TOSHULIN

PRODUCT CATALOG

TRADITION ACCURACY RELIABILITY

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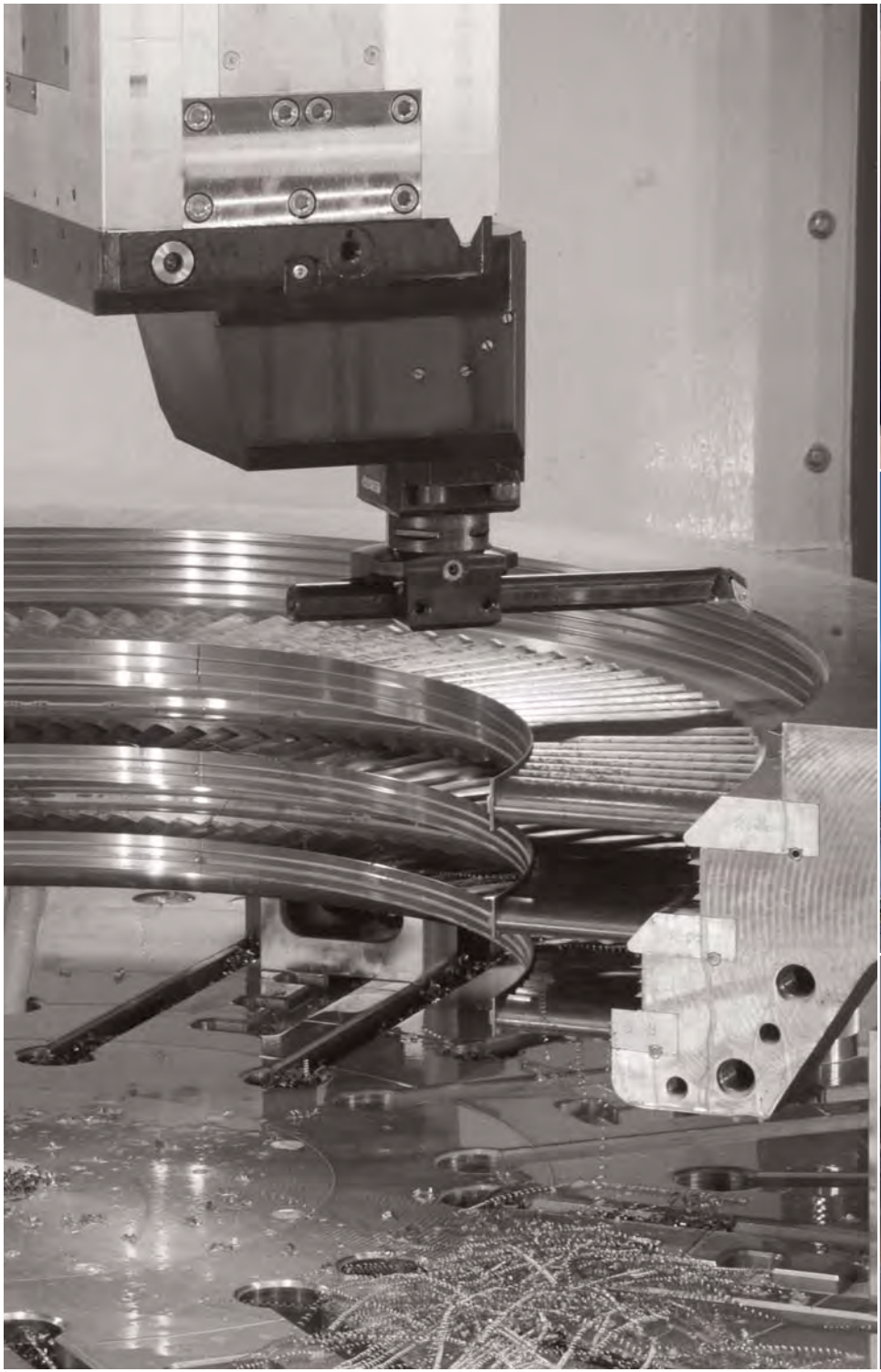

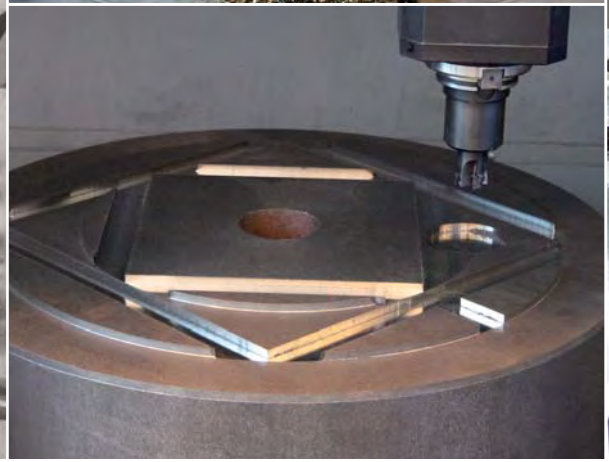

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TRADITION
ACCURACY
RELIABILITY

TOSHULIN, a.s. is one of the leading manufacturers of technologically advanced multi-functional CNC Vertical Lathes in the world. The machines are specified for medium and large sized workpieces up to 7300 mm in diameter.

- TOSHULIN, a. s. – the company began in 1949
- Design, manufacture and assembly of machines are concentrated in the company's headquarters – in Hulín
- The company has top-quality, state of the art manufacturing technology
- The strong technical team provides continuous development and application of new technologies
- TOSHULIN, a. s. offers its customers a worldwide sales and service network
- Quality conditioned by tradition and skills for more than 65 years

TOSHULIN

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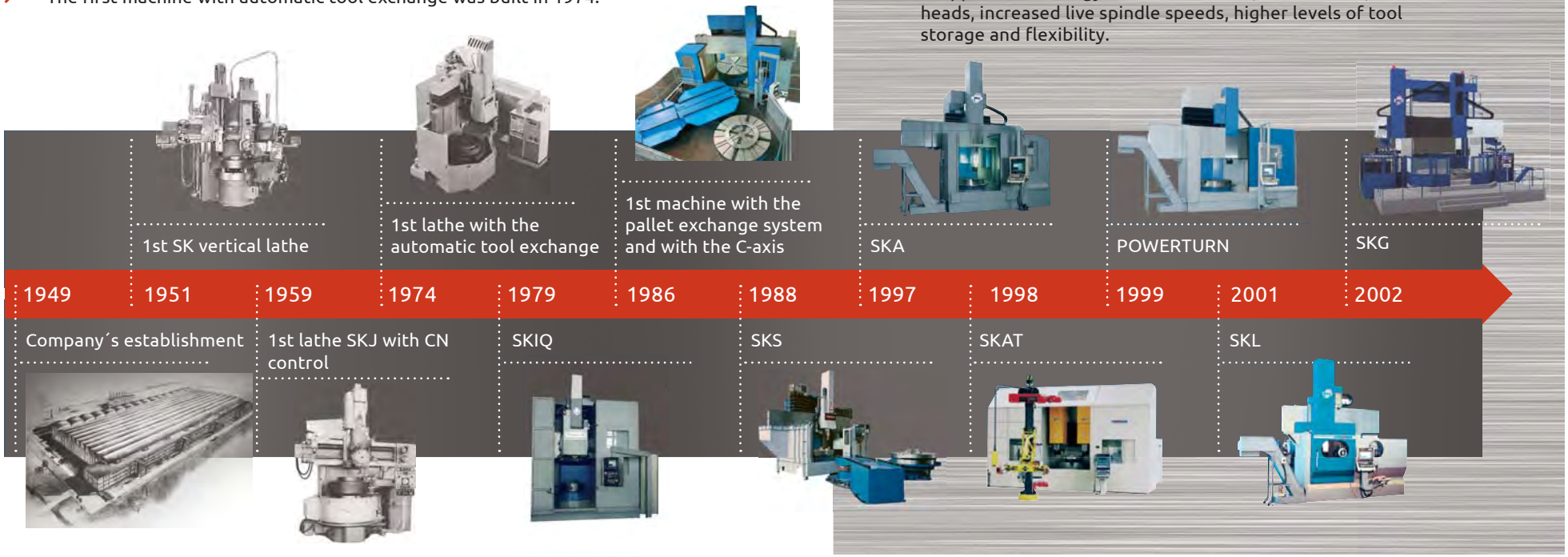
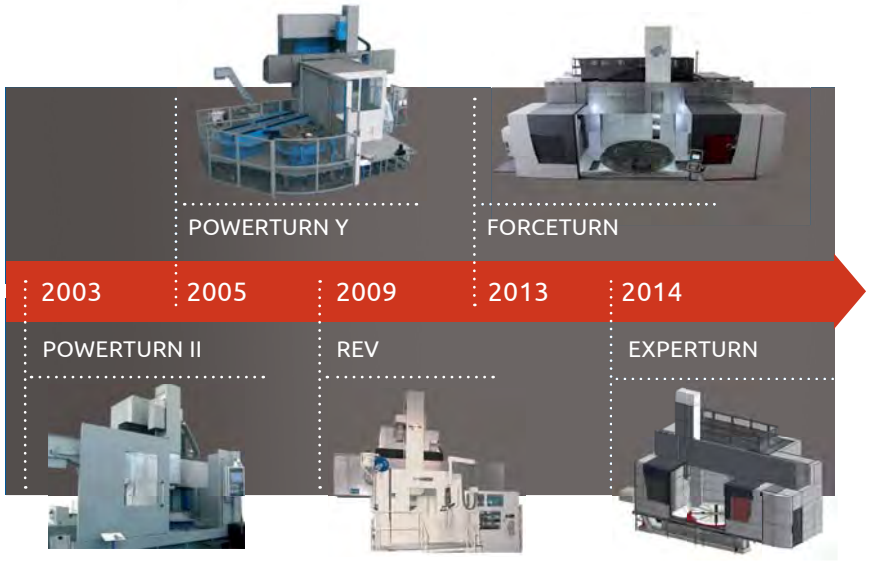
MOST IMPORTANT MOMENTS IN THE DEVELOPMENT OF TOSHULIN´S PRODUCTION

- The history of TOSHULIN began in 1949. Since 1951, the company has focused on the manufacture of vertical lathes.
- The company was one of the first in the world to design vertical lathes with continuous movements, copying capability and NC coordinate system control.
- The first machine with automatic tool exchange was built in 1974.
- The first machine with a pallet changer was built in 1986.
- The first machine with live spindle and C axis was built in 1986.
- In 1999, the POWERTURN machine was introduced.
- In the early 2000's, the new series SKL "lighter duty" machines was introduced along with the SKG – larger heavy duty machines.
- In 2002, the first machine with a table diameter larger than 4 meters was produced.
- The last fourteen years have produced significant advances in applied technology – Y axis machines, B axis heads, Y axis heads, increased live spindle speeds, higher levels of tool storage and flexibility.



- 2009 brought about the development of a machine with its main components – the base and column - made from high strength concrete. This provides more stable thermal and dampening properties for increased accuracy.
- In 2011, the new POWERTURN with the dual drive Master-slave system was produced. This machine has 140 kW (S1) capability and increased C axis speed.
- In 2012, we streamlined our product offering into four categories: BASICTURN, POWERTURN, EXPERTURN and FORCETURN.
- In 2014: newly developed multitastking headstock can be applied at the machine. Cylindrical sliding-out spindle is integrated into the ram. This spindle allows providing internal machining operations even at places with complicated access.



NEW PRODUCT SERIES

TRADITION ACCURACY RELIABILITY

MAIN APPLICATIONS

More than 13000 machines manufactured during the company's existence

References of manufacturing plants in more than 60 countries all over the world

Aircraft industry

- Jet engine components

Power industry

- Steam turbine components
- Gas turbine components
- Transmission components
- Electric motor components

Transportation industry

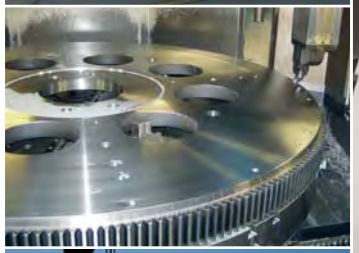
- Railway wheels
- Drive components

General industry

- Transmission components
- Healthcare diagnostic components
- Bearings
- Tire molds

Mining and chemical industry

- Special fittings,valves and pump components
- Drill bit components



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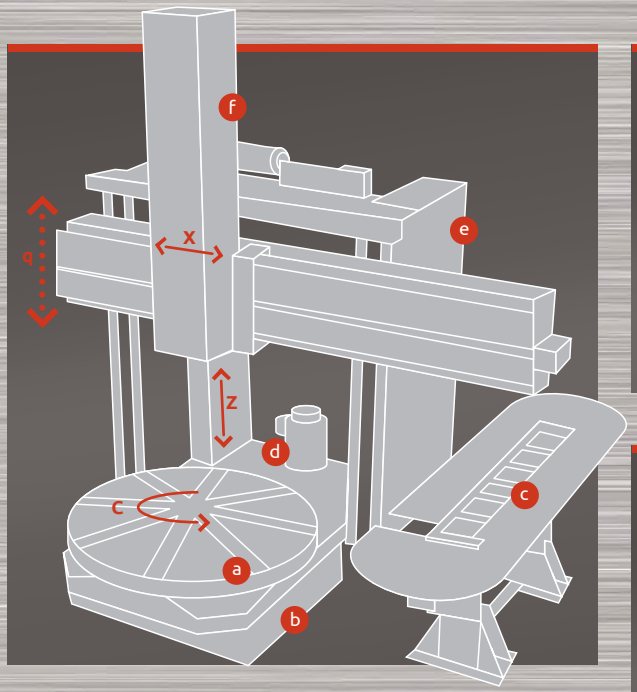
FEATURES OF A CNC MULTIFUNCTIONAL MACHINE TOOL



TABLE

a Tables of our own design are supplied in versions with manual clamping as well as integrated hydraulic chuck.

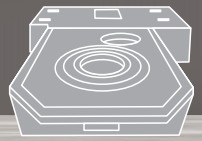
TABLE BEARING

The table is supported by a large cross-roller bearing or a hydrostatic system.

BASE

b The base is the foundation of the machine frame. It is made from high quality grey cast iron with ribbing for rigidity and support.

The main bearing and the mechanism driving the table are mounted on the base.



TOOL MAGAZINE

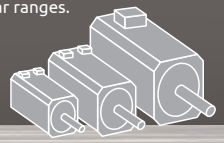
c Complete tooling is located in the tool magazine.

Tool magazines are supplied with various capacities depending upon the particular application.

TABLE DRIVE

d Top parameters of the drive for turning operations guarantee high-efficient machining. The drive includes the epicyclic gearbox with automatic shifting of two gear ranges.

Solid and precise drive mechanism for the table positioning (C-axis) provides high accuracy for drilling and milling.

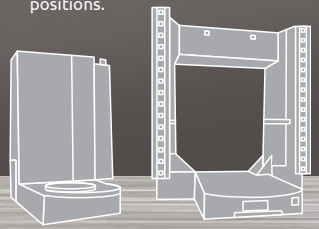


MACHINE FRAME

e The column or dual columns are made from high quality grey cast iron. The design includes specialized ribbing to provide exceptional strength and dampening characteristics.

The frame is designed with one column or two columns, dependant upon the machine size.

The cross rail can be adjusted for height and it is hydraulically clamped on the column in optimal positions.

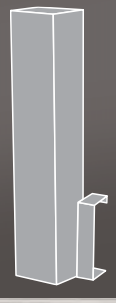


RAIL HEAD

f The horizontal motion is along the large cross rail. Bearing packs and mechanical preload provide high rigidity and dampening characteristics. The extremely large saddle width provides exceptional ram support.

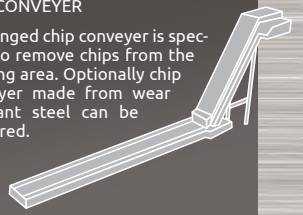
RAM

The ram is a forging which is heat treated and precisely ground. The large cross section provides support for long extensions and heavy machining. The ram has sixteen roller packs providing support and dampening for high machining accuracy.



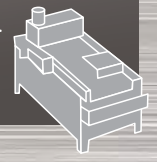
CHIP CONVEYER

The hinged chip conveyer is specified to remove chips from the working area. Optionally chip conveyer made from wear resistant steel can be delivered.



COOLANT TANK

The machine can be equipped with the coolant tank having the volume up to 2000 litres. Pumps installed in the tank deliver coolant under the selected pressure to the place of machining. Filtration equipment is included in the tank.



TRADITION ACCURACY RELIABILITY

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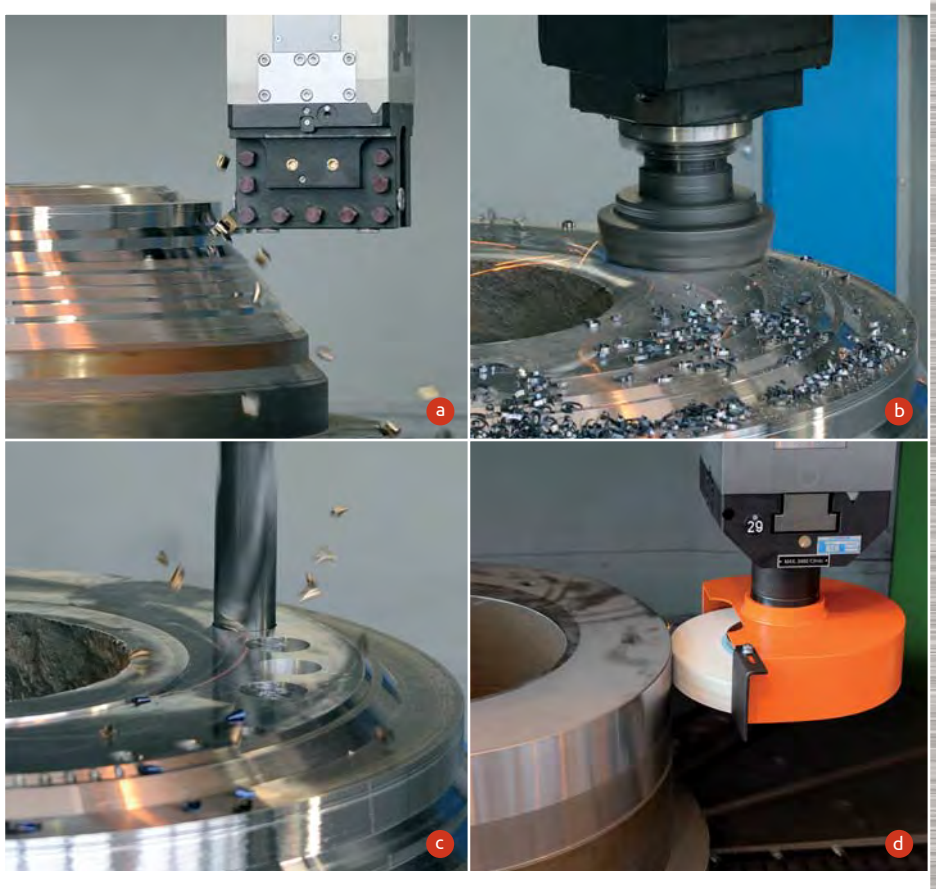
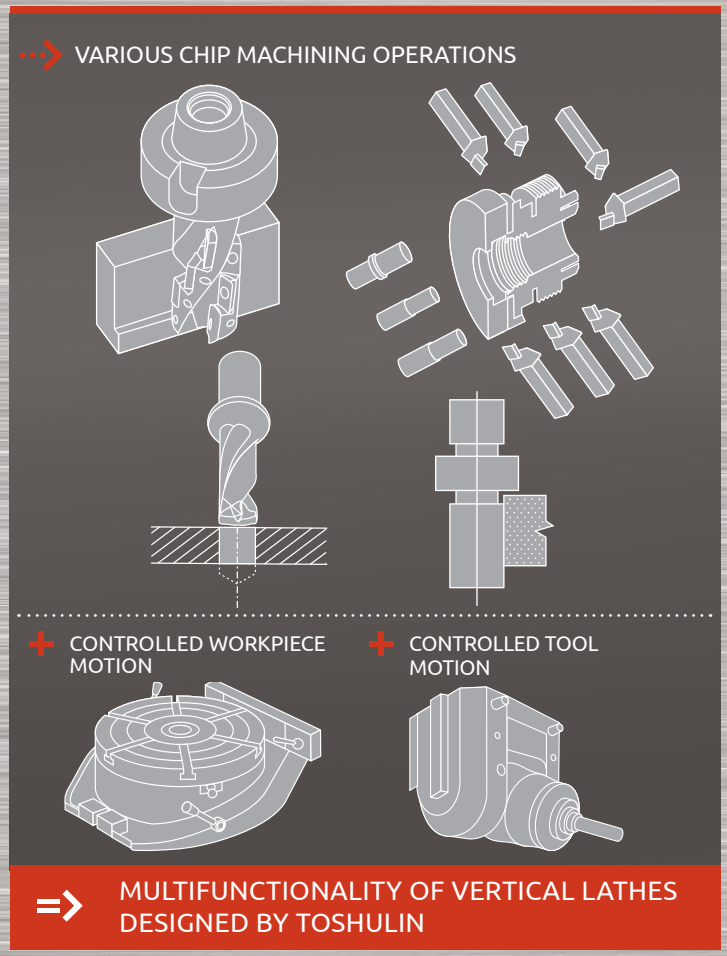
CHIP MACHINING OPERATION



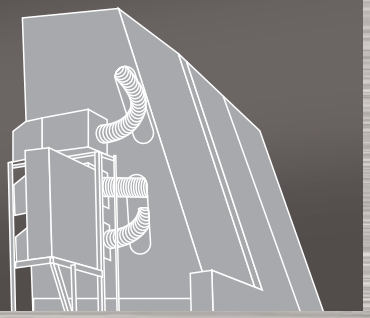
a Turning b Milling c Drilling d Grinding

MULTIFUNCTIONALITY

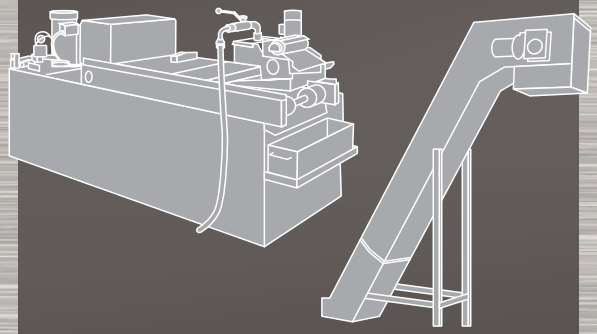


ECOLOGY

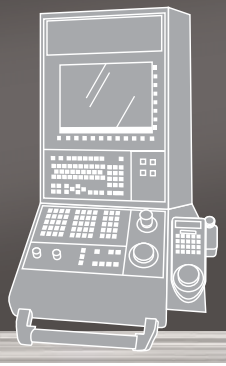
COMPLETE COVERAGE OF THE WORKING AREA WITH EXHAUSTION OF AEROSOL, SMOKE AND OTHER EMISSIONS



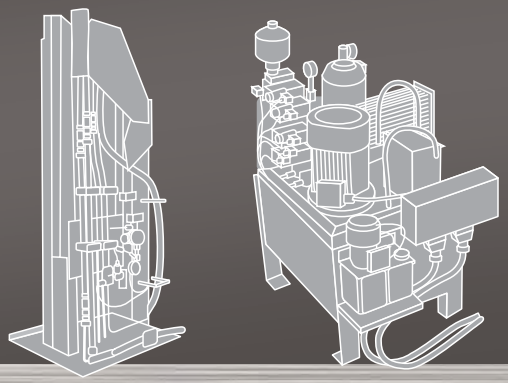
SEPARATION OF COOLANT AND CHIPS



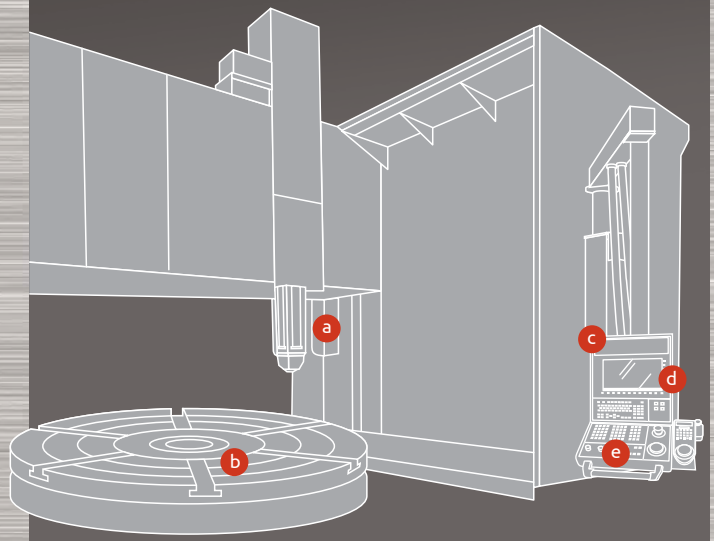
POWER MANAGEMENT OF THE POWER OUTPUT OF INSTALLED DRIVE



ENVIROMENTAL STYLE OF MEDIA SOURCES AND DISTRIBUTION ON THE MACHINE



INTELLIGENCE



- a Intelligent macros for tool measuring and workpiece measuring
- b Thermal stabilization
- c Diagnostics and help for the operator
- d Safety Integrated, Dual Check Safety
- e Easy operation using customized screens

TRADITION ACCURACY RELIABILITY

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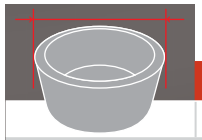
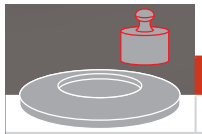
BASIC TECHNICAL PARAMETERS

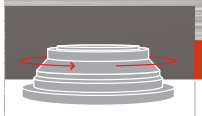
Table diameter [mm]	800	1000	1250	1600	2000	2500	3000	4000	5000	6000
BASICTURN			●	●	●	●	●	●		
POWERTURN	●	●	●	●	●	●	●	●	●	
EXPERTURN	●	●	●	●	●	●	●	●	●	
FORCETURN						●	●	●	●	●



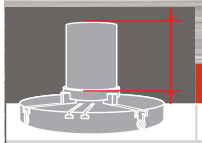
Maximum workpiece diameter [mm]	800	1000	1250	1600	2000	2500	3000	4000	5000	6000
BASICTURN			1400	2000	2300	2900	3600	5000		
POWERTURN	1000	1400	1400	2000	2300	2900	3600	5000	5800	
EXPERTURN	1000	1400	1400	2000	2300	2900	3600	5000	5800	
FORCETURN						2900	3600	5000	6300	7300



Maximum workpiece weight [kg]	800	1000	1250	1600	2000	2500	3000	4000	5000	6000
BASICTURN			8000	12000	20000	25000	25000	25000		
POWERTURN	4000	6500	8000	12000	20000	25000	30000	30000	30000	
EXPERTURN	4000	6500	8000	12000	20000	25000	30000	30000	30000	
FORCETURN						45000	45000	60000	80000	100000



Range of the infinitely variable table speed [rpm]	800	1000	1250	1600	2000	2500	3000	4000	5000	6000
BASICTURN			630	400	315	250	200	150		
POWERTURN	630	630	630	400	315	250	200	150	125	
EXPERTURN	INDIVIDUAL APROACH IN PRACTISE									
FORCETURN						250	200	150	125	100



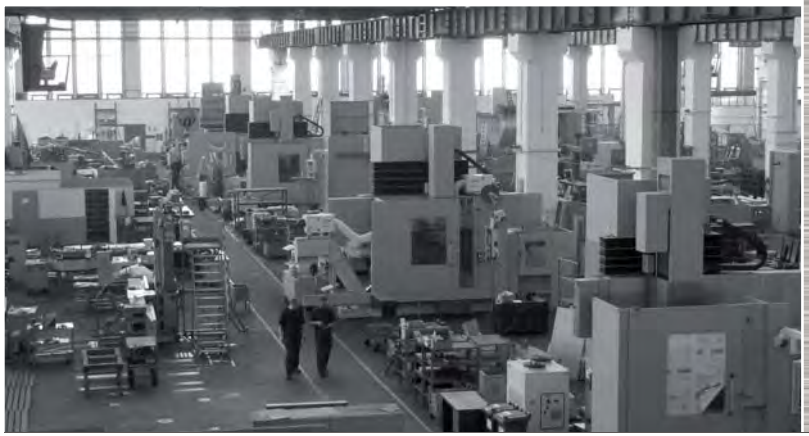
Maximum workpiece height [mm]	800	1000	1250	1600	2000	2500	3000	4000	5000	6000
BASICTURN			1900	2000	2000	2540	2540	2480		
POWERTURN	1300	1800	1800	2500	2500	3140	3140	3080	3080	
EXPERTURN	1300	1800	1800	2500	2500	3140	3140	3080	3080	
FORCETURN						4000	4000	5000	5000	5000

TOSHULIN, a.s.

Is a machine tool company with a long TRADITION established by successfully servicing the most demanding markets in the world.

The main features of its products are high ACCURACY, superior quality and customized solutions. TOSHULIN supplies the market with the most highly advanced technologies.

Our reputation for RELIABILITY and stability is well-known by our clients.



BASICTURN

EFFECTIVE MACHINING
OF A WIDE WORKPIECE RANGE.

SPEED EASY EFFICIENCY

POWERTURN

DEMANDING TECHNOLOGICAL
APPLICATIONS WITH HIGH ACCURACY.

POWER OUTPUT ACCURACY VARIABILITY

EXPERTURN

COMPLETE MACHINING
WITHOUT COMPROMISES.

USEFULNESS EXCEPTIONALITY UNIQUE CHARACTER

FORCETURN

HIGH-EFFICIENT MACHINING
OF LARGE WORKPIECES.

FORCE STABILITY ENERGY

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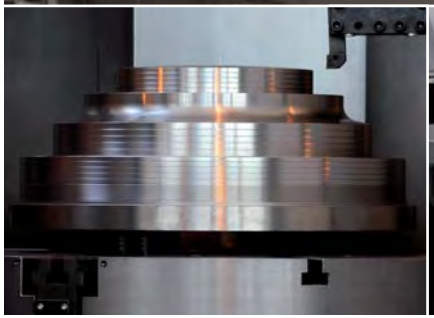
BASICTURN

Effective machining of a wide workpiece range

- Frame with high rigidity and stability
- Design emphasizing functionality and easy maintenance
- Pre-defined configuration enabling quick machine delivery
- Control systems Siemens or Fanuc
- Possibility to equip the machine with table positioning (C-axis) and with the rotary tool drive
- Automatic exchange of turning tools and rotary tools
- Ram designed for efficient and precise machining
- Variable height of the working area
- Possibility to perform high-pressure, through the tool cooling
- Up-to-date and user-comfortable operation

SPEED EASY EFFICIENCY



MAIN ADVANTAGES

SPEED

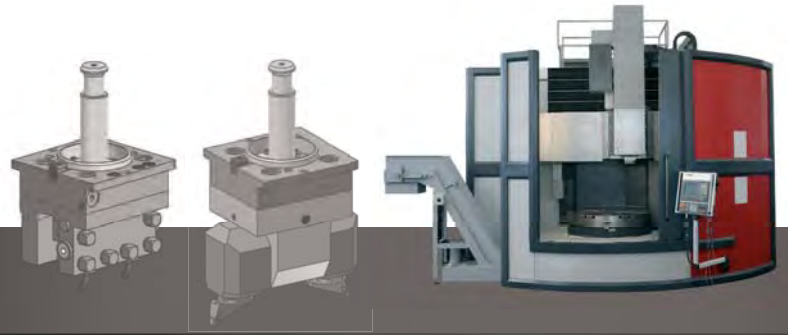
- Modular configuration for a quick design of the optimal machine specification
- Efficient implementation of selected options
- Quick delivery and short machine assembly

EASY

- Functional design and ergonomy enable easy maintenance, control and operation

EFFICIENCY

- Large machine frame with robust rigidity and stability enables high machining output
- Automatic tool exchange increases machining efficiency
- Ram with the integrated spindle as an efficient variant for applications with a higher number of rotary tools
- In addition to standard tool holders for turning tools 40 × 40mm, it is possible to supply tool holders for modular tool systems (e.g. Capto)



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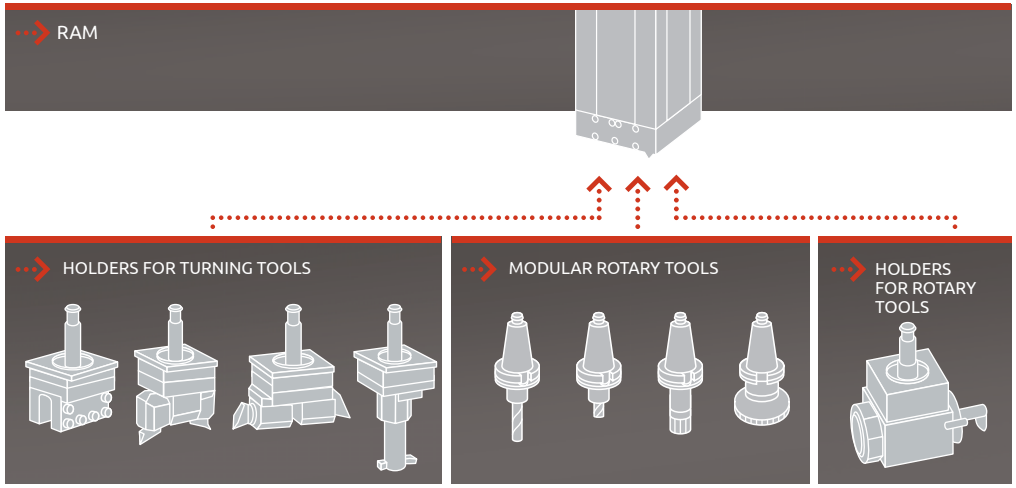
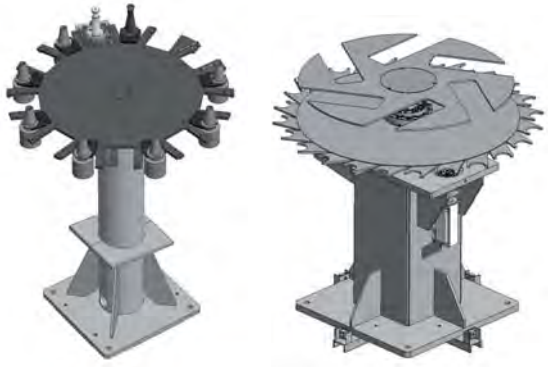
BASICTURN 1

AUTOMATIC TOOL EXCHANGE

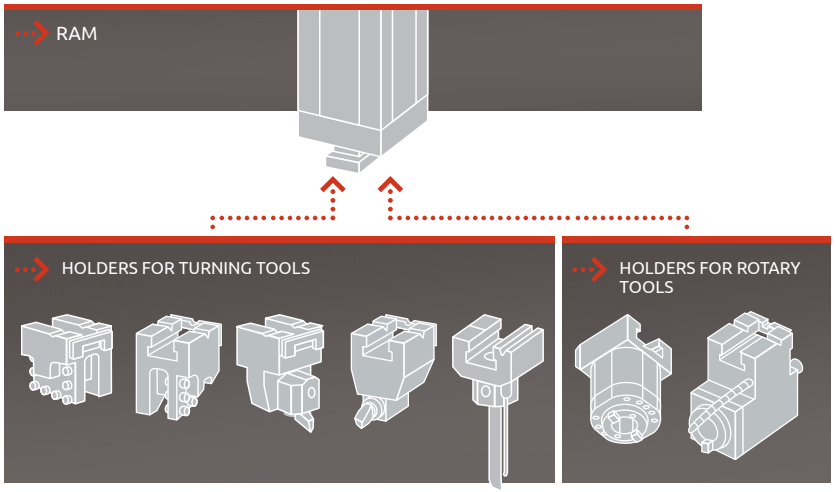


TOOL MAGAZINE

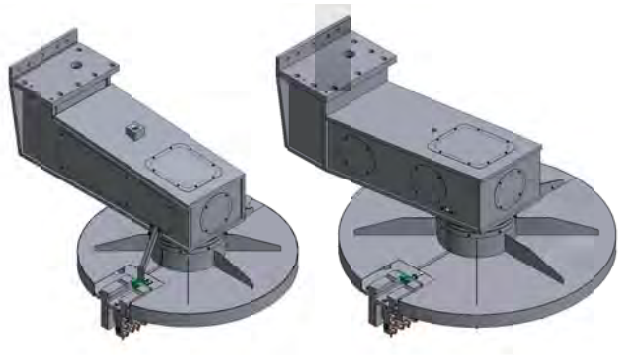
- Disc magazine with 17 places
- Two-level disc magazine with 6+24 places



BASICTURN 2



- Disc magazine with 9 places
- Disc magazine with 12 places

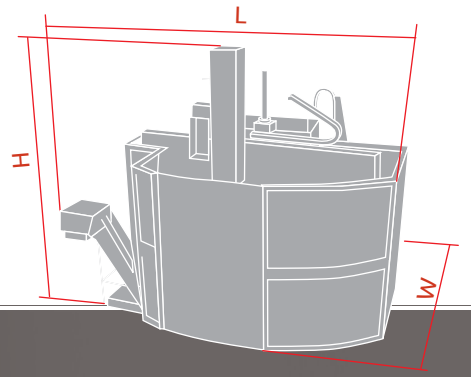


Basic technical parameters *

BASICTURN		1250	1600	2000	2500	3000	4000
WORKING RANGE							
Maximum workpiece diameter	mm	1400	2000	2300	2900	3600	5000
Maximum workpiece height	mm	1400 (1900)	1500 (2000)		1940 (2540)		1880 (2480)
Maximum workpiece weight	kg	8000	12000	20000	250000		
TABLE							
Table diameter	mm	1250	1600	2000	2500	3000	4000
Main motor power output	kW	44 (58) / 45 (60)	58 (81) / 60 (75)				
Maximum table speed	1/min	400 (500, 630)	315 (400)	250 (315)	200 (250)	200	150
RAIL HEAD							
Rail-head section	mm	200 × 240					
Ram working stroke (Z-axis)	mm	BASICTURN 1: 1360, BASICTURN 2: 1060 (1360)					
AUTOMATIC TOOL EXCHANGE							
Tool magazine capacity		BASICTURN 1: 17 (6+24), BASICTURN 2: 9(12)					
ROTARY TOOL DRIVE							
Motor power output (Siemens / Fanuc)	kW	22					
Maximum speed of rotary tools	1/min	4 – 3000					

Basic dimensions **

Basic machine size		1200	1600	2000	2500	3000	4000
Length (L)	mm	7060	7665	8200	8650	9525	11550
Depth (W)	mm	5540	5625	6090	6950	6950	8450
Height (H)	mm	5555	5655	5655	6395	6395	6395



* Specifications subject to change without notice
** Can be different according to concrete specification

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POWERTURN

Demanding technological applications with high accuracy

- Table diameter ranging from 800 to 5000 mm
- Time-tested frame design which guarantees high rigidity and stability during machining
- Very precise table positioning (C-axis) and rotary tool drive with high power output
- Control systems Siemens or Fanuc
- Great variability of tooling
- Tool magazine specification based upon the customer´s wish
- Machine can be equipped with the automatic exchange of pallets and/or manual or hydraulic chucking capability
- Application of high-pressure coolant in the cutting process
- Fully enclosed machining area with patented enclosure for smaller air filters and separating the ballscrews, scales, motors and connections from the coolant mist
- Possibility to connect an air filter system
- Extra travel range in the X-axis in both directions from the table centre

POWER OUTPUT ACCURACY VARIABILITY

MAIN ADVANTAGES

POWER OUTPUT

Long-time utilization of high output, working accuracy and machining stability are provided by:

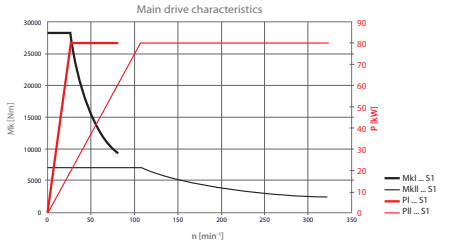
- Robust design of the machine frame
- Optimum setting of the table bearing preload
- Ideal ratio of the ram section relative to its extension
- Rigid tool holder (adapter) clamping in the ram
- Thermal stabilization system of the machine

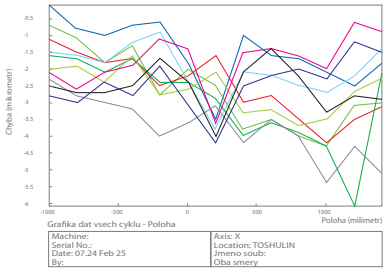
ACCURACY

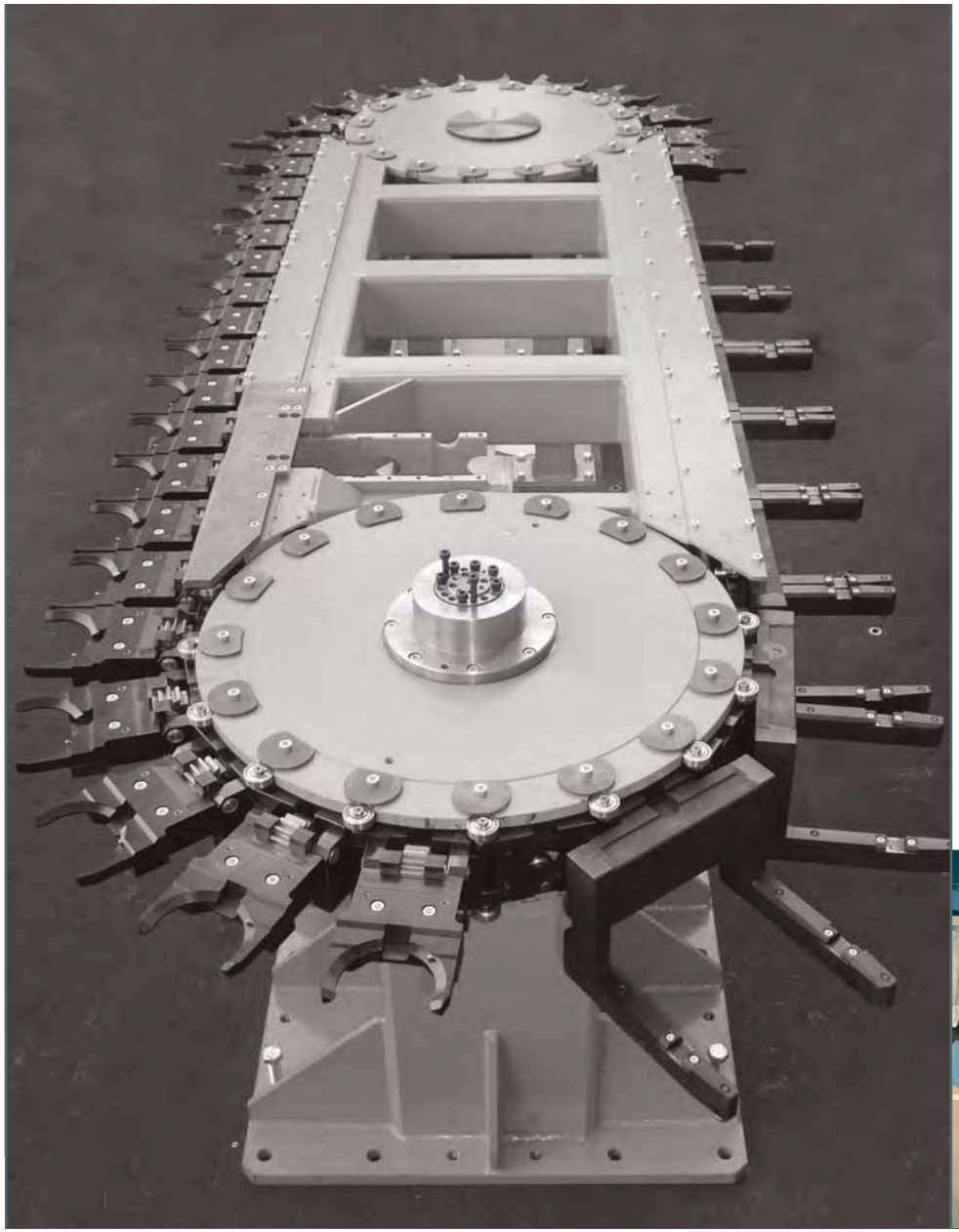
All of TOSHULIN´s production are thoroughly measured and adjusted before they are shipped to the customer.

This includes:

- Machine geometry and its accessories
- Working tests
- Measuring of positioning accuracy
- Testing of the maximum output

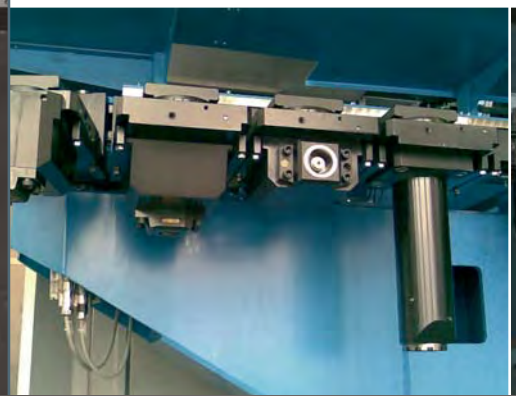






VARIABILITY OF THE TOOL MAGAZINE

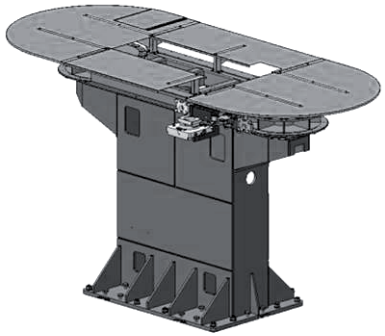
- Tool magazine is chain-style
- Fixed tool magazines are delivered in basic sizes with 45, 75 and 95 chain links
- Machines with increased machining heights can be equipped with lifting tool magazines in sizes – 60, 76, 96
- Final configuration is based upon the customer´s particular application
- Chain links are occupied by storage places for tool holders/adapters, rotary tools, turning tools and measuring probes
- Tool magazine is equipped with a mechanism enabling the automatic tool exchange of a tool in vertical as well as in horizontal position
- The tool magazine can be configured with modular tools of various standards

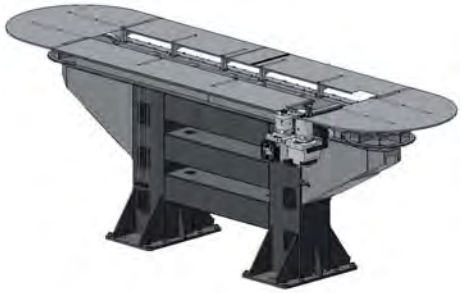


VARIABILITY OF THE TOOL MAGAZINE

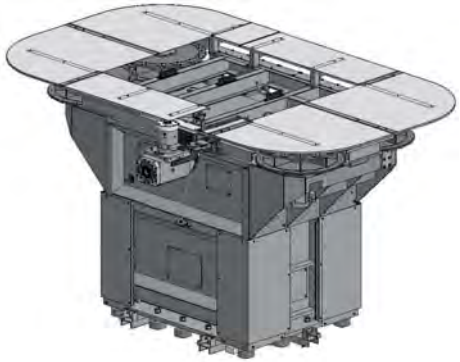
POWERTURN 1

- Fixed tool magazines are delivered in basic sizes with 45, 75 and 95 chain links



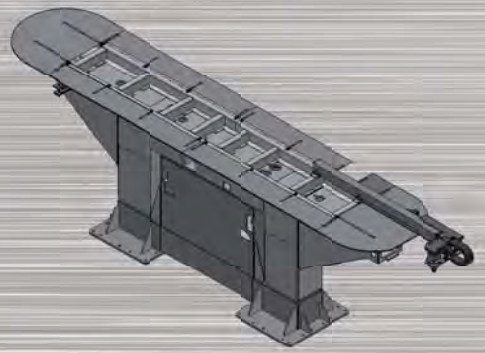


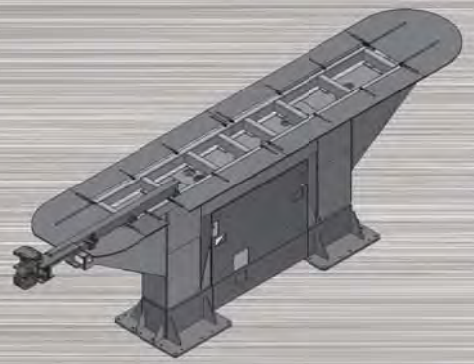
- Machines with heights can be equipped with lifting tool magazines in sizes – 60, 76, 96.



POWERTURN 2

- Lifting and non-lifting tool magazine can be delivered in sizes with 20 or 30 chain links





POWERTURN

POWER OUTPUT ACCURACY VARIABILITY

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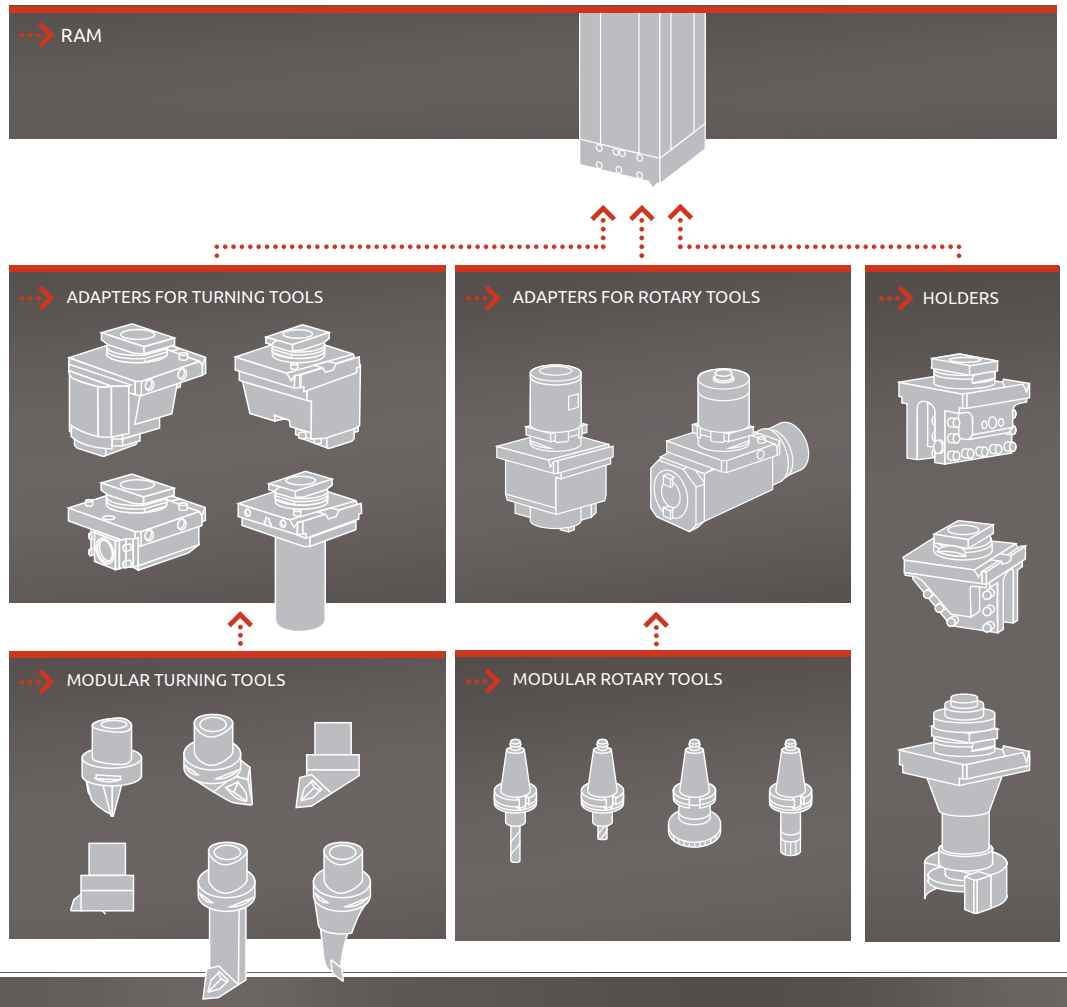
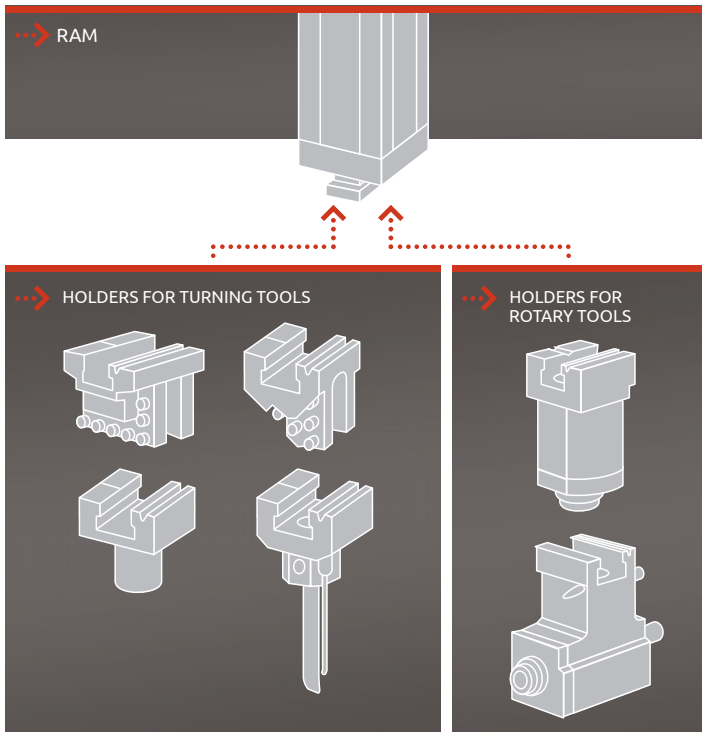
VARIABILITY OF TOOLS

POWERTURN 1



POWERTURN 2

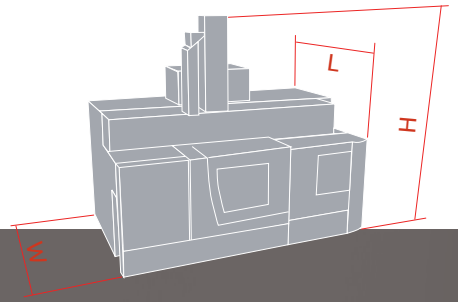


Basic technical parameters *

POWERTURN		800	1000	1250	1600	2000	2500	3000	4000	5000
WORKING RANGE										
Maximum workpiece diameter	mm	1000	1400	1400	2000	2300	2900	3600	5000	5800
Maximum workpiece height	mm	1300	1300 (1800)		1400 (1900, 2100, 2500)		1840 (2440, 3140)		1780 (2380, 3080)	
Maximum workpiece weight	kg	4000	6500	8000	12000	20000	25000	30000		
TABLE										
Table diameter	mm	800	1000	1250	1600	2000	2500	3000	4000	5000
Main motor power output	kW	44 (58) / 45 (60)			58 (81) / 60 (75)			81 (105) / 75 (100)		
Maximum table speed	1/min	400 (500, 630)			315 (400)	250 (315)	200 (250)	200	150	125
RAIL HEAD										
Ram section	mm	240 × 240								
Ram working stroke (Z-axis)	mm	1280	1280 (1500)				1500			
ROTARY TOOL DRIVE										
Motor power output (Siemens/Fanuc)	kW	22 (31, 37) / 22 (30, 37)								
Maximum speed of rotary tools	1/min	3000 (4500)								
AUTOMATIC TOOL EXCHANGE										
AUTOMATIC TOOL EXCHANGE OF MODULAR TOOLS POWERTURN 1										
Number of chain links in the chain tool magazine		45 (60, 75, 76, 95, 96)								
AUTOMATIC TOOL EXCHANGE OF TOOL HOLDERS POWERTURN 2										
Number of tool holders inthe chain tool magazine		20 (30)								

Basic dimensions **

Basic machine size		800	1000	1250	1600	2000	2500	3000	4000	5000
Length (L)	mm	7915	7915	7915	8435	8950	8830	9590	11675	12635
Depth (W)	mm	6575	6575	6575	6590	6680	8445	8445	9050	9550
Height (H)	mm	5895	6950	6950	7050	7050	7590	7590	7590	7590



* Specifications subject to change without notice
** Can be different according to concrete specification

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EXPERTURN

Complete machining without compromises

- Extraordinarily rigid and stable machine frame from cast iron or high performance concrete
- Ram designed for high-efficiency machining
- Very precise table positioning (C-axis) and rotary tool drive with high power output
- Optional hydrostatic guiding in linear axes
- Table bearing – optionally hydrostatic system / crossed roller bearing
- Possibility to complete machine configuration with the controlled Y-axis
- Wide tooling range
- Machine accuracy adapted to client specification
- Possibility to apply high-pressure cooling or UHPC
- Highly customizable to meet client specifications

USEFULNESS EXCEPTIONALITY UNIQUE CHARACTER

MAIN ADVANTAGES

USEFULNESS

- Machine is configured to fulfill a particular special requirement or technological application
- Design and machine equipment consider the requirements placed on high machining accuracy, high machining output, application of special tool holders specified for special operations or designed to keep special cutting conditions

EXCEPTIONABILITY

- Complete variability of particular machine assembly groups specified to reach parameters necessary to perform required machining
- Realization of specific customer's wishes is enabled by strong technical background (own engineering office, team of skilled application technicians and exceptional project management)
- We manufacture our own key machine components. We have thorough quality inspection and qualified assembly team to quickly implement design and technological enhancements

UNIQUE CHARACTER

- Individual approach creating unique solutions for machining of high performance alloys, railway wheels, very precise parts of aircraft engines or workpieces with complex shapes
- An example of an individual solution is the realization of tooling designed to machine a particular workpiece

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INDIVIDUAL APPROACH TO CUSTOMER APPLICATIONS

a Controlled Y-axis
It enables complete workpiece machining (turning, boring of off-axis holes, milling of general surfaces on the workpiece casing, etc.)

b Matrix tool magazine with a manipulator
Flexible and quick automatic tool exchange with high capacity of storage places

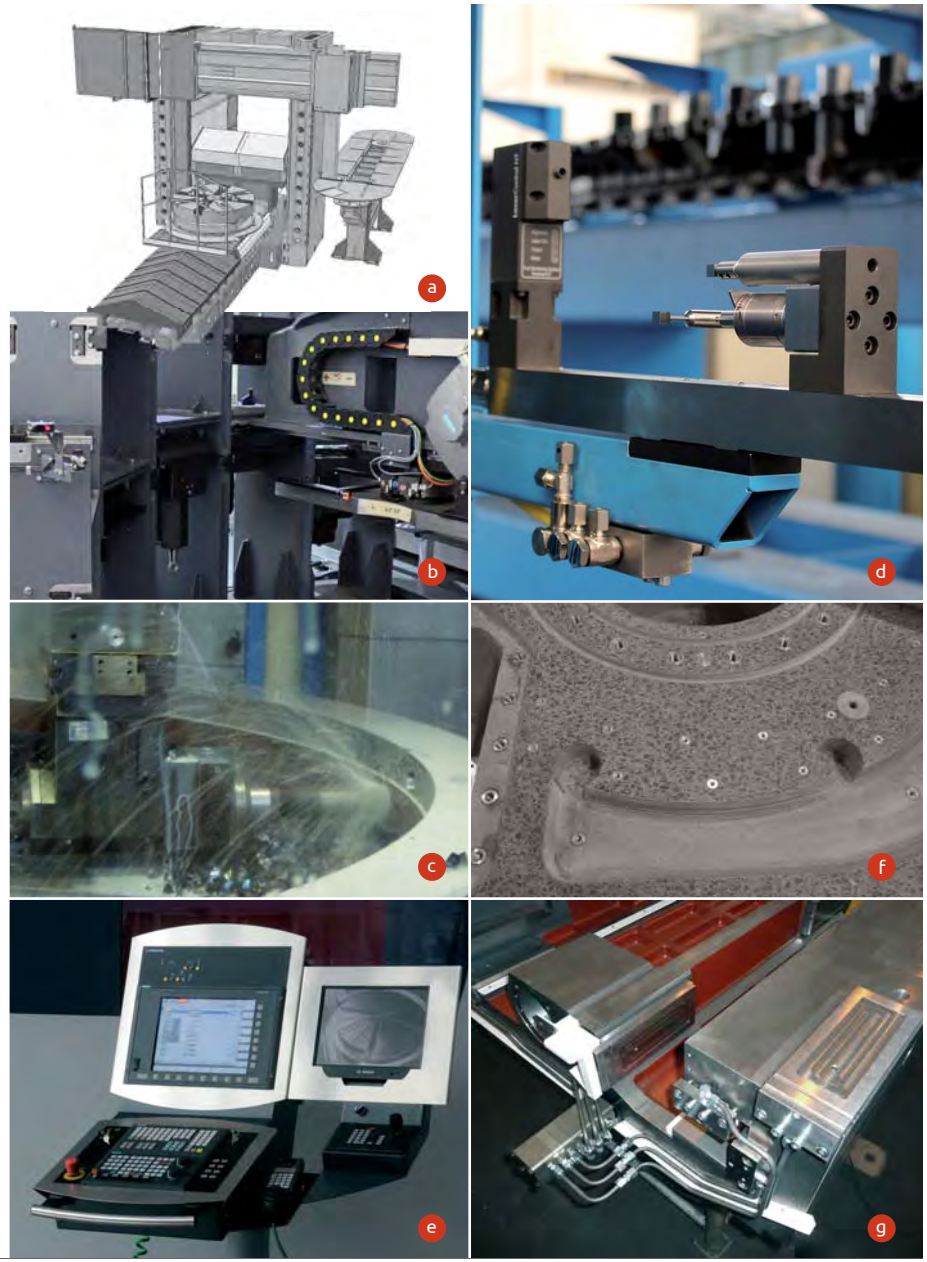
c UHPC cooling (up to 400 bar)
Increase the efficient machining of high performance alloys

d System for complete measuring of rotary and turning tools
Standard contact measuring of turning tools is completed by measuring of rotary tools with a laser beam based system

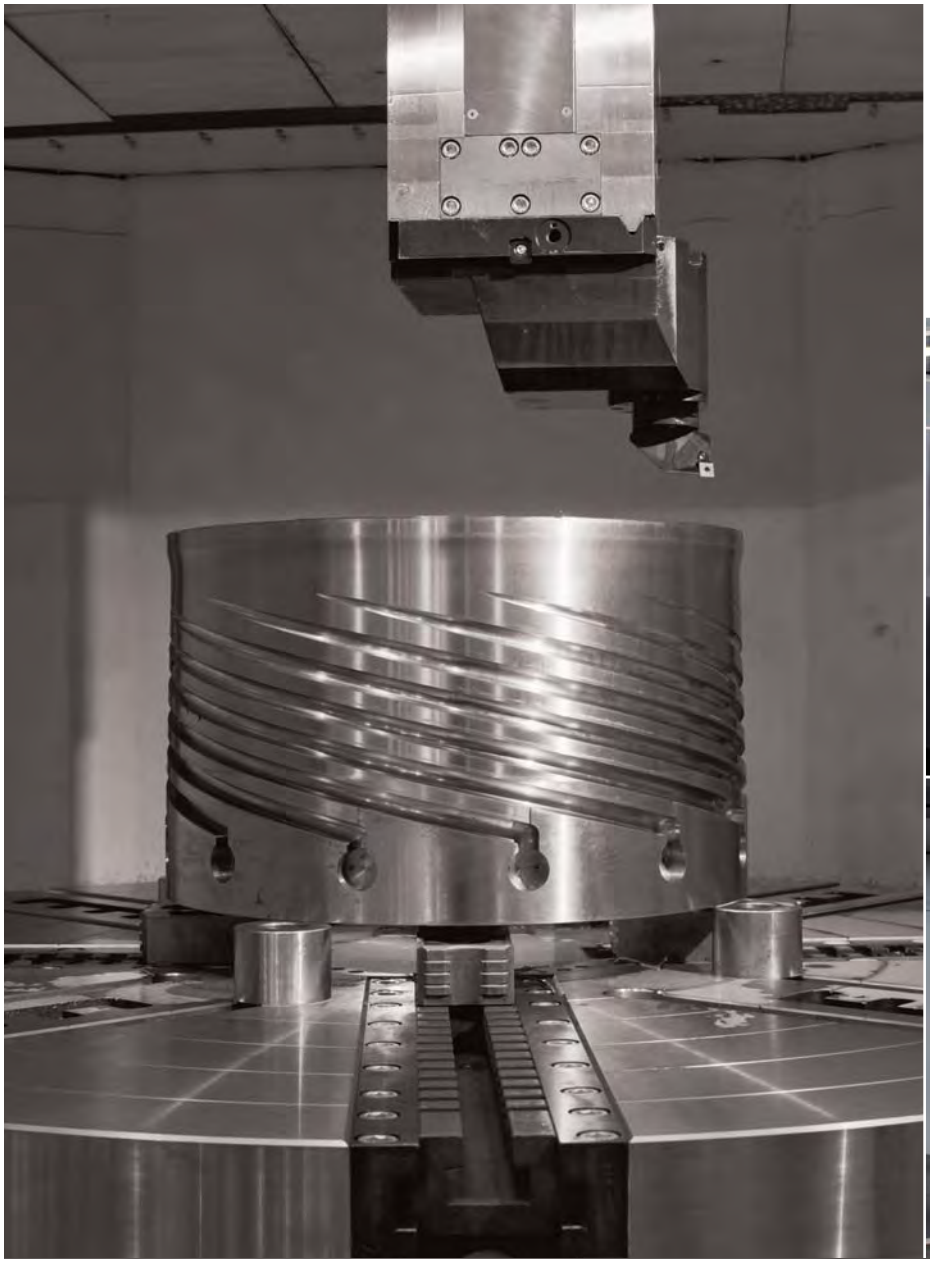
e Camera system in the working area
It simplifies the viewing of machining operations, of tall or complicated workpieces and it enables viewing of places which are usually inaccessible

f Machine frame from high performance concrete
It provides perfect thermal stability and dampening of undesirable vibrations during machining

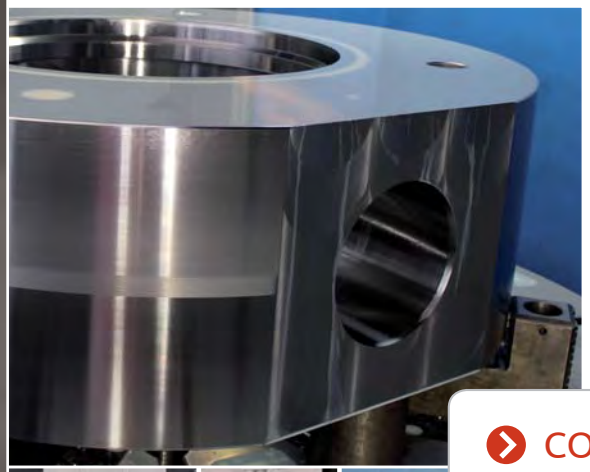
g Hydrostatic guiding of linear axes
For long-term accuracy and high dynamic rigidity of the machine

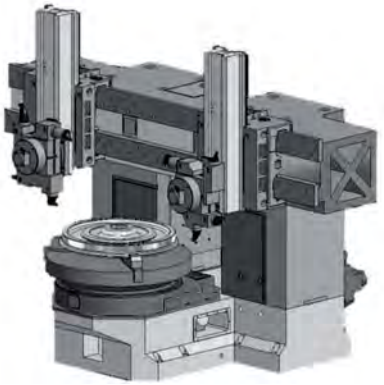


USEFULNESS EXCEPTIONALITY UNIQUE CHARACTER

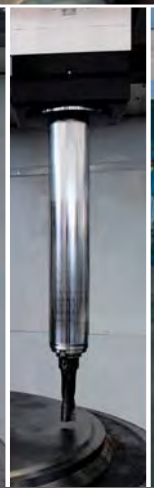


APPLICATION EXAMPLES





COMPLETE MACHINING
WITHOUT COMPROMISES.



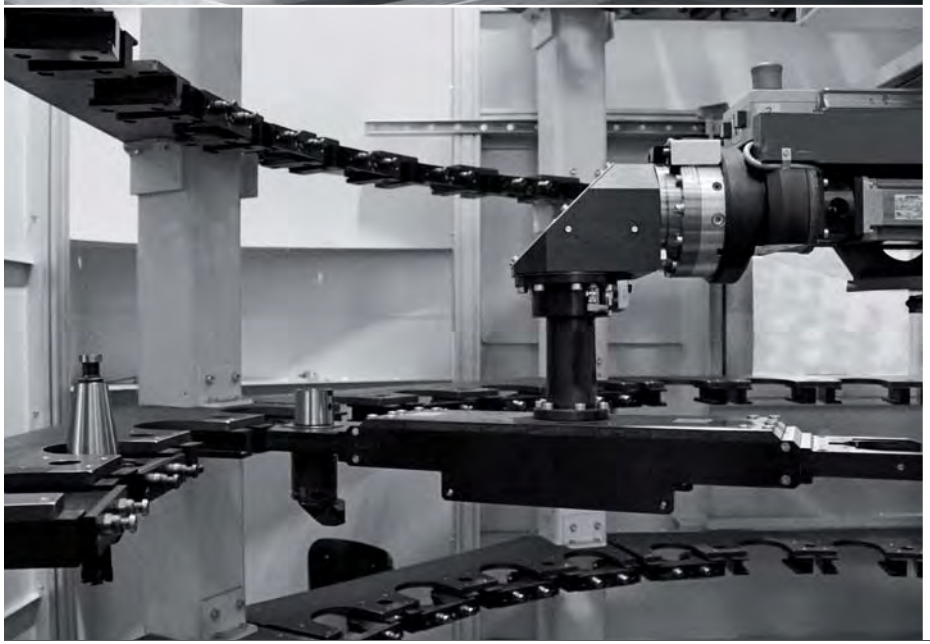
EXPERTURN

FORCETURN

High-efficient machining of large workpieces

- Table size ranging from 2500 to 6000 mm
- Capability to machine high and heavy workpieces
- Highly stable machine frame from cast iron specified for high efficiency machining
- Ram designed for the most efficient machining
- Extremely rigid table bearing using hydrostatic guiding principles
- Precise table positioning (C-axis) and the rotary tool drive with high power output
- Control systems Siemens or Fanuc
- Possibility to use high pressure coolant
- Great variability of tooling
- Increased travel range in the X-axis in both directions from table center
- Protective guarding to keep chips and coolant inside the machine

FORCE STABILITY ENERGY



MAIN ADVANTAGES

FORCE

- Table bearing system with a high weight capacity. Large ram section with precise guides for use of high machining power output for long time periods. Heavy material removal – even at full ram extension. High productivity with optimal parameters of the rotary tool drive system. The machine uses the variable system of automatic tool exchange. Modular clamping systems of turning and rotary tools (CAPTO, KM, HSK, ISO, CAT) are utilized to reach the full machine potential. Turning holders also available for 50 × 50 mm tooling.

STABILITY

- Ribbing and structural design of the base, columns, bridge and cross rail comprise the structure of for the robust and extremely rigid machine frame. The complete structure is optimized by means of the latest modeling techniques.

ENERGY

- FORCETURN machines are specified for machining of large and heavy workpieces with the particular machine parameters adapted for their efficient machining. The robust ram with the extra long working extension as well as the parameters of the Master-Slave table drive enable high machining productivity, heavy chip removal and a large reduction in machining time.

  High manufacturing productivity and reliability support the long-term operation of the machine. Accessible components and design allow for easy operation and service.

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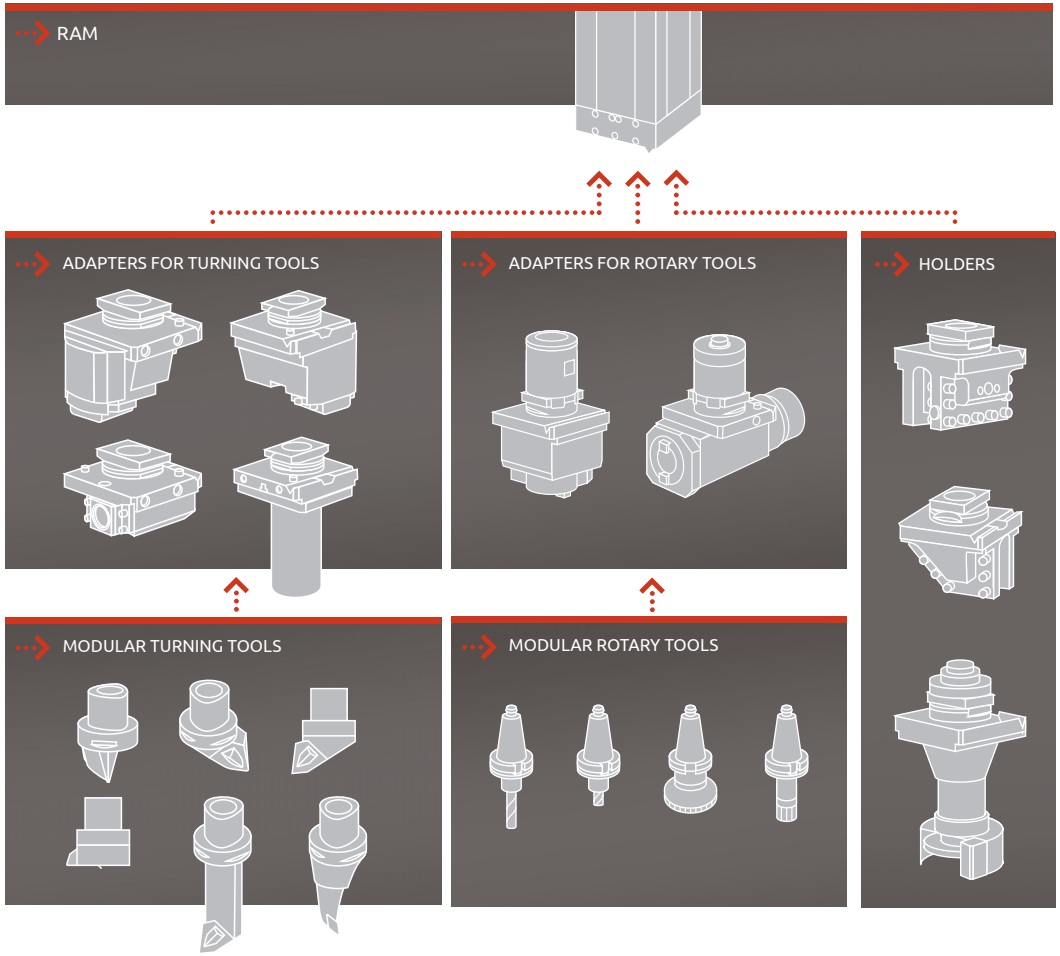
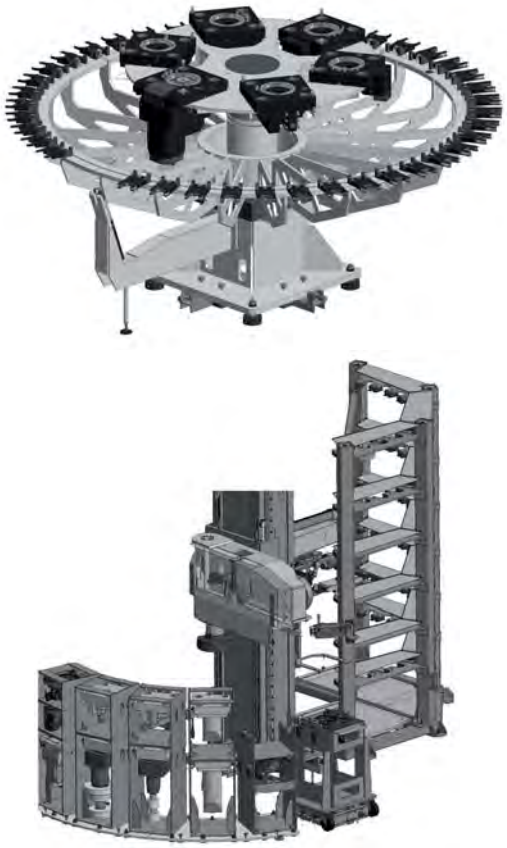
AUTOMATIC TOOL EXCHANGE



TOOL MAGAZINE

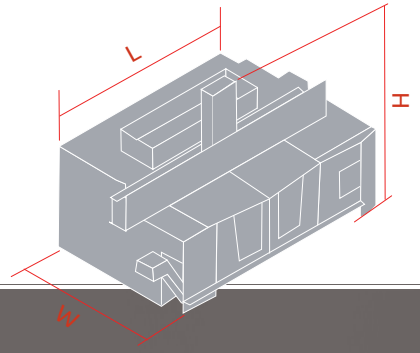


Basic technical parameters *

FORCETURN			2500	3000	4000	5000	6000
WORKING RANGE							
Maximum workpiece diameter		mm	2900	3600	5000	6300	7300
Maximum workpiece height	FORCETURN 1	mm	2500 (3500, 4000)		2500 (3500, 4000, 5000)		
	FORCETURN 2		1840 (2440, 3140)		1780 (2380, 3080)		
Maximum workpiece weight		kg	45000 (30000)		60000 (40000)	80000 (50000)	100000 (50000)
TABLE							
Table diameter		mm	2500	3000	4000	5000	6000
Main motor power output		kW	2 × 58 (2 × 71) / 2 × 60 (2 × 75)		2 × 58 (2 × 71, 2 × 105) / 2 × 60 (2 × 75, 2 × 100)		
Maximum table speed		1/min	200 (250)	200	125 (150)	100 (125)	80 (100)
RAIL HEAD							
Ram section		mm	400 × 400 (320 × 320)				
Ram working stroke (Z-axis)		mm	2000 (2500)				
AUTOMATIC TOOL EXCHANGE							
Tool magazine capacity (adapters + modular tools)			6+40 / 6 (8, 10, 12) + 40 (60, 82, 124)				
ROTARY TOOL DRIVE							
Motor power output (Siemens/Fanuc)		kW	31 (51) / 30 (45)				
Maximum speed of rotary tools		1/min	4 – 3000				

Basic dimensions **

Basic machine size		2500	3000	4000	5000	6000
Length (L)	mm	11300	11800	13300	15000	16600
Depth (W)	mm	7600	7600	8300	8800	9300
Height (H)	mm	8870	8870	8870	8870	8870



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OPTIONAL EQUIPMENT POSSIBILITIES

a Table positioning (C-axis) and rotary tool drive
These features add to the standard functions of the vertical lathe by using rotary tools -drilling, tapping, milling and grinding. It is possible to machine circular and linear workpiece shapes.

b Working area height
Possibility to select the working area height considering the dimensions of planned workpieces.

c Table types
Hydraulic chucks available to reduce the part setup time and increase accuracy and efficiency.

d Hydraulically lifted platforms
For operator's comfort during work performed inside the machine working area.

e Automatic pallet exchange system
Enables the simultaneous main machining time and setup time (adjusting, setting, clamping) to considerably increase machine productivity.

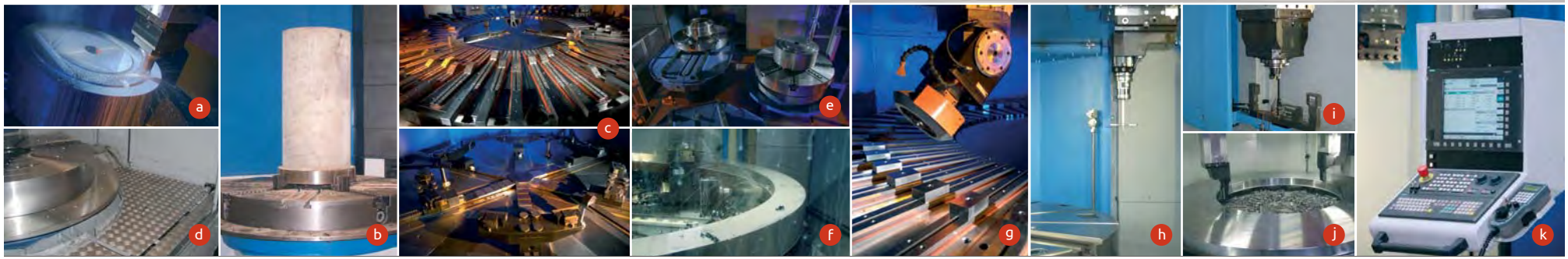
f High pressure tool coolant
The machine can be prepared for machining with high-pressure coolant and with through the tool coolant. This enables higher part quality and reduces machining time.

g Grinding spindle
This feature adds to the standard function of the vertical lathe with a dedicated grinding spindle. An automatic wheel dresser is also available.

h Automatic workpiece measuring
This provides automatic part dimension measurement and offset during the machining process.

i Automatic tool measuring
This provides automatic tool measurement and offset.

j Second ram
Efficient machining with two tools at the same time.



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k Tool condition monitoring

The automatic tool condition monitoring system reduces the risk of workpiece damage due to collision or tool breakage.

l Special head with an additional axis

1 B- head

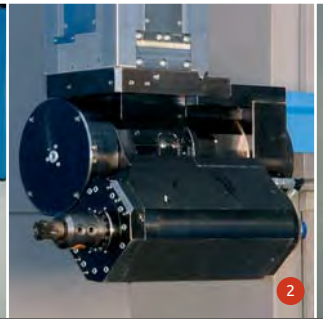
This head increases the machining possibilities with a controlled B-axis. This is used for drilling and milling of angled features.

2 Y-head

This head increases the machining possibilities with a controlled Y-head on the side of the workpiece. This is used for drilling and milling of off-center features – both in front and behind table centerline.

3 Facing head

This head increases the machining possibilities by turning of shaped surfaces and holes on the workpiece side surface. It is used for rotational symmetrical surfaces on the horizontal axis of rotation.



	BASICTURN	POWERTURN	EXPERTURN	FORCETURN
TABLE POSITIONING (C-AXIS) AND ROTARY TOOL DRIVE	●	●	●	●
WORKING AREA HEIGHT	●	●	●	●
SELECTABLE TABLE TYPE	●	●	●	●
HYDRAULICALLY LIFTED PLATFORMS		●	●	●
AUTOMATIC PALLET EXCHANGE SYSTEM		●	●	
HIGH PRESSURE TOOL COOLANT (TILL 70 BAR)		●	●	●
ULTRA HIGH PRESSURE COOLANT (UP TO 400 BAR)			●	
AUTOMATIC WORK PIECE MEASURING	●	●	●	●
AUTOMATIC TOOL MEASURING	●	●	●	●
SECOND RAM		●	●	●
TOOL CONDITION CHECK		●	●	●
SPECIAL HEADS WITH THE ADDITIONAL AXIS		●	●	●

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MAJOR OVERHAULS

Major machine overhaul and modernization is an important service we provide.

- Own technical background
- Technical experience of several generations
- Flexible personal approach
- Solution of the most complicated customers' wishes
- Individual approach to each order
- Major overhauls of machines built by different producers

MAJOR OVERHAUL OF MACHINE MECHANICAL PARTS AND MODERNIZATION WITH NEW ELECTRICAL COMPONENTS

- Repair of all guideways – grinding, milling
- Replacement of bearing packs and spacers
- Replacement of bearings
- Replacement of ball screws and nuts
- Replacement of gears in the gearboxes
- Table repair
- New rotary encoder for table speed and position
- Replacement of the lubrication system including the hydraulic set
- Replacement of electrical wiring including the electrical switch box
- New electrical devices in the electrical switch box
- Replacement of the main motor and feed drives
- New control panel including the auxiliary control panel
- Replacement of the control system
- New chip conveyer
- New type of protective guards
- New machine painting
- Measuring records of accuracy under the same conditions as for new machines
- New technical documentation including the foundation plan

FROM THE OLD TO THE UP-TO-DATE

COOPERATION POSSIBILITES

Major overhaul by an exchange

- Minimalization of manufacturing loss
- Exchange variability – possibillity of machine with higher parameters
- Quick delivery time

Major overhaul of a customer's own machine

- Improved machine accuracy
- Increase machine operator's comfort
- Increased competitiveness
- Reduced machine operation costs
- Increased productivity
- Improve reliability

Offer of machine after major overhaul

- Lower-priced alternative compared to purchase of a new machine
- It is possible to provide machine according to customer´s wish
- Machine on stock – quick delivery

Purchase of machines made by our company

- Attractive pricing
- Posibillity of long-term cooperation

MAJOR OVERHAULS

AFTER SALE SERVICE

Warranty repairs

- Immediate service and repair
- Prompt arrangement of subcontractor´s warranty

Repairs after warranty

- Response of service workers in a short time
- Possibillity of regular inspection of machine

HOT LINE

- Consultation by phone regarding the machine operation
- On-line support at troubleshooting
- Contact point for remote diagnostics requests

Spare parts

- Quick delivery – external stocks of spare parts at selected representatives
- Original spare parts

Remote Diagnostics

- The fastest way to identify machine faults
- Very short time from reporting the failure up to the first on-line contact with the customer
- Together with the customer it is possible to immediately determine if a spare part is required.
- Efficiency at troubleshooting is more than 90%
- After a control system failure it is possible to perform its remote recovery
- Backup of machine data at TOSHULIN, a.s.

Application technology

- Turnkey machine delivery, specification of tools, creation of technology programs and machining of a workpiece according to customer's specification

COMPLETE SERVICE OF MACHINES MADE BY OUR COMPANY.

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