www.matec.de

MACH 2010
Hall 5 · Stand 5475

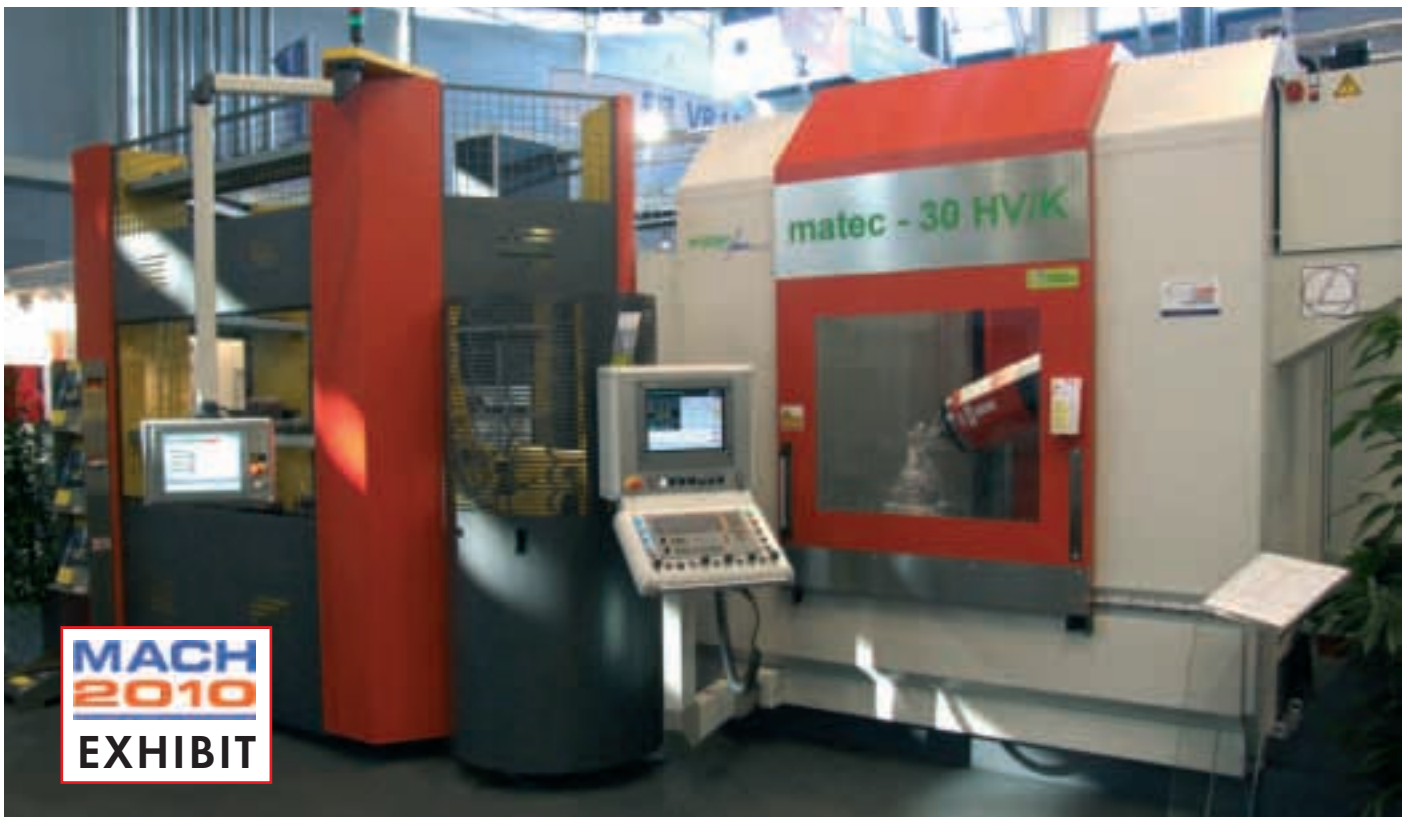
matec Maschinenbau GmbH

News

Machines Processes Applications No 1/2010

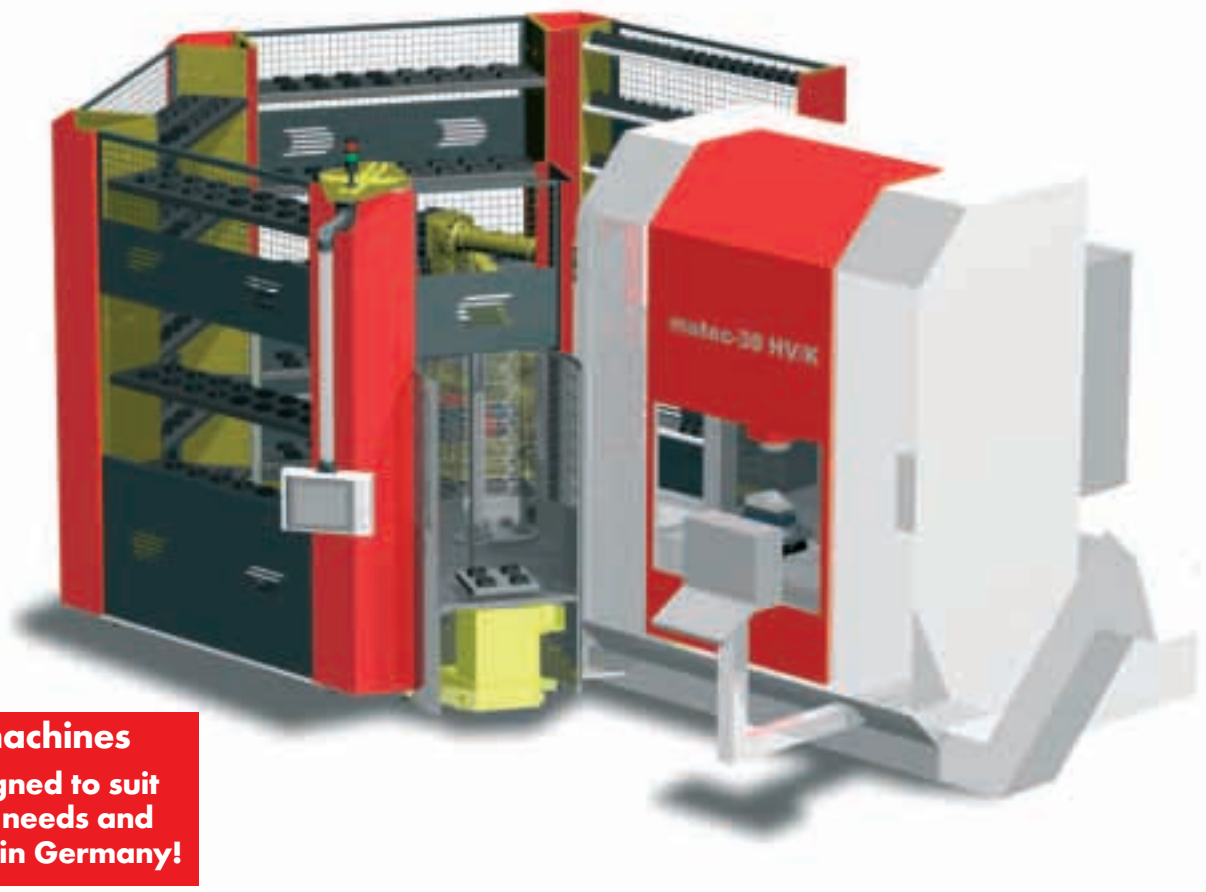
Universal machining centre matec-30 HVK

The perfect solution for complex machining tasks in three-dimensional domain and in 5-side machining. Also available as milling/turning centre!



Machining centre and automation from one source: matec-30 HVK with robot

- **Travelling paths X=1300/Y=600/Z=800 mm**
- **Integrated rotary table Ø 630 mm with swing diameter max. 940 mm**
- **Direct drive in rotary table (A-axis) and swivel head (B-axis)**



matec machines
100 % designed to suit customer's needs and 100 % Made in Germany!

Editorial

Erich Unger, Managing director matec Maschinenbau GmbH

Dear readers, customers and friends of matec machine tool company,

the year of economic crisis, 2009, is over. The months which lie behind us have shown: machine concepts have to prove their worth more than ever in times of crisis. Customer's demands set the bar high - flexibility and customer-orientation are the magic words in difficult times - with matec every customer gets exactly the machine he needs for his economic success.

All signs point to growth in the second half of 2010. We welcome you to meet us at the MACH in Birmingham - to get acquainted with our flexible matec "tailor-made" system. The matec News will show you some of these machine concepts, along with processes and applications.

Get to know matec!

Sincerely

Erich Unger

Fairs 2010

MACH, Birmingham
June 7-11

AMB, Stuttgart
September 28 - October 3

BIMU, Milan
October 5-9

ViennaTec, Vienna
October 12-15

PRODEX, Basel
October 16-20

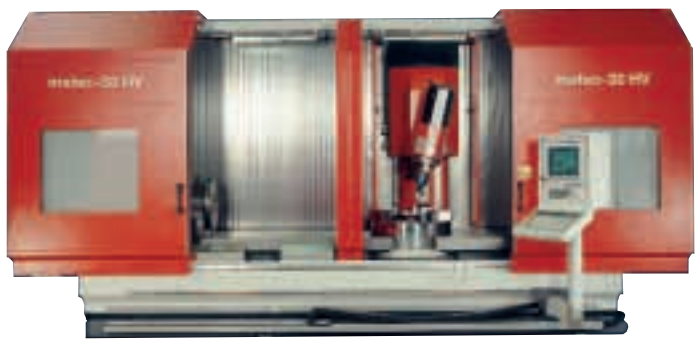
Euromold, Frankfurt
December 1-4

matec Böhm AG Maschinenbau GmbH

Machines

Travelling column series

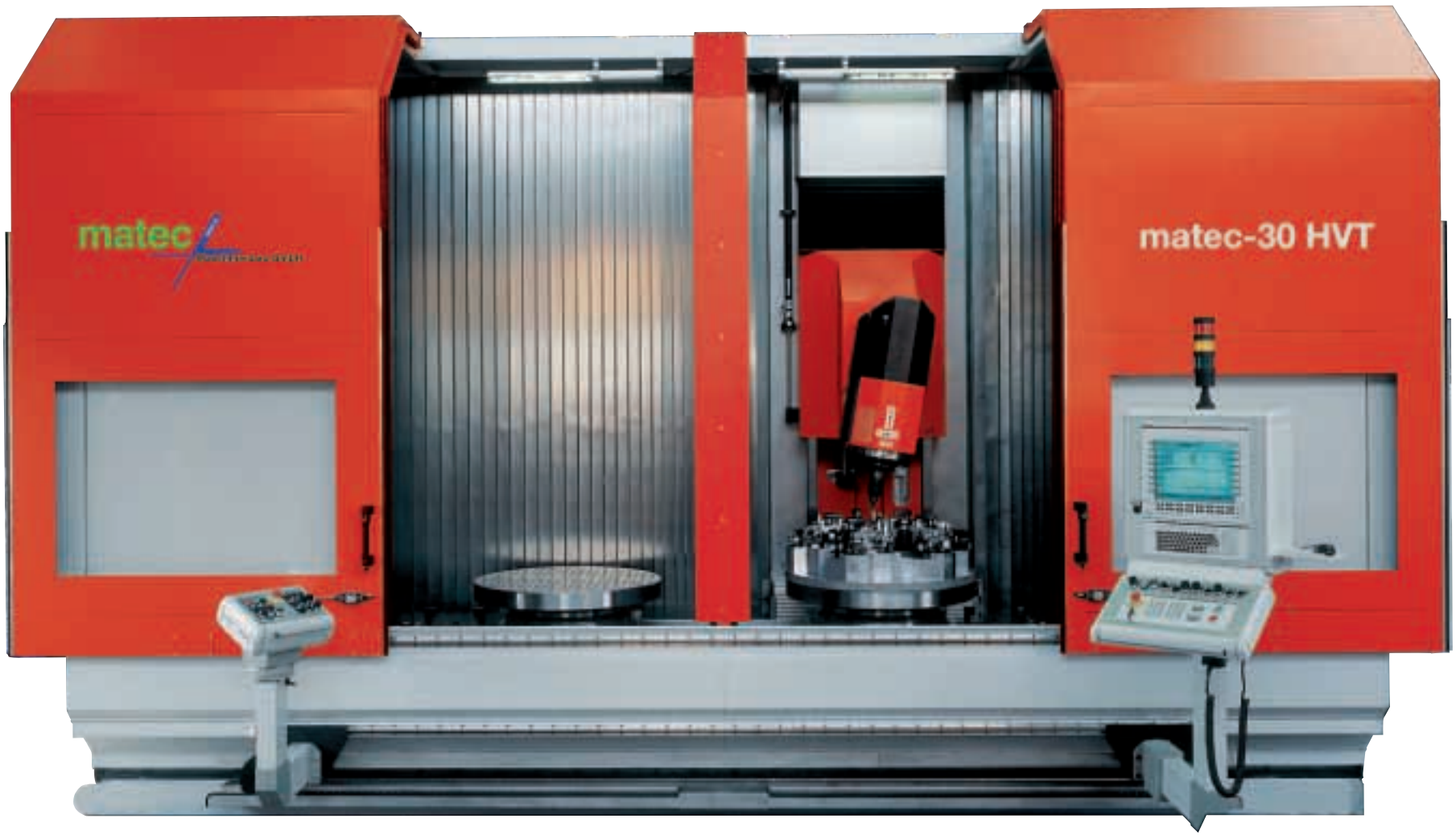
matec-30 HV



matec-30 HV with lathe spindle

In detail:

matec-30 HVT Machining of turbo-chargers for lorries



matec-30 HVT is a milling/turning centre for series production. If work parts are best manufactured by complete machining this can be done on the matec-30 HVT in max. two clampings. The vertical lathe spindles are able to turn and to position depending on the machining task. The swivel head provides for five-side machining during drilling and milling processes and during the turning process it allows the application of multifunctional lathe tools in all angles.

The customized matec-30 HVT shown above has two rotary tables with direct drive which have a speed of 1000 rpm. The machine is very fast in turning and positioning.

In the machining of turbo-chargers the geometry of the workpieces necessitates the application of long tools. The very high stability of the matec-30 HVT meets this challenge without any difficulty. The requested precision and the unbalanced mass of the workpieces which is characteristic for high speed range demand secure clamping. This is achieved by a clamping system which was especially designed by matec.

Special features

- High-speed rotary tables with direct drive, Ø 300 up to 2200 mm
- Speed of lathe spindle from 100 up to 6000 rpm (depending on spindle type and turning device)
- Separate tool magazines for turning tool holder
- Swivel head +/- 90° with serration catching in steps of 1°, option: continuously variable)

HV machines - swivel head for more flexibility

matec-40 HVU

matec-30 HVTH

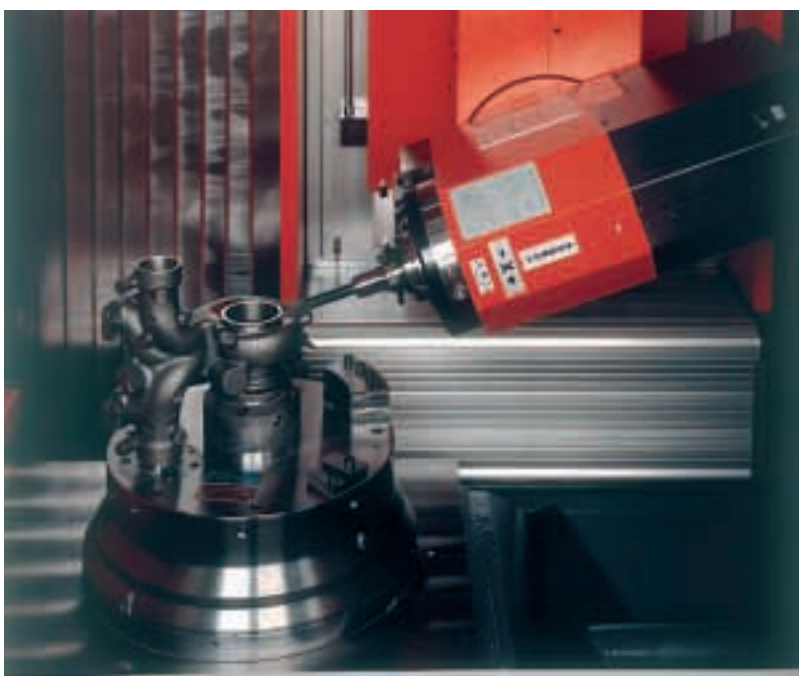
Milling - turning - drilling: Complete machining of turbo-chargers for lorries

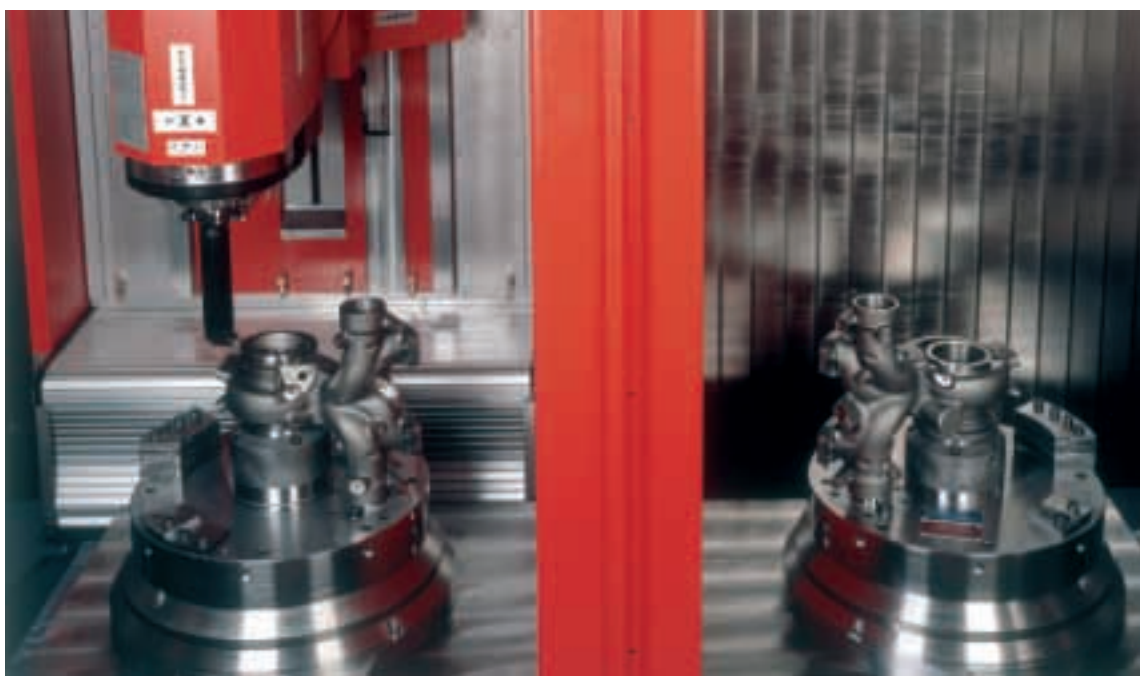
Specifications matec-30 HVT

Working area X	1300 - 12 000 mm
Working area Y	600 (800/1000/1200) mm
Working area Z	vert. 700 (1000/1200)/hor. 800 (1100/1300) mm
Machine table width	635 (835/1035/1235) mm
Spindle	SK40 - DIN 69871 (HSK 63 A)
Speed	9000 (12000/15000/18000/24000/42000) rpm
Power	16 (30) kW - 40% ED
Torque, max.	100 (190) Nm - 40 % ED
Lathe spindle	motor spindle head DIN 55026 A8 (A11)
Rapid feed	30 (48/100 with linear drive) m/min
Tool magazine	36 (48 bis 128) pcs

Subject to technical changes

Lathe spindles





For further information on the travelling column series please see www.matec.de

matec Maschinenbau GmbH

Machines

Travelling column series

matec-30 HVK

matec-30 HVC

In detail:

matec-40 HV Taper SK50 - also available as milling/turning centre

The travelling column machining centre matec-40 HV is equipped with taper SK 50/HSK 100, which allows heavy-duty machining tasks. One of the particular machine features is a swivel head. A variety of CNC rotary tables in connection with the swivel head allow 5-side or three dimensional machining of work parts. The long X-axis and the swivel head swivelling 105° to both sides guarantees multilateral machining of long profiles or shafts in multiple clamping. The price-performance ratio of the matec-40 HV is excellent.

Special features

- Tool taper SK 50 / HSK 100 A
- Swivel head +/- 105° continuously variable as CNC-axis for horizontal and vertical machining, indexing precision +/- 5 angular seconds
- Optionally available as milling/turning center with turning diameters up to 2200 mm

Specifications

Working area X	2000 - 12000 mm
Working area Y	800 mm
Working area Z	800/1100 mm
Spindle	SK 50 / HSK 100A
Speed	8000 rpm
Power	44 (68) kW - 20% DC
Torque, max.	350 (460) Nm - 20 % DC
Rapid feed	30/ (48/80 with linear driveb) m/min
Tool magazine	40 (60 bis 200) pcs

HV machines - swivel head for more flexibility

matec-30 HV machining of crankshafts

matec-30 HV with rotary table

In detail:

Travelling column series HV-machines with swivel head

matec-30 HV, integrated rotary table with direct drive n_{max} = 500 rpm

The travelling column series has been conceived for single-part and series production. Whether used for twin table machining with rotary table or tail stock, multiple clamping or single-part manufacturing of voluminous parts, this machine group covers nearly all fields of application. Stability, precision and high speed are characteristics of these machines.

Outstanding features of the travelling column series are long traverse paths, horizontally and vertically swivelling machine spindles, easy mounting of clamping units as well as automatic loading by means of external loading systems. A swivel head for horizontal and vertical machining on 5 sides and 3D characterizes the HV machines. The machines are available in a variety of configurations.

Turning and milling in one machine

Each HV machine can be turned into a milling/turning center for series production. If work parts are best manufactured by complete machining this can be done in max. two clampings. The swivel head provides for five-side machining during drilling and milling processes and during the turning process it allows the application of multifunctional lathe tools in all angles.

Standard features

Digital main spindle drive, motor spindle, oriented spindle stop

Spindle bearing Ø 80 mm, tool clamping 12.000 N

Linear guides in all axes

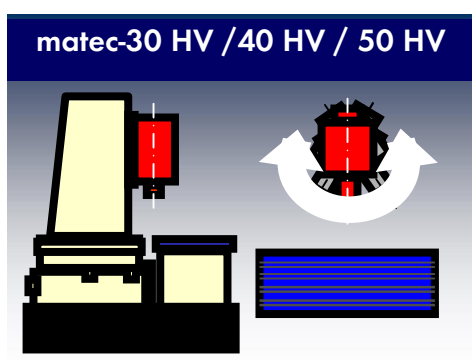
Feed rate/rapid feed with digital AC servo motors in all axes

Tool magazine travelling in X-axis
(protectively installed in the traveling column)

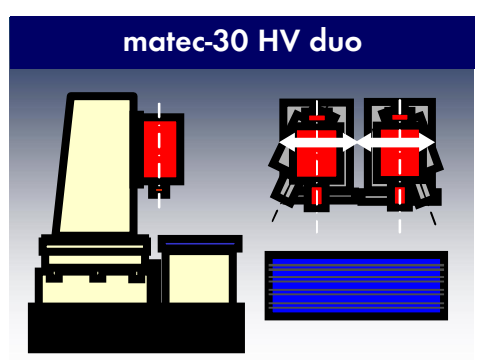
Tool position coding variable

Automatic lag compensation for high speed milling of contours

Spindle configurations



HV-spindle (swivel head)



2 traveling columns HV spindle

For further information on the travelling column series please see www.matec.de

matec-30 HV duo

In detail:

matec-30 HV **Manufacturing of electric motors**

The matec-30 HV shown above is a milling/turning center for series production of electro-motors. If work parts are best manufactured by complete machining this can be done on the matec-30 HV in max. two clampings. The vertical lathe spindles are able to turn and to position depending on the machining task. The swivel head provides for five-side machining during drilling and milling processes and during the turning process it allows the application of multifunctional lathe tools in all angles. The matec-30 HV is equipped with two rotary tables with direct drive which have a speed of 1000 rpm. The machine is very fast in turning and positioning.

The requested precision and the unbalanced mass of the workpieces which is characteristic for high speed range demand secure clamping. This is achieved by a clamping system which was especially designed by matec.

Specifications

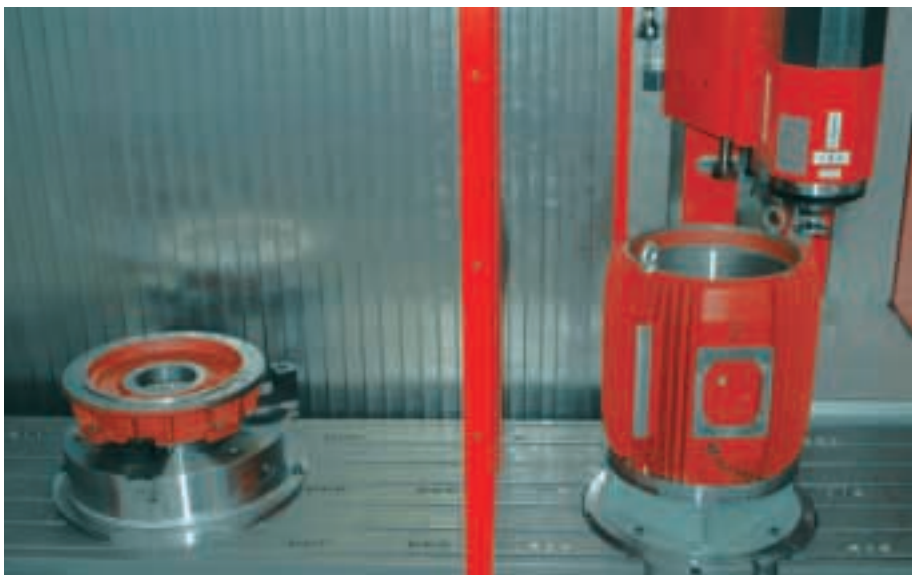
Working area X	3000 mm
Working area Y	800 mm
Working area Z	800 mm
Spindle	HSK 63A
Speed	9000 rpm
Power	30 kW - 40% ED
Torque, max.	190 Nm - 40 % ED
Rapid feed	X- / Y- and Z-axis 48 m/min
Tool magazine	108 pcs

HV machines - swivel head for more flexibility

matec-40 HV

matec-50 HV

Complete machining **Travelling column series** **HV-machines with swivel head**



matec-30 HV 2 two separate working areas with rotary tables for pendulum machining

Most machining centres of the travelling column series can be additionally equipped with a lathe spindle or high-speed rotary table with direct drive. In connection with a CNC swivel head we have developed a universal milling/turning centre especially for supplier companies in single-part and small-part production.

Economic manufacturing of complex parts

Complex parts can be machined economically on such machines in one or two clampings in demanded tolerance and surface quality. Designed correspondingly our machines allow controlled boring of even the inner contours in slant borings. The advantage is evident: two machining processes united in one machine – the work part machined either on the face or on the perimeter and in every angular position – that saves time and costs. Last but not least, on the basis of the modular system matec offers a wide range of various options to satisfy every customer's need.

The travelling column machines are ideally suited for the machining of long, bulky workpieces in one clamping. Large machine tables allow multiple clamping or twin-table machining. While the travelling column is machining one or more workpieces in the first working area, raw parts can be set up in the second working area during processing time.

The possibilities of the HV machines for the machining of 5 sides or 3D of any kind of work parts are almost unlimited. The long X-axis and a swivel head tilting 105° continuously to both sides, with SK or HSK tapers, in combination with a variety of CNC rotary tables make these machines infinitely flexible.

Options Travelling column series

Additional tool magazine with up to 200 pcs

Pick-up stations for oversized tools or angle drilling and milling heads

CTS with pressure 20/40/70 bar

Micro lubrication system

1-axis rotary table with conventional or direct drives

2-axis tilting rotary table

Lathe spindle vertical/horizontal, size A8 and A11

High speed rotary table with direct drive up to 4000 rpm (turning/positioning)

Additional tool magazine only for turning tools with separate tool changer

Separate fixed tool holder on the headstock for turning tools
(option: with interrupted cut especially for heavy turning operations)

CNC-carriage unit for tail-stock, steady rest and opposed spindle

Integrated quick change pallet systems

3-D probe

Tool measuring or tool breaking control

Loading automation / NC-gripper

For further information on the travelling column series please see www.matec.de

matec-30 HVK - milling, turning and gear-cutting in one machine matec-30 HVK

Special features

- Integrated rotary table Ø 630 mm, with swing diameter max. 940 mm
- Direct drive in rotary table and swivel head

Longer Z-axis for tall work parts

The universal machining centre matec-30 HVK is equipped with direct drives in the swivel head and in the rotary table. The integrated high-speed rotary table with diameter 630 mm and 80 rpm has a swing diameter of up to 940 mm. Optionally the speed can be augmented to 1000 rpm without constructional alterations of the machine design. This makes the matec-HVK the perfect solution for complex machining tasks in three dimensional domain and 5-side machining and at the same time allows turning in all angles.

The longer Z-axis extends the machinable range of work parts in the height. Work parts with a swing diameter of up to 940 mm can be loaded on the rotary table. The separation of B- and C-axis results in stable chipping conditions for exact contours und optimal surface quality of the workpiece.

Gear cutting on a general-purpose machine

All travelling column machining centres of the HV-series can additionally be equipped with a hobbing module. This module can be used for straight and helical gearing as well as for worm-shaped gearing. The extremely rugged HV machines are perfecty fit for this kind of application. Gears up to 2 m in diameter can be manufactured in single and series production.

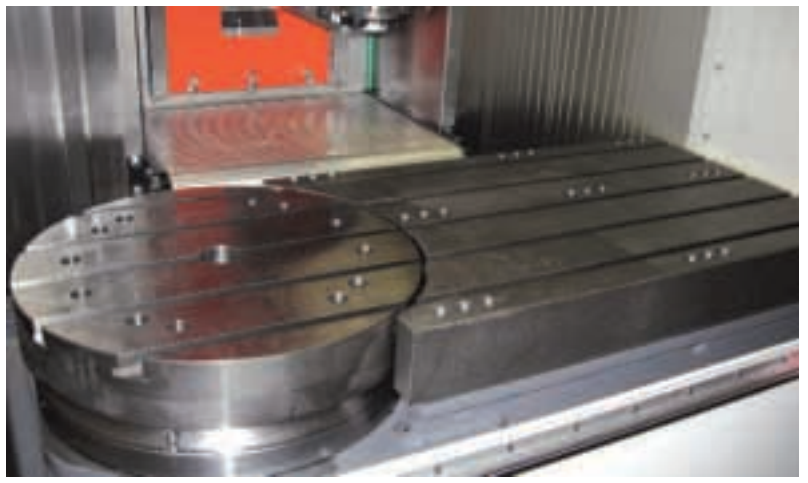
Equipped with an integrated rotary table the HV machines are ideally suited for the machining of flat gears; for the gearing of long shafts the machines are fitted with a horizontally mounted rotary table with tailstock.

The economic advantage is obvious: The HV machines can still be used for milling and turning (equipped with a rotary table with direct drive).

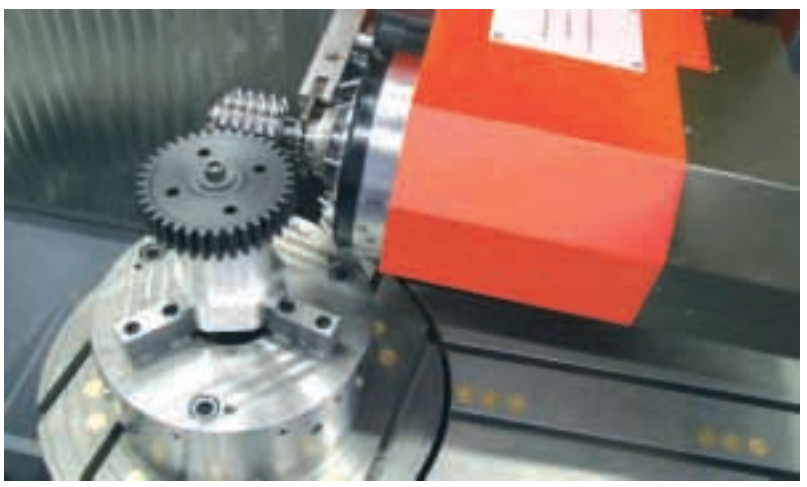
Machining of a work part

Specifications matec-30 HVK

Working area X	1300 mm
Working area Y	600 mm
Working area Z	vertical 675 / horizontal 800 mm
Spindle	HSK 63A
Speed	9000 (12000/15000/18000/24000/42000) rpm
Power	16 (30) kW - 40% ED
Torque, max.	100 (190) Nm - 40 % ED
Rapid feed	30 (48/100 with linear drive) m/min
Tool magazine	36 (48 bis 128) pcs



Working area with rotary table amd fixed machine table



Gear machining - gear cutting now possible on the HV-series machines

In detail:

matec-50 P - Top-level machining with taper SK 50

Customer-specific variant matec-50 P with 2-axis CNC motor spindle milling head and travelling operator platform
X = 16 000 mm, Y = 5 000 mm, Z = 1500 mm, W= 800 mm

Gantry machine matec-50 P

matec-50 P with 2-axis swivel head is a gantry machining centre with tool system SK50 /HSK 100 A. The machine has been developed for machining of extensive and voluminous work parts in mold, steel and machine industries.

The application range mainly covers the manufacturing of 3-D forms made of synthetic materials, non-steel metals and steel as well as machining of welding parts and plate-formed work parts.

The high-performance motor spindle with 60 kW and a constant speed of 9000 rpm provides for the optimal chipping of all materials in its class.

Special features

- 2-axis CNC swivel head for 5-axis simultaneous machining.
  C-axis (rotary axis) ± 200°/B-axis (swivel axis) ± 120°
- Long Z-axis up to 1500 mm
- Gantry bridge adjustment for optimal chipping process

Specifications

Working area X	4000-50000 mm
Working area Y	5000 mm
Working area Z	1100 (1500) mm
Working area W	gantry bridge adjustment 800 mm
Gantry clearance height	2270 (3070) mm
Gantry clearance width	4000 mm
Machine table width	3000 mm
Spindle	SK50 - DIN 69871 (HSK 100 A)
Speed	9000 rpm
Power	60 kW - 40% ED
Torque, max.	575 Nm - 40 % ED
Rapid feed	30 m/min
Drilling in steel	80 mm
Tapping in steel	M36
Milling performance in steel	1000 cm^3/min
Tool magazine	18 (up to 200) pcs
Tool diameter, max.	150 (250) mm
Tool length, max.	520 mm
Tool weight	25 kg
Tool change time	ca. 10 sec.

Subject to technical changes

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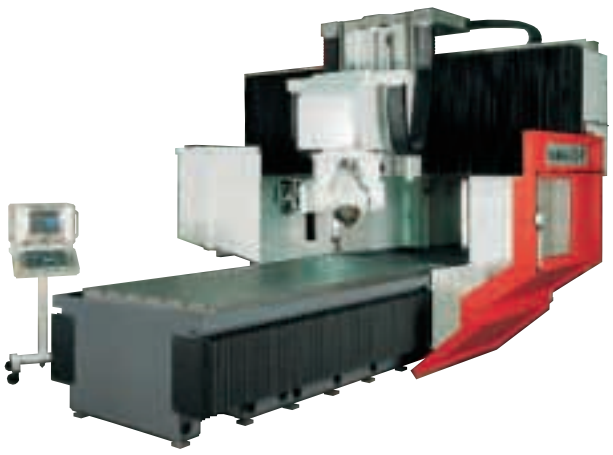
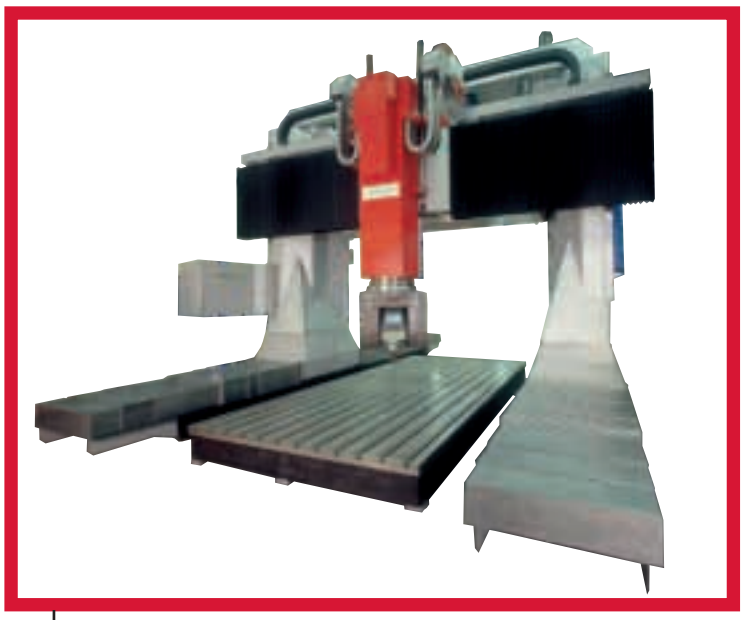
Machines
Gantry series

matec-30 P with
vertical spindle



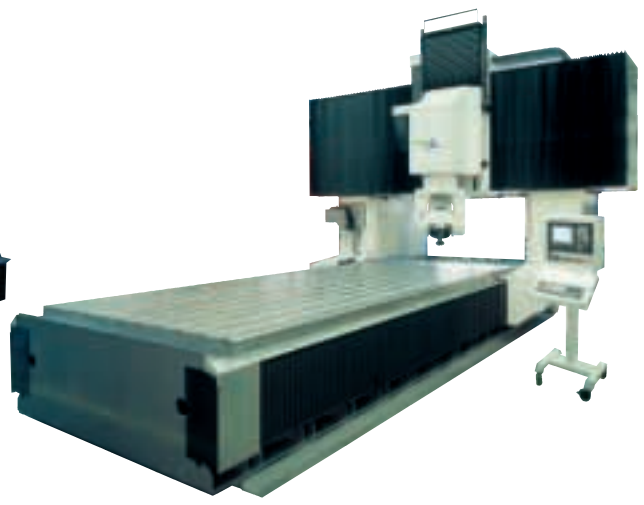
matec-30 P with
2-axis swivel head



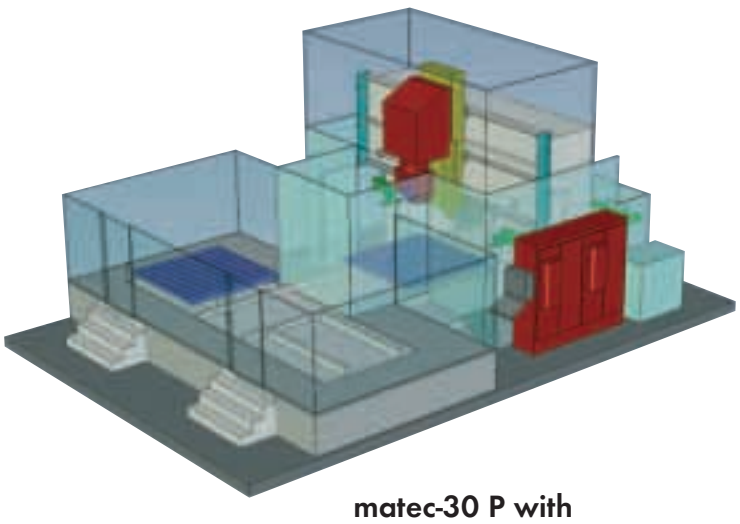
Customer-specific variant matec-50 P with 2-axis CNC motor spindle milling head and travelling operator platform
X = 16 000 mm, Y = 5 000 mm, Z = 1500 mm, W= 800 mm

Long traverse paths for voluminous work parts

matec-30 P with travelling operator platform



matec-40 P with 2-axis CNC swivel head



matec-30 P with pallet changer

Gantry series

The gantry machines 30 P (Taper SK40/HSK 63A) and 50 P (Taper SK50/HSK 100 A) were designed for single-part and series production of large and heavy work parts for tool and mould making, mechanical engineering, and structural steel engineering. Main range of application is the machining of 3D-shapes in steel and aluminium, plates, welding and steel construction.

The gantry construction guarantees good accessibility from all sides in a constrained space. The application of either a swivel head (± 90°) or a 2-axis CNC motor spindle milling head permits multilateral machining. A rich variety of spindle speed and spindle power possibilities for all materials is available.

matec-50 P Tool magazine HSK 100 for 200 tools

Standard features

Gantry design with fixed machine table

Traverse path in X-axis from 3000 to 15000 mm

Traverse path in Y-axis from 1600 to 5000 mm

Traverse path in Z-axis from 800 to 2300 mm

Prestressed roller guides in all axes

Rapid feed rate with digital AC servo motor

Digital main spindle drive

Motor spindle, speed 9000 rpm

Orientated spindle stop

Tool magazine travelling in X-axis

Tool position coding variable

Tool life control

Sister tool managing

Automatic lag compensation in order to provide high speed milling of contours

Chip conveyor on both sides along the X-axis

Coolant system (CTS)

Machine cladding (without roof) according to CE norm

Control panel with all necessary operating devices

Controls:

Rexroth IndraMotion MTX
Heidenhain iTNC 530
Siemens 840D

Options

Linear drives in X- and Y-axis

Motor spindle speed 9000 up to 42000 rpm

Motor spindle power 16 kW up to 34/60 kW

Additional tool magazine with up to 200 pcs

Pick-up stations for oversized tools or angle drilling and milling heads

CTS with pressure 20/40/70 bar

Minimal quantity lubrication

Coolant cleaning units with different filter systems

Coolant temperature control

Coolant tank with volume capacity 450/900/2000 l

Oil suction unit

Automatic doors

Integrated quick change pallet system

Clamping hydraulics or pneumatics

3-D probe

Tool measuring or tool breaking control

Tool identification system

Tool control system

Control panel portable or with radio signal

For further information on the gantry series please see www.matec.de

matec-30 HV

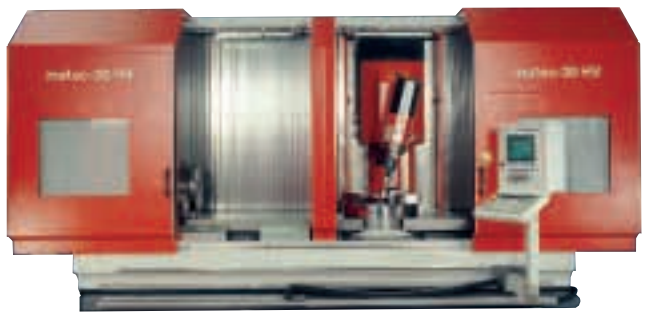
In detail: matec-40 HVU Machining centre with universal milling head

Special features

- Variable travelling paths
- Universal milling head, applicable as positioning and CNC-milling head, continuously swivelling simultaneously in both axes
- Option: hydraulic disconnection via M-mode

Specifications	matec-30 HVU	matec-40/50 HVU
X-axis	2000 - 20000 mm and more	
Y-axis	1000 - 1500 mm	
Z-axis	1100/1300/up to 2500 mm	
Speed	up to 18000 rpm	up to 8000 rpm
Power	up to 34 kW	up to 33 kW
Torque	up to 216 Nm	up to 382 Nm

HV machines - swivel head for more flexibility



matec-30 HV with lathe spindle

matec-30 HVT

matec-30 HVTH

for the machining of long parts on up to 6 sides

Machine concept HVU-series

The universal machining centers matec-30 HVU, matec-40 HVU and matec-50 HVU are based on the machining centers matec-30 HV/40 HV/50 HV.

Universal milling head and variable traveling paths

The HVU machines have a universal milling head with 2 axes, which turns the motor spindle in a 45° diagonal position from vertical to horizontal. This allows the maching of long workpieces on four sides - in connection with an integrated rotary table even on five sides.

In that case 6 axes are at disposal for demanding machining tasks on a workpiece. The HVU-series is available in two versions: matec-30 HVU with taper SK40/HSK 63A and matec-40 resp. 50 HVU with taper SK50/HSK 100.

For further information on the travelling column series please see www.matec.de

A distinctive feature of the new universal mill/turn center matec-30 FDZ for 5-axis simultaneous machining is the extremely long milling path of 1100 mm in the Z-axis.

The lathe spindle of the matec-30 FDZ has a power of 70 kW and 2800 rpm and is equipped with a special clamping system for extremely low locking pressure.

Friedrich Kappler GmbH & Co. KG

Sucess with flexible high-precision machines

Kappler, a company in the German town of Birkenfeld-Gräfenhausen, puts the main focus on the production of complete component modules for application in the field of special-purpose machines, devices, handling and automation, medical technology, chip production, and optical industry

Kappler, medium-sized hightech-supplier for machine tool and mould making industry, has specialised in the manufacturing of precise and complex milling and turning parts In order to respond flexibly to customers' demands, and to meet the requirements of the quite demanding range of parts, state-of the-art manufacturing solutions were sought after - and found in matec 5-axis travelling column machining centres.

The first 5-axis machining centre matec 30 HV for milling ranges of 3000 x 1000 x 1100 mm (X x Y x Z) was purchased in 2005, due to the fact that the flexibility of the standard machines at hand did not suffice for the comprehensive range of parts to be produced. To meet Kappler's demands for a working area for very long parts, the matec engineers chose to integrate an off-centre CNC rotary table into the machine table - this leaves ample room for the swivelling motor spindle to move in the Y-axis, which is necessary for the machining of voluminous parts. The flushly integrated rotary table holds no barrier for the clamping and machining of even extremely long parts.

Rainer Gottschling, owner and general manager of Kappler: „We need machines, which exactly meet our demands concerning flexibility. The matec engineers were willing to respond to these demands. Most suppliers of standard machines make modifications available, but usually these modifications restrict the working area and raise the price of the machine substantially. matec on the other hand took care in realizing our favoured machine concept, which was based on our requirements and they calculated an affordable price."

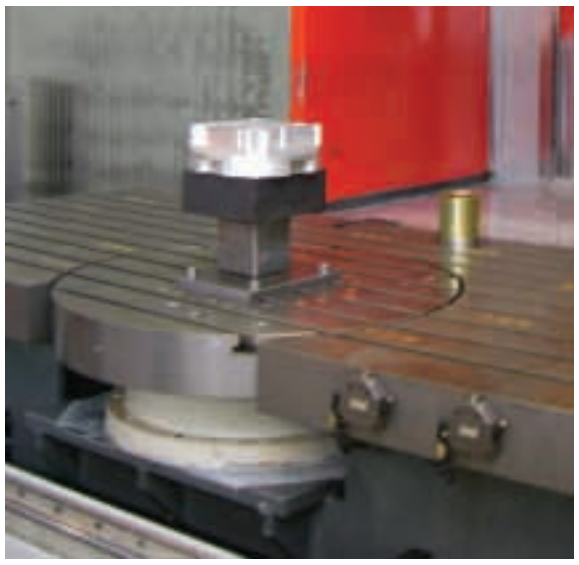
Customized machining center

matec's problem solver is an intelligent modular system, which makes it easier for matec development and design engineers to adapt a machine concept to customer's actual needs, without constructive changes in the machine design, thus providing for inumerable individual solutions in different cases of application. According to matec sales manager Jürgen Wolf, the consequent customer orientation is matec's secret of success: "All our customers get exactly the machine they wish for - a concept which is certainly different from the off-the-shelf machines of our competitors." Since the first 5-axis machining center proved its worth rather quickly, matec was inevitably the first one to be asked when a second 5-axis machining center for a special range of parts was required. The Kappler team, the people who have the final say concerning machines to be purchased, felt positive about matec. This time a machine had to be designed which was optimized for milling and turning at the same time.

Powerful milling and turning of big diameters

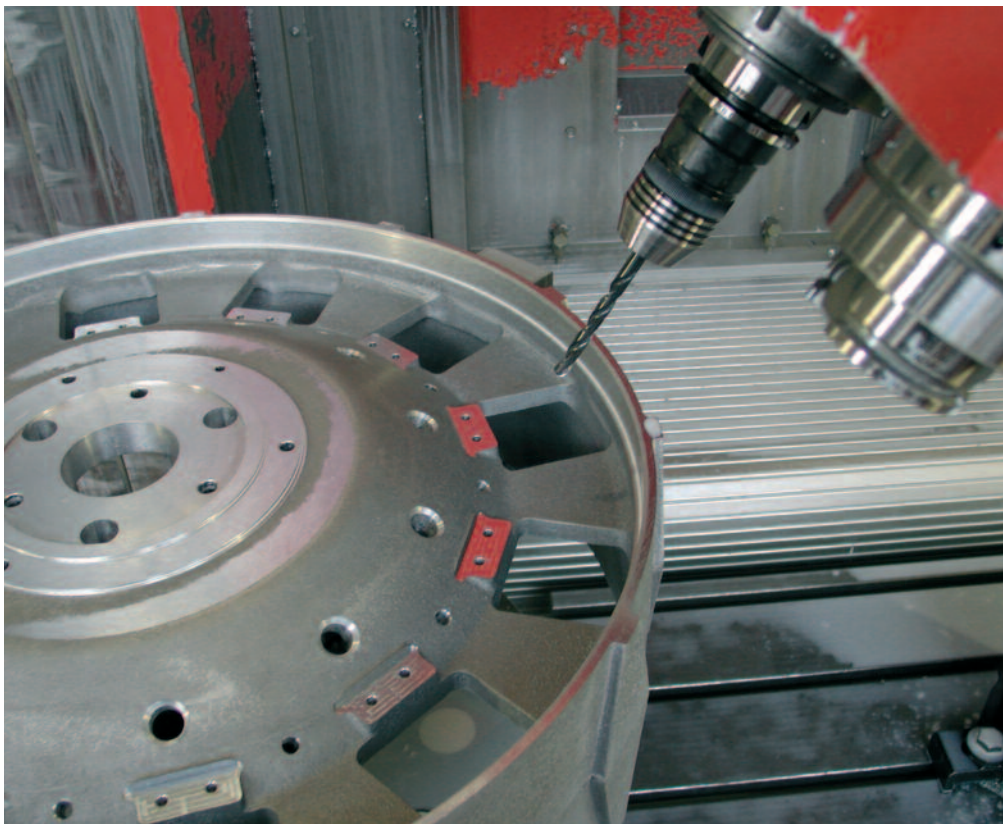
A lathe spindle with powerful drive and big taper, in which at least a 550 chuck could be clamped was requested. An additional adapter was integrated in order to ensure the machining of work parts up to 800 mm in diameter. The decision whether to clamp the HSK 63 lathe tools in the motor spindle or in a separate spindle was quickly come to. Jürgen Wolf: "We decided on a separate HSK tool holder fixed on the headstock, because that way we could use the motor spindle to clamp the milling tools and clamp the lathe tools for rough machining in the stationary spindle. The motor spindle is thus uneffected by the strokes which occur during interrupted cutting or heavy milling. Optionally we can still use the motor spindle for lathe tools doing finishing tasks. The positioning of the spindle is ideally suited for the turning of inner and outer contours."

In order to supply both spindles from one tool magazine, the magazine with 80 tools was fixed alongside the machine, thus using the travelling column as a pick-up device. For quick speed, the X-axis is equipped with linear drives.



An integrated off-center rotary table is one of the many options and variants in the matec modular system

in different industrial sectors and all over the world



Above: Machining of a rotary table for automatic rotary indexing systems on the matec-30 FDZ. Material: cast aluminium. A special clamping system for extremely low locking pressure prevents the thin-walled parts from damage.

Extremely low locking pressure for thin-walled parts

For customer requirements which are not met by the matec modular system alone, the matec engineers work out special solutions. In order to clamp thin-walled and deforming parts with a low pressure of 5 bar, it was necessary to design a special clamping unit. Customary chucks need a pressure of up to 7 bar, in order to defy the initial friction of the clamping jaws. Once the static friction is eliminated, the jaws abruptly clamp the workpiece - which is totally inapplicable for the fragile parts machined by Kappler. Since there was no chuck available on the market to meet the particular requirements, the matec specialists, in cooperation with Rainer Gottschling, designed a pressure-differentiating clamping system, i.e the clamping jaws are working with the full pressure, while at the same time a minutely adjustable counter-pressure joins the circuit in order to prevent an abrupt clamping of the parts.

For tool monitoring and tool length measuring the machine table is equipped with a laser measuring system on the left-hand side of the lathe spindle. And on the right-hand side of the machine table there is enough room to machine the clamped parts on the sixth side. For all the many modifications, this matec machine again completely met the demands of the Kappler team after a short period of bringing into service.

According to Rainer Gottschling, one wish is yet unfulfilled: "We would like to have a calibration cycle, in which a measuring sensor inside the motor spindle can scan a measure ball, in order to monitor and automatically align the center of the motorspindle to the center of the rotary table." This is unproblematic, because the new machine - like all of Kappler's new 5-axis machining centers - is equipped with a Siemens 840 D control.

Right direction

Gottschling is convinced, that the equipment investments are trend-setting for his company. He believes that the manufacturing of demanding and complex parts will stay in Germany: "For these parts the crucial element is not low labour costs, but technical know-how." For Gottschling not only the machinery is a determining factor: "The whole periphery is taking part in the process. The knowledge and know-how of the employees, their technological experience regarding annealing and aging processes, the different levels between pre-machining and finishing, the clamping without deformation and the right preparation of the flats are the guarantee for high-quality parts."

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The 5-axis machining center matec-30 HV purchased in 2005 has proved its worth. The integrated off-center rotary table makes the machine ultra-flexible.

The tool magazine with 80 tools, fixed alongside the matec-30 FDZ, alternatively changes the tools into the motor spindle or the stationary spindle in front.

Kappler general manager Rainer Gottschling places his emphasis on the machining of highly complex and precise parts, combined with short delivery time and a high vertical range of manufacture.

matec Maschinenbau GmbH

New design
matec-30 PP and matec-40 PP

In detail:

Gantry machines matec-30 PP and matec-40 PP - innovative solutions

Stability and speed due to new pallet changer

The gantry machines matec-30 PP and matec-40 PP are designed for single-part and series production of large and heavy workpieces for tool and mould making, mechanical engineering, and structural-steel engineering. They fulfil highest quality demands. The well-dimensioned gantry construction warrants minor deformation of the machine and therefore highest contour constancy and surface quality of the work part.

The gantry construction garantees good accessibility from all sides in a constrained space. The application of either a swivel head (± 95°) or a 2-axis CNC motor spindle milling head permits multilateral machining. A rich variety of spindle speed and spindle power options for all materials is available.

Special features

- 2-axis swivel head CNC-controlled for 5-axis simultaneous machining. C-axis (turning axis) ±180°/B-axis (tilting axis) ± 95°
- Long Z-axis 1500 mm
- Stable gantry bridge
- New tool magazine with 216 tools places

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