ENERGY

We will reduce your energy costs.

From the initial consultation up to a comprehensive solution – our engineers will prepare a multi-stage energy efficiency solution tailored to your requirements at your site.



Your benefits

Benefit from our competence now. Energy efficiency measures ...

- · show results directly.
- · ensure your competitiveness.
- protect you from power price increases.
- reduce your CO2 emissions.
- · are subsidised by government.

The two steps of energy efficiency analysis

1. BASIC - ANALYSIS

- · Consumer analysis
- Estimation of potential savings
- Approximately 4 days of consultation

2. COMPLETE - ANALYSIS

- · Consumer analysis
- Detailed analysis of savings potentials, including amortisation calculation and possible introduction of a metering concept
- · Approximately 25 days of consultation



E-MOBILITY CHARGING INFRASTRUCTURE, THE E-FILLING STATION COMPLETE SOLUTION

Only he who fills up green also drives green.

The e-filling station complete solution from GILDEMEISTER energy solutions is not only clean, but also efficient. Electric vehicles are charged quickly and cleanly with up to 44 kW charge rating.

The SunCarrier and / or the WindCarrier, which charge the large CellCube FB 30-130 battery, use renewable energy as a natural, highly efficient alternative to fossil fuels. In this way, the e-filling station can be erected in the shortest period of time, even without connection to the grid. Besides the e-filling station complete solution we will gladly prepare an individual filling station concept for you with a suitable Cellcube storage unit and the charging infrastructure for your fleet of electric vehicles.

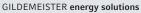
We offer you concepts for efficient electro-mobility and show you the road to a sustainable lowering of your power consumption.

Contact us!

Highlights e-filling station

- 6 charging points for different contact systems
- · Motorised lid for protection against soiling
- Protection against unauthorised access and vandalism
- · Simple operation
- · Emission-free and clean provision of energy





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