

The DMG MORI magazine for customers and interested readers.

DMG MORI Software Solutions: 24 exclusive technology cycles and 10 new CELOS® APPs.

DMG MORI manufacturer service: CUSTOMER FIRST – We've been listening to you! 5 service promises for the best service quality at fair prices.

CLX / CMX: Attractive entry-level machines are the evolution of our ECOLINE series with improved quality and technology. NEW HEIDENHAIN.

Holistic technology solutions for the automotive and aerospace industry.

**DMG MORI**

# JOURNAL

N° 2 – 2016

**NEW**

**TECHNOLOGY INTEGRATION**  
MTG – Milling, turning and grinding in one set-up.

More on page \_\_\_\_\_ 28



DMG MORI technology cycle MTG: Milling, turning and grinding.

## Innovative technologies with unique software solutions.

24 exclusive DMG MORI technology cycles – up to 60 % faster conversational programming through easy input of parameters.

Find out more about this topic from page



Dr Ing. Masahiko Mori, President DMG MORI COMPANY LIMITED and Christian Thönes, CEO DMG MORI AKTIENGESELLSCHAFT.

# Integration, innovation and quality.

## Dear customers and interested parties,

“Global One” is aimed at the integration of DMG MORI COMPANY LIMITED and DMG MORI AKTIENGESELLSCHAFT to establish a global, integrated machine tool group. More than 12,000 employees in our worldwide production facilities and our 164 international Sales and Service sites now work with a holistic approach, to be the **world number 1 for our customers**.

We can promise **stability and continuity** in our partnership with you, our customers and suppliers. Together with you we would like to start new initiatives: “Global One” stands for future-oriented innovations for machines, DMG MORI Components, Software Solutions and LifeCycle Services for unrivalled quality from production to customer-oriented overall solutions. It heralds a new dimension in technologies and processes for automation and digitisation in the era of Industry 4.0.

We will promote the diversity of global skills and extend the regional strengths of our production sites. This applies, for instance, to Pfronten and Seebach as training factories, especially in fascinating 5-axis complete machining. Bielefeld and Iga will promote universal turning and turn-and-mill in close alliance. Bergamo will in future focus on production and automatic turning. In addition, we will rely on the strengths of our Excellence Centres in Nara for the automotive sector and in Pfronten for the aerospace industry.

As an integrated machine tool manufacturer we will in future also develop **innovations** for your benefit. Our focus is definitely on value for the customer. Above all, we want to do one thing: Listen to you and create solutions for your requirements. Besides machines and selected DMG MORI Components, we will focus on holistic technologies and process solutions.

**For us, digitisation is one of the core issues of the future.** We will expand our APP-based control and operating software CELOS® to become a digitisation platform. We have the technology and products for Industry 4.0 as well as the required process know-how. With CELOS® we already offer our customers the key element for networked intelligent production. A new and simple option

is the integration of own CELOS® APPs for selected customers. The new technologies ULTRASONIC & LASERTEC already offer many opportunities for you to differentiate your production. Additive Manufacturing in particular will be expanded further, focusing on metallic working materials.

We will also continue our “First Quality Strategy” in the field of **quality**. A consistent orientation towards quality ranges across the worldwide integrated Group. The evolution of the ECOLINE for the new CLX and CMX series is a prime example for this. Conceptualised as attractive entry-level machines for the world market, they open up the complete range of technological performance as well as the full control system and automation know-how of DMG MORI to the user, with improved quality and productivity – now NEW with HEIDENHAIN for the CMX V. We will never lose sight of you, our foundation!

We have completely revised the Service and Spare Parts Pricing. With our **5 service promises** we want to meet your requirements for service quality – particularly at fair prices and with a best price warranty. You can take us at our word!

We are convinced that you, our customers, suppliers and business partners will benefit from the further integration to a “Global One” company. Thanks to you, we have become what we are today and we would like to shape the future jointly with you. Therefore we invite you: Talk to us! Your feedback is important to us!

Dr Ing. Masahiko Mori,  
President  
DMG MORI COMPANY LIMITED

Christian Thönes,  
CEO  
DMG MORI AKTIENGESELLSCHAFT



1870 ▶▶

# GLOBAL ONE

*"Our goal: to be the world number 1 for our customers."*



## SOFTWARE SOLUTIONS

CELOS® – The APP-based control and operating system which serves as an entry point to digitisation and exclusive technology cycles. **Technology cycles:** 60 % faster conversational programming.



## SERVICE & SPARE PARTS

**CUSTOMER FIRST** – We've been listening to you! 5 service promises for the best service quality at fair prices.



## CLX / CMX

Evolution of the ECOLINE – More options, technology and quality at fair prices. NEW: now also with HEIDENHAIN.



## AUTOMATION

New, innovative automation solutions such as the Robo2Go – With free access and no robotics expertise required.



## TECHNOLOGY SOLUTIONS

Our technology centres – Holistic technological and industrial expertise including Additive Manufacturing.

Japan

## DMG MORI

2016

GLOBAL ONE – worldwide integrated manufacturer of machine tools

2013

Worldwide uniform branding

2011

First jointly developed projects

2009

Start of cooperation

1948 **MORI SEIKI**

Over 200 years of experience in the machine tool industry.

24 exclusive DMG MORI technology cycles

## Your assistive systems for efficient programming and maximum machine safety.

Up to 60 % faster programming of complex machining cycles through automatic generation of the DIN program:

- + Easy windows-based conversational input of parameters
- + No need for a CAD/CAM system, e.g. in the manufacture of threads and gears

➤ Selected examples:

### Interpolation turning – recess turning cycle

Easy manufacturing of sealing surfaces and recesses on milling and turning machines through circular interpolation of two linear axes.

*"I can even perform eccentric turning operations although I do not own a turning machine."*

Available for all turn-mill machines and milling machines with CELOS® and SIEMENS.

### Multi-thread cycle 2.0

Production of multi-start threads with free definition of contours, pitches and angles.

*"Without an expensive CAD/CAM system I can generate complex thread geometries, directly on the machine."*

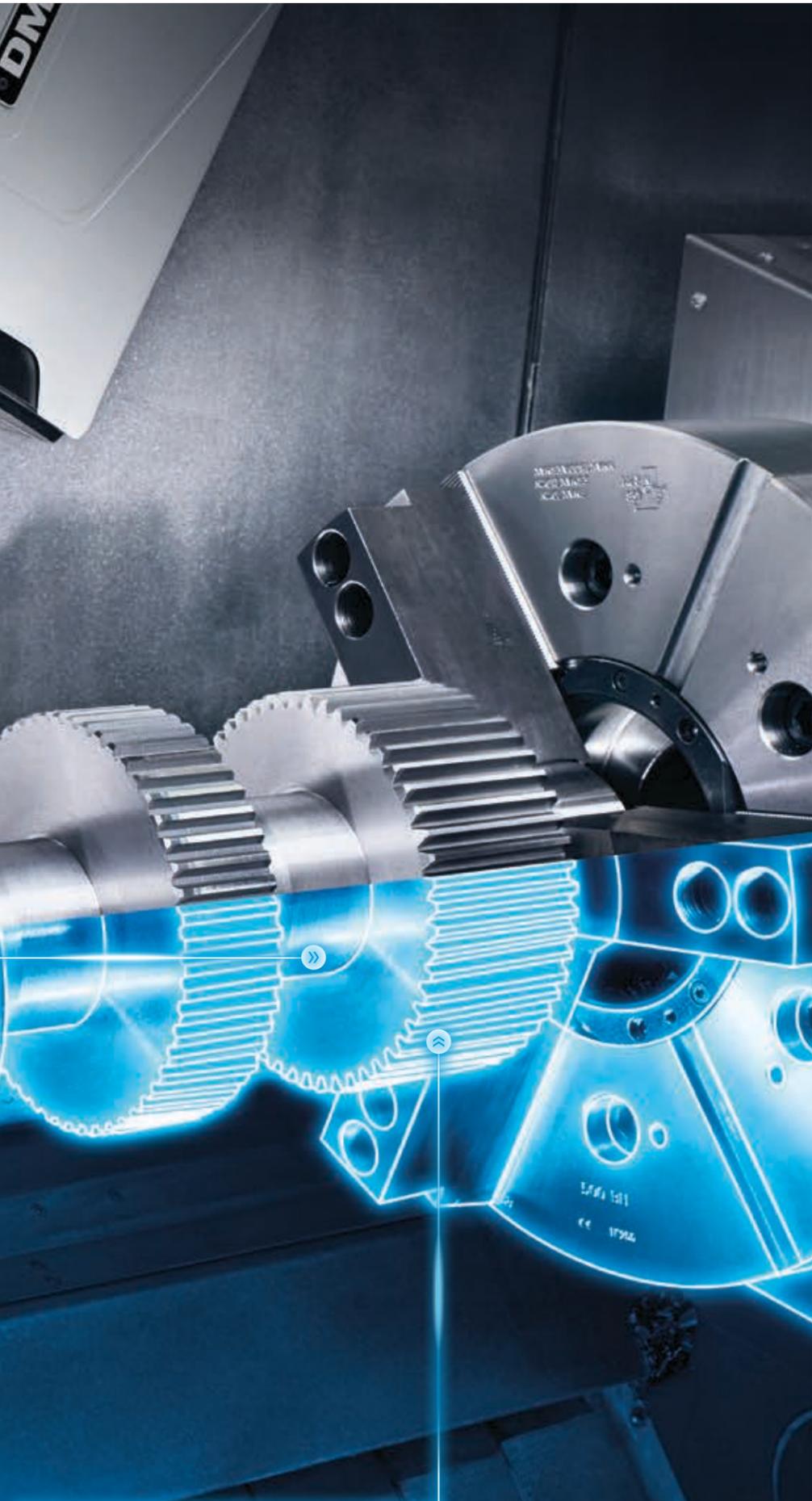
Available for all turning and turn-mill machines with CELOS® and SIEMENS.

### Off-centre turning and milling

Creation of eccentric turning and milling contours by overlaying the turning movement with additional X- and Y-axis movements.

*"Instead of using a complex CAD/CAM system, I only have to enter a few parameters."*

Available for all turning machines with Y-axis and milling machines with CELOS® and SIEMENS.



## gearSKIVING

Straight and angled external or internal spur gears as well as splines, without interference or damage.

*"An ingenious machining process! I now manufacture my gears up to 8 times faster than with gear shaping."*



View the video about the DMG MORI technology cycles

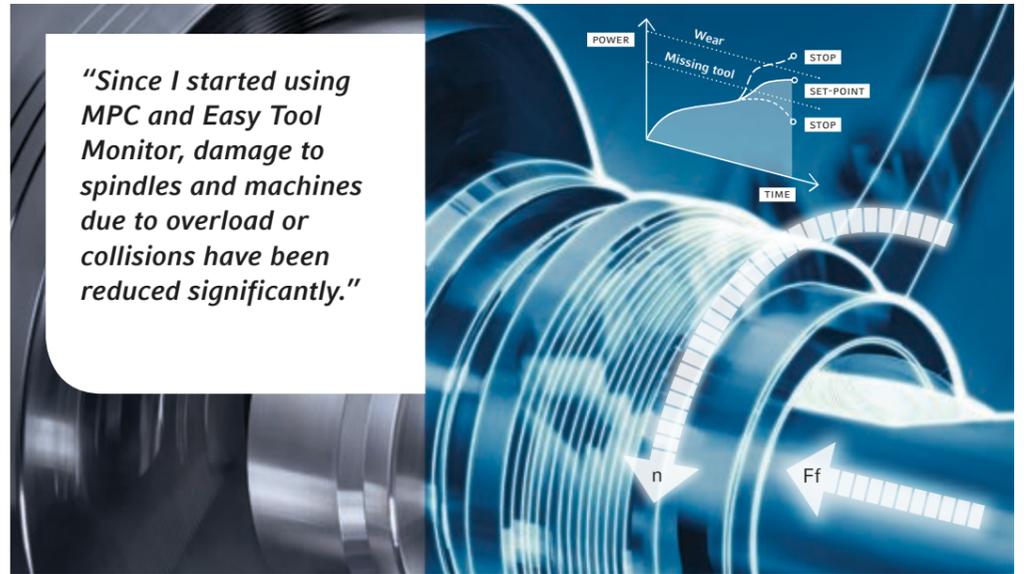


Download the brochure with all 24 DMG MORI technology cycles:

[download.dmgmori.com](http://download.dmgmori.com)



Available for all turn-mill machines and mill-turn machines with CELOS® and SIEMENS.



*"Since I started using MPC and Easy Tool Monitor, damage to spindles and machines due to overload or collisions have been reduced significantly."*

## Protection Package\* including Easy Tool Monitor 2.0 and MPC

### OPTIMISED MACHINE PROTECTION

- + Monitoring of vibrations and rapid stoppage of feed motion (MPC – Machine Protection Control)
- + Automatic learning of load limits through innovative evaluation algorithms (Easy Tool Monitor 2.0)

Available for all CTX TC machines with CELOS® and SIEMENS.

## DMG MORI Process Chain NEW: Module for adaptive measuring.

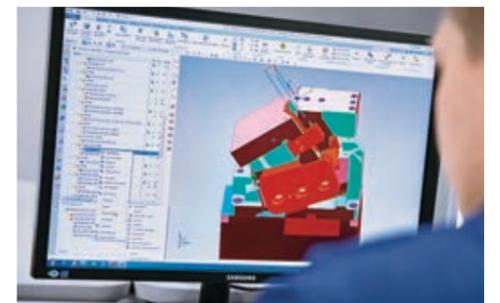
### VOESTALPINE GIESSEREI LINZ GMBH



*"We now have zero-error production thanks to automatic measuring of components and adaptation of the milling parameters."*



Christian Farthofer, CAM Programming, and Herwig Riess, Head of NEM Production at voestalpine in Linz at the DMC 80 U duoBLOCK® control.



Programming of the measuring steps on NX CAM, so that the milling parameters can be corrected automatically during machining on the DMC 80 U duoBLOCK®.

voestalpine Gießerei Linz GmbH, founded in 1954, develops and produces cam slides for stamping and forming machines in the automotive industry. Increasing customer demands require a high degree of measuring accuracy of these cam slides. **"We are required to maintain these accuracies despite shorter delivery times"**, says Herwig Riess, Head of NEM Production. Therefore the **DMG MORI Process Chain** was supplemented with a **module for adaptive measurement** together with DMG MORI, JANUS Engineering AG and Renishaw. The actual parameters resulting from in-process measurement during **5-axis machining** on a DMC 80 U duoBLOCK® are now read back into special cycles, **fully automatically** and in **real time**. **Accuracies of < 5 µm are achieved, irrespective of shape and positional tolerance fluctuations of the component.** Measurement of the cam slides is saved in the CAM program and is performed automatically between machining steps. Herwig Riess comments: **"The system detects and compensates for set-up errors or kinematic inaccuracies completely autonomously."** Manual measuring processes are no longer required, and tedious quality control is also obsolete. **"We achieve an overall reject rate of close to zero percent."**

VOESTALPINE GIESSEREI LINZ GMBH  
voestalpine-Strasse 3, A-4020 Linz  
giesserei@voestalpine.com, www.voestalpine.com/giesserei

**voestalpine**  
ONE STEP AHEAD.

# CELOS® – your solution is a bespoke partner APP.

- + Integration of your software solutions into a CELOS® partner APP, including intuitive look & feel, tested and certified by DMG MORI
- + Proven solutions perfectly integrated in CELOS®, ensure smooth processes and functioning interfaces
- + Easily create your own APP in 7 steps –  
We will gladly assist you: Your contact person: [patrick.beller@dmgmori.com](mailto:patrick.beller@dmgmori.com)

*“With CELOS® DEVELOPER we offer our customers and business partners an easy option to develop their own CELOS® APPs.”*

**Dr Holger Rudzio**  
Managing Director DMG MORI Software Solutions

## ➤ 2 new partner APPs:



**NEW**

### SURFACE ANALYSER

- + Machine-integrated measurement of surface finish
- + In-process quality control of the surface
- + Certified for medical and aerospace



**NEW**

### CLAMP CHECK

- + Increasing machine safety through control of the clamping forces
- + Wireless measurement, even during turning

**NEW**

## Now with 26 APPs – 10 new APPs in total and new functions.



View the video on CELOS®



Find out more about CELOS® at:

[celos.dmgmori.com](https://celos.dmgmori.com)



Download the CELOS® brochure:

[download.dmgmori.com](https://download.dmgmori.com)



SURFACE ANALYSER



CLAMP CHECK



CONDITION ANALYSER

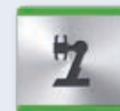


PERFORMANCE MONITOR

“KPI and OEE analysis at a glance”



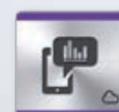
3D PART ANALYSER



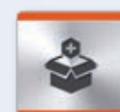
ROBO2GO



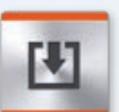
PALLET MANAGER



MESSENGER



CELOS® DEVELOPER



CELOS® UPDATER

SENSORS

NEW

# DMG MORI Condition Analyser – 60 sensors in the machine monitor the machine status.

From **BIG DATA** to **SMART DATA** – record and analyse machine data with direct feedback to the customer for maximum machine productivity.  
 > Analysis of **individual machines, multiple machines at one site** or **across sites**.



> **Measurement, visualisation and analysis** of force, vibration, temperature and lubrication.



**CONDITION ANALYSER**

- + NC program optimisation
- + Early detection of machine faults
- + Analysis of damage causes
- + Saved data for long-term analysis

## i4.0 sensor package

for improved accuracy and increased **process safety**:

### TURNING\*

- + **Advanced Sensor Control** – Analysis of power and compressed air consumption as well as coolant control
- + **Temperature Control** – Displacement compensation and precision alignment
- + **Machine Protection Control (MPC)** – Preventive protection with vibration sensors on the milling spindle
- + **Easy Tool Monitor 2.0** – Tool breakage and wear monitoring

### MILLING\*\*

- + **Machine Protection Control (MPC)** – Preventive protection with vibration sensors on the milling spindle
- + **Spindle Growth Sensor (SGS)** – A sensor designed to determine and compensate for spindle growth
- + **IKZ flow monitor** – Internal coolant supply flow monitoring to determine the necessary coolant output

\* for all CTX beta and gamma TC machines with the compactMASTER® turn-mill spindle.

\*\* for all monoBLOCK®, duoBLOCK® and portal machines in conjunction with IKZ 600 / 980 / 2,500 | (40 / 80 bar); Not with gear-driven spindles.

# Ready for Industry 4.0 with intelligent sensors and networked software.

**Passion 4.0 for Machine Tools:** With mechatronic bearing systems and “domain know-how in rolling bearings” towards digitalised solutions in the Machine Tool 4.0. Benefit from the new possibilities in digitalisation with micro-services from Schaeffler, such as automated rolling bearing diagnosis and residual life calculation of rolling bearings.

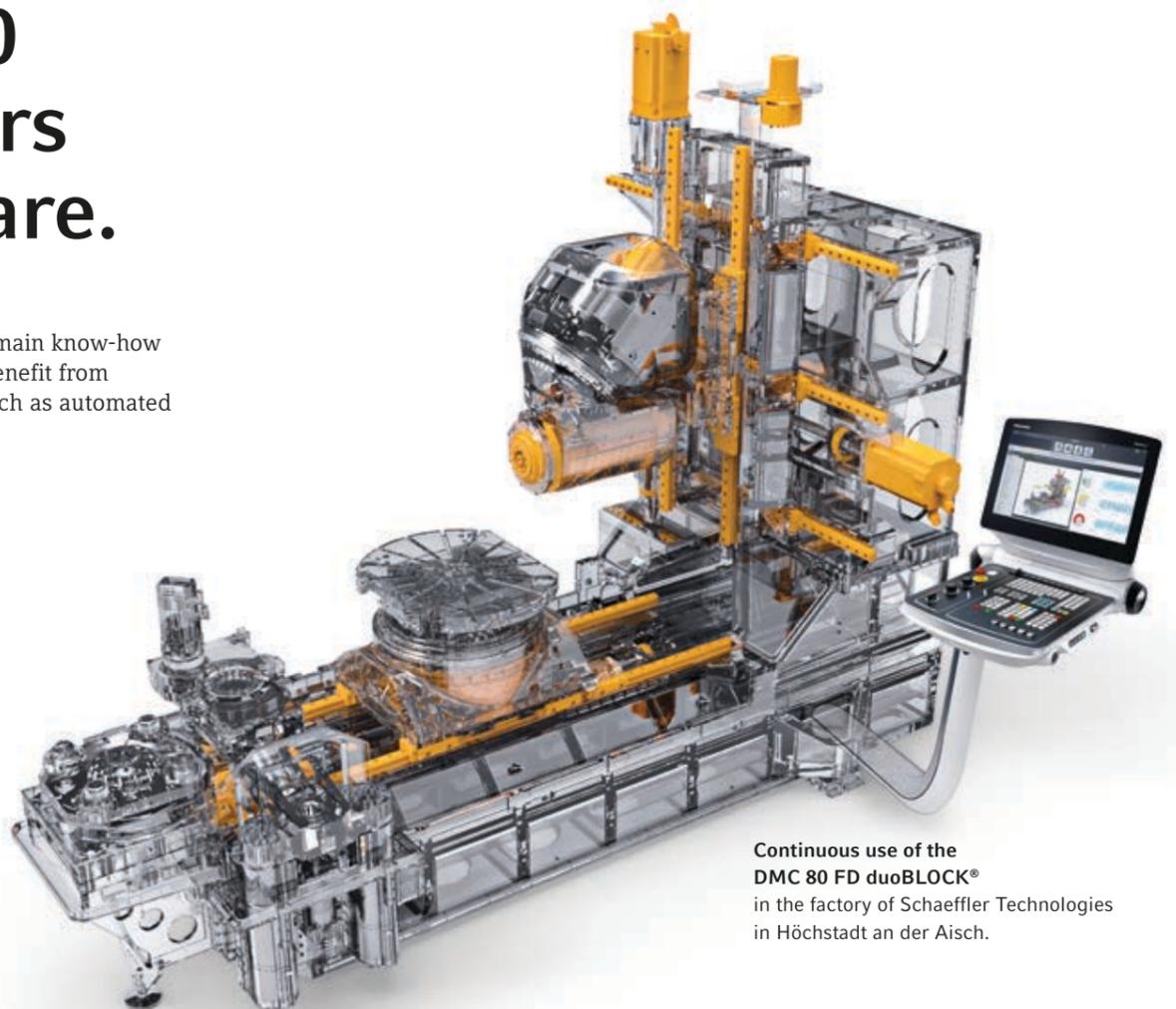


**Rotary table bearing YRTMA** with integrated angular measuring system.



**Linear recirculating roller bearing and guideway assembly RUE 4.0** with piezoelectric acceleration sensors.

> **Predictive maintenance** by means of monitoring **force, vibration, temperature and lubrication**.



Continuous use of the **DMC 80 FD duoBLOCK®** in the factory of Schaeffler Technologies in Höchststadt an der Aisch.



**Dr Stefan Spindler**  
 Director Industrial  
 Schaeffler AG

*“Together with DMG MORI we will further develop our digitalised production solutions for our own production and for DMG MORI customers. The valuable practice experiences we have gained in our factory in Höchststadt with the digitalised DMC 80 FD duoBLOCK® and the positive resonance from the market form the basis for this approach.”*



**SCHAEFFLER**

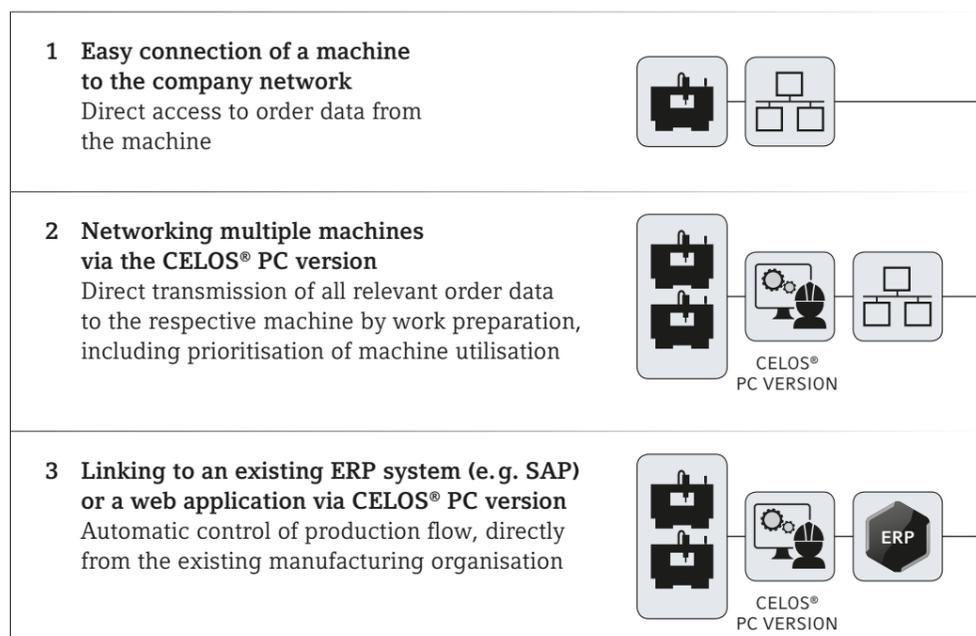


Schaeffler Technologies AG & Co.KG  
[www.schaeffler.com](http://www.schaeffler.com)

# CELOS® – Your entry into digitalisation.

*“We will show you solutions for digital transformation and the challenges posed to you and us by Industry 4.0. With its APP functionality, CELOS® already revolutionises the paperless interaction between man and machine.”*

## 3 CONFIGURATION LEVELS OF DIGITALISATION



## OUR SOFTWARE SOLUTIONS FOR ALL LEVELS OF DIGITALISATION

### ➤ ORDER

- + Customer-supplied CAD data or workpiece drawings
- + Creation of the order in Job Manager
- > Process planning

### ORDER MANAGEMENT



JOB MANAGER



CAD/CAM VIEWER



Andreas Böttcher (left), Senior Manager Production & Special Tools at Oerlikon Barmag, and specialist Bahtiyar Ayar, are equally impressed by CELOS®.

## OERLIKON BARMAG



*“CELOS® linked with the ERP intelligently and consistently.”*

Oerlikon Textile GmbH & Co. KG in Remscheid with their brand Oerlikon Barmag are part of the Swiss OC Oerlikon Group. The group of companies is, among others, world market leader in the sector of filament spinning systems for industrial threads, fibres and non-woven fabrics. The core competencies of the Remscheid company include the manufacture of safety-related components. The high speed winders for winding fibres at speeds of up to 8,000 m/min are an outstanding example. In total, high-tech manufacturing in Remscheid comprises about 120 machine tools. Among these are some mill-turn and turn-mill machines from DMG MORI. The latest investment, a CTX beta 800 TC with CELOS®, is of special significance.

Within the framework of a future-oriented pilot project, the turn-mill machine is connected to the ERP system in such a way that orders, NC program and pricing data can be transferred via special middleware from the control

interface to CELOS®, managed and reported back to the ERP after machining. This pilot project forms part of a holistic group initiative, as explained by Andreas Böttcher, Senior Manager Production & Special Tools. The consistency and transparency of data flow across the entire value-added chain are pivotal, in order to be able to optimise machining cycles and manufacturing processes holistically and sustainably. The third important aspect mentioned by Böttcher is the seamless traceability of components right up to the process documentation. He points to the marking station next to the CTX beta 800 TC, which provides every single part with an OCR code for unique identification.

**oerlikon**  
barmag

Oerlikon Barmag  
Remscheid, Germany  
www.barmag.oerlikontextile.com

Turn-and-mill complete machining



Experience Industry 4.0 LIVE: CELOS® Experience Centre covering a floor area of more than 2,000m<sup>2</sup>, at GILDEMEISTER Drehmaschinen in Bielefeld.

➤ PROCESS PLANNING / WORK PREPARATION

DMG MORI Software Solutions and CELOS® APPs for job preparation and process planning.

CAD-CAM / SIMULATION

- + DMG MORI Process Chain
- + Programmer 3D Turning
- + DMG MORI Virtual Machine

CELOS® PC VERSION



JOB MANAGER



JOB SCHEDULER



TECH CALCULATOR



DOCUMENTS

➤ MACHINING

CELOS® APPs for setting up and processing prepared jobs as well as live machine monitoring.

MACHINES



JOB ASSISTANT



TOOL HANDLING



SERVICE AGENT



MESSENGER



Klaus Wehr, Manager Manufacturing for tool carriers at Ingersoll in Haiger.

INGERSOLL WERKZEUGE GMBH



*“With in-process measurement and a reliable machining concept we manufacture high precision blade inserts on the NTX 1000, virtually unmanned.”*

The product portfolio of Ingersoll Werkzeuge GmbH ranges from 0.1 mm drilling bits for the dental industry up to 5,500 mm special tools for shipbuilding. At the Head Office in Haiger, the company, in close cooperation with customers from all industries, produces individual special tools for heavy duty machining, accounting for 90 % of production. This includes highly complex roller slicers fitted with a few hundred HSS blades. Highly demanding geometry and precision are a matter of course. Machining of these blades has been implemented since 2014 on a NTX 1000 from DMG MORI.

“While we normally manufacture our tools as individual pieces, these blades have batch sizes of up to 3,000 units” explains Klaus Wehr, Manager Manufacturing of tool carriers at Ingersoll. With a bar loader, automatic workpiece retrieval and in-process measurement, the NTX 1000 is ideally equipped for this series production – to a large extent unmanned. The turn-mill centre also satisfies the complexity demands: “We position the workpiece using the C-axis for 5-axis simultaneous machining. Thanks to the tailstock and the stable machine concept, we comply with all specifications for geometry and accuracy.”



5-axis simultaneous machining of blade inserts for milling cutters on the NTX 1000.



Milling cutter loaded with a few hundred blades.



Ingersoll Werkzeuge GmbH  
Kalteiche-Ring 21-25, D-35708 Haiger  
www.ingersoll-imc.de

# CUSTOMER FIRST – Our 5 service promises!

1

2

*"We've been listening to you!  
Our 5 service promises help us to meet your  
high service quality expectations at fair prices.  
You can take us at our word!"*



Dr Maurice Eschweiler  
Director of Industrial Services,  
DMG MORI AKTIENGESELLSCHAFT

## BEST PRICE GUARANTEE FOR ORIGINAL SPARE PARTS



NEW

## SPINDLE SERVICE AT BEST PRICES DIRECTLY FROM THE MANUFACTURER



NEW

### » SPARE PARTS

#### EXAMPLE MAINTENANCE KITS



#### MAINTENANCE KITS

Affordable original replacement parts,  
in a full package.

Safe DIY maintenance. Put together by our experts,  
perfectly customised for the individual machine  
types! Your advantage – everything in one package,  
at a reduced price.

#### HIGHLIGHTS

- + More than 200 different maintenance kits available, all perfectly customised for each machine type
- + Ensuring machine availability
- + All important wear parts in one kit
- + Protection from expensive subsequent damage
- + Save up to 25% with our attractive package rate

More information, descriptions and prices for our maintenance kits are available from your local service team: [www.dmgmori.com](http://www.dmgmori.com)

If a spare part, offered or supplied by us, is at least 20% cheaper elsewhere, we'll immediately give you a full refund of the price difference. Guaranteed!\*

#### IT'S THAT EASY



Just send an e-mail to the address below, listing our offer or order number and the cheaper alternative offer or alternative supplier's weblink:  
[bestprice@dmgmori.com](mailto:bestprice@dmgmori.com)

\* Only applicable if delivery of our spare part was after 01/09/2016. The spare part in the alternative offer is completely identical – not a repair, copy or other version. It is a new part with an identical warranty period and contents. The scope of supply and quantity are identical. The alternative part has the same availability.

#### DMG MORI SPARE PARTS SERVICE

Maximum availability with a global presence.

- + Global logistics network for all non-domestic markets
- + More than 280,000 different items in stock
- + More than 1,000 spindles available immediately
- + Spare parts availability rate of > 95%
- + New and replacement parts available
- + Many spare parts also available for older series dating back to 1970
- + Order from anywhere in the world with the 24/7 service hotline

World-class manufacturer's expertise at new attractive prices – DMG MORI spindle service!

#### SPINDLE REPAIRS

Expert repairs with full cost control.

- + Fixed price without additional charges
- + 6-month warranty
- + Includes replacement of rotary feed-through
- + Includes replacement of any faulty stator and rotor parts
- + Professional removal and installation of your spindle by experienced DMG MORI service engineers

#### SPINDLE REPLACEMENT SERVICE

The choice is yours: Fully refurbished replacement spindle or a new spindle ready-to-use.

- + Warranty up to 9 months or 18 months
- + Including replacement of rotary feed-through
- + Professional replacement of the damaged spindle by experienced DMG MORI service technicians





3

**MANUFACTURER SERVICE YOU CAN RELY ON**



**NEW**

4

**WE SAFEGUARD YOUR PRODUCTIVITY**



**NEW**

5

**COMPLETE OVERHAULS – RESTORING MAXIMUM PERFORMANCE**



**PROVEN**

» SERVICE

Local presence is our global strength. We are there for you around the clock in case of emergency. Any time, anywhere.

**HIGHLIGHTS**

- + More than 2,500 highly qualified service technicians worldwide
- + Unrivalled availability and operational capability with our extensive service network
- + Proximity to our customers, with more than 150 technology and service centres worldwide
- + 24/7 service hotline: Our experts can solve your problems over the phone in 60 % of cases
- + Minimising unplanned machine failures through preventive maintenance
- + More than 300 innovative service products to help optimise your processes
- + Comprehensive training portfolio

Reduced operating costs, maximum machine availability and precision throughout the entire life cycle of your machine – DMG MORI Service Plus!

**MAINTENANCE PLUS**

Manufacturer maintenance for maximum machine availability.

- + Replacement / installation of required wear parts at a fixed price
- + The maintenance level is adapted to meet machine running time requirements
- + 10 % special discount on any services and spare parts identified as necessary during maintenance
- + Term: 3 years (new machines) or 2 years (existing machines)

**SERVICECOMPETENCE PLUS**

Professional maintenance – we show you how to do it yourself.

- + Replacement of key wear parts with maintenance kits tailored to each specific machine type
- + Extensive 2,000-hour maintenance training
- + Handover and iKey training (Inspection Key)

Full functionality from proven DMG MORI technologies – Ensure well-established production processes with machine or component overhauls.

**HIGHLIGHTS**

- + A wide range of machine types at a fixed price
- + Maximum performance restored
- + Component reconditioning to manufacturer's quality standards
- + Additional software updates and selected retrofitting options
- + Top quality through extensive operational testing
- + Full service warranty
- + Overhaul options – on-site or at manufacturer's own location

**REFERENCE PROJECTS**



View the overhaul video MF Twin 65 now



View the overhaul video DMC 200 U now



View the video on LifeCycle Services



Find out more about our Service Plus products at: [serviceplus.dmgmori.com](http://serviceplus.dmgmori.com)



# Evolution of the ECOLINE for CLX / CMX.

## FROM 1<sup>ST</sup> SEPTEMBER: NEW ENTRY-LEVEL MACHINES

- + CLX – Entry-level universal turning machines
- + CMX V – Entry-level vertical machining centres
- + CMX U – Entry-level universal milling machines

## MOTIVATION FOR THE NEW APPROACH

### + More technology and solutions!

#### 3D CONTROL SYSTEMS:

SIEMENS, HEIDENHAIN, FANUC, MITSUBISHI

#### SOFTWARE SOLUTIONS:

Technology cycles

#### CUSTOMER-SPECIFIC ADAPTATIONS:

Diverse options

### + First quality!

### + Attractive prices!

## ADVANTAGES OF THE NEW APPROACH FOR OUR CUSTOMERS

- + Complete range of technology solutions from DMG MORI
- + Automation options

## EFFECT ON OUR EXISTING CUSTOMERS

- + No disadvantages for our existing customers
- + Same service and spare parts availability for ECOLINE machines

C =  
COMPACT,  
COMPETITIVE,  
CUSTOMISED

19" DMG MORI SLIMline® multi-touch control system  
with Operate on SIEMENS



CLX 450

## DELIVERY 2016 – ECOLINE EXISTING MACHINES

Short delivery times starting at just two weeks  
with delivery and commissioning in 2016

ecoTurn 310  
ecoTurn 450  
ecoTurn 510  
ecoTurn 650

ecoMill 600 V  
ecoMill 800 V  
ecoMill 1100 V

ecoMill 50  
ecoMill 70



Check availability!

#### YOUR CONTACT

Mr Florian Kock  
Tel.: +49 (0) 52 05 / 74 31 46  
florian.kock@dmgmori.com

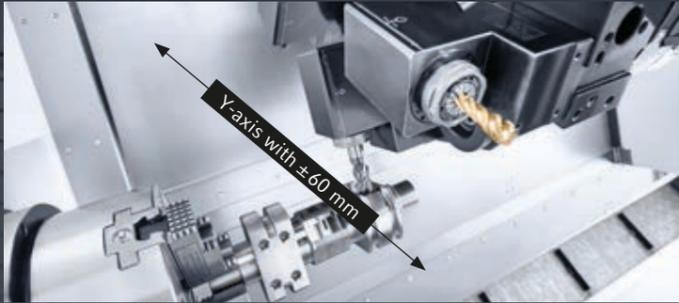


View all available offers:

[cnc-scout.dmgmori.com](http://cnc-scout.dmgmori.com)



# The latest entry-level machines from DMG MORI with more technology.



OPTION // Y-axis with 60 mm traverse, milling on turning machines



OPTION // NC rotary table for efficient 4-sided machining



SOFTWARE SOLUTION // Exclusive DMG MORI technology cycles: 3D quickSET®

19" DMG MORI SLIMline® multi-touch control system with Operate on SIEMENS

19" DMG MORI SLIMline® multi-touch control system with Operate on SIEMENS



CMX 50 U



CMX 600 V

## NEW CMX U – POWERFUL UNIVERSAL MILLING MACHINES FOR 5-SIDED MACHINING

- + Maximum rigidity with C-frame cast iron construction and patented NC swivelling rotary table
- + Powerful 12,000 rpm milling spindle for optimum performance
- + Quick tool magazine with 30 positions as standard, including double gripper for short exchange times
- + Higher productivity and efficiency through dynamic drives – up to 20 % shorter non-productive times and 30 m/min rapid traverse in all axes
- + 3D control system technology:
  - 19" DMG MORI SLIMline® multi-touch control system with Operate on SIEMENS
  - 15" DMG MORI SLIMline® with HEIDENHAIN TNC 620

## NEW CMX V – NOW ALSO AVAILABLE WITH HEIDENHAIN CONTROL SYSTEM



Find out more about the CMX V series at:

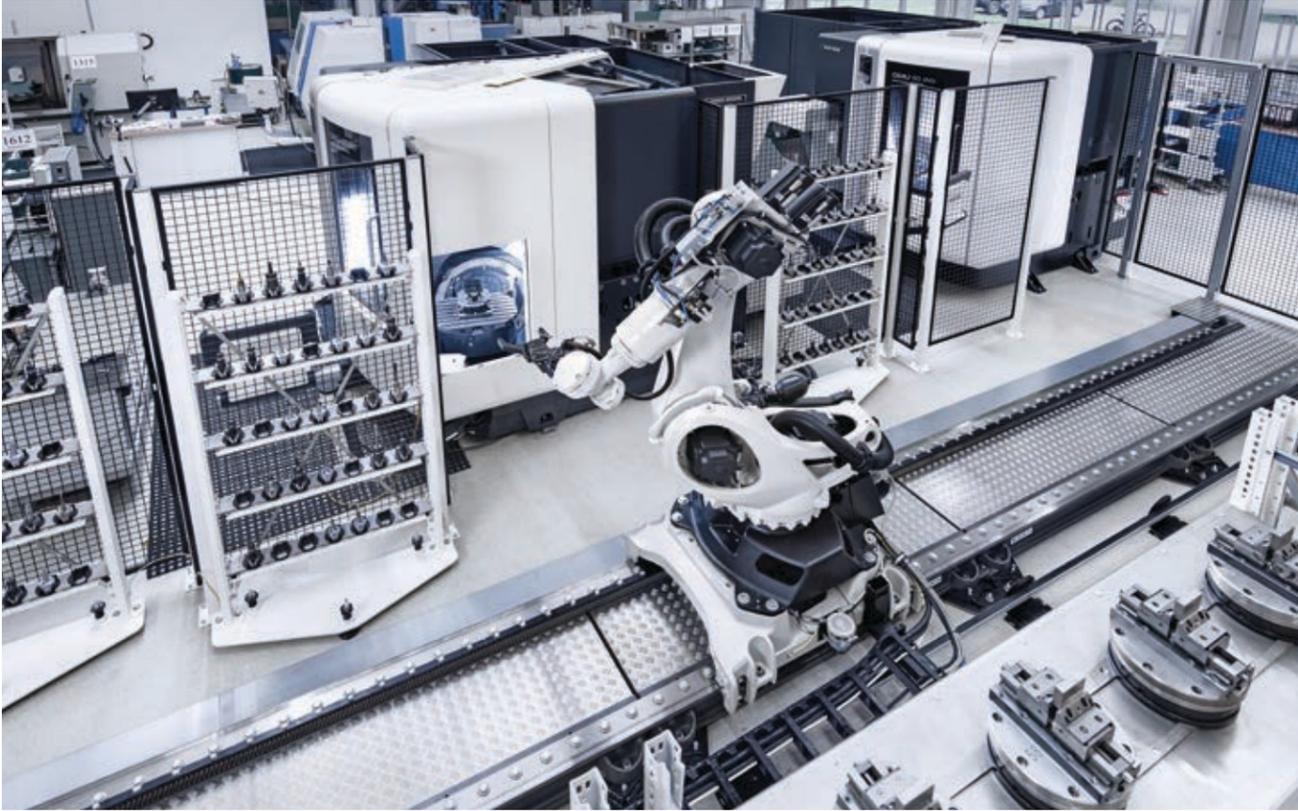
[cmx-v.dmgmori.com](http://cmx-v.dmgmori.com)



ZAHORANSKY AG

WADA MACHINE  
MANUFACTURING CO., LTD.

*"Thanks to the new manufacturing cells consisting of three 5-axis machining centres with a total of 580 tool pockets and 112 pallet positions, we can now manufacture more than 4,000 different workpieces highly flexibly and fully automatically."*



Flexible manufacturing cell with two DMU 60 eVo, one DMU 70 eVo, one robot on the 7<sup>th</sup> axis and CAD/CAM connection to the process control computer for controlling the machine and tooling requirements as well as order prioritisation.

Since the start of the 20<sup>th</sup> century, ZAHORANSKY AG has been acknowledged as the leader in automated manufacture of brushes. At the head office in Todtnau-Geschwend, approximately 300 employees attend to the development and manufacture of special machines for the production of twisted brushes, household brushes, technical brushes, toothbrushes and their packaging. **Small batch sizes and one-off production are the order of the day.** "This requires a high degree of flexibility, especially regarding swarf management", according to Lothar Wagner, Manager Production of ZAHORANSKY AG. **This flexibility was expanded in 2015 with a manufacturing cell from DMG MORI.** During the turnkey project, automation experts from DMG MORI linked three 5-axis machining centres – two newly installed DMU 60 eVo and one DMU 70 eVo dating from 2007 – via a robot. "This was carried out while production continued", remembers Lothar Wagner. For ZAHORANSKY, this automation is a **bespoke solution with stringent demands on the flexibility with which workpieces must be produced.** The range of components presently comprises more than 4,000 **part numbers**, with components made of aluminium, steel and even stainless steel **in varying sizes.** Therefore a **large number of tool positions and pallet positions is required.** Besides the 120 or 210 tool positions in the machines, the robot

cell has space for 130 additional tools, which can be supplied to any of the machines fully automatically. "The same flexibility exists for the pallets", explains Lothar Wagner: **"DMG MORI Systems have set up 112 shelf positions."** With only six standardised clamping devices, all components can be covered. "All pallets fit into every machining centre." Thanks to the six loading stations, idle times during loading are reduced to a minimum. **"We now have sufficient buffer capacity, so that employees can load without having to wait."** ZAHORANSKY works in two shifts, but the manufacturing cell is loaded so that it can **autonomously run overnight and into the weekend.** The Manager Production states: **"We aim for 6,000 running hours per year on each machining centre."**



ZAHORANSKY AG

Anton-Zahoransky-Strasse 1, D-79674 Todtnau  
info@zahoransky.com, www.zahoransky.com

*"RPP system-integrated NHX 4000 improves efficiency of high-mix low-volume production."*



Medical equipment component machined by comprehensive features of the NHX 4000 with a max workpiece swing diameter of 630 mm.



Executive Director Shuhei Wada has every confidence in DMG MORI's prompt service and machine stability and accuracy.

WADA Machine Manufacturing Co., Ltd., established in 1957, expanded into the medical equipment field after relocating to Numazu Iron Industrial Park in 1973. Since then the company has specialised in **machining of precision parts for cutting-edge medical equipment** for a major medical equipment company. "We have been commended by the customer several times for **keeping to strict delivery schedules** despite our distance from them, while maintaining high product quality," says Yoshihisa Wada, President of the company, looking back on the company history. **Advanced medical equipment such as MRI and CT scanners requires quick responsiveness to high mix, low volume production as well as high precision.** "For the first time in Japan, we employed the 5-pallet RPP (Round Pallet Pool)-integrated NHX 4000." **A normal pallet pool system requires a footprint twice as large as the size of a machine. With the RPP-integrated NHX 4000, the floor space requirement is 50% less.** The decisive factors for our purchasing the machine are the **capability for unmanned operation during the night; high reliability, durability, stability and precision that the DMG MORI machine is offering and prompt service,** explains Shuhei Wada, Executive Director of the company. "We previously used **multiple machines and set up multiple processes** to meet quantity requirements. But with the NHX 4000 + 5RPP, which is able to perform unmanned operation during night, **the required number can be achieved on one machine.** We now can respond to urgent requests to machine a single component by always having one of the five pallets available and ready."



WADA Machine Manufacturing Co., Ltd.

Numazu Iron Industrial Park  
294-26, Ashitaka, Numazu City, Shizuoka 410-0001  
www.wada-machine.co.jp



## Reliability & Availability - Worldwide

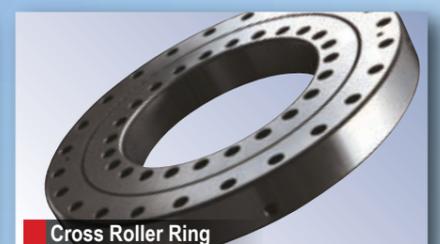
THK provides original technology in the highest quality for smooth and accurate movement.



LM Guide



Ball Screw



Cross Roller Ring

Japan

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☎ +81-3-5434-0351  
www.thk.com/jp

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THK GmbH  
☎ +49-2102-7425-555  
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THK (Shanghai) Co., Ltd.  
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America

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☎ +1-847-310-1111  
www.thk.com/us

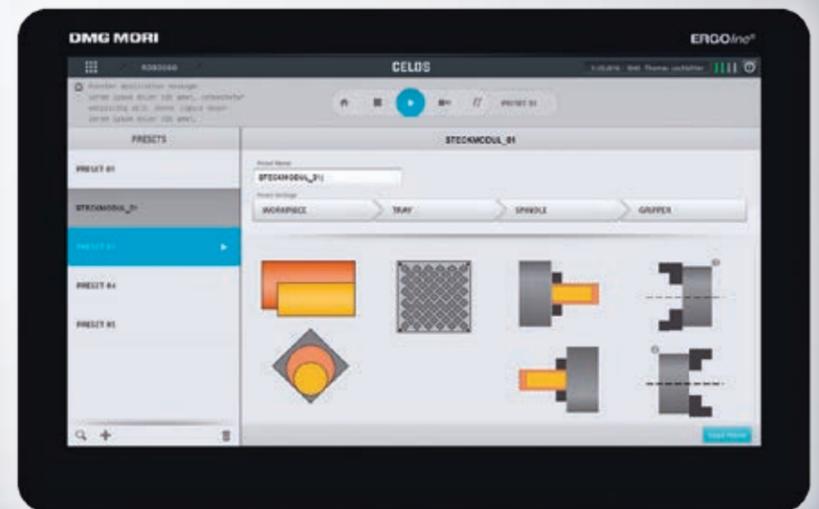
**THK**  
The Mark of Linear Motion

# NEW: Robo2Go – Automation can be that easy!

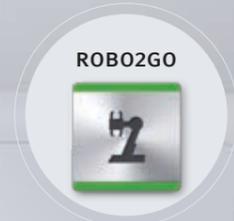
Find out more about our retrofit offers: [systems@dmgmori.com](mailto:systems@dmgmori.com)

## SIMPLY AUTOMATE

- + Available for all DMG MORI universal turning machines with CELOS®
- + Free access for maximum operator acceptance
- + No robot knowledge required, control system completely via CELOS®
- + Can be used flexibly on multiple machines
- + Simple positioning of the automation equipment by pallet truck
- + Three options: Loading capacity 10 kg, 20 kg or 35 kg



Controlled by CELOS® – no robot knowledge required!



### Safety Zone:

Laser scanner monitors the working area – immediate safety stop when someone enters. Modern working environment without guarding for maximum operator convenience.



Find out more about DMG MORI Systems at: [systems.dmgmori.com](http://systems.dmgmori.com)

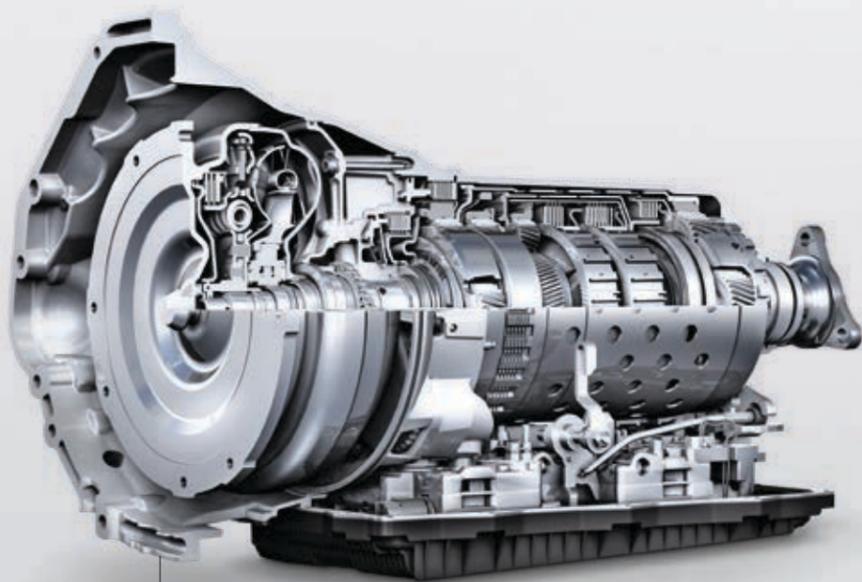
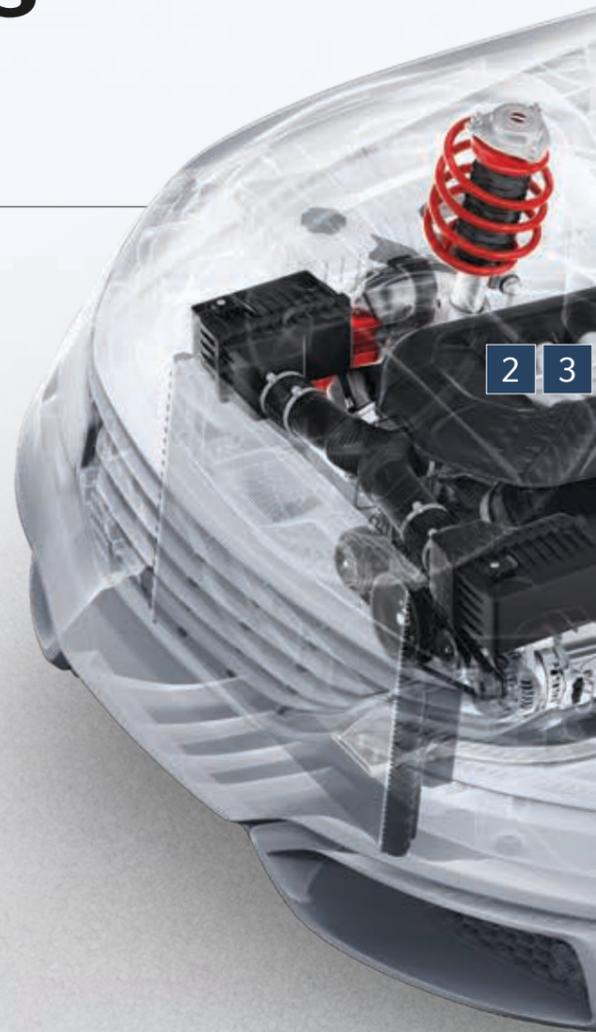
Download product brochure DMG MORI Systems: [download.dmgmori.com](http://download.dmgmori.com)

View the video on the topic „Robo2Go“



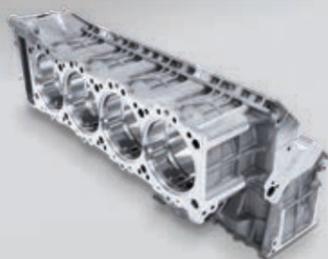
# DMG MORI – Holistic supplier of machines, technologies and processes.

- + More than 1,500 DMG MORI machines per year for the automotive industry
- + Global competence partner for the best support, maximum availability and comprehensive turnkey projects
- + Intelligent monitoring functions for maximum process safety
- + Holistic system configuration for unique production solutions



1

650 × 355 × 390 mm  
ZF 8HP gearbox housing  
Material: Aluminium



2

500 × 300 × 250 mm  
Crankcase housing / automotive  
Material: Aluminium



3

410 × 180 × 120 mm  
Cylinder head  
Material: Aluminium



4

350 × 410 × 230 mm  
Cylinder block  
Material: Aluminium

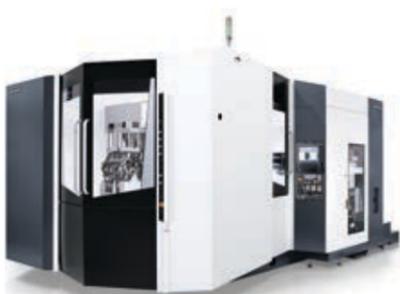


5

∅ 150 × 560 mm  
Crankshaft  
Material: GG20

**DMC H linear** – Highly dynamic linear drives with 1 g acceleration and maximum continuous accuracy.

- + Linear drives in all axes up to 100 m/min rapid traverse, 1 g acceleration and a chip-to-chip time of 2.5 seconds
- + Maximum continuous accuracy, e. g. for down to 6 µm roundness
- + NC rotary table or swivelling rotary table for 5-axis simultaneous machining
- + 17.2 m<sup>2</sup> space requirement, including pallet changer and chip conveyor



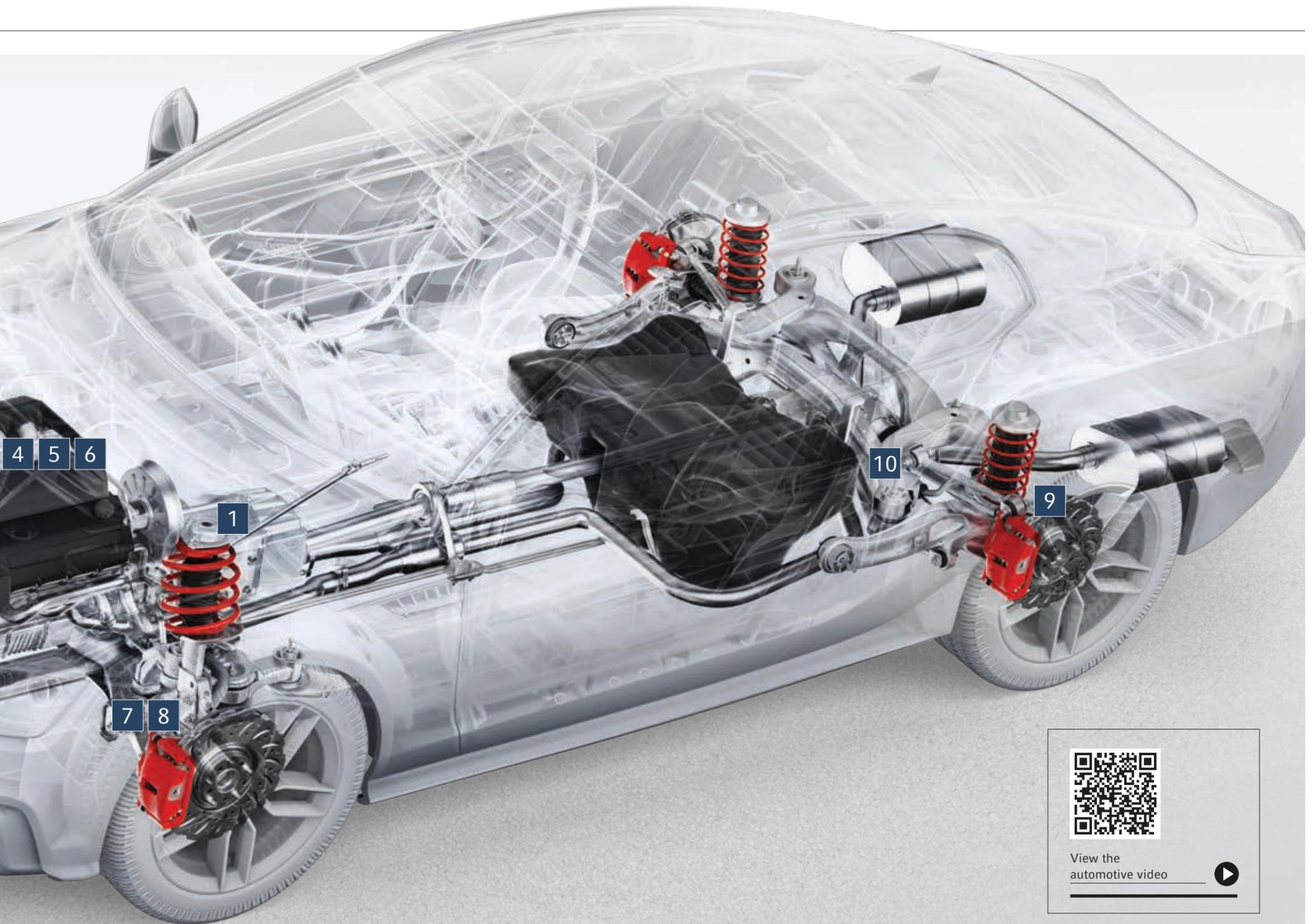
**i-Series** – Highly productive concept for series production of 4-cylinder engines.

- + Patented Z-axis kinematics of the spindle: Maximum stability due to angled guideway
- + Low moving mass due to X / Y / Z spindle traverse: High machine dynamics for short chip-to-chip times; Optimal chip discharge through the machine bed
- + Footprint of only 6.7 m<sup>2</sup>



**NZX-S series** – Compact turning centres for series production of shafts.





View the automotive video



**4**  
 ø 40 × 470 mm  
**Camshaft**  
 Material: GG25



**7**  
 ø 18 mm ball diameter  
**CV joint AC ball inner race**  
 Material: 20MnCr5



**8**  
 ø 18 mm ball diameter  
**CV ball plunging joint**  
 Material: CF53



**9**  
 ø 120 × 80 mm  
**Wheel hub**  
 Material: S53C (JIS)



**10**  
 ø 60 × 100 mm  
**Connector**  
 Material: heat-treated alloy steel

- + **Space-saving construction** for production lines with short traverses and optimised spindle power and feed
- + **Thermo-symmetrical construction** for consistency of spindle centre position and maximum machining accuracy
- + **Optimal access** to workpieces and tools
- + **Vertical construction** for optimal chip discharge

**CTV 250 DF – Vertical turn-mill centre for machining constant velocity joints.**



- + **Maximum dynamics** from the turn-mill swing arm (TM) with 90 rpm direct drive and a swivel range of +105° / -45°
- + TM swing arm for up to two HSK-C63-F80 milling spindles, 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

**NRX – Highly productive double spindle turning centre for series production.**



- + **Maximum turning diameter** ø 180 / 150 mm (turning specification / milling specification), chuck size maximum ø 200 mm (8")
- + **Maximum productivity** due to world's fastest workpiece loading in just 5.6 seconds
- + **Parallel loading** of one spindle while the second spindle is machining
- + **Two 8-station (optionally 10\*) turrets** for optimal chip discharge
- + **Excellent accessibility** to chucks, tools and transfer system

\* MC configuration: Standard

## STRUCTURAL COMPONENTS

6 7

## UNDERCARRIAGE COMPONENTS

4 5

# DMG MORI – Your competent partner for aviation and aerospace.

AEROSPACE EXCELLENCE CENTRE IN PFRONTEN

- + **Perfectly matched synergy** between machine, tool and machining strategy
- + **Industry know-how** starting with technical advice up to provision of customer-specific turnkey solutions

## ➤ Typical aerospace components

### Turbine components



1

ø 950 × 400 mm  
**Casing**  
DMC FD duoBLOCK® series  
Material: Titanium 6-4

High precision complete machining with milling and turning on one machine in four set-ups.



2

ø 450 × 120 mm  
**Blisk**  
DMU monoBLOCK® series  
Material: Titanium 17

Dynamic 5-axis simultaneous milling of blade profiles with swivelling rotary table and direct drive in the A- and C-axes.



3

ø 1,500 × 750 mm  
**Intermediate housing**  
DMU portal FD series  
Material: Titanium 6-4

Simultaneous 5-axis machining of the intermediate housing for aviation turbine by milling and turning.



4

ø 300 × 300 mm  
**Undercarriage component**  
NLX series  
Material: Steel

Heavy machining with box ways with optimal damping characteristics, milling with BMT® turret with 100 Nm.



5

ø 130 × 290 mm  
**Landing gear cylinder**  
NTX series  
Material: Steel

Simultaneous 5-axis machining; simultaneous machining with bottom BMT® turret as second tool carrier.



**TURBINE COMPONENTS**

- 1
- 2
- 3



**AEROSPACE EXCELLENCE CENTRE AT DECKEL MAHO PFRONTEN**

- + More than 20 years of aerospace competence
- + Holistic technology solutions up to turnkey process development across machines: Machine design, tools, clamping systems, programming
- + Future-oriented and innovative additional development of processes and machines, e. g. Additive Manufacturing
- + **Your contact:**  
Michael Kirbach, *Manager Aerospace Excellence Centre*  
michael.kirbach@dmgmori.com



View the aerospace video 

Download the aerospace brochure:  
[download.dmgmori.com](http://download.dmgmori.com) 



Up to 454 cm<sup>3</sup>/min in Ti6Al4V

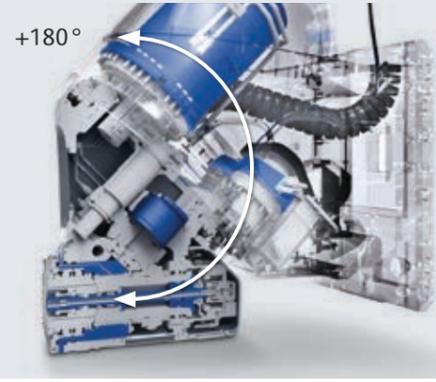
**Heavy-duty machining package for the 4<sup>th</sup> Generation duoBLOCK®**

Up to 50 % better chipping in titanium with a simultaneous reduction in tooling costs and improved surface finish through:

- + Hydraulic clamping of the NC rotary table
- + Damper shoes in the Y-axis\*
- + Software optimisation for heavy duty machining ATC\*

\* Available in conjunction with SIEMENS CNC control system

**Optimal for heavy duty machining!**  
NEW: 5X torqueMASTER® with 60 % higher torque (1,800 Nm) and 180° swivel range.



**Structural components**

**New technologies – LASERTEC Additive Manufacturing and ULTRASONIC**



**6**  
600 × 500 × 45 mm  
**Pylon support**  
DMC duoBLOCK® series  
Material: Titanium 6-4

Complete machining with powerful motor spindle powerMASTER® with 1,000 Nm and heavy duty machining in one set-up.



**7**  
1,200 × 200 × 200 mm  
**Aileron component**  
DMF 180  
Material: Aluminium

Dynamic machining of long slender components up to 6,000 mm long at speeds up to 18,000 rpm.



ø 450 × 470 mm  
**Jet for rocket engine**  
LASERTEC 3D series  
Material: Stainless steel (X5CrNiMo 17-12-2)

Complete 5-axis machining – laser deposition and turning on one machine.



ø 180 × 80 mm  
**Turbine housing**  
LASERTEC 3D series  
Material: Inconel / Copper

Complete 5-axis machining – laser deposition and milling on one machine.



ø 380 × 420 mm  
**Camera housing**  
ULTRASONIC series  
Material: Silicon nitride

Final machining of sintered semi-finished part in multiple set-ups.

# Selected 5-axis solutions.

Available with CELOS® on SIEMENS or with HEIDENHAIN.

## DMU 50 – The entry point into 5-axis machining.

- + Powerful NC swivelling rotary table for 5-axis simultaneous machining with a high degree of stiffness
- + Heavy loads up to 300 kg
- + High-performance inline spindle rated at 14,000 rpm as standard, optionally 18,000 rpm
- + Digital drives with 30 m/min rapid traverse as standard
- + Tool magazine can be populated during machining with up to 60 tools
- + CELOS® by DMG MORI with SIEMENS and 21.5" ERGOline® Control with multi-touch monitor
- + HEIDENHAIN iTNC 530 with 19" ERGOline® control

## DMU 60 eVo *linear* – Unbeatable 5-axis technology with linear drive.

- + Linear drive in the X-axis and Y-axis for maximum precision and dynamics with up to 80 m/min rapid traverse
- + Swivelling rotary table for 5-axis simultaneous machining with swivel angle of 115° and 400 kg load capacity
- + speedMASTER® spindle with 20,000 rpm and 130 Nm as standard
- + Optimised gantry construction for maximum stability with low space requirement and optimal access
- + Optional with mill-turn technology or twin pallet changer

Standard with immediate effect:  
Chip conveyor, spray gun and MPC.



FIT FOR THE FUTURE  
WITH SINUMERIK

**DMG MORI**

**PREMIUM  
PARTNER**

**SIEMENS**

[www.siemens.com/sinumerik](http://www.siemens.com/sinumerik)



**smartOperate –  
SINUMERIK Operate optimized  
for multi-touch operation**

- + Quicker interaction
- + Smart zooming and scrolling functions
- + Full control through gesture commands with reliable SINUMERIK Operate user interface



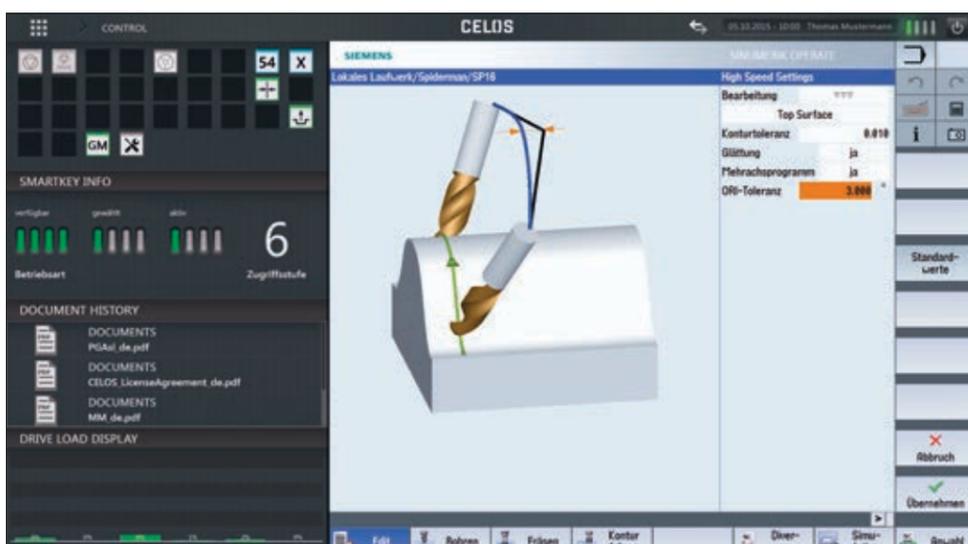
### DMC 160 U duoBLOCK® 4<sup>th</sup> Generation

- + Cubic workspace with X=1,600 mm, Y=1,600 mm, Z=1,100 mm for the machining of large workpieces with a diameter of up to 1,600 mm and a max workpiece weight of 4,000 kg
- + Powerful gear spindle available: 5X torqueMASTER® with up to 1,800 Nm
- + Maximum long-term precision by intensive cooling and linear guideways bounded on carbon rods



### DMC 210 U 2<sup>nd</sup> Generation

- + Innovative wheel magazine for up to 243 tools (SK50 / HSK-A100) with a minimal footprint and shortest non-productive time
- + Expanded swivel range and optimized milling head interference contour (250° instead of 210°), internal cable drag
- + Highest long-term precision and temperature stability due to extensive cooling: linear guideways, feedrate axis, ball screws, rotary axis, insulation of the back side from the electronic cabinet



### Top Surface – Perfect Workpiece Surfaces in Tool and Mold Making

- + Smart motion control
- + Optimal surface quality
- + Highest milling precision
- + Simplest handling
- + NEW: Starting at Operate 4.7



# Clear advantage of 5-axis technology from DMG MORI.



John Kenny (middle), Managing Director JK Engineering, together with two of his dedicated specialists.



5-axis machining on a DMU 60 eVo.



Complex aluminium workpiece for Formula 1.



Artificial titanium joint for the medical sector.



Aluminium gearbox housing.

## JK ENGINEERING HOLDINGS LTD.



*"The high stability of the DMU eVo allows us to machine titanium components for the aerospace or medical industries with maximum precision."*

The origins of JK Engineering, which was founded in the UK in 2001, are as manufacturing service provider for Formula 1, where precision parts are the order of the day. The company in Kings Langley fulfils similarly demanding manufacture for the medical, dental and electronics sectors and – since its certification to AS 9100 and ISO 9001 – in the aerospace and defence industries as well. 25 competent and dynamic specialists are employed by JK Engineering. A modern workshop consisting of 14 machining centres and turning machines from DMG MORI form the subcontractor's core manufacturing capacity. 5-axis universal milling and automation are prominently represented.

**"We operate in a fast-moving market with high demands on quality"** John Kenny, Managing Director of JK Engineering, states in summarising the daily challenges. His team has quickly learned not only to comply with these market requirements but to exceed them. "We can only remain competitive if we consistently expand our know-how and invest in the most modern machining technology." The introduction of 5-axis machining seven years ago was a result of this philosophy. **"The DMU 50 from DMG MORI was in our opinion the first really reliable 5-axis machine"** John Kenny remembers about the purchase. Besides that, the compact model with its small footprint fitted perfectly into our production environment. **"With 5-axis machining we were able to significantly reduce the number of set-ups, which gave us a big advantage over our competitors."** At that time the competition was still using 3-axis machines.

JK Engineering has been loyal to DMG MORI ever since. Ten of the total of 14 DMG MORI machines are 5-axis models: three DMU 50, five DMU 40 eVo and two DMU 60 eVo, the latest with a pallet changer. John Kenny points out another decisive feature of the machines: **"Thanks to the stable construction and the powerful spindles we can work productively and accurately, especially during heavy duty machining."** Accuracies of 10 µm are routine. "The temperature management of the DMG MORI machines also contributes towards precision." The fact that JK Engineering manufactures in air-conditioned factory units makes their pursuit of top precision self-evident.

For JK Engineering, 5-axis machining was only the first step towards sustainable process optimisation. **"Automation is the key to the most efficient utilisation of our capacity"**, according to John Kenny. Robots and loading equipment are indispensable for unmanned manufacturing overnight and at weekends. **"The robots provide additional flexibility for small series production, because we can easily adapt order priorities as required – and without long set-up times."** In addition, automatic loading of the machines eliminates inaccuracies due to manual set-up. John Kenny looks to the future with optimism: **"Our technical competencies combined with reliable and accurate machines from DMG MORI are helping us to deliver the most demanding components quickly and at competitive prices."**

**jkengineering**

JK Engineering Holdings Ltd.  
Unit 2 Leewood Farm, Harthall Lane, Kings Langley,  
Watford, Herts, WD4 8JJ.  
sales@jk-engineering.co.uk, www.jkeng.co.uk

## Navigate your future ~NTN ULTAGE~

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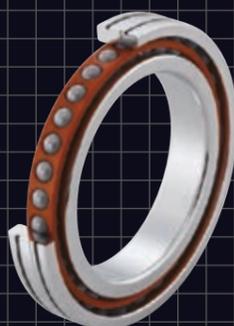
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NTN® SNR®

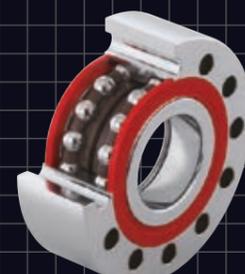
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Machine Tool  
Main Spindle Bearing  
with Air Cooling Spacer



High-speed Angular Contact  
Ball Bearing with Outer Ring  
Refueling Holes (HSE-W)



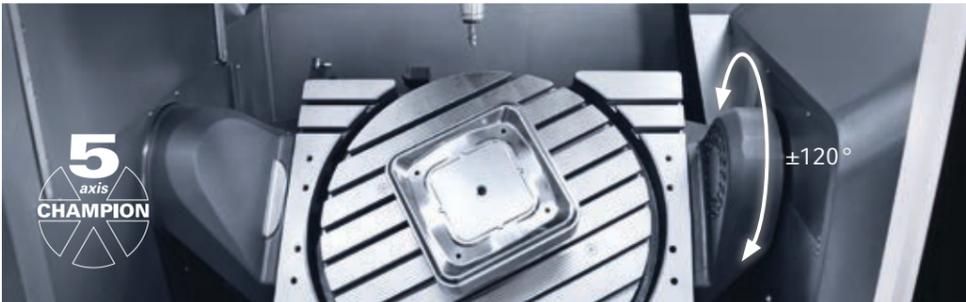
Ball Screw Support Unit  
(BSTU)



Double-row Cylindrical  
Roller Bearing for Main Spindle  
(NN30HSR)



Hans Keller (left), Manager Prototype and Tool Construction at AESCULAP and Dr Uli Sutor, Key Account Manager Medical at DMG MORI.



Machining of deep drawing moulds measuring up to 800 mm.

AESCULAP AG



The 2,500<sup>th</sup> monoBLOCK® machine!

*“The DMU 75 monoBLOCK® is the best solution for 5-axis simultaneous machining of our high precision workpieces in hard-to-machine chrome steel.”*

Within the B. Braun Group, AESCULAP AG in Tuttlingen is a subsidiary specialising in surgery, with products and services for all types of surgical intervention. One core component in the value-adding chain is the multiple award winning Tool and Prototype Construction section. With many years of experience in 5-axis simultaneous machining, DMG MORI acts as supplier of powerful machining centres. Recently the 2,500<sup>th</sup> monoBLOCK® machine from the machine tool manufacturer found a good home

at AESCULAP. The DMU 75 monoBLOCK® overcame four rival products in a tough selection process.

“We were looking for the best way to simultaneously machine challenging deep drawing moulds weighing up to 300 kg in five axes from hard-to-machine high-alloy chrome steel and finally found it in the Allgäu region”, explains Hans Keller, head of Prototype and Tool Construction enthusiastically.

Besides the excellent milling performance – the DMU 75 monoBLOCK® has a 20,000 SK40 motor spindle as standard – he specifically praises the stability of the new monoBLOCK® for achieving high surface quality and long tool service life. In addition, the NC swivelling rotary table can easily be loaded from the top by crane with workpieces up to 800 mm. The vertical chain magazine with space for 60 tools and a small footprint of only 8m<sup>2</sup> round off this unique 5-axis all-round package.



AESCULAP AG  
Am Aesculap-Platz, D-78532 Tuttlingen  
info@aesculap.de, www.aesculap.de



Factory Director, Hidenobu Shigeki visited 30 potential customers a month when the company experienced a sharp decline in orders triggered by the collapse of Lehman Brothers. His sales activities, brimming with vitality, led to today's growth and success.

TOMOEI SEIMITSU CO., LTD.



*“Thanks to the DMU 80 eVo linear we are now 4 times faster when machining superalloys – achieving an accuracy of ±2 µm.”*

“Our company mainly manufactures prototype parts for air conditioners, automobiles and bicycles. Most delivery time requirements are demanding, for example one week or even only two days.” Factory Director Hidenobu Shigeki explains the difficulties inherent in prototype manufacturing. According to the company, they are not allowed to compromise on accuracy, no matter how short the delivery time. Most orders require a dimensional accuracy of within ±2 µm. Moreover, some prototypes use difficult-to-cut materials such as Hastelloy.

“In order to ensure high accuracy, we constantly control the small temperature differences between the upper and lower parts of the machine and conduct quality inspections on every machined workpiece. “Every time we receive an order, we are taking on the challenge of shorter delivery times while maintaining high accuracy” says Shigeki. Tomoei Seimitsu has invested in plant and equipment to accommodate rapidly increasing order volumes and has purchased nine machine tools over the past two years.

“Among those machines, the one that is particularly contributing to boosting our productivity is the DMU 80 eVo linear,” says Production Director Hitoshi Nagao. He also praises the performance of the DMU 80 eVo linear saying, “Equipped with optional linear drives, the machine achieves approximately four times greater productivity in 3D shape machining compared to other companies’ machines.” The output of the DMU 80 eVo linear is by far the highest of any 5-axis machine in the factory and almost all of the operators want to use it, “Use eVo if not in use” has become a catchphrase among them.

Production Director Nagao explains the reason for that. “eVo is easy to use even during machining that requires high accuracy and high speed. Its excellent accessibility due to the wide door opening also makes setup easier.” Factory Director Shigeki speaks about his hopes for the company's future from a management perspective, “DMG MORI machines offer good space efficiency and can achieve extremely high productivity per unit area. We would like to further increase production rates, and are aiming to hold a dominant position in the prototype manufacturing field.”

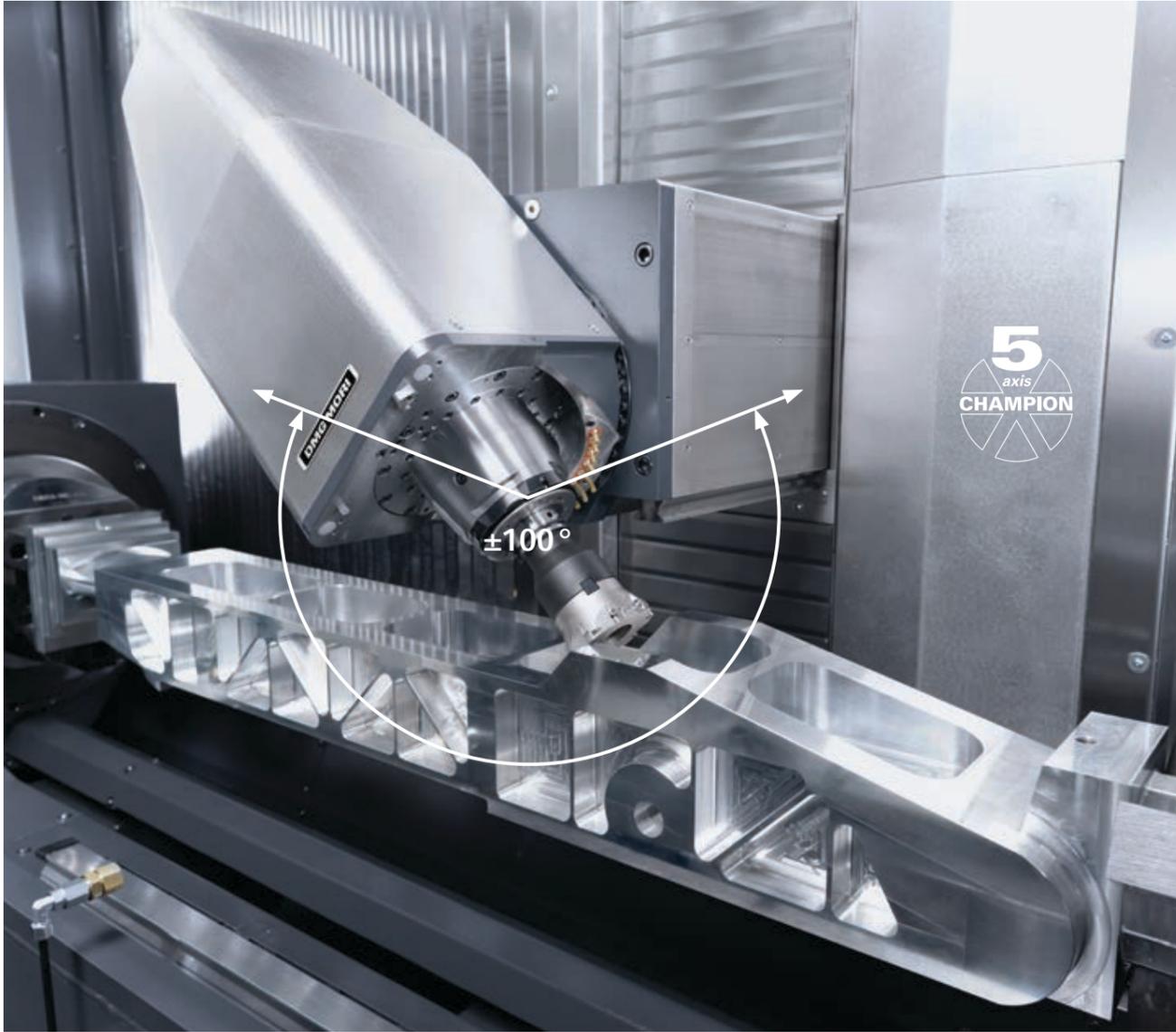


Tomoei Seimitsu's elite operators who skillfully run the DMU 80 eVo linear (From left to right: Satoshi Sumitani, Hitoshi Nagao, Junji Oki and Hayato Ikenaga).

Tomoei Seimitsu Co., Ltd.

2-2-11, Nakano-cho-higashi, Tondabayashi City, Osaka 584-0022  
www.tomoeiseimitsu.co.jp

**DMF** Travelling column milling machines



5-axis machining on the DMF 26017.



Linear drive in the X-axis for up to 80 m/min rapid traverse.



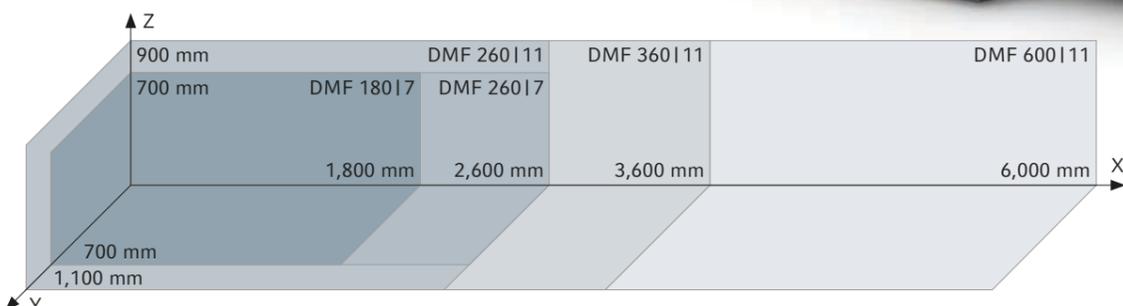
Integrated rotary table for 5-axis and mill-turn machining.

## DMF series – B-axis now standard.

- + Linear drive in the X-axis providing 80 m/min rapid traverse
- + Large single working area or working area partition for pendulum machining
- + 5-axis machining with B- / C-axis for mill-turn technology
- + X-axis traverse up to 6,000 mm, table load up to 10t
- + Spindle speed up to 18,000 rpm or 10,000 rpm at 413 Nm and SK50 / HSK-A100



Travelling column milling machines in two sizes with 700 mm or 1,100 mm traverse in the Y-axis

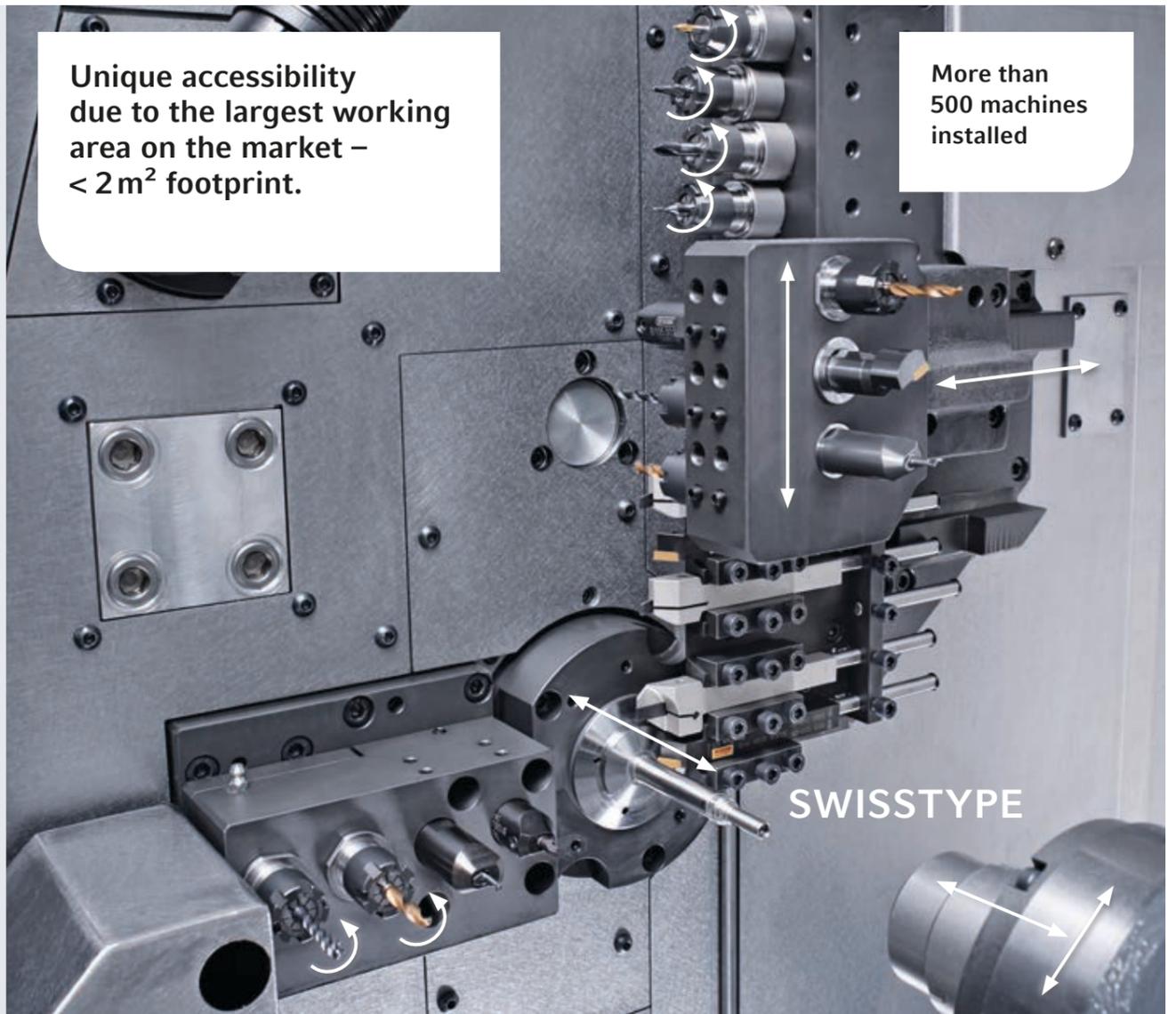


**SPRINT** Automated / production turning

**SPRINT 20|5 – Parts up to  $\varnothing 20 \times 600$  mm machined with maximum precision of  $< 5 \mu\text{m}$  – best in class.**

- +  $< 5 \mu\text{m}$  accuracy due to exceptional rigidity and thermal stability
- + **Optimal chip removal** thanks to steep covers in the working area
- + 5 linear axes and 2\* C-axes
- + 23 tools in 2 independent tool carriers; up to 6 driven tool positions
- + **SWISSTYPEkit\*** for short and long part turning on one machine, changeover time of less than 30 minutes
- + FANUC 32i-B with 10.4" colour display

\* Optional



Unique accessibility due to the largest working area on the market –  $< 2 \text{m}^2$  footprint.

More than 500 machines installed

SWISSTYPE

Working area with space for 23 tools in 2 independent tool carriers, including 4 driven tool positions for the main spindle and 2 optional driven tool positions for the counter spindle (including C-axis for the counter spindle).

**Short delivery times starting at just 2 weeks!\***

\* Delivered ex works from Bergamo.

**SWISSTYPEkit**



$\varnothing 10 \times 85$  mm  
Bone screw // Medical  
Material: Titanium (Ti6Al4V)  
Machining time: 240 sec.



$\varnothing 6 \times 65$  mm  
Shaft // Automotive  
Material: AISI 304  
Machining time: 38 sec.

**SHORT TURNING**



$\varnothing 16 \times 50$  mm  
Valve // Hydraulics  
Material: Stainless steel (X8CrNiS18-9)  
Machining time: 98 sec.



$\varnothing 19 \times 42$  mm  
Disc // Engineering  
Material: Ck45  
Machining time: 78 sec.

SPRINT 20|5  $< 2 \text{m}^2$  footprint, outstanding ratio of working area to footprint.



View the video on "Local production in Italy"



Find out more about the SPRINT series at:

[sprint.dmgmori.com](http://sprint.dmgmori.com)



Download the product brochure for the SPRINT series:

[download.dmgmori.com](http://download.dmgmori.com)



► SPRINT series now with 14 models.

SPRINT 2018	SPRINT 3218	SPRINT 4218 linear
SPRINT 2015	SPRINT 3215	

Automated turning – SWISSTYPEkit

		Complexity (linear axes)
SPRINT 50-3T B	SPRINT 65-3T B	10 +B
	SPRINT 65-3T (FANUC)	10
SPRINT 50-3T	SPRINT 65-3T	
SPRINT 50-2T	SPRINT 65-2T	8
SPRINT 50-2T (FANUC)		7
		6
		5

Control system: FANUC

Control system: CELOS® with SIEMENS or with MAPPS on FANUC

**ADDITIVE MANUFACTURING**

# LASERTEC 65 3D / 4300 3D – Full hybrid construction for efficient complete machining of challenging 3D components.

**HIGHLIGHTS LASERTEC 3D**

- + Unique technology combination of laser deposition welding, milling / turning as well as ULTRASONIC grinding / milling
- + Powder nozzle allows unique material combinations and reduced material consumption
- + Cross-process software module

\* only LASERTEC 65 3D



View the LASERTEC 65 3D video



Flexible HSK interface LASER + Mill + ULTRASONIC\*



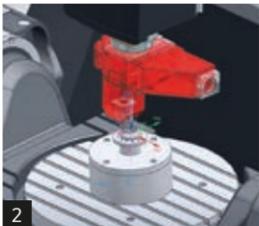
LASER + Turn & Mill

**➤ ALL-IN-ONE: THE PROCESS**

**HYBRID CAD /CAM FOR ADDITIVE AND SUBTRACTIVE NC-PROGRAMMING**



1 Generation of NC paths for laser machining and milling; output via post-processor; definition of program sequence.



2 3D simulation for collision avoidance, taking into consideration the integrated laser head.



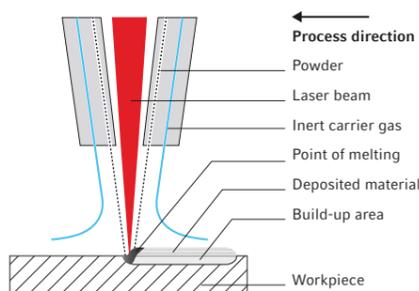
3 Laser deposition welding and milling combined on the LASERTEC 65 3D (flexible change possible).



4 Completed workpiece being inspected.

**CAD/CAM HIGHLIGHTS**

- + Fully integrated software solution for programming the additive and subtractive processes
- + Simulation of additive and subtractive NC paths
- + Pre-programmed strategies for accelerated programming
- + Combination of multiple structure strategies is possible



**➤ THE APPLICATIONS**

**MANUFACTURE OF 3D COMPONENTS, COATINGS, REPAIRS**

**Oil & Gas**

- Base materials:**
- + Oerlikon Metco INC 625
  - + Oerlikon Metco INC 718
- Coating materials:**
- + Oerlikon Metco 60 % WC (Ni base)
  - + UTP 40 % WC (Ni base)



Drill head

**Die & Mould**

- Base materials:**
- + UTP Ferro 44 (X2CrCoMo 15-15-3)
  - + UTP Ferro 55 (X35CrMoMn 7-2-1)
- Coating materials:**
- + Sandvik M2 (S 6-5-2)

**Aerospace**

- Base materials:**
- + Oerlikon Metco 316 L (X2CrNiMo 17-13-2)
  - + Oerlikon Metco INC 718
- Coating materials:**
- + Stellite 6
- Reactive materials:**
- + Titanium alloy (TiAl6V4)



Turbine housing

**Engineering**

- Base materials:**
- + Oerlikon Metco 316 L (X2CrNiMo 17-13-2)
  - + Oerlikon Metco 316 L + Si
  - + Oerlikon Metco INC 718
- Coating materials:**
- + Stellite 694
  - + Stellite 21

LASERTEC SHAPE



Drill head  
LASERTEC 65 3D

**3 materials in sandwich construction:**  
Steel > Inconel > Tungsten carbide

Complete machining, including laser deposition, milling and ULTRASONIC grinding in one set-up.



**YOUR CONTACT**

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➤ MATERIAL KNOW-HOW

MATERIAL DATABASE / METALLURGY



Injection mould

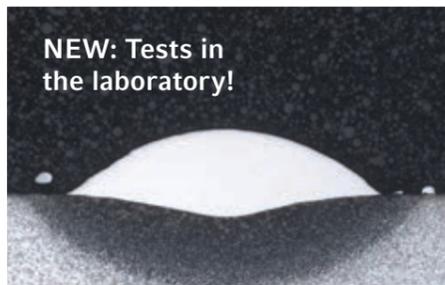


Flange / piping



**Additive Manufacturing material database for users**

- + Development of process parameters for surfaces, webs, 3D objects
- + Evaluated database based on acceptance of components for material qualification
- + Customer-specific material development in four Additive Manufacturing technology centres worldwide



**NEW: Tests in the laboratory!**

**Continuous inspection of material characteristics**

- + Inspection of the powder material
- + Density measurements, structural analysis
- + Mechanical test procedures (tension, pressure, bending)
- + Measurement: Surface quality, hardness, corrosion
- + Achievement of a metal density of > 99.8 %

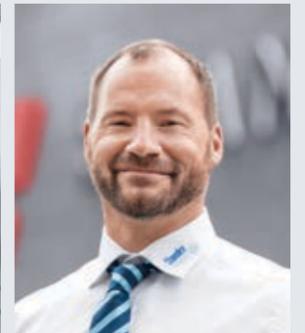
STANDEX ENGRAVING MOLD-TECH



*"Highly dynamic, high repeatability laser texturing and paint removal using optimal laser focus."*



LASERTEC 65 Shape: 5-axis laser texturing / paint removal from a steering wheel mould.



Thorsten Miebach, Director Laser Technologies, at Standex in Krefeld.



Know-how of the holistic CAD/CAM process chain.



Measuring the mould geometry with a 3D scanner.

Since 1967 **Standex Engraving / MOLD-TECH** with its more than 1,000 employees is renowned for the development and manufacture of plastic products with high visual and tactile surface qualities as well as absence of warpage. "We are the only texturing company with a global network consisting of 35 subsidiaries", explains Thorsten Miebach, Director Laser Technologies. He manages the laser competence centre of the worldwide Centre for Coordination and Grain / Texture Development in Krefeld. Since 2013 the company has installed nine LASERTEC Shape machines in Germany, China and the USA. **"Above all, the Shape technology opens up creative possibilities in design and texturing and is often more economical than etching"** according to Thorsten Miebach. The high dynamics and precision of the DMG MORI machines is an important aspect too: **"At the time of acquisition of the first LASERTEC Shape, it was the only machine on the market, capable of texturing our dashboards with a laser with the required quality and within the specified time and with repeatable accuracy. As a result of our positive experience with this machine, our global capacity expanded continuously."** But Standex is more than just a structuring service provider. "We set very high standards for ourselves. We continuously develop individual and innovative solutions for our customers, that have an effect on the entire texturing industry sector." Investment in new, innovative technologies is part of the business. "For our operation in China we will acquire a LASERTEC 210 Shape to optimally serve the automotive industry in this important market."



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www.standex-gmbh.de

**TECHNOLOGY INTEGRATION GRINDING**

**Unique: MTG – Milling, turning, grinding in one set-up.**

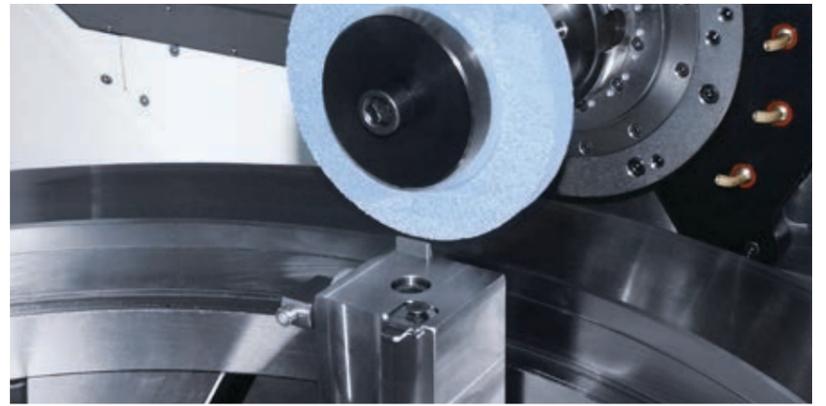
**TECHNOLOGY INTEGRATION FOR:**

- + Surface quality of Ra < 0.3 µm
- + Roundness < 10 µm
- + Quality 4 with diameter > 120 mm

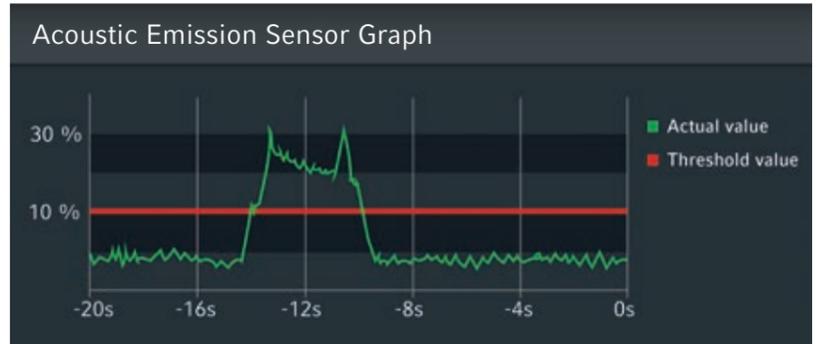
**GRINDING**

Dependent on material and environmental conditions

Control system:  
CELOS® on Operate  
with SIEMENS 840D solutionline



Dressing of the grinding wheel.



Measuring window integrated in the CELOS® display.

**HIGHLIGHTS**

- + **Best surface quality** (Ra < 0.3 µm) through integration of grinding technology
- + **Economic manufacturing** through elimination of repeated set-ups
- + **Grinding cycles for internal, external and face grinding**
- + **NEW: Integral sound sensor** to assist start-up and dressing

**MTG PACKAGE CONSISTING OF**

- + MTG spindle with integral sound sensor
- + Grinding and dressing cycles
- + MTG coolant system 1,300l
- + Extended machine protection

Available for the DMC FD duoBLOCK®



**YOUR CONTACT**

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**Experience DMG MORI live!**

**NEXT EVENTS:**

+ BIMU, Milano / IT	04-08/10/2016
+ MAKTEK, Istanbul / TK	11-16/10/2016
+ Open House Seebach / DE	08-11/11/2016
+ Open House Hilden / DE	08-11/11/2016
+ Grand Opening Technology Centre, Seoul / KR	08/11/2016
+ PRODEX, Basel / CH	15-18/11/2016
+ JIMTOF, Tokyo / JP	17-22/11/2016
+ METALEX, Bangkok / TH	23-26/11/2016
+ MTI, Jakarta / ID	30/11-03/12/2016
+ IMTEX, Bangalore / IN	26/01-01/02/2017



Experience DMG MORI live!

[events.dmgmori.com](http://events.dmgmori.com)



Open house  
in Pfronten  
14-18/02/2017

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