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Stuttgart
September 18 – 22

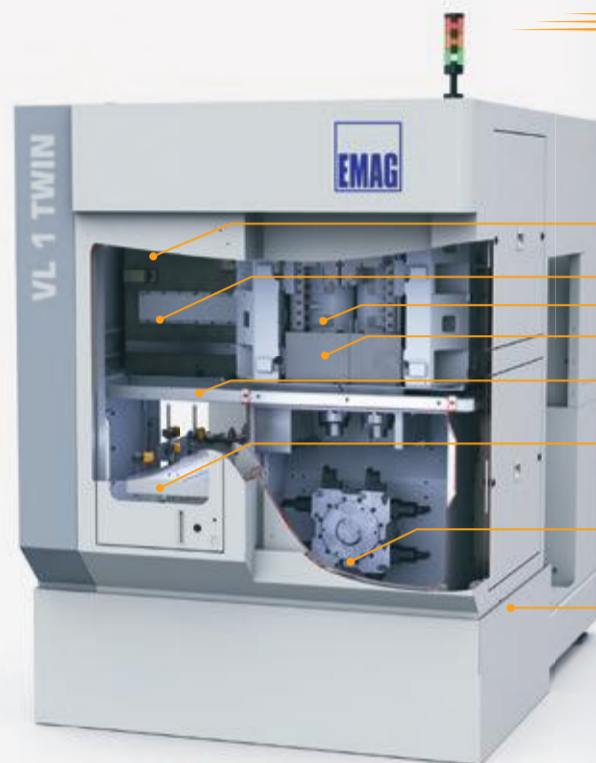
HALL 4, BOOTH 4B51

VL 1 TWIN – THE PERFECT PRODUCTION PROCESS FOR PLANETARY GEARS, SUN WHEELS, CAMS AND MORE!



If you combine the productive TWIN approach with the simple to link TrackMotion automation system, you get the VL 1 TWIN line – one of the most compact, productive manufacturing solutions on the market for chucked parts with a maximum diameter of up to 75 mm.

With the VL 1 TWIN line two components can be machine on two sides in OP 10 / OP 10 and OP 20 / OP 20. This process allows for cycles times of less than 20 seconds for the entire OP 10 / OP 10 and OP 20 / OP 20. The machines low cost, and short cycle times lead to for a significant reduction in cost per piece.



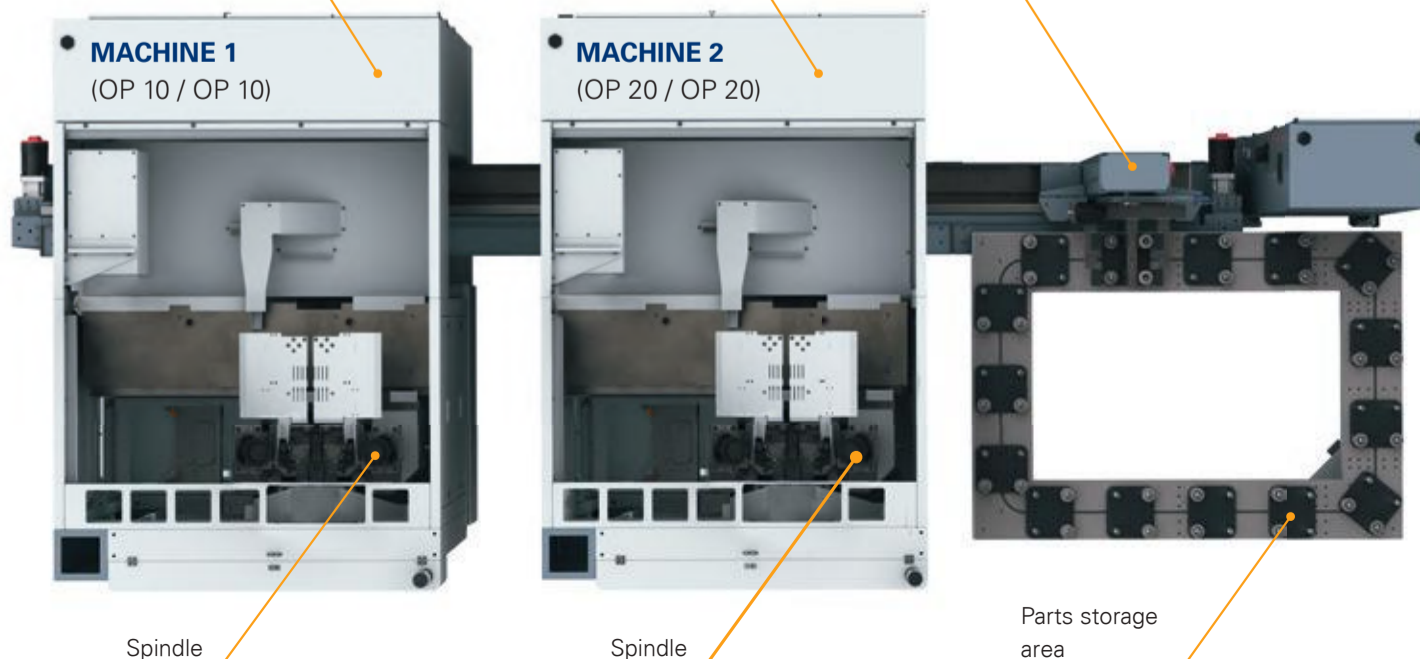
- Machine base made of MINERALIT® polymer concrete
- Linear motor (secondary component) in the X-axis
- Spindle unit (Z-axis)
- Slide unit (X-axis)
- Direct position measuring system in the Z-axis
- OP 10 / OP 10 NC Shuttle
- Tool turret for 2 x 4 VDI30 or BMT45 tools
- Chip tray for wet and dry machining



Access to e-container and hydraulics

Access to e-container and hydraulics

TrackMotion automation system



MACHINE 1
(OP 10 / OP 10)

MACHINE 2
(OP 20 / OP 20)

Spindle

Spindle

Parts storage area

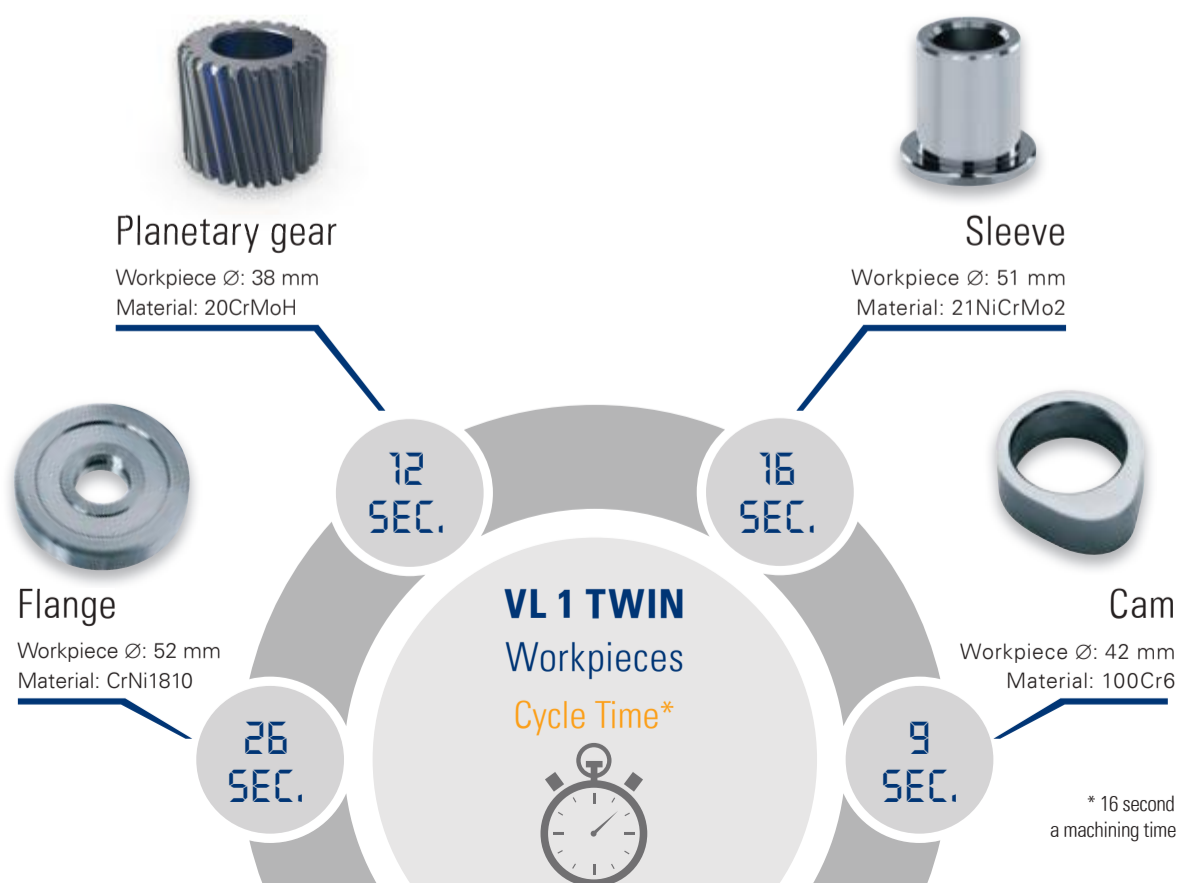
The TrackMotion automation system links two VL 1 TWIN machines including the parts storage area.

The two components are removed from the conveyor belt by the pick-up spindles (9.9 kW / 136 Nm), transported to the machining area and machined simultaneously in one clamping operation. The diameter and length (X / Y direction) of the two components can be corrected independently of each other – a special feature of the VL 1 TWIN.

AUTOMATION INCLUDED



The TrackMotion automation system not only easily links multiple machines, but also replaces changers and conveyor belts. With their three-dimensional design, stacker pallets in the parts storage area provide a place to store a large number of workpieces, ensuring maximum autonomy.

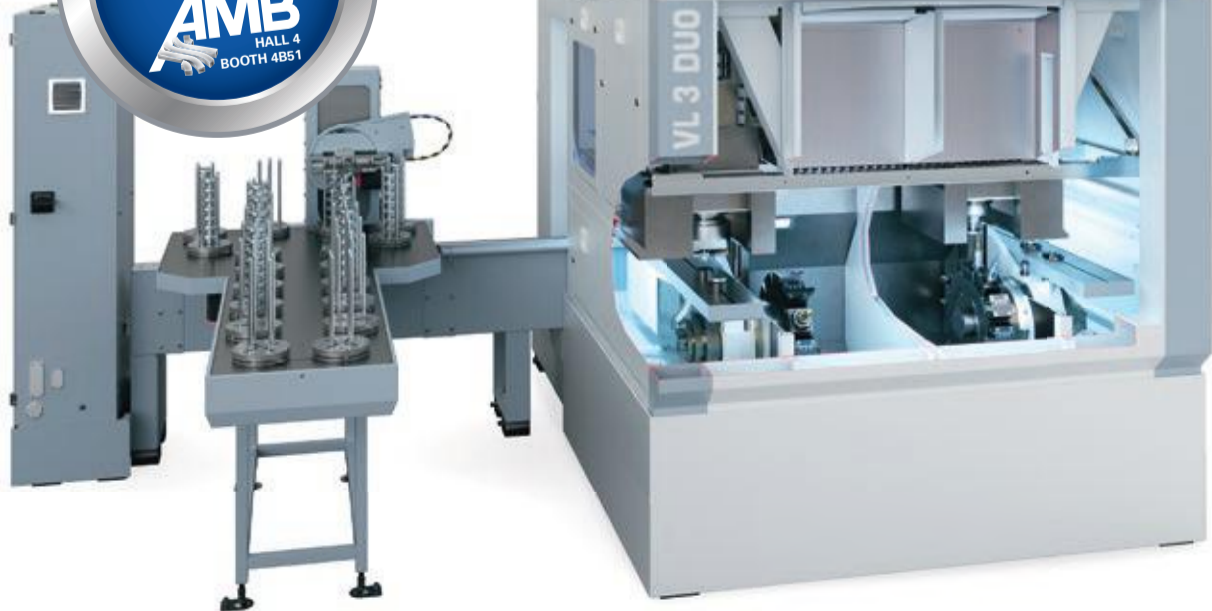


TECHNICAL DATA

Max. workpiece diameter	75 mm
Chuck diameter	140 mm
Swing diameter	160 mm
Max. workpiece length	75 mm
Workpiece weight	1 kg
Travel distance, X / Z	600 / 200 mm
Main spindle	
» Power rating, 40% / 100%	9.9 / 9.4 kW
» Torque, 40% / 100%	136 / 95 Nm
» Max. number of revolutions	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

VL 3 DUO – TWIN-SPINDLE TURNING MACHINE FOR THE HIGHLY PRODUCTIVE MANUFACTURING OF CHUCKED PARTS

With its ability to manufacture parts with a maximum diameter of 150 mm, the VL 3 DUO is perfect for the production of transmission components, for example, machining blanks for gear wheel production in OP 10 and OP 20. Check out more examples on the right.



TECHNICAL DATA

Max. workpiece diameter	150 mm
Chuck diameter	210 mm
Max. workpiece length	110 mm
Travel distances, X (machining stroke) / Y (optional) / Z	505 / ±30 / 250 mm
Main spindles (2x)	
» Power rating, 40% / 100%	17.9 / 15.5 kW
» Torque, 40% / 100%	144 / 98 Nm
» Max. number of revolutions	5,000 rpm
» Spindle flange to DIN 55026	Size 6
» Spindle bearing diameter, front	100 mm
Turrets (2x)	
» Turret tool positions	12
Rapid-traverse rate, X / Y / Z	60 / 30 / 30 m/min

MACHINING EXAMPLES



1

Soft machining of gear wheels (complete line)



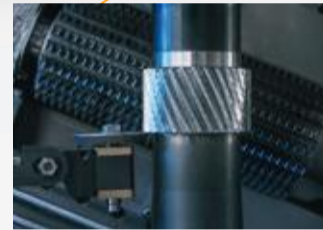
28 SEC. CYCLE TIME



Parts storage area for up to 400 workpieces, including TrackMotion



Turning of first and second side (OP 10 / OP 20)



Gear hobbing (OP 30)



Roller deburring (OP 40)



2

Soft turning of pulleys for CVT transmissions



93 SEC. CYCLE TIME



Turning of both sides (OP 10 and OP 20)



3

Soft machining of sprockets (complete line)



37 SEC. CYCLE TIME



Turning of the first side (OP 10)



Turning of the second side (OP 20)



Gear hobbing (OP 30)



Roller deburring (OP 40)



Parts storage area for a maximum of 400 workpieces, including TrackMotion

Machines shown in trade show format

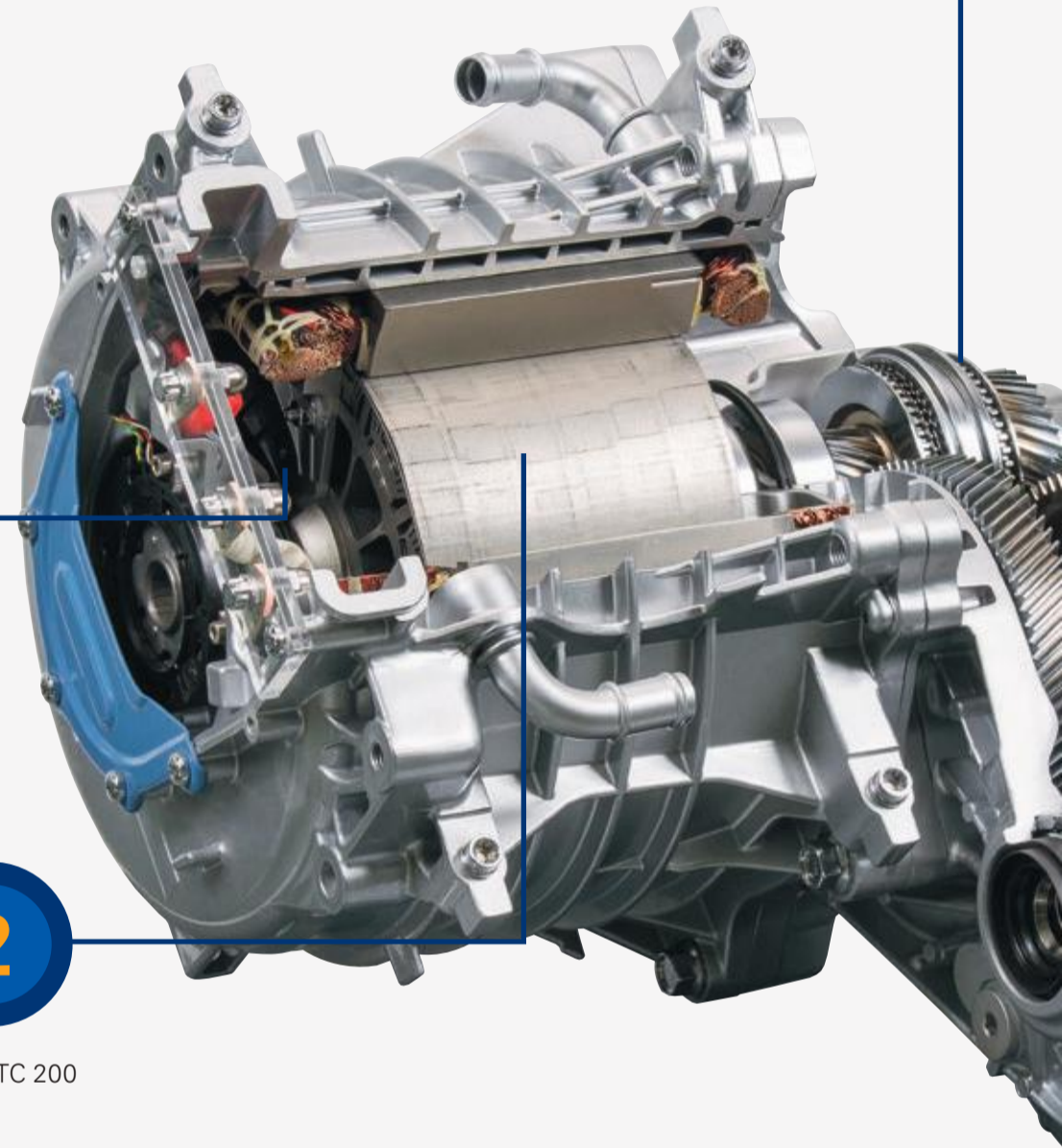
EMAG SOLUTIONS FOR ELECTRIC MOTORS

EMAG can supply a wide range of solutions for the production of workpieces used in electric drive units – shown in this example on a 96 kW electric motor including a two-speed automatic transmission.



ROTOR COVER

+ Turning, drilling, thread machining
Machine: VL 3 DUO



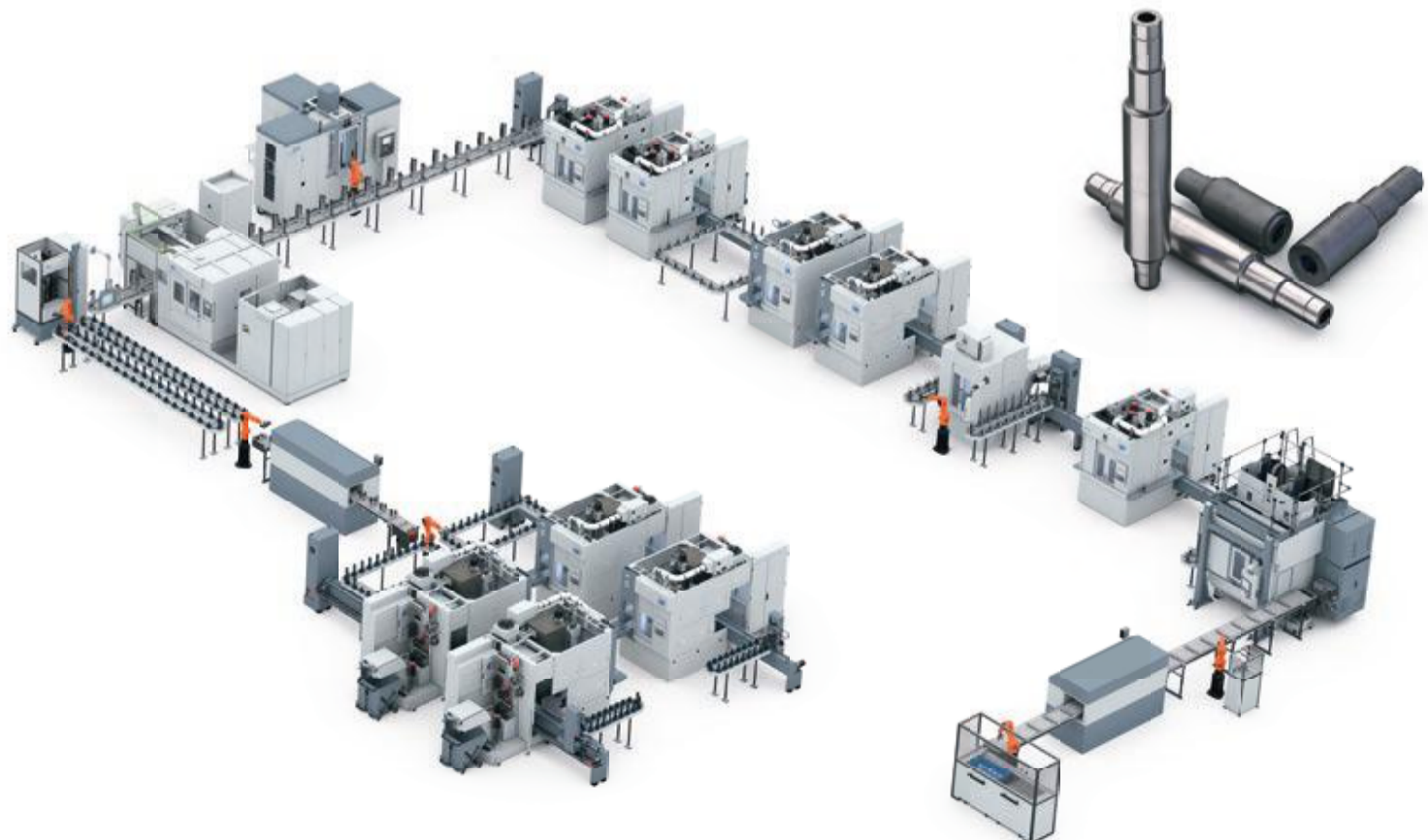
ROTOR

- + Turning of the rotor shaft
Machines: VT 2 / VT 4 / VTC 100 / VTC 200
- + Induction hardening
Machines: eldec MIND / VLC 100 IH
- + Hard finishing (hard turning / grinding)
Machines: VTC 100 GT / VTC 315 DS
- + ECM broaching of internal gears (hard machining)
Machine: CI 400



MANUFACTURING LINE FOR ELECTRIC MOTOR ROTOR SHAFTS

Rotor shafts are primary components for the electric motor and are being manufactured by the millions. The EMAG production line for rotor shafts not only allows these components to be produced with the shortest possible cycle time, but also optimizes weight and cost. All the technologies used in this line are produced by EMAG which allows for perfect processes and quality. One solution, one contact, perfect components – synonymous with EMAG manufacturing systems.



5

SYNCHRONIZER SLEEVE

+ Turning

Machine: VL 3 DUO

+ Grinding, external recess

Machines: VLC 100 GT / VLC 200 GT / HG 2

+ ECM deburring and internal machining

Machine: CI 400



4

GEAR WHEELS

+ Turning of wheels

Machine: VL 3 DUO

+ Gear hobbing of the gear wheels

Machine: VL 4 H

+ Grinding of internal diameter & shoulder

Machine: VLC 200 GT

+ Joining

Machine: HA 700 P



3

DIFFERENTIAL

+ Turning of differential housing

Machine: VL 3 DUO

+ Turning of ring gear

Machine: VL 4

+ Gear hobbing of ring gear

Machine: VL 4 H

+ Joining of differential housing & ring gear

Machine: ELC 250 DUO



MACHINING ROTOR BRACKETS

Rotor brackets are an essential component in electric motor housings for hybrid vehicles- and are in high demand. ECM, or electro-chemical machining, provides major benefits in their production.

ECM technology is characterized by the burr-free, non-contact machining of metal parts, making it the perfect process for thin-walled rotor brackets. The risk of deformation is eliminated because there is no contact between the workpiece and tool. In addition, ECM machining produces final surface quality, eliminating the need for re-working.

- + ECM gear broaching
- + ECM drilling



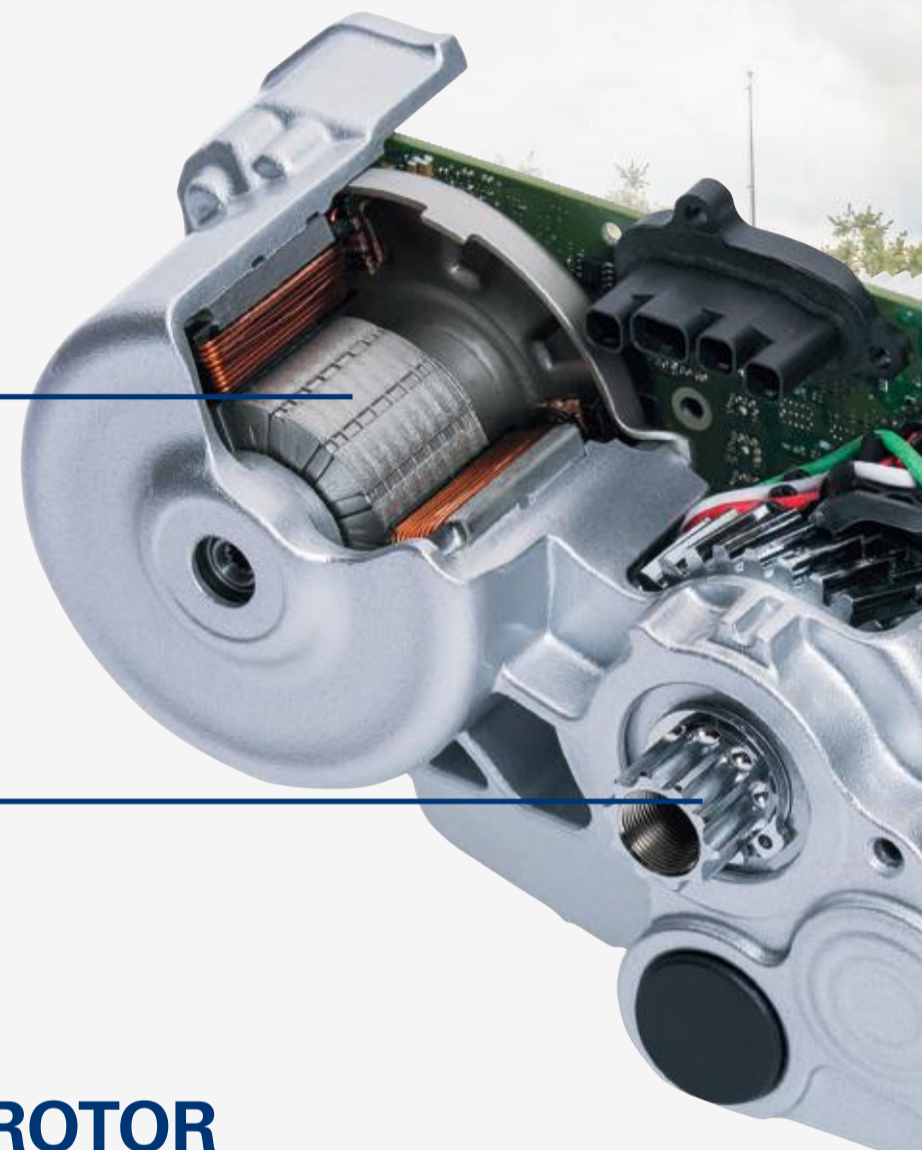
TECHNICAL DATA

Machining area	1,150 x 950 mm
Vertical stroke	300 mm
DC	2 – 55 / 400 – 5,000 V / A
Max. pulsed power	12,000 A
Electrolyte	NaNO ₃ / NaCl
Operating pressure	10 bar



MANUFACTURING SOLUTIONS FOR E-BIKE MOTORS

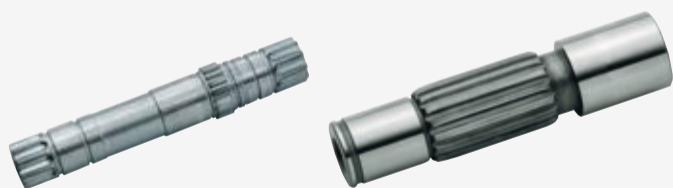
Throughout Germany in 2017, 720,000 e-bikes were sold, representing a 19% increase in sales. The e-bike has firmly established itself as an alternative means to transportation, and continues to grow in popularity. This market growth can be seen particularly in towns and cities, where you can often reach your destination faster on two wheels than on four. New bike trends, such as cargo bikes, mean that even heavy, awkward items can be transported with the support of small, powerful electric motors. EMAG will be demonstrating how highly productive manufacturing solutions for these motors look at the AMB in Stuttgart.



TRANSMISSION SHAFTS



- + **Turning**
Machines: VT 2 / VTC 100
- + **Gear hobbing of the gears wheels**
Machine: HLC 150 H
- + **Hard finishing (hard turning / grinding)**
Machine: VTC 100 GT
- + **ECM machining of gears with runout**
Machine: CI 400



ROTOR

- + **Turning of the rotor shaft**
Machines: VT 2 / VT 4 / VTC 100 / VTC 200
- + **Induction hardening**
Machines: eldec MIND / VLC 100 IH
- + **Hard finishing (hard turning / grinding)**
Machines: VTC 100 GT / VTC 315 DS



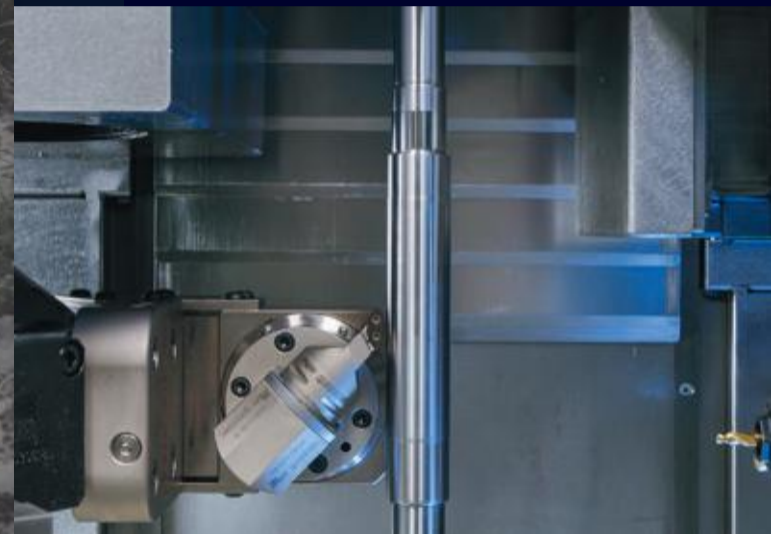
MACHINING EXAMPLE: HOLLOW SHAFT (CRANK SYSTEM) USING ECM TECHNOLOGY

For years, the hollow shaft has been established as the axle for the crank system in an effort to reduce weight. However, due to the unique configuration of these workpieces, the traditional chip removal processes faced a number of unique challenges. Traditionally, the workpiece is hardened which increases tool costs, and with the low wall thickness of the hollow shaft can result in warping. With the EMAG ECM process, these problems do not exist. Both the borehole and the external gears can be cut in hardened condition using ECM with no burrs or workpiece distortion, while also eliminating the need for finishing work.



rollFEED® TURNING – THE THIRD AXIS FOR TURNING SHAFTS FOR ELECTRIC MOTORS

This technology, developed by Vandurit, acts as a third access and allows the tool to swivel during the turning process. The center offset that is generated by this is compensated for by the machine's existing X- and Z-axes. These customized rollFEED cutting inserts roll down the surface of the workpiece during the three-axis motion.



+ Enormous machining capacity

It is often possible to use higher feed speeds and reduce the machining time by up to 90% as a result of large working radii.

+ Significantly longer service life

Identical to scroll-free turning

+ Minimized retooling time

+ Scroll-free surfaces possible

+ Can be retrofitted

rollFeed® unit in the form of a Lifetool tool

rollfeed® **TURNING**
by vandurit



3

GEAR WHEELS

+ Turning

Machines: VL 1 TWIN / VL 3 DUO

+ Gear hobbing of the gears wheels

Machines: VL 4 H / HLC 150 H

+ Grinding of internal diameter & shoulder

Machine: VLC 200 GT



1. ECM DEBURRING

- + Defined edge rounding
- + Multiple deburring in a single process step
- + Reproducible (uniform quality)

3. ECM BROACHING

- + Broaching with no stress or tension
- + Cost-efficient machining (tool costs)
- + Soft and hard broaching in a single process step
- + Reproducible (uniform quality)

2. ECM DRILLING

- + Absolutely zero burr
- + Drilling and rounding in a single process step
- + Reproducible (uniform quality)

**OP 10:
TURNING THE FLANGE SIDE**

- + Internal machining of the flange side on a VL 4
- + Perfect clamping thanks to special EMAG chuck
- + Bell tool for fast machining process (axle mount)



**95 SEC.
CYCLE
TIME**

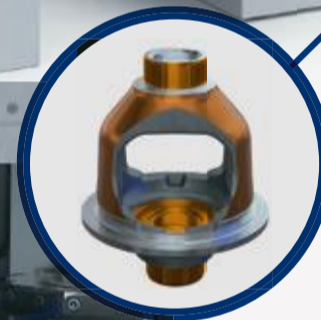


Measuring station

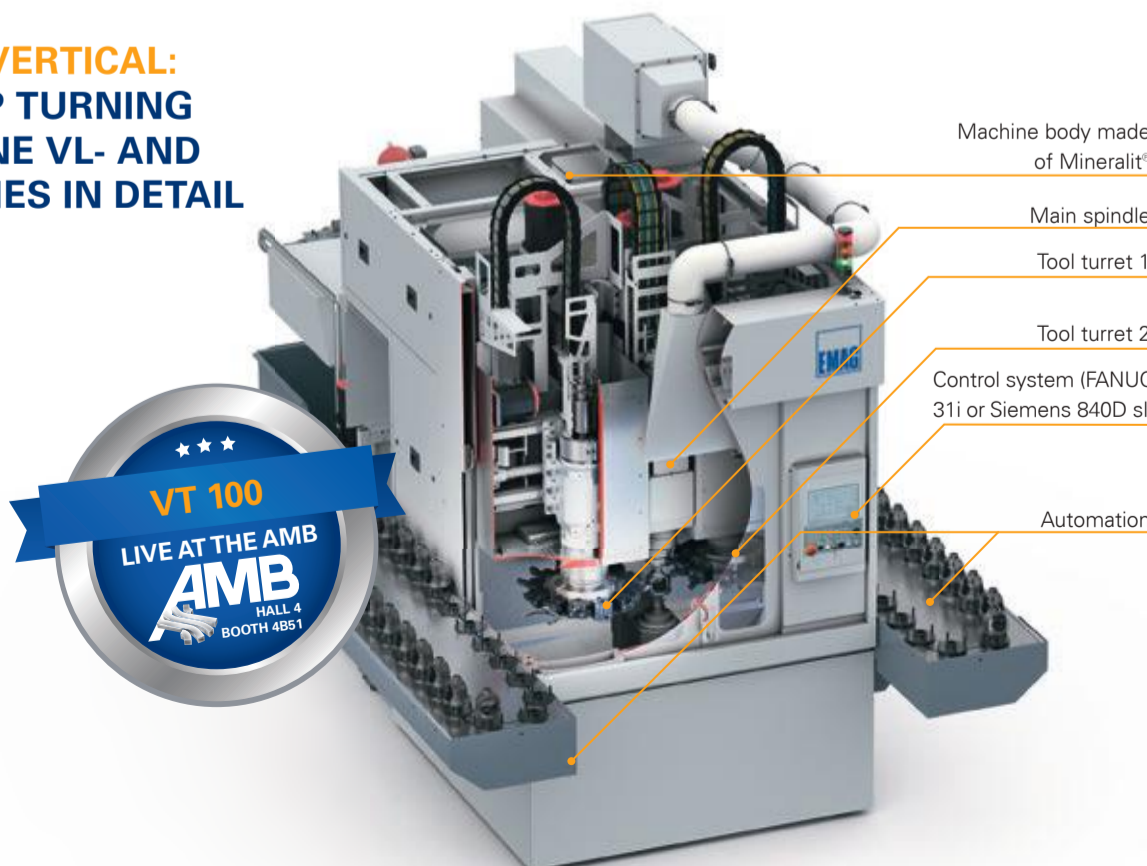
NOK parts

**OP 30: TURNING THE
EXTERNAL DIAMETERS**

- + External machining on a VT 4
- + Four-axis machining for fast process
- + High quality machining due to machine stability



**THINK VERTICAL:
PICK-UP TURNING
MACHINE VL- AND
VT-SERIES IN DETAIL**



Machine body made of Mineralit®

Main spindle

Tool turret 1

Tool turret 2

Control system (FANUC 31i or Siemens 840D sl)

Automation



TECHNICAL DATA		VT 2	VT 4
Max. workpiece diameter	mm	100	200
Chuck diameter	mm	160	250
Swing diameter	mm	210	270
Max. workpiece gripper diameter	mm	63	90
Max. workpiece length	mm	400	630
Spindle nose – quill distance	mm	848	870
» Option: Main and counter spindle / W1 + 100 mm	mm	600 / 700	–
» Option: Spindle at the bottom	mm	567.5	–
» Option: Tailstock 100 mm lower	mm	–	970
» Option: Spindle 160 mm higher / 109 mm lower	mm	–	1,030 / 761
Travel distance, X / Y (optional) / Z	mm	336 / ±25 / 625	395 / ±25 / 810
Main spindle			
» Power rating, 40% / 100%	kW	17.9 / 14.1	38 / 29
» Torque, 40% / 100%	Nm	142 / 90	250 / 200
» Max. number of revolutions	rpm	6,000	4,500
Turret tool positions		2 x 11 (2 x 1 gripper)	2 x 11 (2 x 1 gripper)
Rapid-traverse rate, X / Y / Z	m/min	30 / 15 / 30	30 / 15 / 30
Max. revolutions of driven tools	rpm	12,000	9,600
Torque of driven tools, 30% / 100%	Nm	30 / 16	56 / 33

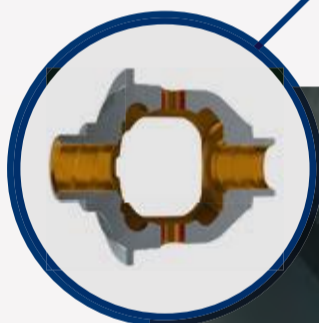
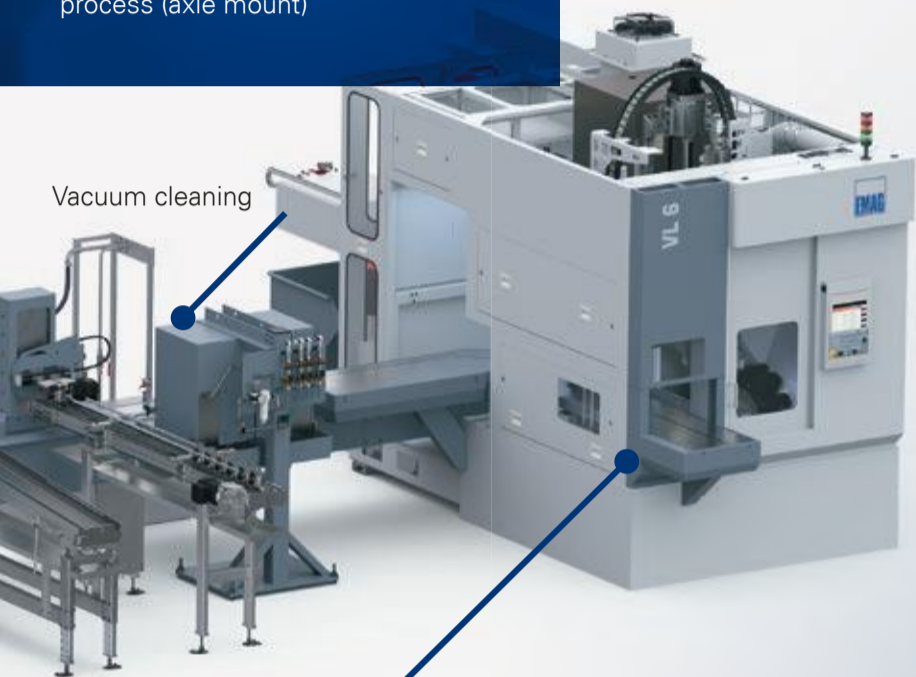
MANUFACTURING SYSTEM FOR DIFFERENTIAL HOUSING MACHINING

This differential housing production solution was developed to guarantee the best productivity and process reliability.

By using only machines from the EMAG Modular Solution line, this system promises maximum efficiency and comparatively low investment costs.

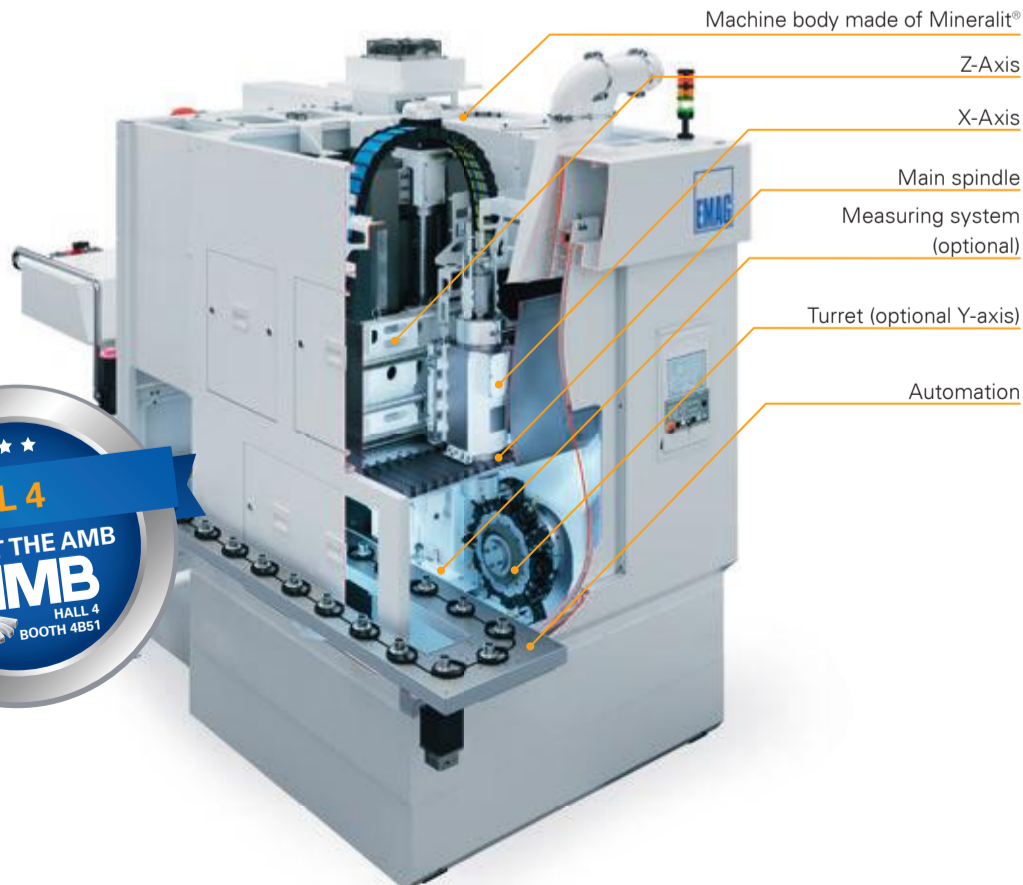
OP 20: TURNING THE CAGE SIDE

- + Internal machining of the cage side on a VL 4
- + Insertion of the borehole (Lifetool turret)
- + Perfect clamping thanks to special EMAG chuck
- + Bell tool for fast machining process (axle mount)



OP 40: FINAL MACHINING AND FINISHING

- + Finishing on a VL 6
- + Complete machining of the spherical cap with gooseneck tool
- + Reaming the main borehole
- + Perfect clamping thanks to special EMAG chuck



TECHNICAL DATA		VL 4	VL 6
Max. workpiece diameter	mm	200	300
Chuck diameter	mm	260	400
Shortest / longest part	mm	30 / 200	30 / 250
Travel distances, X / Y (optional) / Z	mm	740 / ±30 / 400	880 / ±30 / 480
Main spindle			
» Power rating, 40% / 100% duty cycle	kW	25 / 18	39 / 28
» Torque, 40% / 100% duty cycle	Nm	280 / 202	460 / 340
» Max. number of revolutions	rpm	4,500	3,100
Turret tool positions	Qty	12	12
Rapid-traverse rate, X / Y (optional) / Z	m/min	60 / 15 / 30	60 / 15 / 30
Revolutions of driven tools	rpm	6,000	6,000
Torque of driven tools, 30% / 100% duty cycle	Nm	27 / 15	27 / 15

HIGHLY PRODUCTIVE GEAR CUTTING SOLUTIONS UP TO MODULE 12

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

Covering a unique spectrum of production applications, the HLC 150 H stands out because of the number of innovations included. This machine's ability to produce steering gears or shafts and straight, angled or worm gearing puts all of EMAG KOEPFER's expertise at the user's disposal. To complement 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.

RANGE OF WORKPIECES FOR THE HLC 150 H

A complete solution in every respect – this high performance gear cutter can machine a large range of workpieces, from armature shafts and pinions, gear wheels, planetary gears, worm gear wheels and worm gears to transmissions shafts with a maximum length of 500 mm.



VL 4 H / VLC 200 H

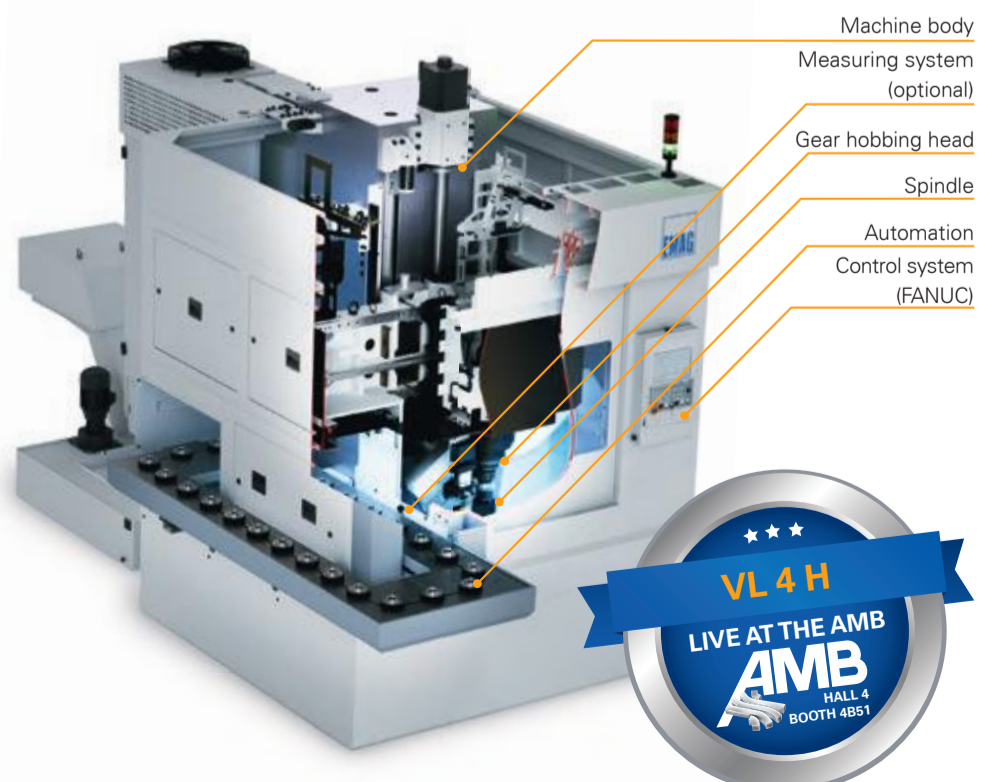


Vertical gear hobbing machines from EMAG KOEPFER for gear wheels up to module 4

The VL 4 H and VLC 200 H feature high performance drives that generate high torques and speeds at the main spindle and milling tool. With these features, productive manufacturing of gear wheels with a maximum diameter of 200 mm and module 4 are guaranteed, and dry milling is possible within a short machining time.

EXAMPLE: VL 4 H

Max. module	4
Max. workpiece diameter	200 mm
Max. workpiece length	200 mm
Max. cutter diameter	100 mm
Max. cutting length	180 mm
Max. shift distance	200 mm



HIGHLIGHTS

- + FANUC control unit
- + Enormous range of workpieces due to innovative compound slide design and "virtual Y-axis"
- + Worm milling operations are possible due to the large milling head swivel angle
- + Integrated deburring technology
- + Different linking options including TrackMotion
- + Gear hobbing machine with impressive performance data

TECHNICAL DATA

Max. module	3 mm
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 rpm (optional 12,000)
Power rating, 100% duty cycle	28 kW
Torque, 100% duty cycle	140 Nm



R Series



Gear hobbing machines from EMAG Richardon: Maximum flexibility for a wide range of parts

The R 500 gear hobbing machine from EMAG Richardon features special flexibility – it will cut gears in various components up to module 12 with a workpiece diameter of 300 to 700 mm. This is made possible by the extraordinary basic design of the gear hobbing machine.

EXAMPLE: R 500

Max. module	12 (25)
Max. workpiece diameter	700 mm
Max. workpiece length	1,500 mm
Max. external cutter diameter	180 (300) mm
Max. cutting length	1,000 mm
Max. shift distance	350 mm

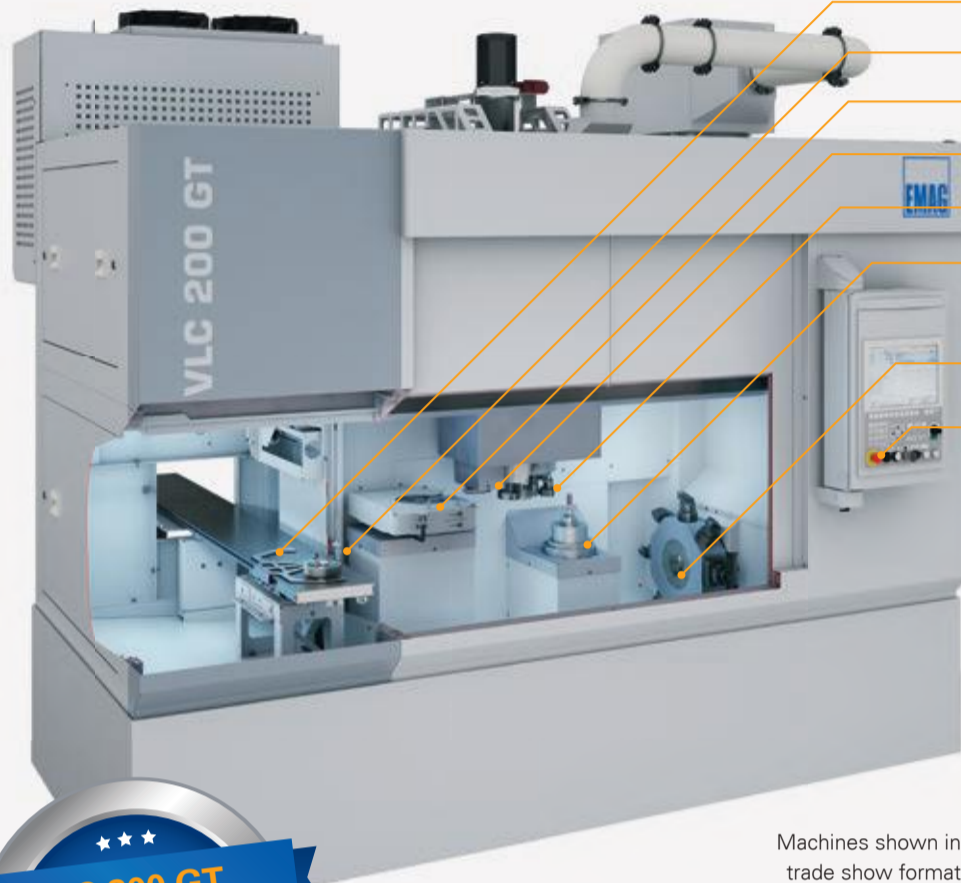


MODERN GRINDING SOLUTIONS FOR MODERN MOBILITY CONCEPTS

One of the main characteristics of modern mobility concepts is that they blur or even eliminate borders to develop new ideas for the mobility of the future.

Today, modern transmissions tend to be smaller and lighter, but are required to have more gears, and therefore more gear wheels and gear components. The EMAG grinding machines unveiled at the AMB have been optimized for machining these and other modern powertrain and engine components, and promise their users maximum flexibility.

When working with EMAG, you'll have access to our engineers throughout the design process – and with their wealth of experience, we can ensure maximum component quality with minimized part costs and cycle times. For example, the VLC 200 GT excels with a variably configurable machining area and turning / grinding combination machining.



Shuttle automation for supply and removal of parts

Probe

External grinding spindle

Rotating dressing roll

Working spindle

Internal grinding spindle

12-tool turret for (hard) turning tools (optional Lifetool turret)

NC controller



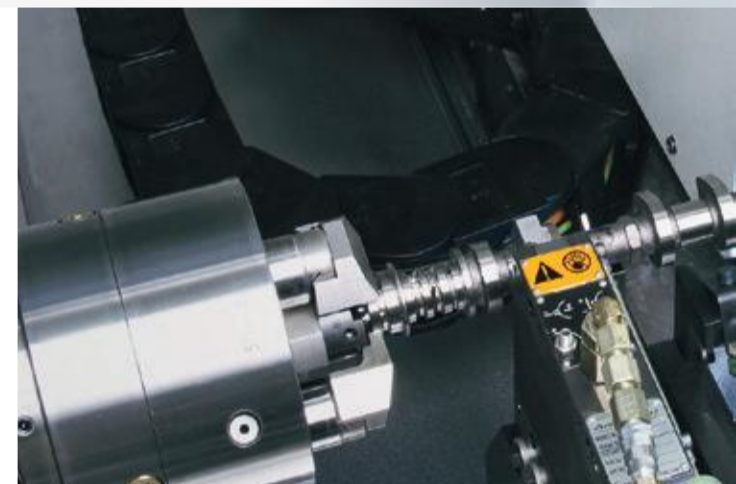
Machines shown in trade show format



PMD 2

Precision grinding of crankshafts

- + Machining of automotive crankshafts with a maximum length of 700 mm
- + Simultaneous oscillating / grinding with independent grinding units
- + X-axis drive system with anti-backlash linear motor
- + Workpiece headstock with direct drive
- + Hydrostatic guide track (X-axis)
- + In-process measuring control



SN 204

Grinding of camshafts and cam pieces

- + Non-round grinding of camshafts
- + External round and external non-round-machining possible
- + Up to three grinding wheels (B-axis) possible
- + Hydrostatic ball screw drive and hydrostatic guideway in the X-axis
- + Compact table design reduces the footprint





Short, flat surfaces are typically turned to finish. Geometric elements with high quality requirements, for example, for ripple, can be pre-turned and ground to a finish. The combination machining available on this unit allows tools to be customized to fit the specific machining tasks, enabling surface values with an average peak-to-valley height Rz of less than 1.6 µm to be easily achieved.

TECHNICAL DATA

Chuck diameter	210 mm
Swing diameter	270 mm
Max. workpiece diameter	160 mm
Max. workpiece length	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
» Max. number of revolutions	3,000 rpm
» Spindle bearing diameter, front	110 mm

PERFECT FOR ALUMINIUM OXIDE AND CBN GRINDING EQUIPMENT



HG 204 / HG 208

Cylindrical grinding machine for the precision machining of shafts in series production

- + Modular system for the cylindrical grinding of shafts with simple single-slide solutions and highly productive twin-slide solutions.
- + Use of CBN or aluminium oxide grinding equipment (maximum diameter of 750 mm)
- + In-process measuring for external diameter and longitudinal positioning
- + Optional hydrostatic center drive for the simultaneous internal and external machining of hollow shafts



GENERATORS FOR ALMOST EVERY APPLICATION

“Maximum process reliability and flexibility” is a common demand for industrial production: The technology should allow for different sub-processes to be used and be as fast and reliable as possible.

For hardening, joining, or heating, this demand is perfect for induction technology. Compared to traditional alternatives, induction technology normally decreases process times and energy requirements, while also providing for easy integration into the part flow of a production line. EMAG eldec uses the whole spectrum of induction technology.



PICO by eldec

Small, red, powerful:

Just heat. Low-cost energy sources with a single output and very simple intuitive control.

MF and HF: 5 – 150 kW.



eldec ECO LINE

The mid-range:

Energy sources with single or multiple outputs to act as a stand-alone solution or for integration complete systems.

MF and HF: 5 – 150 kW.



eldec RACK LINE

Multi power:

Scalable energy source using plug-in equipment for precise system integration.

MF: 5 – 30 kW.



eldec CUSTOM LINE

Everything is possible:

Energy sources with single or multiple outputs and a wide range of power and frequency combinations.

LF, MF, HF, DF, SDF®. 20 – 3,000 kW.

INDUCTION HARDENING OF ROTOR SHAFTS USING THE VLC 100 IH

The VLC 100 IH from EMAG eldec is a hardening machine featuring induction technology which uses the time-tested EMAG automatic pick-up principle. The rotor shafts are picked up automatically by the pick-up spindle from the integrated parts storage facility and transported into the machining area for the hardening process. The machine features a center drive chuck. Combined with the individual inductor design, this enables the complete shaft to be hardened in a single clamping operation.



BENEFITS OF THE VLC 100 IH

- + Integrated automation
- + Precise and stable – high process reliability
- + Can be integrated perfectly into production lines
- + Thousands of the same basic machine already sold: High availability

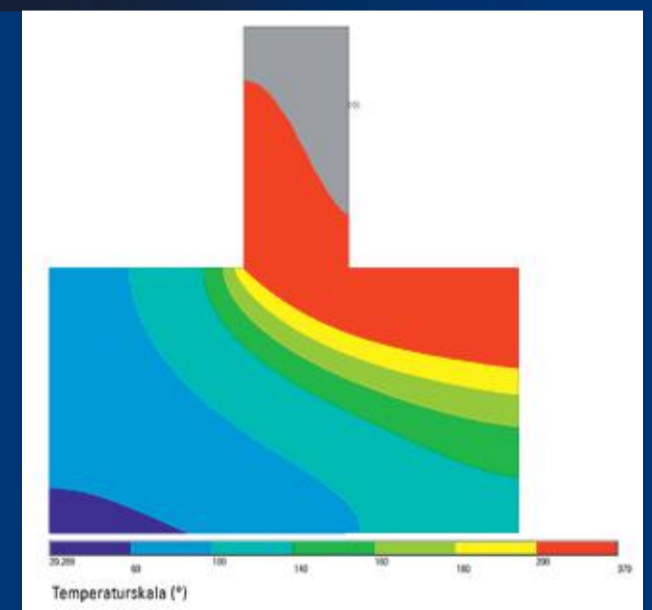
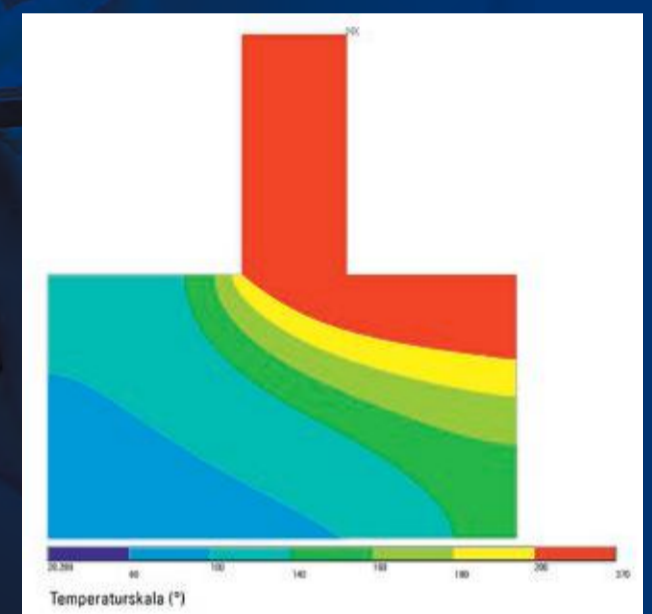


THE APPROPRIATE FREQUENCY FOR THE COMPONENT AND APPLICATION

In addition to the power generator, the selected frequency of the supplied currents (low frequency – LF, medium frequency – MF, or high frequency – HF) has a major influence on the required heating results. If not just the surface, but the entire component needs to be heated, then in addition to the power of the generator, the selected frequency and the necessary penetration depth are what decide the heating speed.

This is shown clearly in the following simulation:

CROSS-SECTION OF THE WORKPIECE WITH TEMPERATURE CURVE



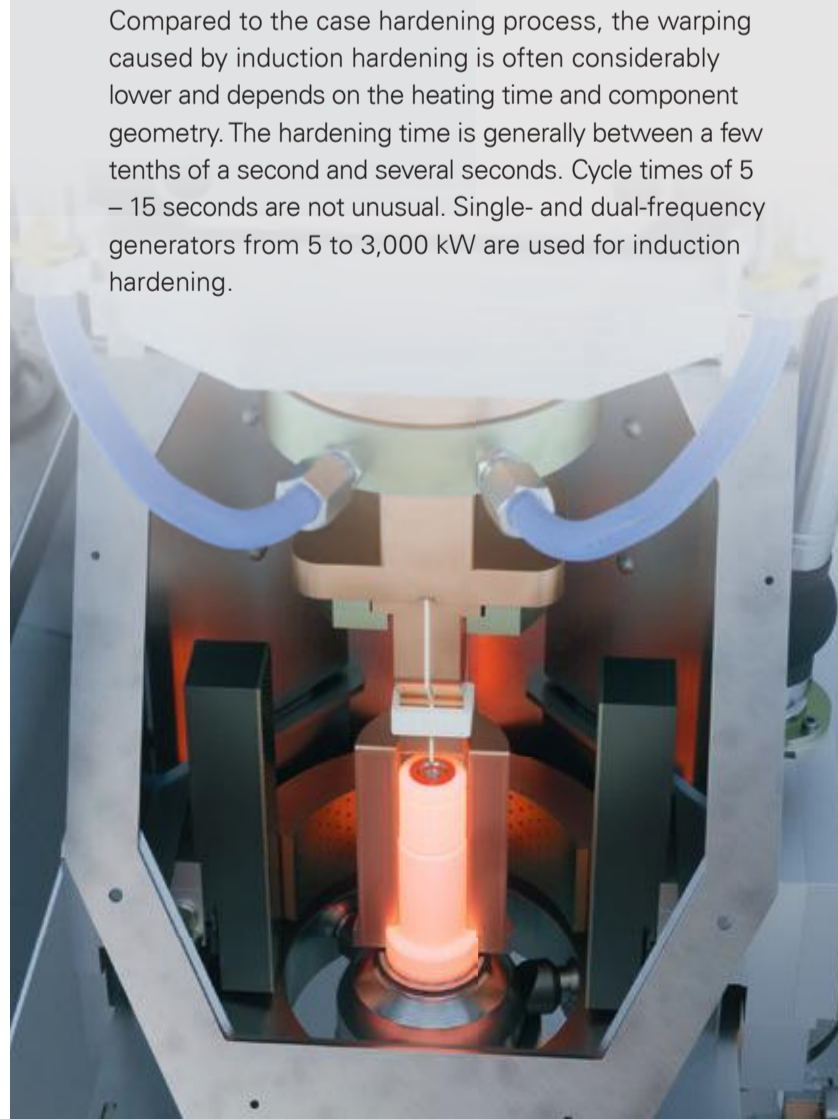
Two temperature distributions – each after a heating time of five seconds: If 2 kHz (LF) is used (top figure), the rim has the required temperature of 200°C – red means target temperature reached. The maximum permitted temperature of 370°C is not exceeded. If 12.5 kHz (MF) is used (bottom figure), the maximum temperature must rise to 420°C – grey means maximum temperature exceeded.

Conclusion: At the higher frequency, the component must be heated for longer to achieve the target temperature throughout without exceeding the maximum permitted temperature. The process can be completed more quickly using LF.



INDUCTION HARDENING

Compared to the case hardening process, the warping caused by induction hardening is often considerably lower and depends on the heating time and component geometry. The hardening time is generally between a few tenths of a second and several seconds. Cycle times of 5 – 15 seconds are not unusual. Single- and dual-frequency generators from 5 to 3,000 kW are used for induction hardening.



CHALLENGE FOR CONNECTING THE RING GEAR AND DIFFERENTIAL HOUSING

Nowadays, the joining of the differential housing and the ring gear using laser welding is an established industry standard for premium vehicles with rear-wheel or all-wheel drives. The primary reason for using the welded design is because of weight and cost benefits when comparing to the traditional screw connection.

And this despite the fact that the process is extremely demanding: First of all, the individual parts must be brought into a 'weldable' condition by laser cleaning; the requirements on the chip removal equipment are high and welding a cast material with a case-hardened steel requires a modified welding process.

The EMAG ELC 250 DUO is the most commonly used laser welding system in the world for differentials with installations in all 'car countries'.

Currently, we're experiencing a technological shift. The spread of vehicles with hybrid drive systems, the advance of all-wheel-drive vehicles as well as the increasing pressure to reduce weight, all increase the demand on weight-optimized differential gears, which are smaller than their typical 'colleagues' in the rear axle differentials of premium vehicles.

With the ELC 160 and an enhanced automation cell, EMAG is offering an optimized solution for these applications with smaller differentials – a solution which is setting new standards in terms of productivity and economic efficiency.

The ELC 160 is mainly used for laser welding powertrain components, particularly for welding round seams, for example, on ratchets or dual clutch parts or, as shown here, for welding the ring gear and differential housing.



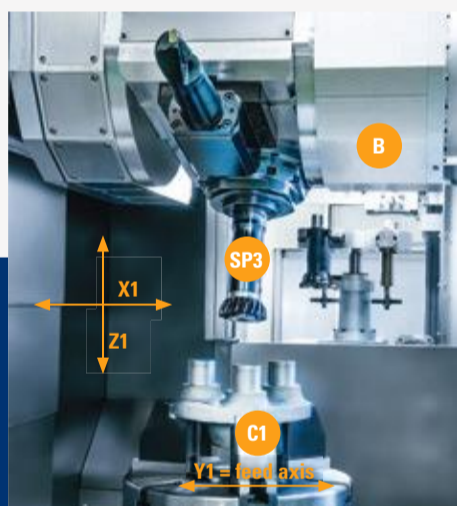
ELC 160

- + Production laser welding system for powertrain components
- + Process integration: Joining / pressing with force-distance monitoring, induction pre-heating, welding, testing
- + Maximum precision and reliability due to the "fixed optic / moving workpiece" design
- + Automatic retooling for optimum flexibility and short changeover time
- + Optimum process stability due to EMAG clamping and suction technology
- + Numerous equipment versions and options



MULTI-FUNCTIONAL TURNING AND MILLING CENTER VMC 450-5 MT

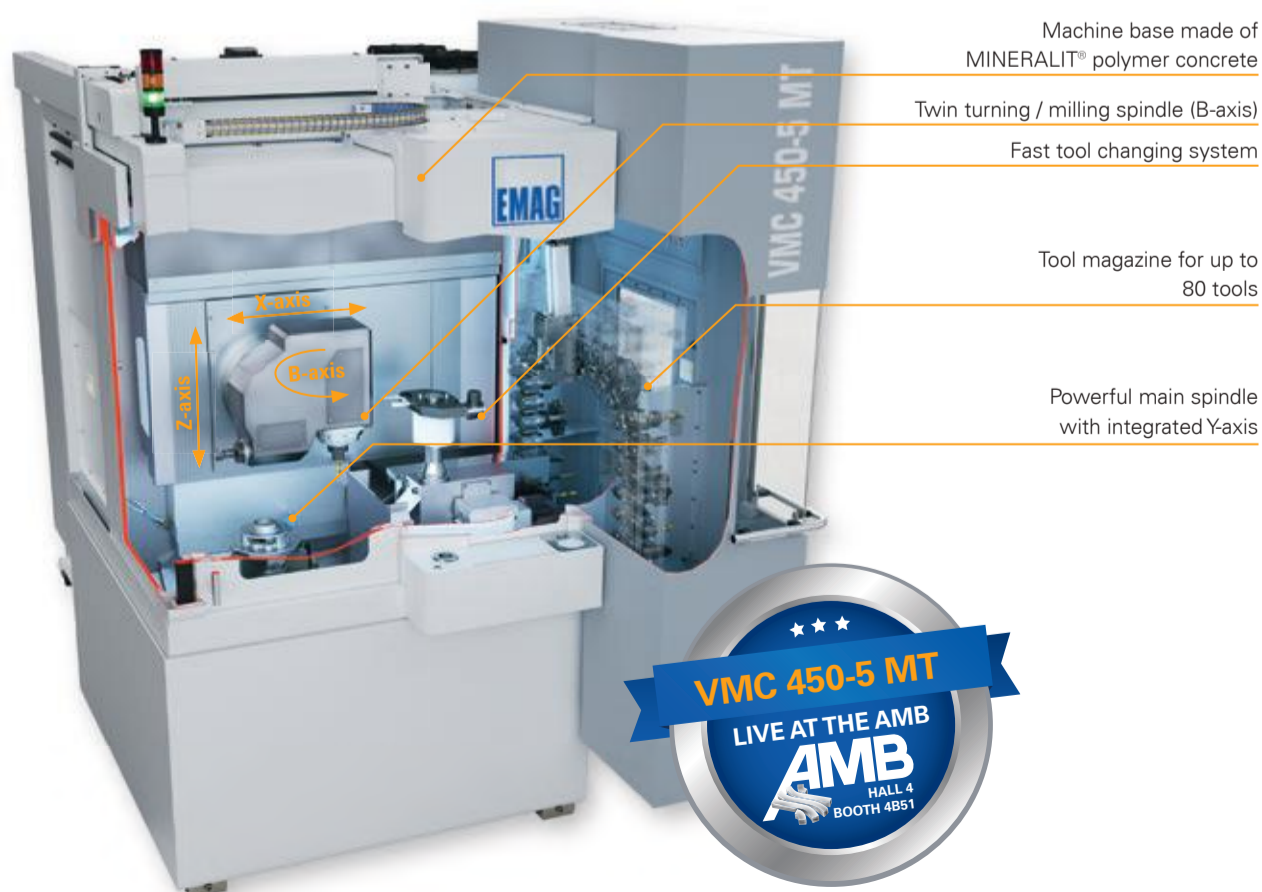
Universality and flexibility are the main features of the VMC MT Series – which can be configured to fit almost any customer demand. This machine delivers with a full range of technologies for turning, drilling, milling and gear cutting. Various spindles and tool socket versions round out the range, enabling complete machining in a single clamping operation.



**POWER
SKIVING
REDUCES CYCLE
TIMES BY UP
TO 50%**

HIGH PERFORMANCE INTERNAL GEARING WITH POWER SKIVING

The five-axis VMC machine is perfectly prepared for the demanding task of internal gearing using power skiving. Not only does the machine have an extremely powerful milling spindle (SP3), which makes fast feed speeds and therefore short cycle times possible, but thanks to the excellent rigidity of all components and the perfect control of all axes (particularly the B-axis and C-axis), it also produces high precision gearing results.



TECHNICAL DATA VMC 450-5 MT

Max. clamping chuck diameter	mm	630
Max. machining diameter	mm	600 (450)
Travel distance, X / Y / Z	mm	780 / 350 / 500
Main spindle drive (synchronous motor)		
» Power rating, 40% duty cycle	kW	72 / 106
» Torque, 40% duty cycle	Nm	860 / 1,450
» Max. number of revolutions	rpm	2,400 / 2,000
Turning / Milling spindle drive (synchronous motor)		
» Power rating, 40% duty cycle	kW	45
» Torque, 40% duty cycle	Nm	187
» Max. number of revolutions	rpm	7,000
Max. workpiece height	mm	300
Max. workpiece weight (incl. clamping chuck)	kg	500

INDUSTRY 4.0 PRODUCTS FROM EMAG – PRODUCTION IN A DIGITAL WORLD

Making the useful tools of the future, possible now – that is the best way to describe the latest breakthroughs in Industry 4.0. The term Industry 4.0 is no longer just an abstract idea, but actually something that can be experienced with our products and providing benefits that are increasingly apparent every day in manufacturing.

At EMAG, 2018 was all about continuing the development and usability of our products. With this in mind, at the AMB 2018, EMAG will be presenting the latest version of its Industry 4.0 products, as well as their first successful applications in everyday production situations. If you are wondering how Industry 4.0 can help you during your production, our experts will be happy to advise you at our EMAG booth.



PRODUCTION IMPROVEMENT USING EMAG INDUSTRY 4.0 SOLUTIONS

When we talk about Industry 4.0, we are mainly talking about networking – networking system components and networking machines with humans acting as controllers in the added value chain. This is precisely where the Industry 4.0 solutions from the EMAG Group start, networking sensor, operating and production data with the analysis and process expertise of EMAG engineers.

This has resulted in Industry 4.0 solutions that deliver real added value for our customers. Each of the Industry 4.0 products has been assigned to a category:

MONITORING

- + MultiMachineMonitor
- + MachineStatus
- + eldec Quality Control – eQC
- + PartStatus

ANALYSIS / EVALUATION / CONTROL

- + SolidProcess
- + LifetoolAnalytics
- + EC Data
- + ToolStatus and ToolStatus+
- + SecurityAssessment

MAINTENANCE AND SERVICING

- + RemoteExperts
- + Fingerprint
- + ServicePlus App

WORK PREPARATION

- + ProcessSim
- + VirtualMachine

INDUSTRY 4.0



MultiMachineMonitor

Full control of all production equipment on a single device

The EMAG MultiMachineMonitor is a simple, but very helpful tool for monitoring one or more EMAG machines. This intuitive interface was developed to provide a perfect overview of the current production status in the company, and can be flexibly configured. Machine messages provide information about the status of each machine, for example, if a machine is currently manufacturing, waiting for parts or undergoing maintenance work.



MachineStatus

All relevant manufacturing and energy consumption data available at a glance, anywhere, anytime

MachineStatus provides a quick overview, KPIs and analyses for all EMAG machines in a production department. These KPIs allow staff to draw clear conclusions about the productivity and the efficiency of these machines, and will notify the user about operating status, operating data and energy consumption. MachineStatus is a web-based software solution that can be configured with just a few clicks. For example, information about quantities, cycle times and results for power/air consumptions can be easily seen.

SERVICE 4.0 FROM EMAG – SERVICE FOR THE CONNECTED WORLD

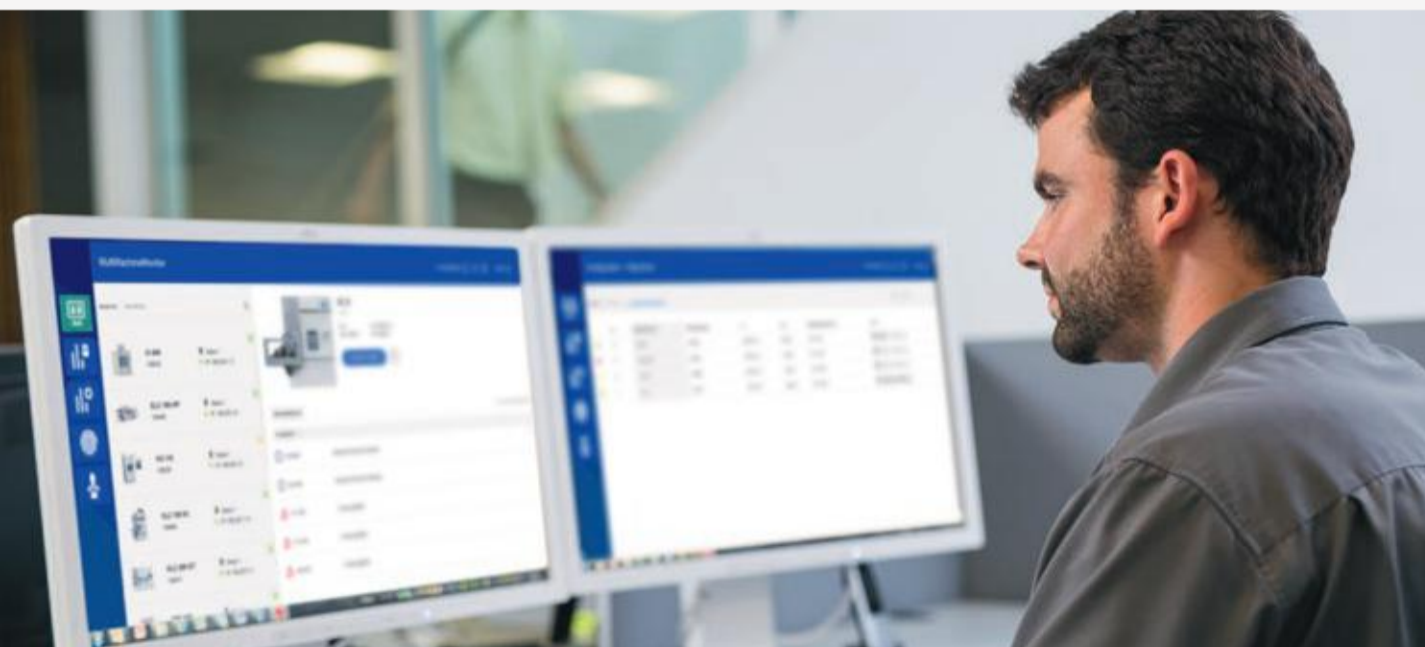
We have all become accustomed to the robotic helpers in our everyday lives – the car reminding us of service needs or errors, robots that vacuum or homes or mow the lawn, and of course smartphones that know the shortest route to our destination and remind us of appointments.

So it's not a big leap to want to incorporate some of these luxuries into our working lives to make life a little bit easier. That is EMAG's goal with Service 4.0, to make your working life easier.

EMAG ServicePlus App

The EMAG ServicePlus app provides quick and direct support for a variety of service requirements in the palm of your hand.

The unique QR code on each EMAG machine allows you to quickly and reliably identify the machine in question by just scanning it in the EMAG ServicePlus app. You can access this app on smartphones or tablets running either iOS or Android and it is available in a variety of languages. To ensure that your machine is secure, the data connection is encrypted.



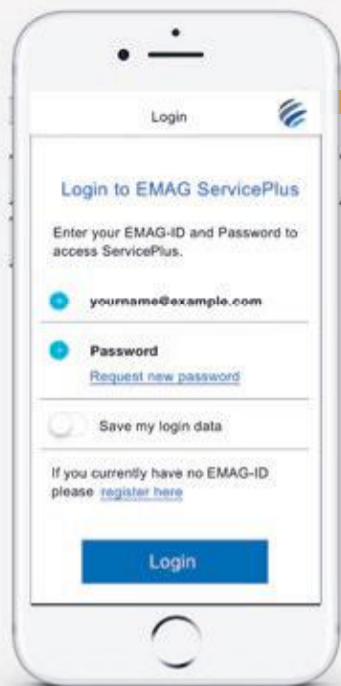
RemoteExperts & RemoteDiagnosis

These products keep machine availability high, and maintenance costs low by providing a quick, efficient alternative to on-site service. With these apps, machine errors can be quickly identified using a secure connection between EMAG and the machine. This allows us to perform the machine error protocols, assess and analyze to find the appropriate solution. If we need to send a service technician, they'll have all the information necessary on the machine error and can provide the right service and parts the first time.



Fingerprint

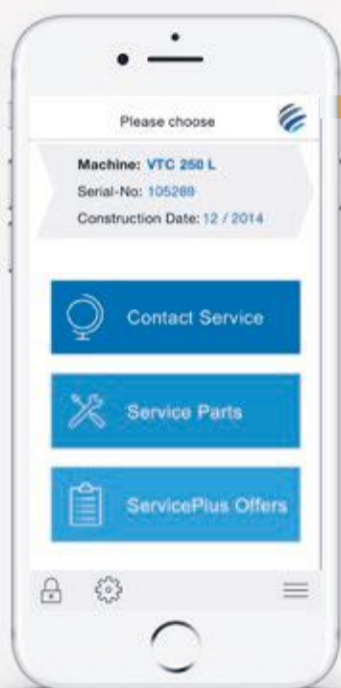
Fingerprint allows you to increase the availability of your machines and productivity, leading to a reduction in workpiece costs. Using Fingerprint, EMAG service can provide you with information on the condition of mechanical components within the machine.



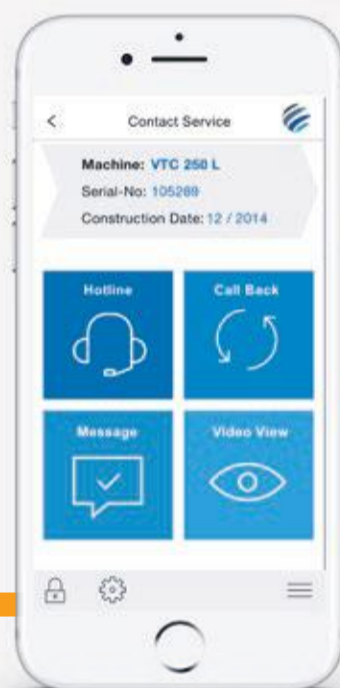
You can register and log on quickly and easily in just a few steps using the login page.



The machine can be quickly and clearly identified by scanning the QR code.



Once the machine has been identified, you can access the wide range of services.



These functions include accessing our service hotline with just a click, easily submitting service requests or transferring live videos of the machine to the EMAG service team.

THE EMAG SERVICEPLUS APP GIVES YOU ACCESS TO THE FOLLOWING SERVICE FUNCTIONS:

- + Immediate connection to your local service hotline depending on machine location
- + Texting relevant EMAG service team with ability to add attachments (ex. photos, videos and voice messages)
- + Live video transmission between the user and the EMAG service team
- + Sending machine specific spare part inquiries
- + Sending requests for quotes on ServicePlus products designed for your machine
- + Schedule callback service for the date and time you need it



Data Analytics & Condition Monitoring

Sensors, machine logs, and other sources supply an enormous amount of data that is analyzed to draw conclusions about the machines state and production situation. The major challenge is how to analyze this big data in a way that generates value added information from it – in terms of minimizing costs and risks to identify production problems quickly. Continuous development in this field has blurred transitions between production KPIs and service inquiries that can be managed using a central tool (Industry 4.0 from EMAG) to ensure that production remains transparent.

The best part is that no expensive dismantling or assembly work is required in order to perform a machine evaluation. Using the data provided by Fingerprint, you obtain an up-to-date machine status report in the shortest possible time.



Manufacturing Systems for
Precision Metal Components



INVITATION TO THE AMB 2018

Manufacturing for a digital world

New products in manufacturing and automation designed for a digital world – find out how you can network, optimize and revolutionize your production with solutions from EMAG.

We invite you to find out more about the new developments at the EMAG Group by visiting our booth at the **AMB in Hall 4, booth 4B51**.

You can order free tickets on our website at amb.emag.com.

We look forward to seeing you there!



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