



# EMAG

# news

Nº28

REINECKER · KARSTENS · KOPP · NAXOS-UNION · KOEPFER · LASER TEC · ECM · ELDEC · RICHARDON

## 04 **E-mobility**

New manufacturing solutions for production of sheet metal packages



### EMO

Hannover

16-21.9.2019

Hall 17,  
Booth C29

## 06 **Faster**

New turbocharger line solution delivers high speed

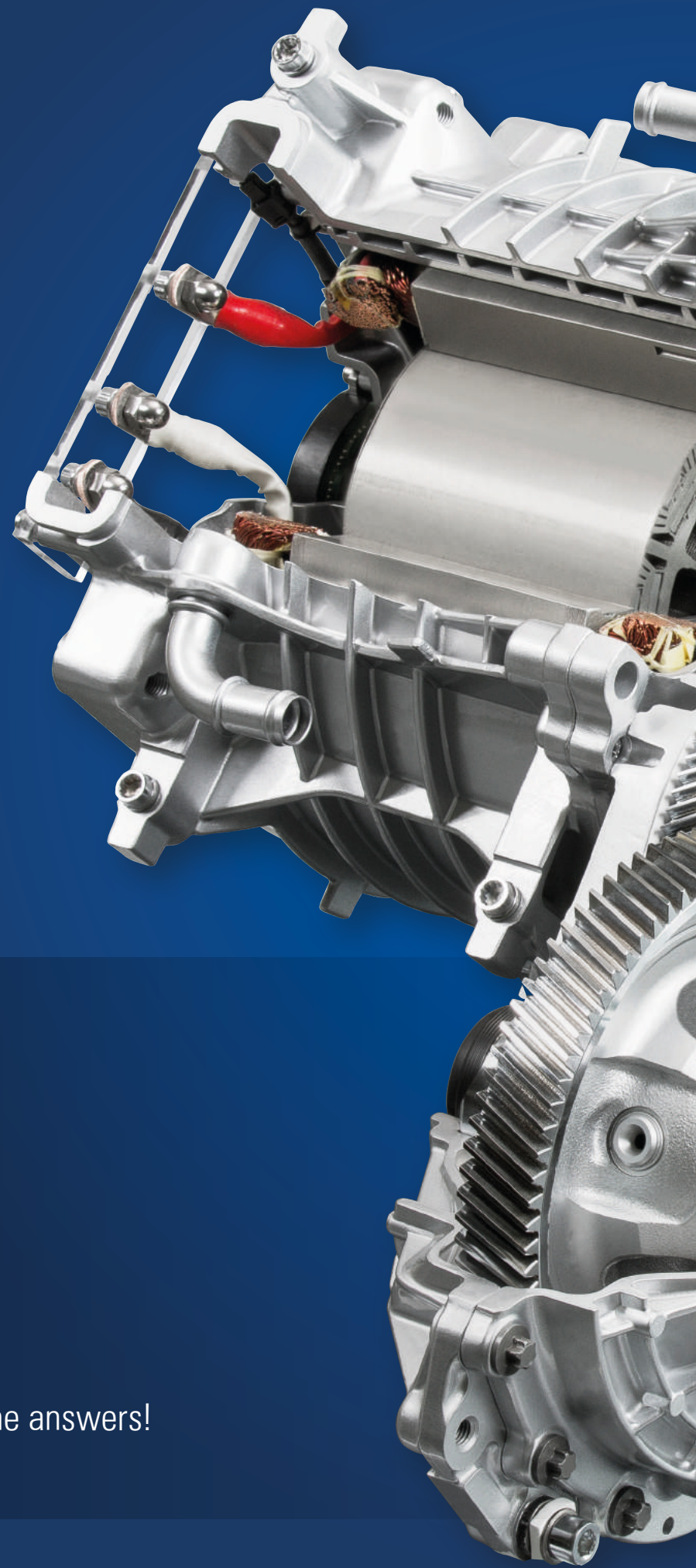
## 10 **Bigger**

New VL 5 DUO machine for transmission components

## 12 **Smarter**

New automation solution simplifies machine loading





# MODERN DRIVE SYSTEMS CHALLENGES FOR MANUFACTURING

What production solutions and modern networking approaches are required to meet the changes taking place in mobility? EMAG has the answers!

## EMAG VIDEO

We presented our initial solutions at our 2019 Technology Forum. See the highlights here:



## WORKPIECES

EMAG offers manufacturing solutions for all modern drive systems.

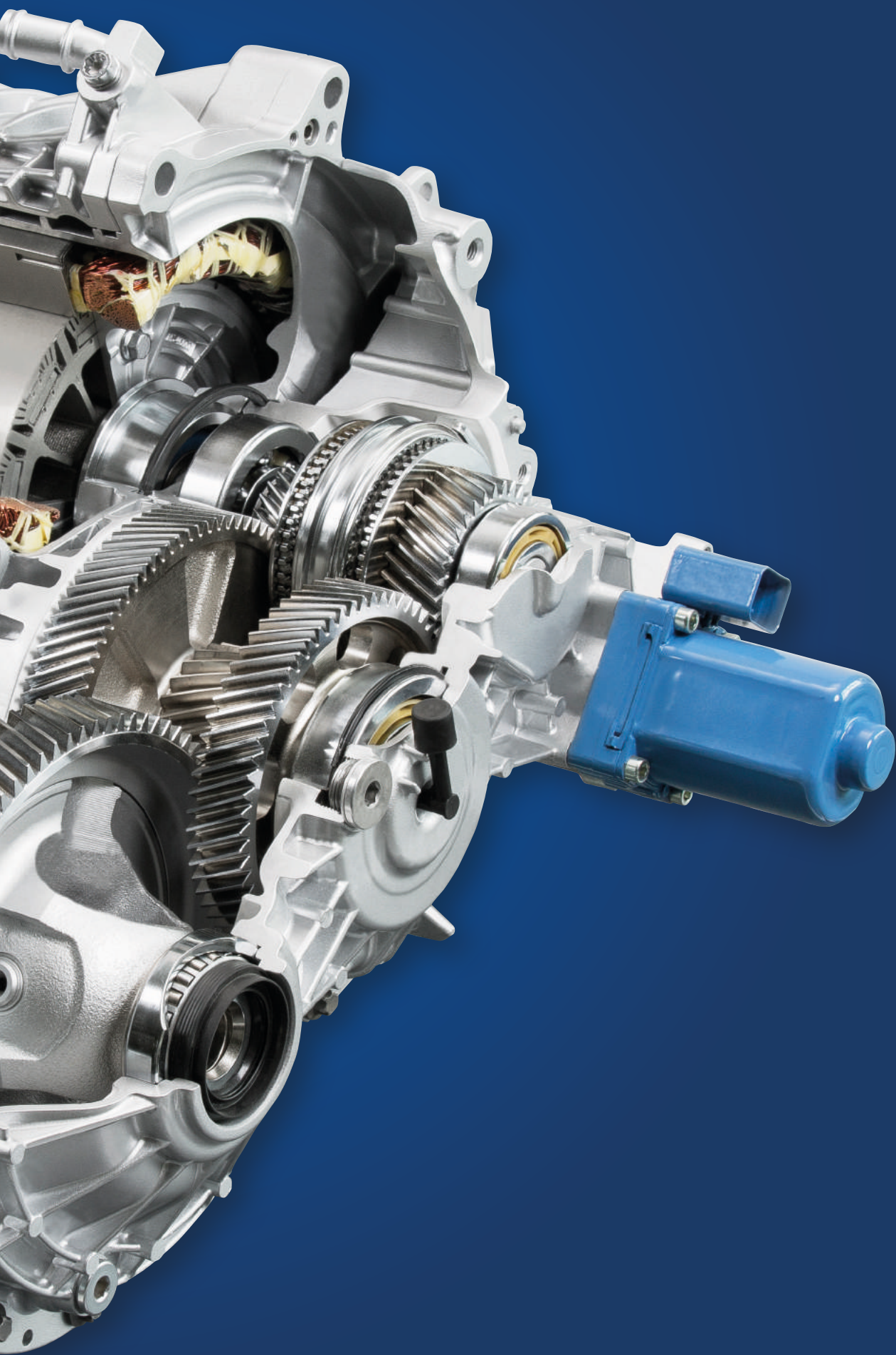


Rotor shaft



Rotor shaft





**W**ith the 2019 Technology Forum, our yearly events schedule was off to a very strong start! The goal for the forum was to provide our customers with extensive information about what the future of mobility will look like. It was your questions at the Technology Forum that motivated us to dig deeper and provide even more detailed solutions at the EMO 2019. Our wide range of technologies and extensive machine portfolio provide us with the tools necessary to help you develop the perfect solution to fit your production process. See for yourself by visiting us in Hannover for EMO 2019. Our focused technology worlds will provide you with the answers to all of your questions, as well as the perfect manufacturing solution!

  
**EMO** **Hannover**  
 16-21·9·2019  
 Hall 17, Booth C29



Gear wheel



Sun wheel



Differential housing



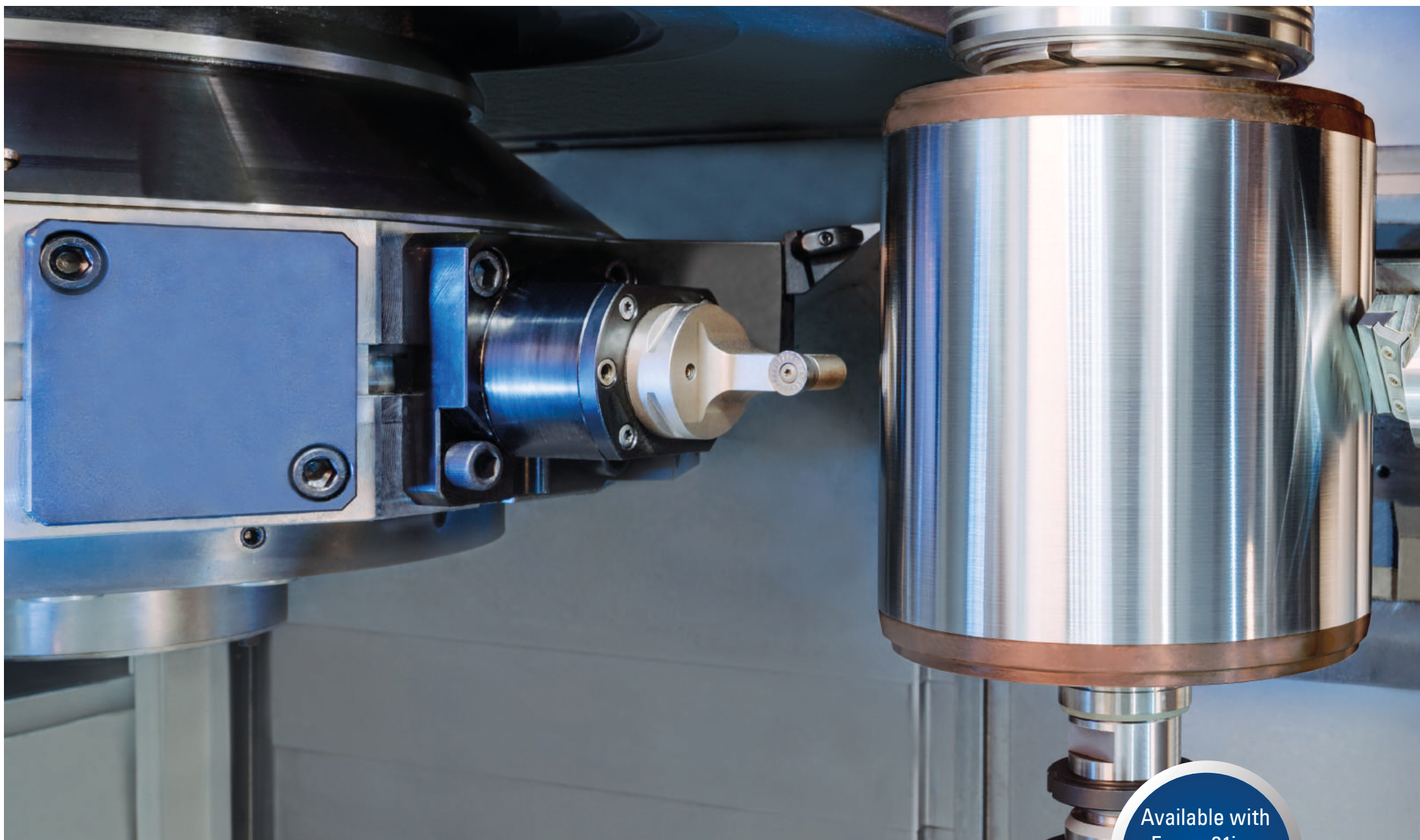
Planetary carrier

## EMAG BLOG

How to prepare for the automotive engineering revolution.







Available with  
Fanuc 31i or  
SIEMENS 840D  
Solution Line

## VT SERIES: HIGH SPEED MACHINING FOR E-MOBILITY

EMAG uses innovative scroll-free turning technology for the final machining of sheet metal packages.

**T**he scroll-free turning of rotor shaft sheet metal packages delivers a wide range of benefits when compared to traditional turning processes. First, scroll-free turning enables significantly higher feed rates per rotation, and therefore reduces cycle times. By using the entire blade, tool service life will also improve and decreases the overall engagement time of the tools. This method has also proven to achieve significantly better surface quality than traditional methods. The VT machine series has been designed specifically for this

machining process! The turning turret on the machine has been completely revised so that its mechanical design and control of the indexing axis satisfy the requirements of scroll-free turning. The programming for the process has also been simplified, which makes it possible to control the machine and process, safely.







## BENEFITS

- » NEW! Standard machine comes ready to integrate with TrackMotion automation system
- » Four-axis machining reduces overall production times
- » Simultaneous loading and unloading of components leads to shorter idle times
- » Integrated automation decrease overall investment costs

## Scroll-Free Turning: Fast, Precise, Reliable.

The theory behind scroll-free turning is different than that of traditional turning because the blade engagement point slides along the component. The angle of the blade and the superimposing movements of the tool and workpiece cause the blade engagement point to continuously move. This is much different from the single-point of stress of ISO turning work, spreading the wear over the entire length of the blade. With this process, completely different stresses occur during production. Not only is the appropriate expertise required to master this technology, but also a reliable and stable machine concept. If this can be provided, as is the case for the VT series from EMAG, the user benefits from 5-6 times faster finishing processes when compared to traditional turning methods. Special surface properties such as no scrolling or an Rmr define the material proportion that can be produced using this process, which is generally implemented in the form of grinding. It may also be replaced for soft machining with a single scroll-free turning cut, depending on the oversize or raw part properties of the roughing and finishing process.



## EMAG ONLINE

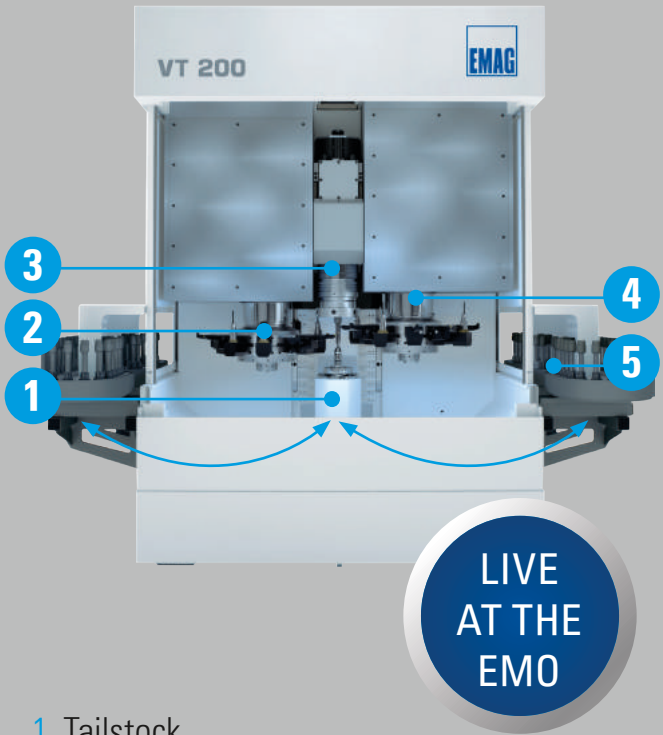
You can read more about scroll-free turning here:



# SERIES VT

## VT SERIES: UNIVERSAL SOLUTION FOR SHAFTS

The VT 200 was designed for the production of shafts with a maximum length of 630 mm, and a diameter of up to 200 mm. This system comes equipped with two tool turrets, each with 11 tool positions for the machining process (each position can be accessed by the workpiece gripper). This makes it possible to use four-axis machining to simultaneously machine the workpieces from two sides.



1. Tailstock
2. Turret 1
3. Working spindle with C-axis
4. Turret 2
5. Automation

## TECHNICAL DATA

	VT 200
Max. workpiece diameter	200 mm
Chuck diameter	250 mm
Swing diameter	270 mm
Max. workpiece length	630 mm
Travel distances X/Z/Y (optional)	395/810/± 25 mm
Main spindle	
» Power rating, 40% / 100%	38/29 kW
» Torque 40% / 100%	250/200 Nm
» Max. speed	4,500 rpm
Rapid-traverse rate X / Y / Z	30/15/30 m/min
Revolutions of driven tools	9,600 rpm



# EMAG PRODUCTION LINE: PERFECT FINISHING FOR THE TURBOCHARGER SHAFT



## 1 VTC 100

**Initial vertical turning of the shaft and wheel in a single clamping operation**

Machine highlights:

- » Fast, reliable four-axis machining
- » The shaft is centered using a power tool
- » Integrated tool storage area
- » Simultaneous loading and unloading

## 2 MIND-M 1000

**Induction heating process releases component stresses around the weld**

Machine highlights:

- » Hanging spindle with chuck for safe clamping
- » Modular design for individual heating and hardening tasks
- » Minimized footprint
- » Precise temperature control and extensive process monitoring

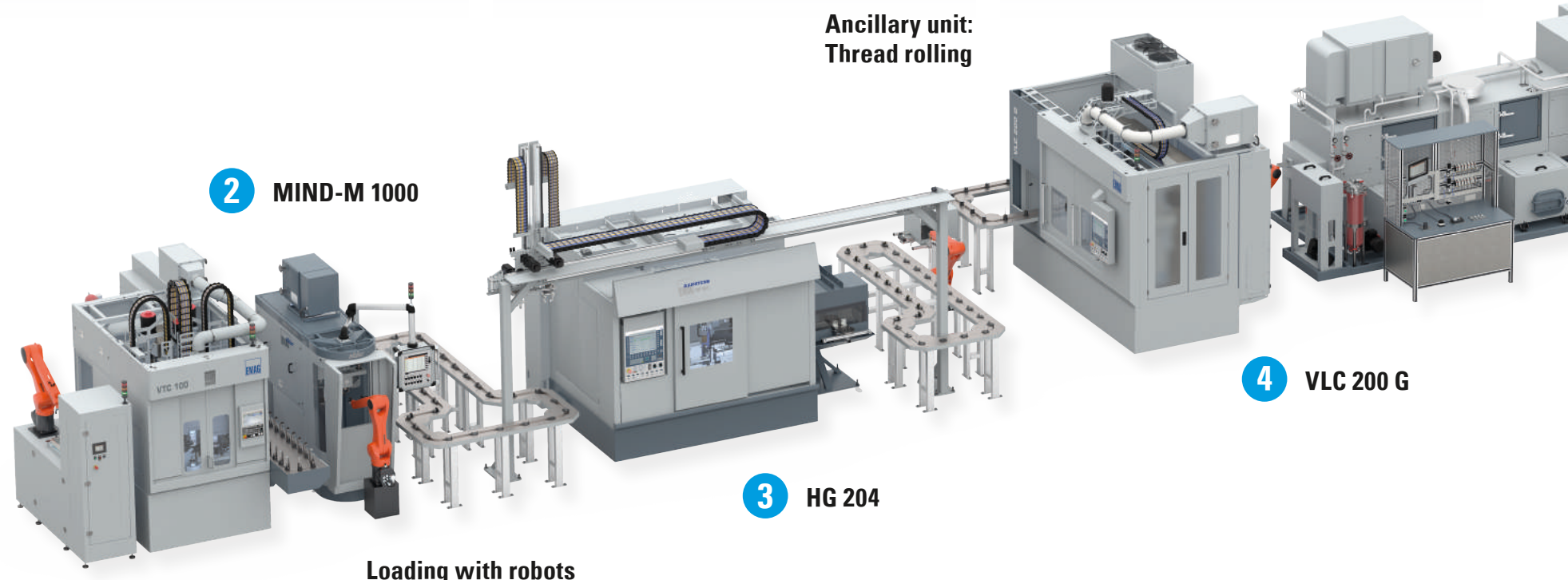
## 3 HG 204

**Horizontal main grinding process of the shaft and one shoulder**

Machine highlights:

- » Integrated diameter and length measurement
- » Dressing unit for aluminium oxide grinding wheels
- » High grinding wheel drive power
- » High precision linear roller guides and absolute measuring systems on all axes
- » Easy handling and accessibility

**Ancillary unit:  
Thread rolling**



## 2 MIND-M 1000

## 4 VLC 200 G

## 3 HG 204

## 1 VTC 100

**Loading with robots**

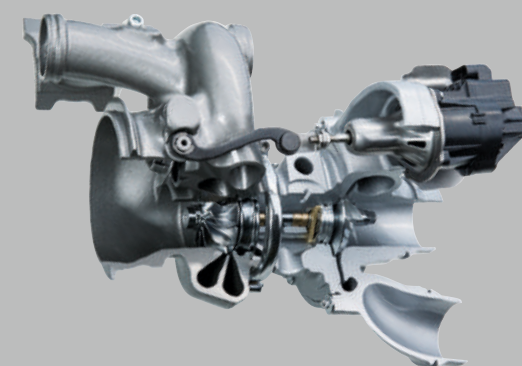


## TURBOCHARGER LINE AT A GLANCE

The entire production line for the complete machining of turbocharger shafts is developed by a single source, is reliable and very fast with a cycle time of approximately 40 – 50 seconds (for car shafts). The shorter the shaft, the lower the cycle times. With this system, once the final balancing process has been completed, you are left with the highest quality component.

## PERFORMANCE DATA

Line cycle time:	approx. 48 seconds
Footprint:	29 x 5.20 m
Output (two shifts)	Around 245,000 parts per year
Number of operations after welding:	5
Washing and measuring processes and thread rolling:	integrated



Turbine shaft inside the turbocharger:  
High precision finish machining

## EMAG BLOG



Manufacturing system  
for turbocharger



### 4 VLC 200 G

**Vertical grinding for the ring grooves and wing contours of the turbine wheel**

Machine highlights:

- » Integrated pick-up automation for short chip-to-chip times
- » Free chip flow conditions
- » Easily accessible
- » High-precision, complete machining in a single clamping operation



### 5 CI 400

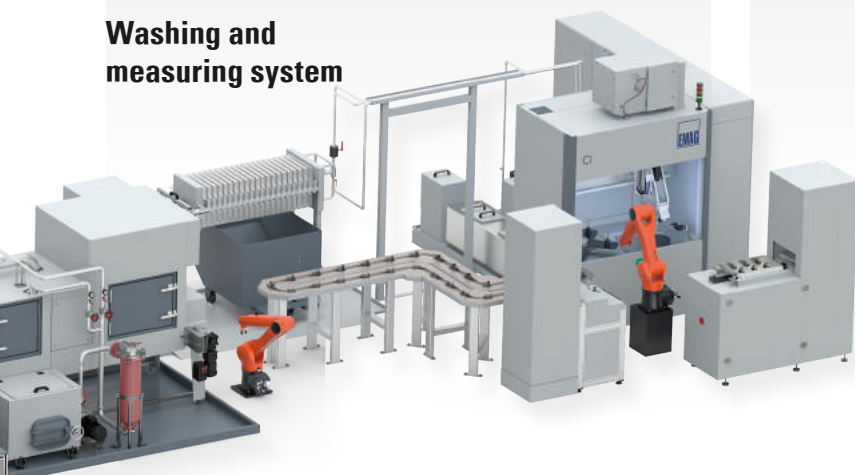
**The entire turbine wheel is balanced using electro-chemical machining**

Machine highlights:

- » One single balancing process
- » No thermal damage to the material
- » Almost zero tool wear
- » Extensive process monitoring



**Washing and measuring system**



### 5 CI 400

The production of turbocharger components is one of the most challenging tasks in automotive engineering and EMAG has created a complete line solution that delivers both speed and precision.

**T**urbochargers play a major role in the performance of engines in modern vehicles. By compressing fresh air that is drawn into the engine and pushing it out into the combustion chambers, turbochargers increase the performance of engines, or allow us to use smaller engines to achieve the same standards (downsizing). Rotating at a speed of approximately 290,000 rpm, the shaft in the turbocharger is under extreme stress and is subjected to very high temperatures. To make this possible, developers create these shafts with high performance materials that can withstand the stress from temperatures up to 1000°C.

How can we efficiently and reliably perform the demanding finishing work on a welded turbine shaft and turbine?

### Speedy New Line Solution!

EMAG has developed the perfect line solution to create these components, and all machines will come from a single source. The component will pass through five main processes – from initial turning and induction hardening, to grinding the shaft, wheel and shoulders. The final process is electro-chemical balancing on an EMAG ECM machine.



# EMAG ELDEC MIND-L 1000: THE NEW STANDARD FOR INDUCTION HARDENING

This new machine from EMAG eldec delivers maximum induction hardening performance, as shown here for hardening wheel hubs.

**W**hen precision and speed are essential in hardening components, there is no comparing the new MIND-L 1000 from EMAG. The precise generator control combined with the EMAG eldec High Precision Tool System (HPTS), the precise axis control and an even more durable machine construction guarantees the perfect hardening results. The standard index disc that comes on the machine can also ensure high cycle speeds.



Machines shown in trade show format

LIVE  
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EMO

## WORKPIECES

MIND-L 1000 – the new generation for large volume vertical index disc machining.



Worm gear



Sprocket



Steering pinion



Gear wheel



# MIND-L 1000



EMAG HMI 4.0



## eQC

eldec Quality Control

## THE BENEFITS

- » Modular system creates flexibility for hardening shaft and chucked parts
- » Excellent accessibility for setting up, cleaning, and maintenance work
- » Maximum process reliability with the axis positioning system and improved rigidity
- » Index disc comes standard, focused on simultaneous multi-processes during the machining time
- » Significantly reduce set-up and retooling times for inductor replacement with HPTS
- » Two control concepts to choose from: SIEMENS 840D SL and the new EMAG HMI 4.0
- » Integrated automation concepts
- » Reduced prices for almost all configurations when compared to older models

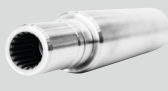
## TECHNICAL DATA

### MIND-L 1000

Max. workpiece length	800 mm
Max. workpiece diameter single spindle / double spindle	200/160 mm
Max. workpiece weight per spindle	10 kg
Generator capacity	10 – 1000 KW LF, MF, HF, DFG, SDF®



Flange



Rotor shaft



Balancing shaft



Axle journal

## ELDEC GENERATORS

eldec supplies a variety of energy sources for induction heating in power classes from 5 to 3000 KW – in the form of stand-alone units or for integration into complete systems using a range of interfaces (for example, Profibus and Profinet)



### ECO LINE/CUSTOM LINE

Single or multiple output energy sources for stand-alone systems, or for integration into a complete ECO LINE system (MF and HF 5 – 225 KW) / CUSTOM LINE (LF, MF, HF, DFG, SDF 20 – 3000 KW).



### PICO-S/PICO-L

Small, red, powerful: low cost energy sources with a single output and very simple control unit (MF and HF 5 – 150 KW).



### MICO-S/MICO-M/MICO-L

All in one: mobile energy sources with integrated active cooler and intuitive touch screen control (MF and HF 20 – 70 KW).



### SYSTEM LINE/RACK LINE

#### SYSTEM LINE

Full integration: SYSTEM LINE generators, designed for integration into machines and fully automated systems (MF and HF 5 – 150 kW). Connection to full systems with SIEMENS PLC controller (Profibus, Profinet, etc.)

#### RACK LINE

Multi-power: extendable energy source using plug-in equipment for precise integration into systems (MF 5 – 30 kW). Connection to full systems with SIEMENS PLC controller (Profibus, Profinet, etc.)



# VL 5 DUO: DOUBLE SPINDLE TURNING MACHINE FOR COMPONENTS UP TO 250 MM IN DIAMETER

Two separate machining areas allow for maximum production flexibility

**W**hether it is a one-machine solution for OP 10 and OP 20, or a TWIN-turning machine for OP 10 and OP 10, the VL 5 DUO can be designed to achieve a wide range of manufacturing scenarios.

The machining areas in this system mirror one another, and each is equipped with its own working spindle with a rating of up to 34.1 kW and a torque of 593 Nm (with a duty cycle of 40%). This provides the system with plenty of power for high speed, precision machining. Each machining area is also equipped with a twelve-position tool turret (with either VDI 40 or BMT 55 interface) that can be fitted with driven tools and a Y-axis, in addition to turning tools.

OP 10 (soft turning)



OP 20 (soft turning)



## » Highly productive DUO concept

Two fully equipped machining areas deliver maximum flexibility and productivity



Machines shown in trade show format

Fanuc 31i – a CNC for controlling spindle 1, spindle 2, TrackMotion & loading belts

## WORKPIECES

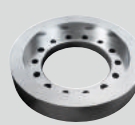
The VL 5 DUO is ideal for machining powertrain components in medium to large scale mass production.



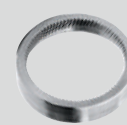
Car wheel hub



Ring gear



Gear wheel



Annulus gear



Differential housing



Sheave (CVT gears)





## 3 QUESTIONS

to Björn Svatek

Modular Solutions - Sales & Marketing Director

### What led to the development of the VL 5 DUO?

We wanted to build on the success of its smaller version, the VL 3 DUO that was launched at the AMB Stuttgart in 2016. This machine went on to be one of the most successful market launches in EMAG history.

### Who was this machine designed for?

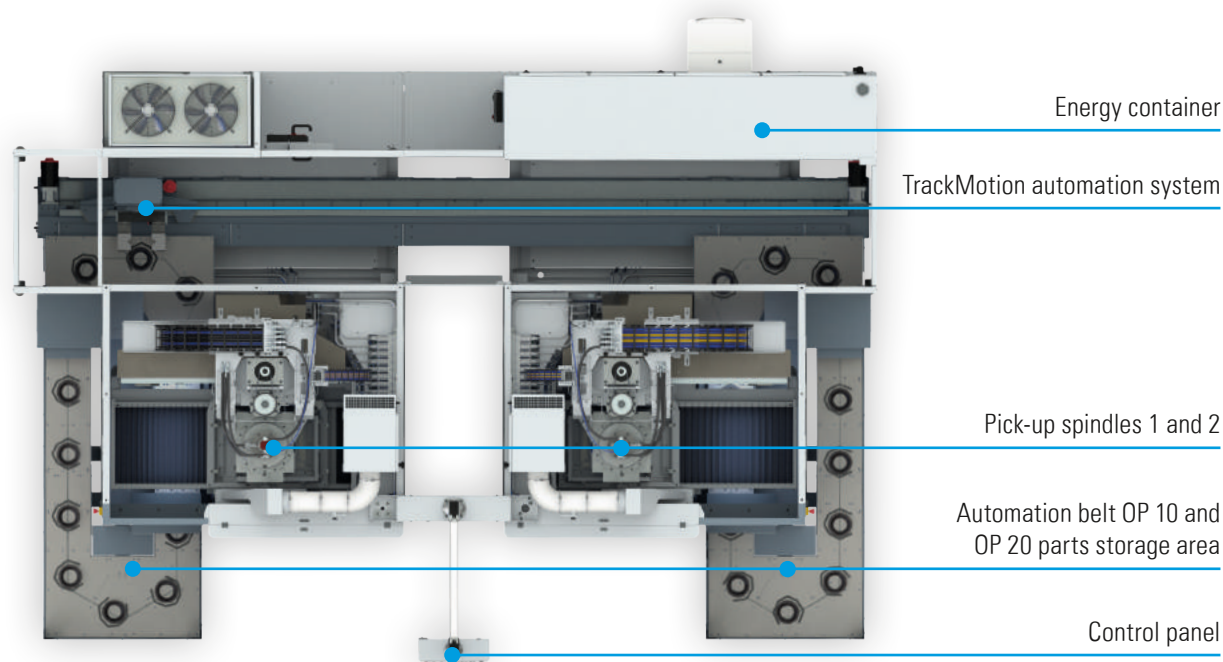
The machine was designed for customers who need to produce parts up to 250 mm in diameter, such as ring gears – both flexibly in two clamping operations, and efficiently.

### How does the customer benefit?

The customer receives the complete system, including the machine, automation system, clamping equipment and tools – all from a single source. Additionally, the “smart machine” concept allows spindle 1, spindle 2 and the automation sequence to be programmed (TrackMotion and conveyor belts) with a single CNC. Not only making it very user-friendly, but also saving the customer money.

## BENEFITS

- » Powerful, water-cooled motorized spindle 500 rpm / 34.1 kW / 593 Nm at 40% duty cycle
- » Maximum precision  
Direct position measuring systems (glass scales) on all linear axes for maximum long term-accuracy
- » EMAG turret  
Water-cooled for high thermal stability and very short indexing times with torque drive
- » Innovative control concept  
One CNC to control spindle 1, spindle 2, the automation system (TrackMotion), & conveyor belts



## EMAG BLOG

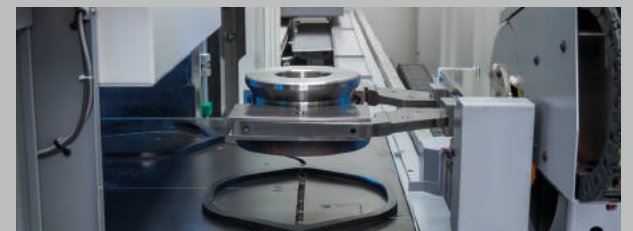
Read the entire interview with Björn Svatek:  
[www.emag.com/blog](http://www.emag.com/blog)



DUO  
5  
VL

## TRACKMOTION AUTOMATION SYSTEM

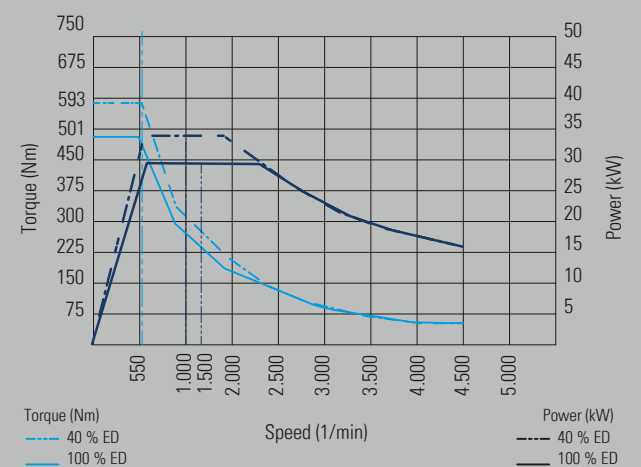
The VL 5 DUO and the TrackMotion automation system were designed for each other! This one, complete and compact solution not only performs the loading and unloading operations, but also transports and turns the parts between operations.



## FULLY INTEGRATED MEASURING

An optional measuring station is available for each machining area. The measuring station is installed between the machine area and the pick-up station.

## PERFORMANCE DATA



## TECHNICAL DATA

### VL 5 DUO

Max. workpiece diameter	250 mm
Chuck diameter	315 mm
Swing diameter	340 mm
Max. workpiece length	175 mm
Workpiece weight	40 kg
Travel distances, X / Y (optional) / Z	750/±30/350 mm
CNC controller	Fanuc 31i with Manual Guide i
Main spindle	
» Power rating, 40% / 100%	34.1/28.9 kW
» Torque 40% / 100%	593/501 Nm
» Max. speed	4,500 rpm
Rapid-traverse rate, X / Z	60/30 m/min
Tool stations	2x12 – VDI40/BMT 55

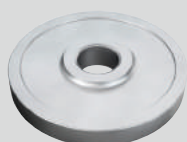
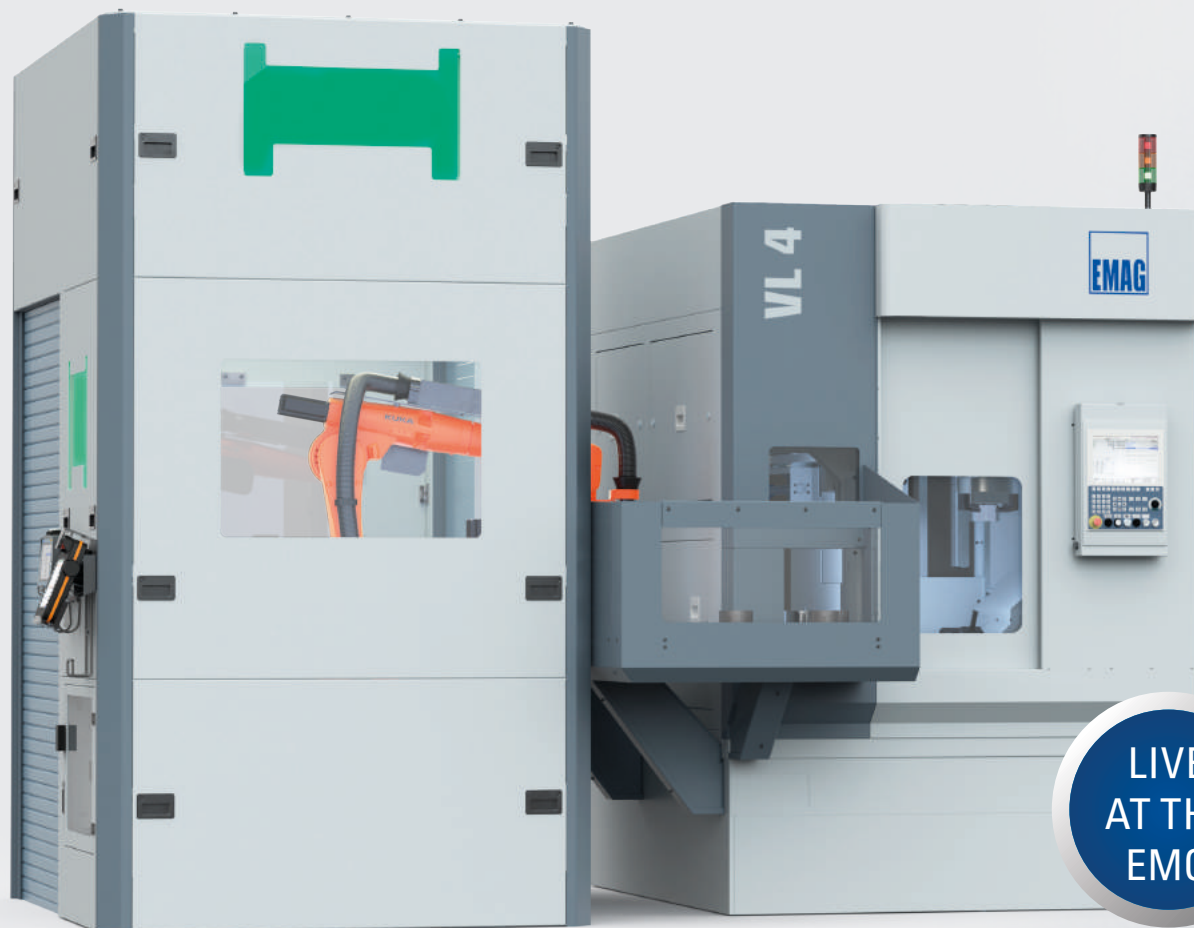
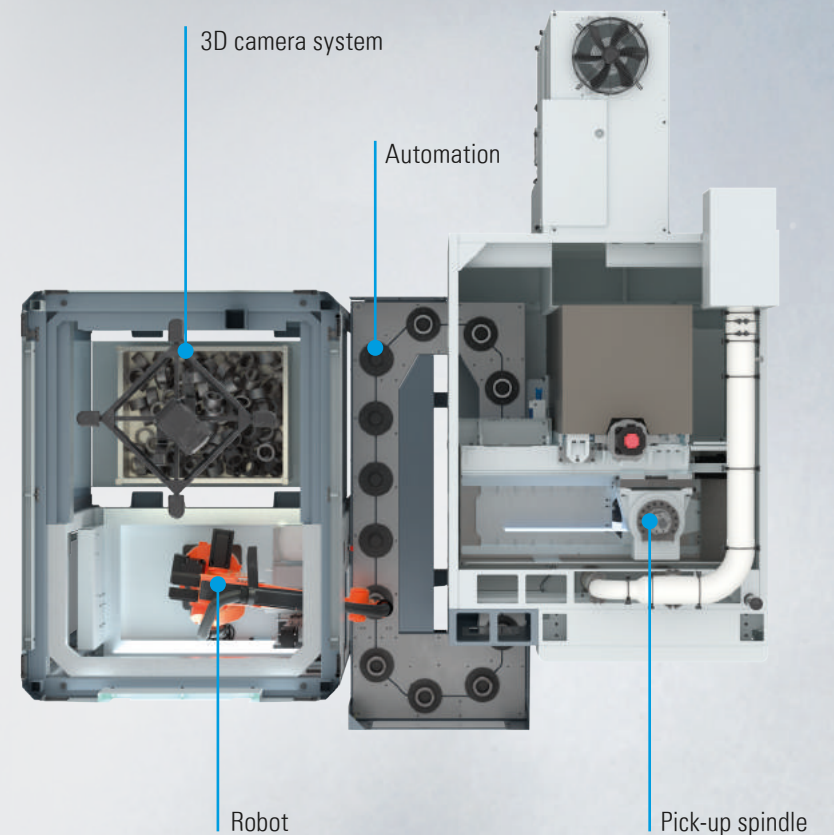


# NEW AUTOMATION SYSTEM: EMAG BIN-PICKING AUTOMATION

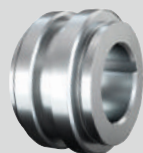
Smart automation solution enables machines to be loaded directly from workpiece containers

**E**MAG VL machines are already highly automated vertical turning machines, by adding this integrated automation system both the machining and loading/unloading processes can be performed automatically using the pick-up spindles. The only work left to do is loading the workpiece conveyor belt, which can be done by hand, or using EMAG's TrackMotion automation system. If the decision is made to load with the pick-up spindle, all workpieces must be pointing the same direction

and correctly positioned on the conveyor belt. In the past, loading sawn sections, for example, from a workpiece container was only possible by hand, vibration conveyors or other supply solutions. The chaotic positioning of raw parts prevented any automation straight from the workpiece container – until now!



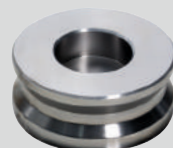
Gear wheel



Sprocket

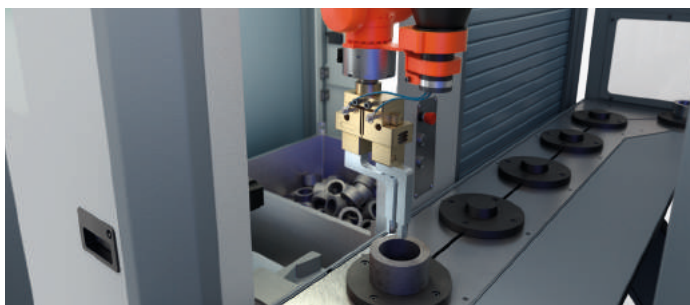


Flange



Roller





# AUTOMATION



## INTEGRATED 3D CAMERA SYSTEM

The bin-picking cell allows machines to be loaded directly from the container. The positions of the raw parts inside the container are identified in real time using a 3D camera system. This data is used to control a robot arm that will pick up the individual components one-by-one (bin-picking) and place them on the VL machine conveyor belt.

## FEATURES

- » 3D camera
- » Mobile control panel
- » Rolling shutter door for fast loading and unloading
- » LED fill level indicator
- » Gripper with collision monitor
- » Individual gripper jaws to fit individual component contours
- » Maximum workpiece weight 15 kg



# THE COMPLETE RANGE OF SOFT AND HARD MACHINING: MANUFACTURING SOLUTIONS FOR PLANETARY GEARS

LIVE  
AT THE  
EMO

## HLC 150 H

**Efficient machining of straight and helical workpiece and worm grears with a maximum diameter of 150 mm**

Machine highlights:

- » Innovative compound slide design and "virtual Y-axis"
- » Integrated chamfering
- » High speed loading portal with double rotary gripper
- » High performance drive technology



## ELC 160

**Highly productive laser welding of planetary carriers (Annulus gear, star, disk)**

Machine highlights:

- » Integrated joining station with force-distance monitoring
- » Weld seam monitoring for optimum quality
- » Perfectly adjusted automation and clamping fixtures
- » Stationary beam guidance and welding optics



## VLC 200 FA

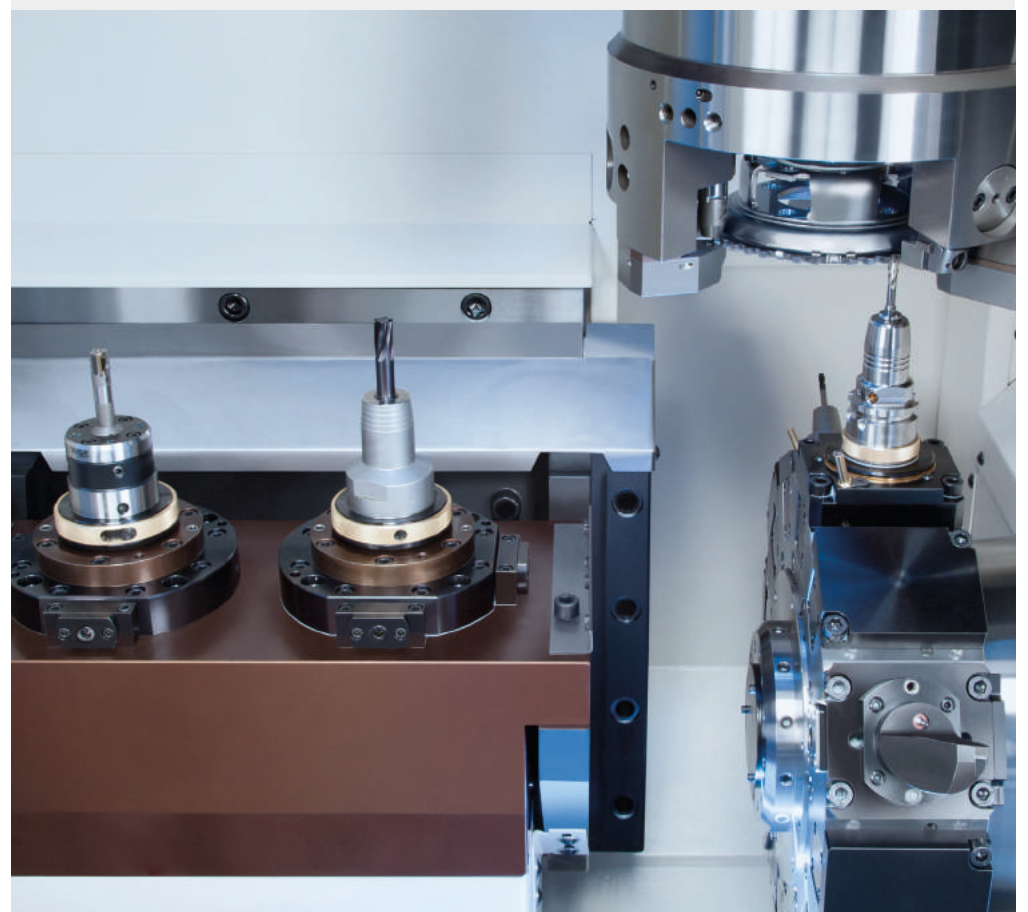
**Complete hard machining of chucked parts with a maximum diameter of 160 mm**

Machine highlights:

- » Flexible machine area configuration with 1, 2 or 3 position multi-spindle drill head
- » Integrated pick-up automation
- » Process combinations improve cycle times



Machines shown in trade show format



Planetary carrier

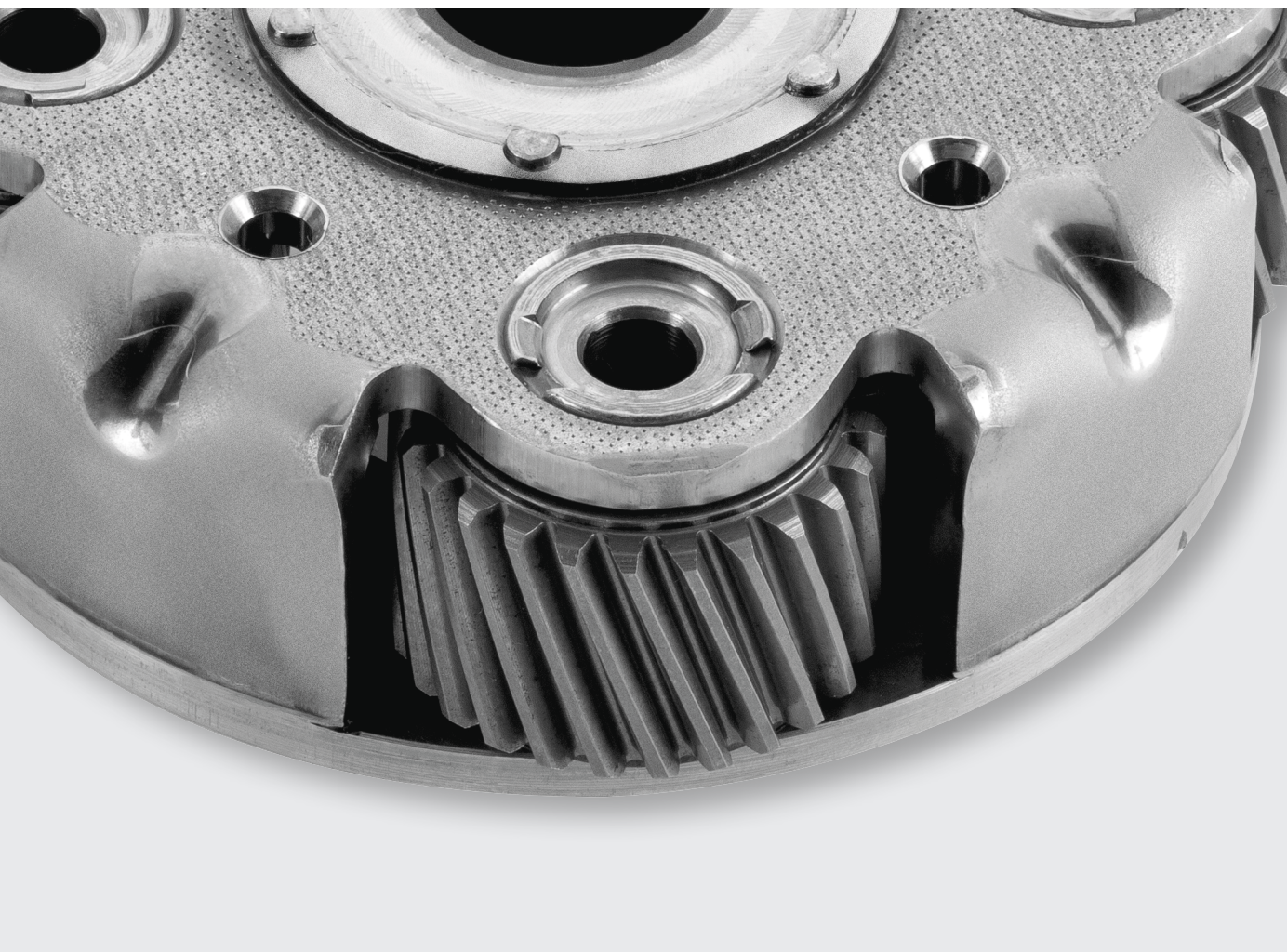


Sun gear



Planetary gear





Planetary gears are used in a wide range of modern automatic transmissions because of their efficiency, compact design, and high power density.

**W**hether we predict that electric vehicles will increase to 25% or 40% of the global market is irrelevant, the overall manufacturing challenge remains the same – adjusting the variety and production capacities of the industry to fit the conditions of the market. At EMAG, we can provide an interesting solution to this in the form of our universal, highly productive machines. These machines are already very flexible in terms of the range of machining operations that can be performed, and the components that can be produced. This is

supplemented by the fact that the machines are easy to link; meaning adjustments in production can be easily achieved. A second major factor is the wide range of technological expertise that you will have at your fingertips thanks to the experts at EMAG. Visit us at EMO to discuss how we can help you solve your production challenges!



LIVE  
AT THE  
EMO

OP 10/OP 20 compact manufacturing line for machining planetary gears

TWIN



## SIMULTANEOUS MACHINING

The VL 1 TWIN enables the simultaneous machining of two identical workpieces, cutting traditional cycle times in half. To achieve this, the machine is fitted with a 4 x 2 tool turret.

## MACHINE HIGHLIGHTS

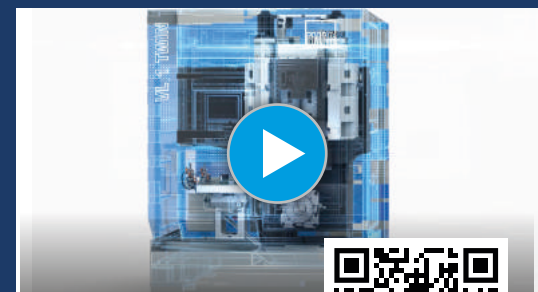
- » Simultaneous "TWIN" machining for maximum productivity
- » Roller guides on all linear axes
- » Direct distance measuring system in the X-axis
- » Optional: integrated probe

## TECHNICAL DATA

### VL 1 TWIN

Max. workpiece diameter	75 mm
Chuck diameter	140 mm
Swing diameter	160 mm
Max. workpiece length	75 mm
Workpiece weight	1 kg
Travel distances X / Z	600/200 mm
Main spindle	
» Power rating, 40% / 100%	13/11.7 kW
» Torque 40% / 100%	113/88 Nm
» Max. speed	6,000 rpm
Rapid-traverse rate, X / Z	60/30 m/min
Tool stations	2 x 4 – VDI30/BMT45
CNC controller	Fanuc 31i with Manual Guide i

## EMAG VIDEO



Look at the complete design of the machine in this animation

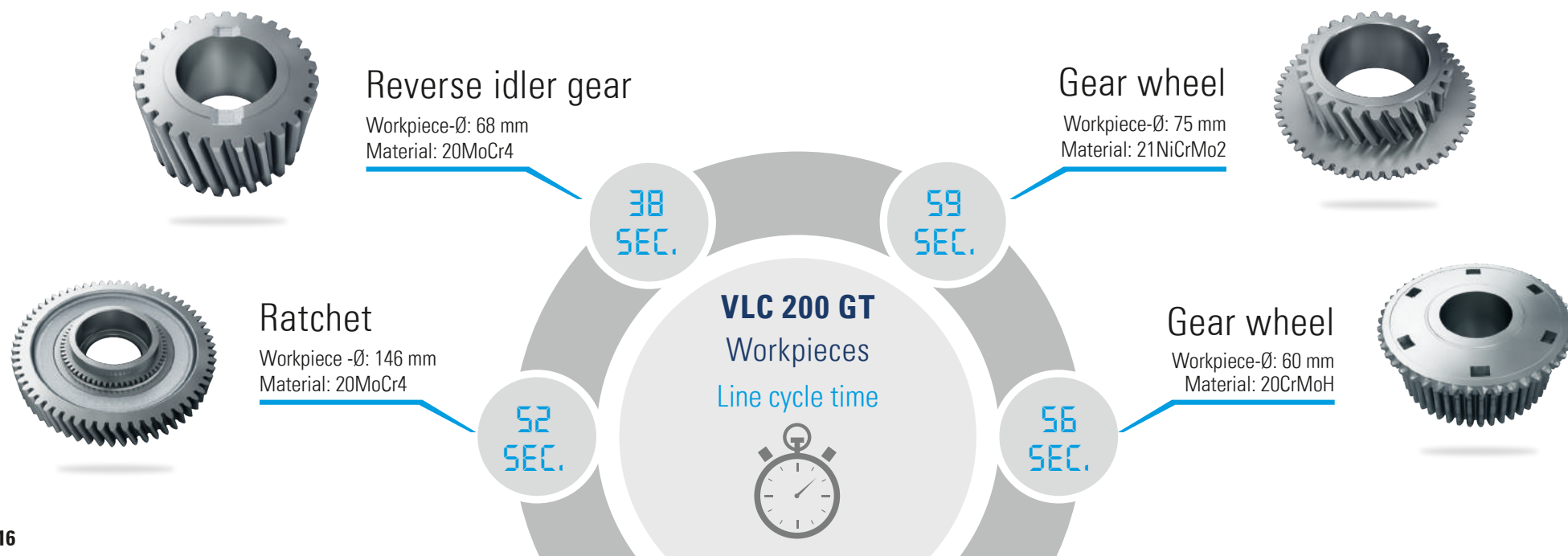




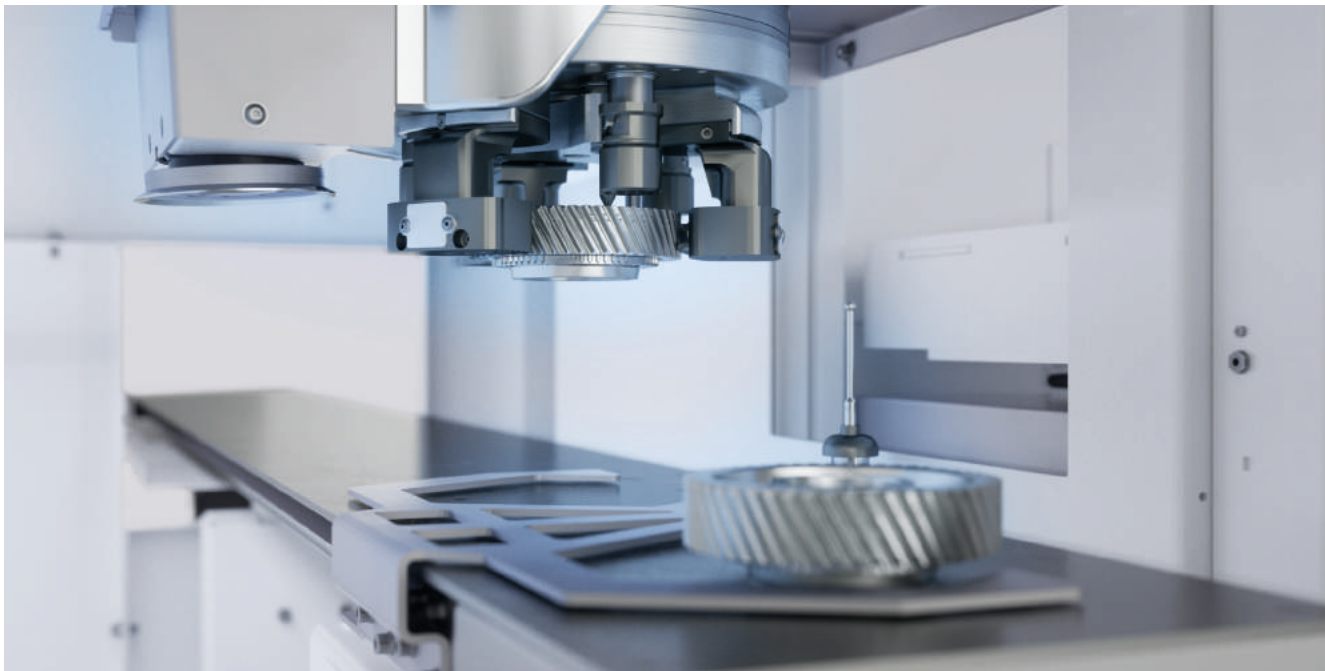
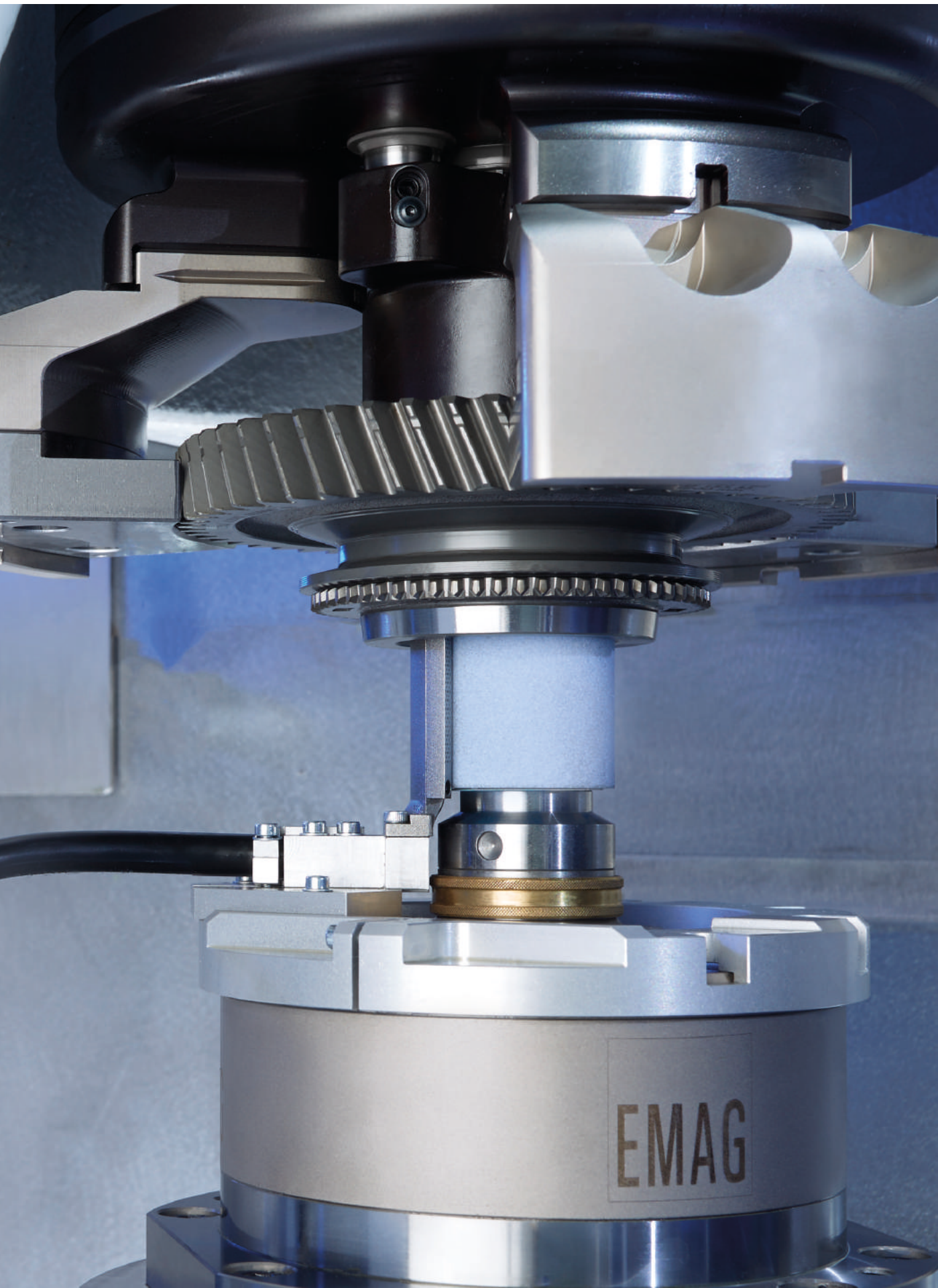
# VLC 200 GT: HARD TURNING, EXTERNAL GRINDING AND INTERNAL GRINDING IN A SINGLE MACHINE

The VLC 200 GT combines the benefits of vertical hard turning with those of grinding – on a single machine and in a single clamping operation.

**D**epending on the application, the machining area of the VLC 200 GT can be flexibly configured to fit. Available options include internal and external grinding spindles, tool block holders, or the time-tested 12-position EMAG tool turret. The machine's flexibility allows for the machining of CVT pulleys, in addition to gear wheels. The combination of hard turning and grinding processes ensures faster cycle times, higher machining quality and lower tool costs.







Automated production using the space-saving EMAG pick-up automation system. As a result, expensive loading portals or other loading devices that may require extensive retooling are not required.

# 200 GT VLC

## MACHINE HIGHLIGHTS

- » Complete machining in a single clamping cycle
- » Machining and servicing areas are easily accessible
- » Use of rotating dressing tools with separate dressing spindle (optional)
- » Use of CBN grinding wheels (optional)

## TECHNICAL DATA

VLC 200 GT	
Chuck diameter	210 mm
Swing diameter	270 mm
Workpiece diameter, max.	160 mm
Workpiece length, max.	100 mm
Travel distances X (total stroke from pick-up to turret)/Z	1,700/250 mm
Loading time (depending on clamping device)	6 – 10 sec.
Main spindle	
» Power rating, 40%/100% duty cycle	22/18 kW
» Torque, 40%/100% duty cycle	250/202 Nm
» Speed, max.	3.000 1/min
» Spindle bearing diameter, front	110 mm

## EMAG VIDEO



You can see the complete design of the machine in this video.





# HLC 150 H: HIGH PRODUCTIVE GEAR CUTTING SOLUTION

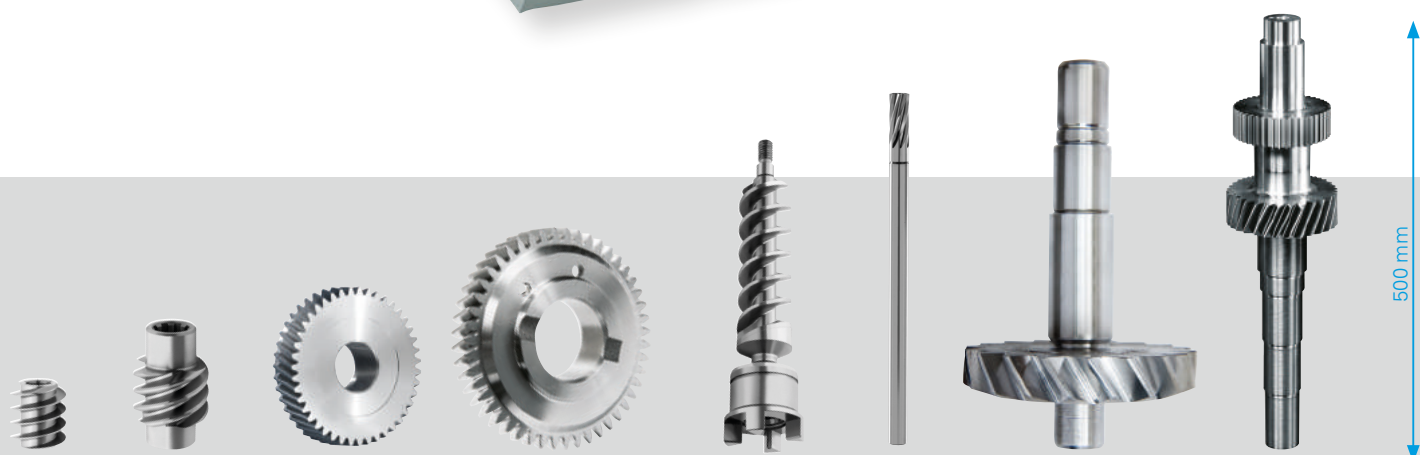
Horizontal gear hobbing machine with integrated chamfering unit for maximum productivity.

**C**overing a unique spectrum of production applications, the HLC 150 H stands out because of the number of innovations included. This machine's ability to hob either straight, angled or worm gear profiles on a wide range of geometries (short gears or long shafts with gear profiles), puts all of EMAG KOEPFER's expertise at the user's disposal. To compliment this machine's abilities a device for chamfering and deburring of components during loading and unloading, without interrupting operation is also included. Together, these features allow for the perfect gear-cutting solution with short cycle times and minimized costs.



## WORKPIECES

Range of workpieces for the HLC 150 H







# 150 H HLC

## AUTOMATION

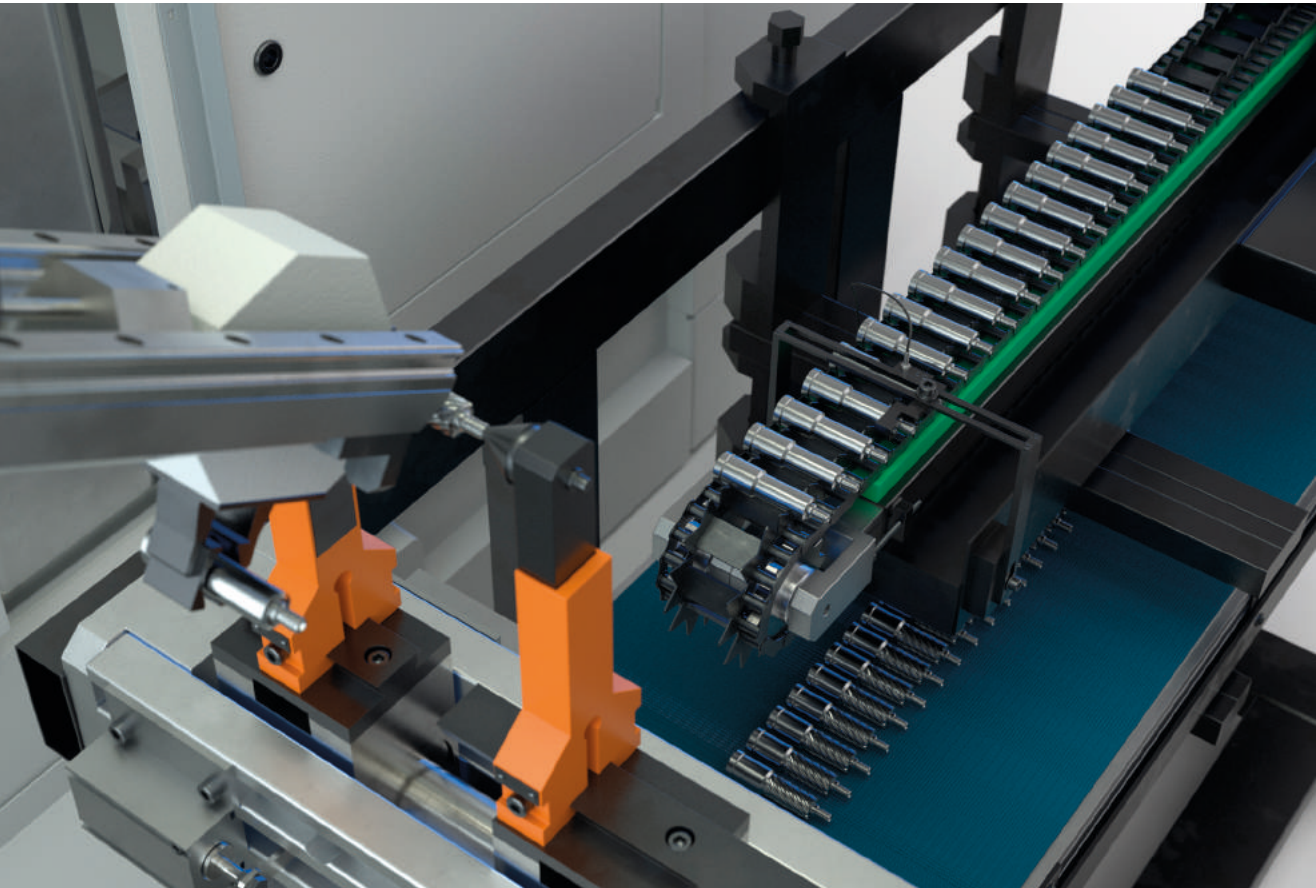
A high-speed loading portal with a double rotary gripper or linear gripper and a V-layout is available for automation.

## MACHINE HIGHLIGHTS

- » FANUC control panel
- » Enormous range of workpieces due to innovative compound slide design and “virtual Y-axis”
- » Large milling head swivel angle makes worm milling possible
- » Integrated deburring technology
- » Different linking options including TrackMotion
- » Gear hobbing machine with impressive performance data

## TECHNICAL DATA

HLC 150 H	
Max. module	3
Max. workpiece diameter	150 mm
Max. workpiece length	500 mm
Angle of inclination	-45/+135°
Max. tool diameter	120 mm
Shift distance	220 mm
Max. speed of gear hobbing head	4,000 (12,000) 1/min
» Power rating, 100% duty cycle	28 kW
» Torque, 100% duty cycle	140 Nm



## EMAG VIDEO

Look at the complete design of the HLC 150 H on Youtube:





# LC 4-2: AUTONOMOUS LASER CLEANING MACHINE FOR USE IN MANUFACTURING LINES OR AS A STAND-ALONE MACHINE



## » NC rotary indexing table

For fast part changing and short cycle times



## » NC-controlled scanner optics

Flexibility with the NC controlled XZB axis system



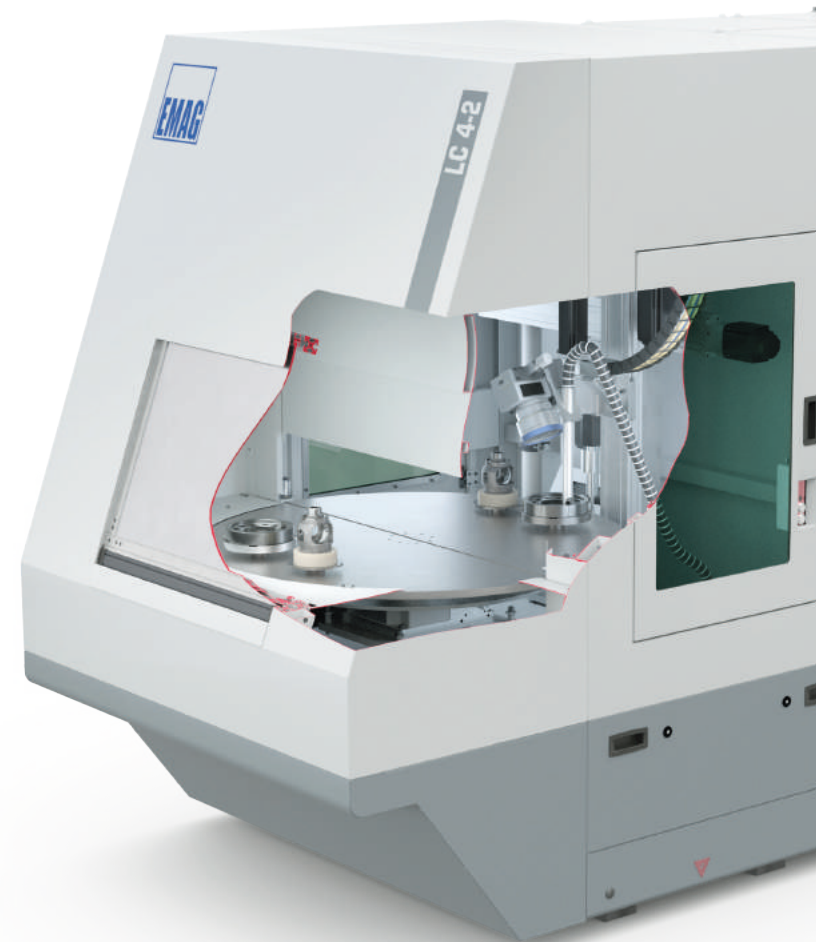
## » Gentle cleaning with no residues

Direct extraction and filtration systems remove dirt

**C**leaning with a laser beam is a quick, space-saving method that will replace conventional washing machines for a wide variety of applications. The success of this method can be seen when compared to traditional cleaning methods in the wide variety of benefits that can be achieved by using this process. First, the method is very inexpensive because cleaning products are not required, so there is no residue to dispose of. The process is also very precise and does not lead to any surface damage. Lastly, and most importantly, is the unmatched cleaning performance that can be achieved. Oxides, dirt particles of all types and difficult to remove impurities from cutting fluids are eliminated in seconds with the laser. The result is a perfect surface that is ready for additional machining processes such as laser welding.

## TECHNICAL DATA

	<b>LC 4-2</b>
Footprint	1500 x 3050 mm (without suckers)
Laser capacity	200 W fiber laser
Max. axis speed (rapid-traverse) X/Z axis	0.4/0.5 m/s
Type C-axis feed speed	0.05 m/s
CNC controller	Sinumerik 840Dsl



Gear wheel



Coupling wheel



Ring gear



Differential housing

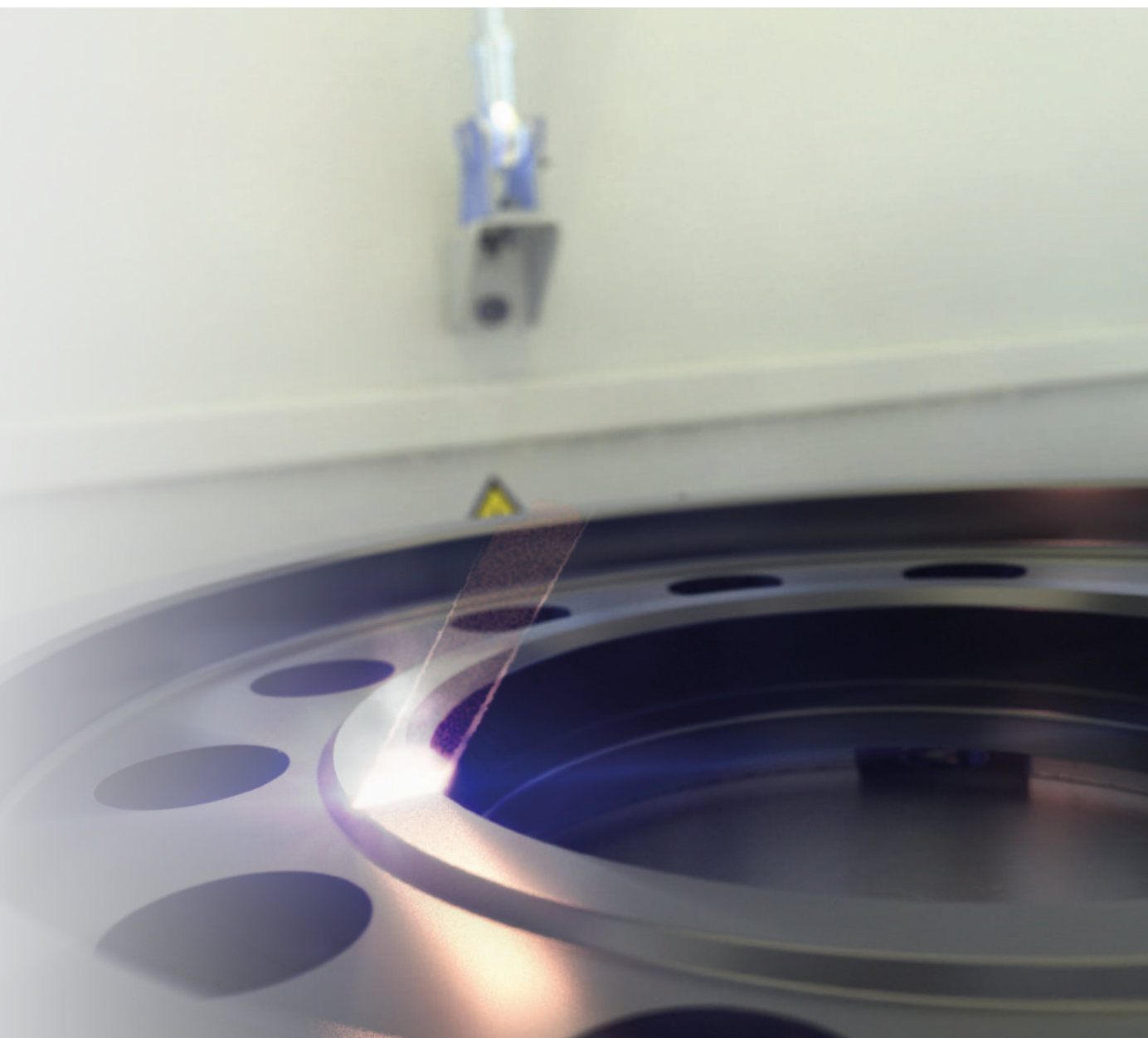


Disk carrier



Brake disk





## 3 QUESTIONS

to Nikolas Meyer,  
Sales Manager EMAG LaserTec

### What led to the development of the LC 4-2?

The LC 4-2 is a uniform, modular system that can cover nearly the entire product line at EMAG LaserTec GmbH, reducing the costs for development and construction of manufacturing systems.

### So is this only targeting previous EMAG LaserTec customers?

No, the LC 4-2 can also be used independently of laser welding as a stand-alone machine. The machine is an alternative to other cleaning systems.

### What component size can be machined?

The machine is designed for a maximum diameter of 200 mm and a maximum height of 350 mm.



Planetary carrier

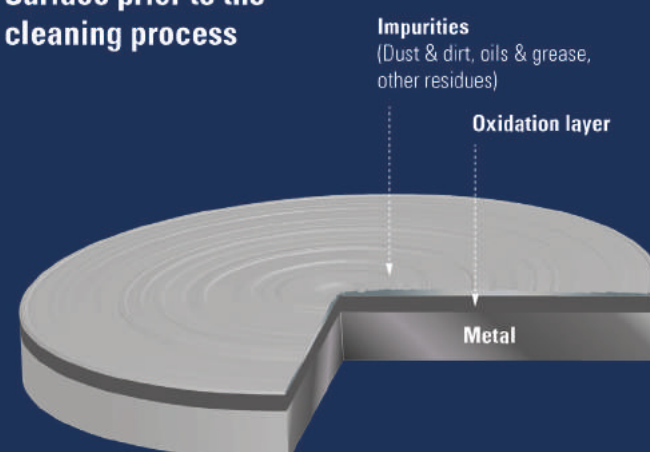
# 4-2

## LASER CLEANING IN DETAIL

Laser cleaning evaporates the impurities on surfaces using a high energy laser beam.

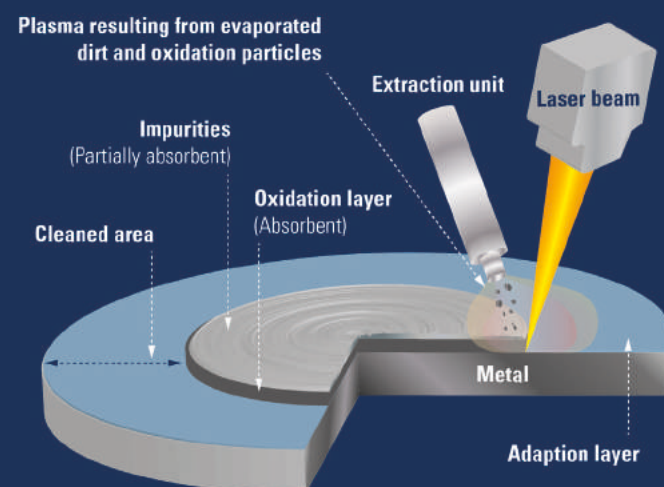
Evaporation residues are extracted and neutralized by catalysts or filter systems.

### Surface prior to the cleaning process



The entire process is extremely eco-friendly and also very compact and low-volume.

### Systematic inspection of the laser-cleaning process

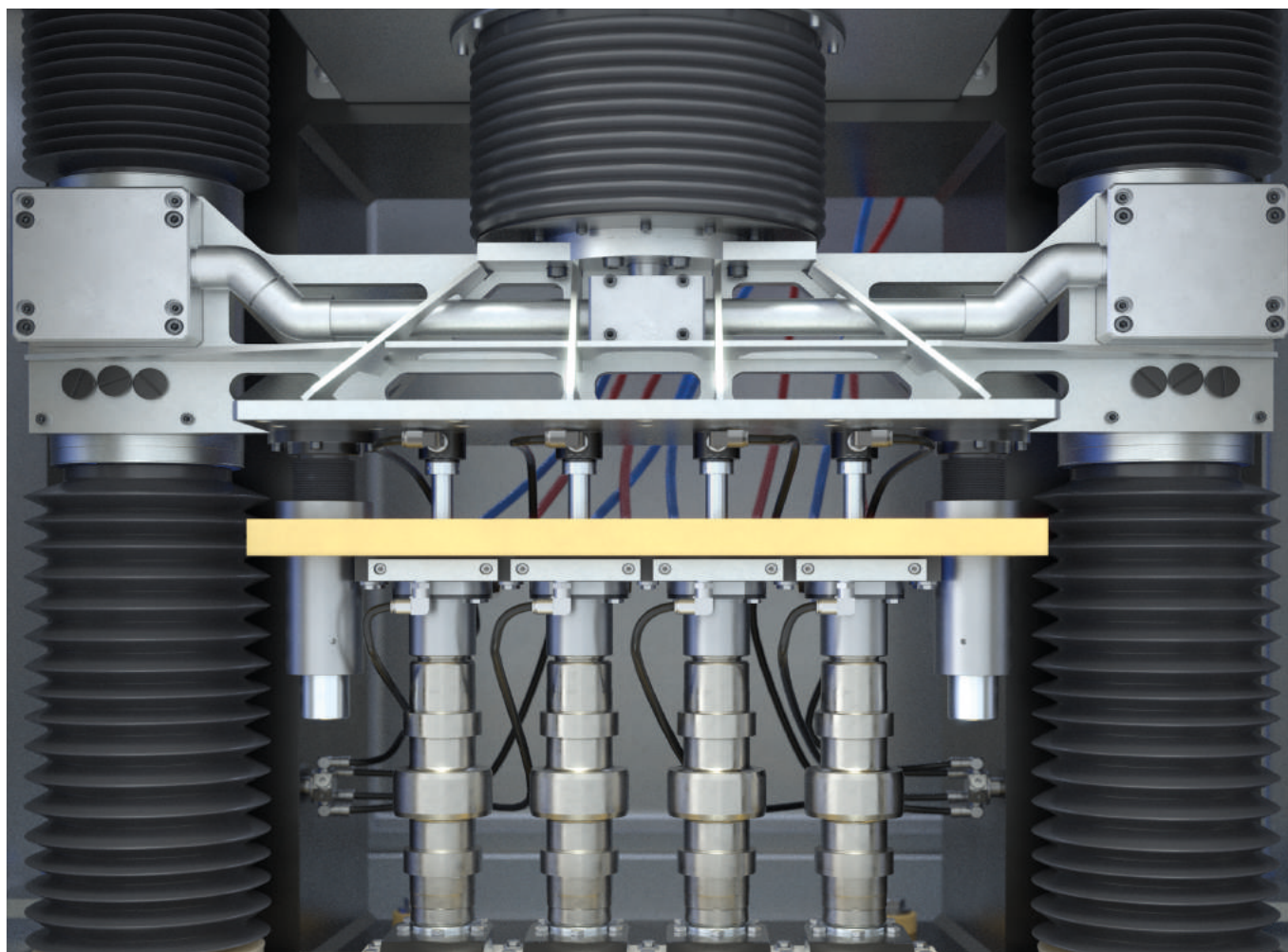


## BENEFITS

- » Energy-efficient: lower energy consumption than washing machines
- » Reliable: no additional contamination from cleaning product residues, practically zero maintenance
- » Fast: no part migration and lengthy idle times since laser cleaning can be fully integrated in the manufacturing systems
- » Quality: all typical organic residues are removed
- » Very cost-efficient
- » Stable process: not dependent on water quality and additives in the water



# 800 PI



## PREMIUM INTEGRATED (PI) 800: THE PERFECT (P)ECM ENTRY LEVEL MODEL

**T**he (P)ECM machining area, control cabinet with control system and electrolyte management system are all mounted on one machine frame (single frame). Giving the PI a small, compact footprint that can easily be transported with just a forklift.



Machines shown in trade show format

### WORKPIECES

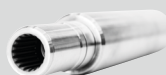
The PI 800 is ideal for the (P)ECM machining, (P)ECM countersinking and (P)ECM broaching of a wide variety of components.



Flange



Die



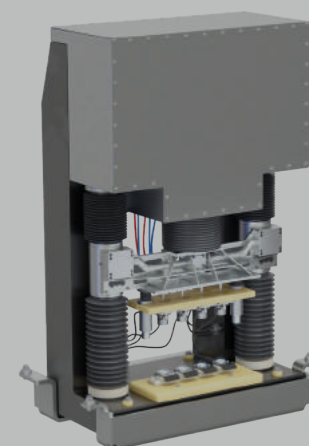
Rotor shaft

### BENEFITS

- » Compact design with integrated electrolyte filtration system
- » Oscillation module, 200 mm stroke
- » Countersinking module, 400 mm stroke
- » Scalable generator technology/pulse technology
- » SIEMENS S7-1500 machine control unit
- » All parameters are monitored by a control unit
- » Pulse duration from 50  $\mu$ s to DC (direct current)
- » Manual or semi-automatic version starter system
- » Fast upgrade to full automation
- » Options available for improving processes and productivity

### THE PERFECT MODULE FOR EVERY APPLICATION

A large number of different workpieces can be machined using ECM and (P)ECM. Which technology is used depends on the workpiece's requirements. The modular design of the PI 800 allows it to be easily configured, at a low cost, to meet any of these requirements. The user has two modules to choose from: the (P)ECM module with oscillator, the ECM counter in module or both for the simultaneous machining of identical workpieces.



Countersinking or oscillation module

### TECHNICAL DATA

**PI 800**

Machining area	1150 x 950 mm
Clamping area	600 x 400 mm
Generator capacity	400 – 2,500 A (DC)
Generator capacity	400 – 6,000 A (pulse)





# VMC SERIES: MANUFACTURING SOLUTIONS FOR COMMERCIAL VEHICLES

Using the VMC machine series provides the user with substantial benefits when it comes to the complete machining of complex components

in a single clamping operation. The VMC series guarantees a new level of flexibility for the machining of large commercial vehicle components such as truck wheel hubs, planetary carriers, clutches and brake components.

## IMPROVE PRODUCTIVITY WITH FOUR-AXIS MACHINING

- » Four-axis simultaneous machining of two sides using two tool turrets
- » Precise, heavy-duty machining using a powerful main spindle and LifeTool turret
- » Tailstock for optimal workpiece support
- » Quality management system using integrated measuring system

## 5 AXES FOR COMPLEX GEOMETRIES AND MULTITECHNOLOGY

- » Turning, milling, drilling, and hob peeling – complete machining on a single machine
- » Significant cost reductions using multitechnology
- » Higher process reliability and quality assurance
- » Greater equipment efficiency (OEE)
- » Flexible loading and automation concepts



Machines shown in trade show format



Machines shown in trade show format

LIVE  
AT THE  
EMO

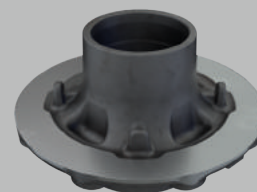
# VMC SERIES



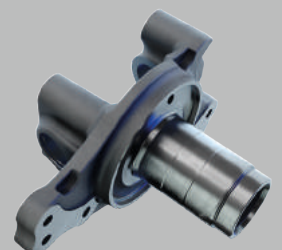
Planetary carrier



Annular ring



Wheel hub \*



Knuckle

## EMAG VIDEO



Manufacturing systems for  
planetary carriers using the  
VMC 450-5 MT





Emergency Stop

Manual Machine Control

RPM

Feed Override

NEW CONTROL PANEL LIVE AT THE **EMO**  
UNIVERSAL HMI ALLOWS MULTIPLE  
MACHINES TO BE CONTROLLED





EMAG is constantly working to digitalize its production technology. Our goal for the future is to ensure that the enormous amounts of sensor, operating and production data gathered on every machine tool can be used to improve production.

Essentially, EMAG wants to connect machines, system components and humans to improve the overall productivity of the process using the data that is collected. However, this is easier said than done. Behind this technology is an extensive development process because networking in a real production environment, and the data management required, are anything but simple. The importance and dedication EMAG has to achieving this is demonstrated in the new universal machine panel that will be launched at EMO. This combines all of EMAG's latest development processes. First, the panel is a modern HMI

developed with and by machine operators. This cooperation guarantees that the panel is easy to operate. Secondly, the panel allows users to easily integrate the existing portfolio of software tools and industry 4.0 applications available at EMAG – so one panel will allow the user to see everything. The Industry 4.0 solutions cover “monitoring”, “analysis”, “service and maintenance” and “work preparation”.

## EMAG VIDEO

Manufacturing for a digital world – find out more about EMAG's vision in this film.







# EMO 2019: SMART TECHNOLOGIES DRIVING TOMORROW'S PRODUCTION

**N**etworking will be a primary topic for the EMAG Group at the EMO 2019, and something that EMAG has considered on a variety of levels. Networking between machines to generate data, between data and people to determine necessary actions, and between people to perfect communication when service is required, and finally beyond company boundaries to enable all to use Industry 4.0.

## UMATI

A very different type of networking between 17 project partners and the VDW has led to the development of UMATI (universal machine tool interface), which will be unveiled for the first time at the EMO. A demonstration of this interface will be shown in Hall 9 where visitors can also find out more about this project. You can see EMAG's implementation of this at our industry 4.0 focused booth.



## EMAG VIDEO

EMAG Industry 4.0 products  
on YouTube:



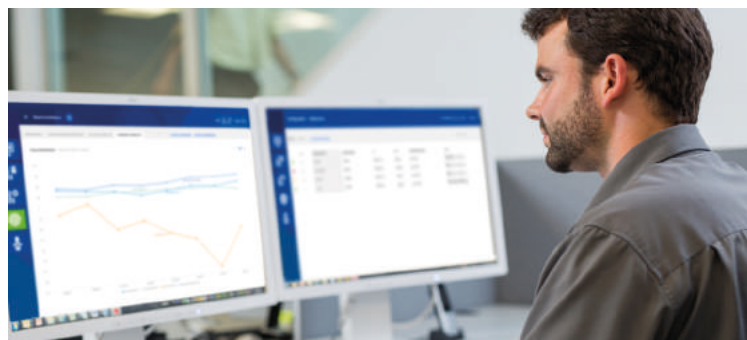




## ServicePlus

**O**ur ServicePlus app for smartphones and tablets allows for easy and effective communication between customers and the EMAG service department. Simply scan the QR code on a machine using the app and you can be directly connected with our service personnel, request a service call back, or submit a request for spare parts.

With the app, service technicians immediately connect with the machine, so they know which machine you are referring to and will have information on its precise configuration. The app will also ensure that you are automatically connected to the appropriate contact. All communication conducted through the app will be routed through EMAG's server, guaranteeing the highest security standards.



# INDUSTRY 4.0

## INDUSTRY 4.0

At the EMAG Group, our advanced Industry 4.0 solutions allow your EMAG machines to be networked. At EMO, we will show you how this data can be used to improve your production. Visit our booth and see for yourself!

 **EMO Hannover**  
16-21.9.2019

## NETWORKING AT THE EMO



Take this opportunity to speak to our Industry 4.0 experts!

Our software developers will be at the booth every day to speak with you about the possibility of networking your production.

Get connected! Live @ EMO 2019.





## INVITATION TO THE EMO 2019

Smart technologies driving tomorrow's production – not only is this the slogan for the EMO 2019, but it also describes the EMAG Group's show presence. We would love to invite you to experience our new products in production, automation and industry 4.0 first hand!

Get your free tickets on our website: [www.emag.com/emo](http://www.emag.com/emo)

We look forward to seeing you in Hannover!

Hall 17  
Booth C29



### FREE TICKETS

visit our website: [www.emag.com/emo](http://www.emag.com/emo)



### EUROPE

#### Salach

Austrasse 24  
73084 Salach  
Germany  
Phone: +49 7162 17-0  
Fax: +49 7162 17-4027  
E-mail: [info@salach.emag.com](mailto:info@salach.emag.com)

#### EMAG Milano S.r.l.

Via dei Mille 31  
20098 San Giuliano Milanese (MI)  
Italy  
Phone: +39 02 905942-1  
Fax: +39 02 905942-21  
E-mail: [info.milano@emag.com](mailto:info.milano@emag.com)

### AMERICA

#### EMAG L.L.C. U.S.A.

38800 Grand River Avenue  
Farmington Hills, MI 48335  
U.S.A.  
Phone: +1 248 477-7440  
Fax: +1 248 477-7784  
E-mail: [info@usa.emag.com](mailto:info@usa.emag.com)

### ASIA

#### EMAG (China) Machinery Co., Ltd

Taicang Sino-German Innovation Park  
Advanced Manufacturing Park  
Building No.2, No.101 Chen Men Jing Road  
215400 Taicang  
Jiangsu, China  
Phone: +86 512 5357-4098  
Fax: +86 512 5357-5399  
E-mail: [info@emag-china.com](mailto:info@emag-china.com)

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We reserve the right to make technical changes.

