



TRANSFER CENTER

FM SMART

APPLICATION

Highly productive and flexible multi-spindle machining in a new design

Since many years ELHA-MASCHINENBAU is the market leader for highly productive transfer centers which are mainly utilized for mass production of automotive parts. More than 350 installed units including process are proof for the great success of this concept.

With the new **FM SMART** Series ELHA launches a great and so far unknown flexibility for multispindle machining on transfer centers. Therefore it provides a real alternative to conventional machining centers.

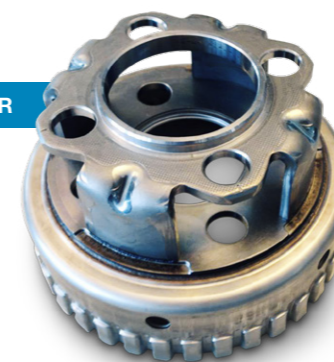
Best machining concept for:

- ✓ Medium up to big lots
- ✓ Small and midsize workpieces
- ✓ Fast work set up and retooling
- ✓ Light metals, (stainless) steels, forging and casting materials

**FLEXIBILITY-
NEWLY DEFINED !**

PLANETARY CARRIER

- steel
- complete machining in one fixture position
- 4 workpieces simultaneous



JOINT FLANGE

- casting material GGG 70
- complete machining in one fixture position
- 2 workpieces simultaneous



WHEEL HUB

- casting material
- partial machining in one fixture position
- 2 workpieces simultaneous



PUMP HOUSING

- die cast aluminium
- complete machining in one fixture position
- 3 workpieces simultaneous



TURBOCHARGER CENTER HOUSING

- cast iron
- partial machining in one fixture position
- 3 workpieces simultaneous



CYLINDER HEAD

- forged steel
- complete machining in two fixture positions
- 4 workpieces simultaneous



FM SMART | Common Features

- Workpieces are moving in the space of the machining area
- Multispindle machining with one active spindle line
- Direct drive for each of the cutting tools
- Interface for manual and hydraulic fixtures
- 4- and/or 5-axes machining possible

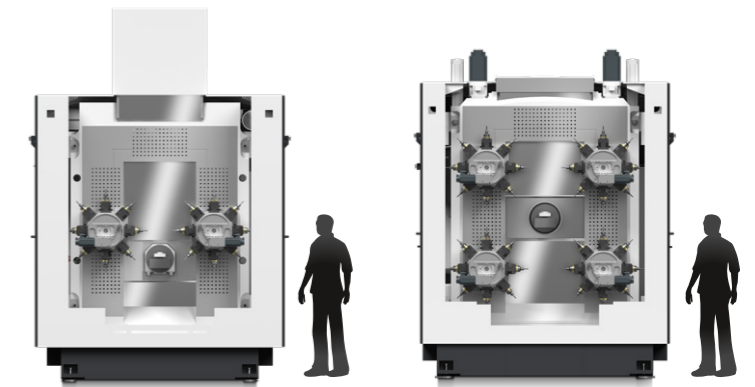
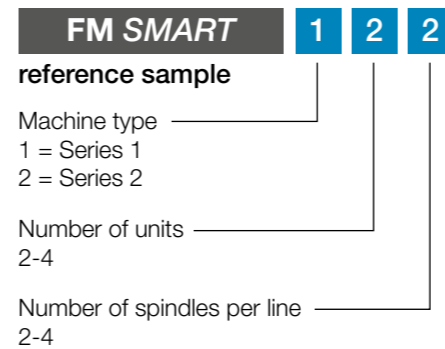


FM SMART Series 1

- Basic ELHA production module FM 3+X with casting machine frame, linear guided 4-axes work unit and ball screw drives
- Max. 2 turret (SRR) or magazine (SRM) units with each 8 tools in double spindle arrangement
- Spindle distance 160 mm

FM SMART Series 2

- Basic ELHA production module FM 3+X *hd* with casting machine frame and linear guided X- and Z-axes
- Hydrostatic ram (Y- and B-axes)
- Double ball screw drives in all linear axes
- Basic version with 2 units (max. 4 units as an option) with 8 spindle lines each in 2-, 3- or 4-spindle arrangement for up to 32 different tools
- Spindle distance 160 mm or 320 mm



		FM SMART Series 1	FM SMART Series 2
TRAVELS			
X-axis (cross)	mm	400	500
Y-axis (vertical)	mm	1000	1200
Z-axis (lengthwise)	mm	500	400
FEEDS			
Speed	m/min	40	60
Acceleration (max.)	m/s ²	6	6

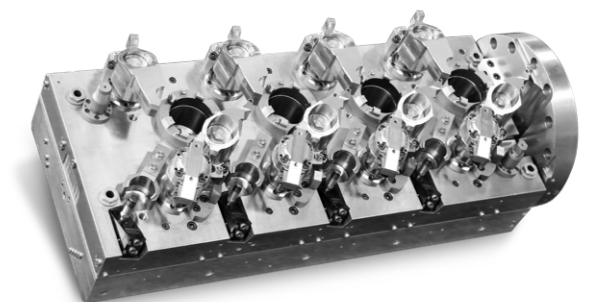
CONFIGURATION SRR / SRM	FM SMART Series 1		FM SMART Series 2			
	1	2	1	2	3	4
8 tools unit	●	●	●	●	○	○
2 spindles in line (A = 160mm)	●	●	●	●	○	○
2 spindles in line (A = 320mm)	-	-	○	○	○	○
3 spindles in line (A = 160mm)	-	-	○	○	○	○
4 spindles in line (A = 160mm)	-	-	○	○	○	○
Spindle speed 16.000 rpm	●	●	●	●	○	○
Spindle speed 8.000 rpm	○	○	○	○	○	○

● = standard ○ = option - = not available

Work Fixture

The **FM SMART** concept offers the possibility to mount your own manual or automatic (hydraulic) work fixtures.

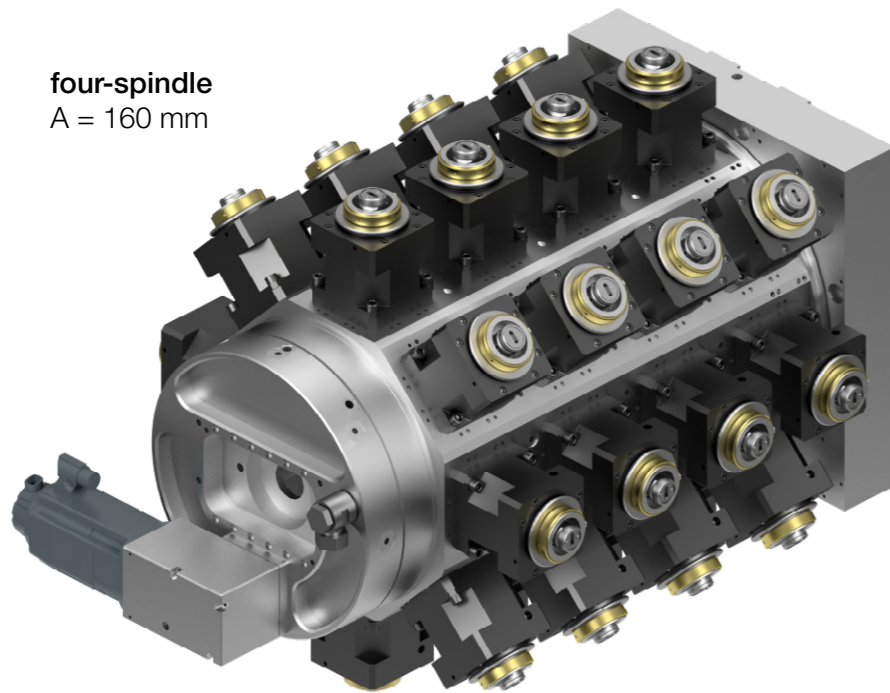
Alternatively ELHA can supply customized work fixtures upon request due to many years of experience in design and manufacturing of such components.



Work fixture for 4 spindle machining

DRUM TYPE TURRET

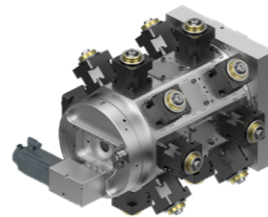
Choose the optimum spindle configuration for your production from a large number of possible variations!



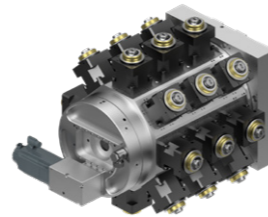
four-spindle
A = 160 mm



two-spindle
A = 160 mm

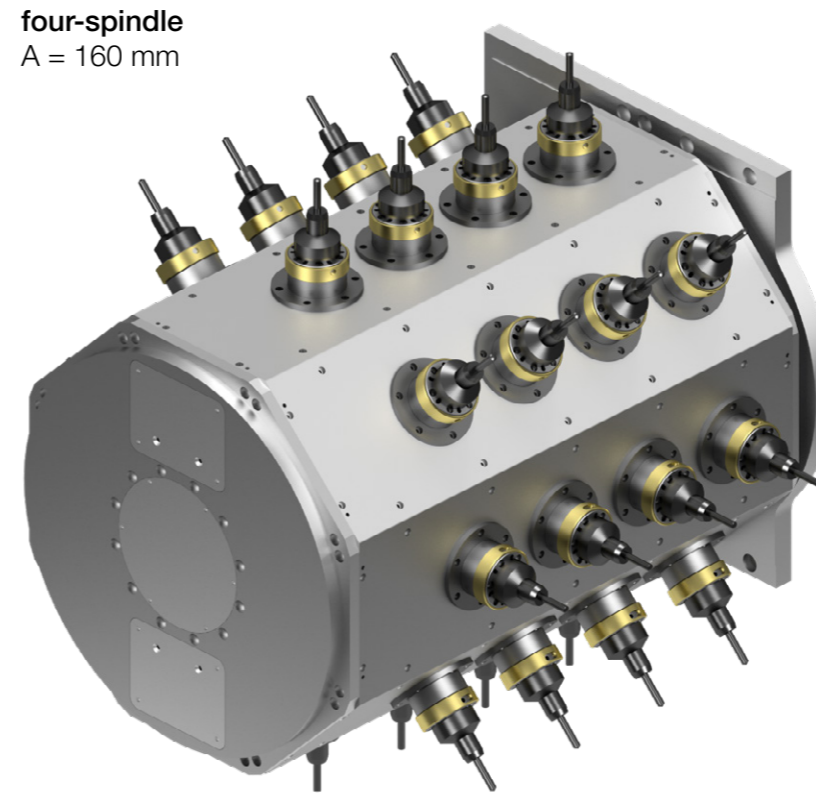


two-spindle
A = 320 mm

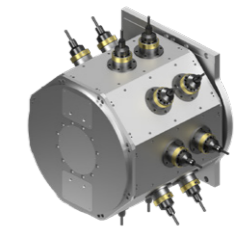


three-spindle
A = 160 mm

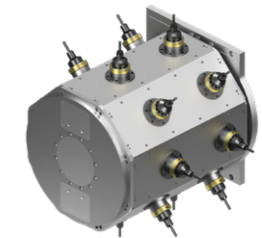
DRUM TYPE MAGAZIN



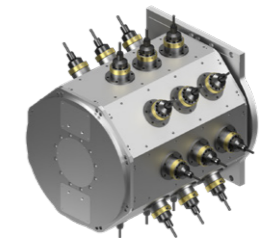
four-spindle
A = 160 mm



two-spindle
A = 160 mm



two-spindle
A = 320 mm



three-spindle
A = 160 mm

SRR

Drum Type Turret | Characteristics

- Complete spindles are swivelled into position
- Fixation via serration
- Fine adjustable spindle in the range of $\pm 10 \mu\text{m}$
- Freely selectable spindle design

SRR & SRM

Common characteristics

- Device for placing 8 rows of tools in only one position within the machine
- Separate drive motor for each tool within the active spindle row
- Manual tool change at end of tool life from outside of the machine
- Tool monitoring by motor current and vibration sensors

SRM

Drum Type Magazine | Characteristics

- Classic motor spindles in a common housing
- Closed magazine drum with adapter rows
- Adapter change in always the same spindle (fine adjustment not necessary)
- Option: Automatic tool change via ELHA robot cell with control functions

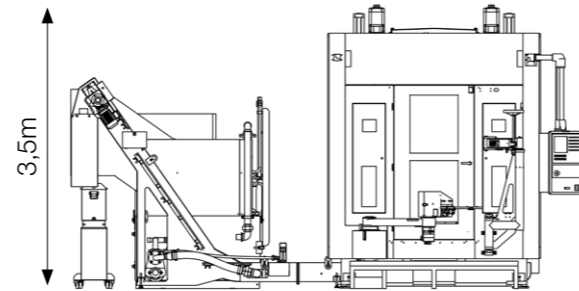
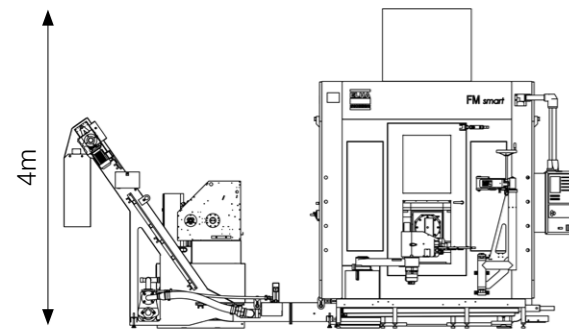
	SRR	SRM
Tool holder	HSK 63	HSK 63
Max. power	29 kW (S6)	20 kW (S1)
Max. torque	62 Nm (S6)	57 Nm (S1)
Max. speed	16.000 min ⁻¹	16.000 min ⁻¹
Indexing time (station-station)	0,8 s	1,5 s
Water-cooled direct drives	yes	yes

FM SMART Series 1 | Automation Step 1

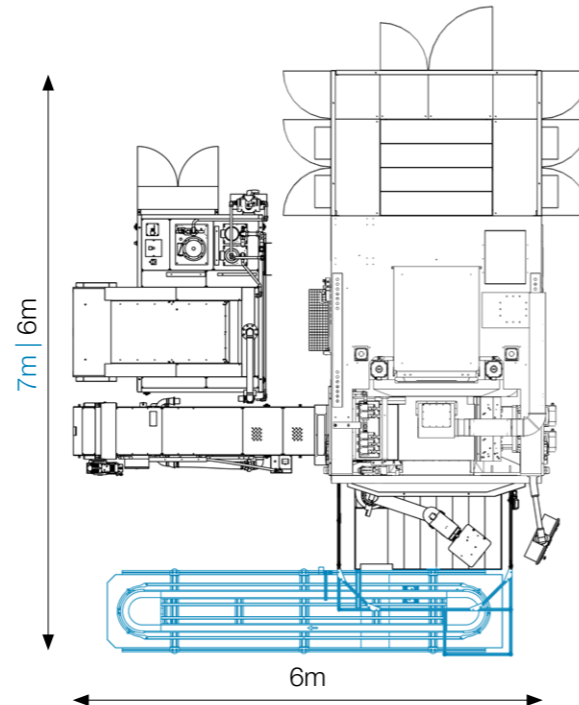
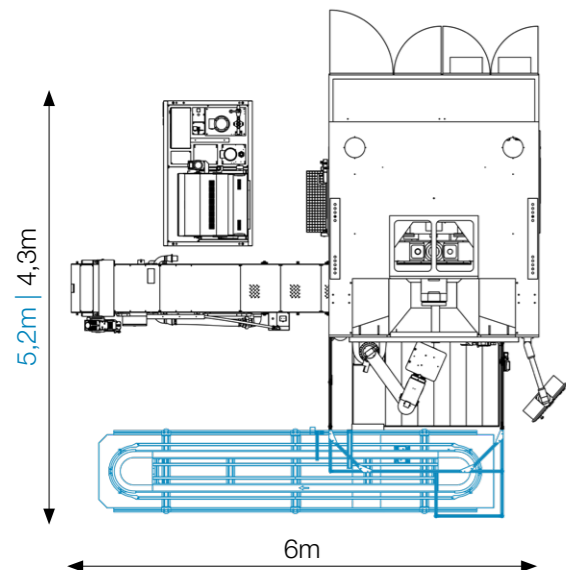
FM SMART Series 2 | Automation Step 2



General front view



Top view with automation
 Step 1 (semi automatic loading)
 Step 2 (pallet conveyor system with buffer)



Fast, flexible ELHA service*



Our highly qualified and motivated team for field service and back office ensures shortest reaction time in order to prevent or reduce machine down to a minimum.

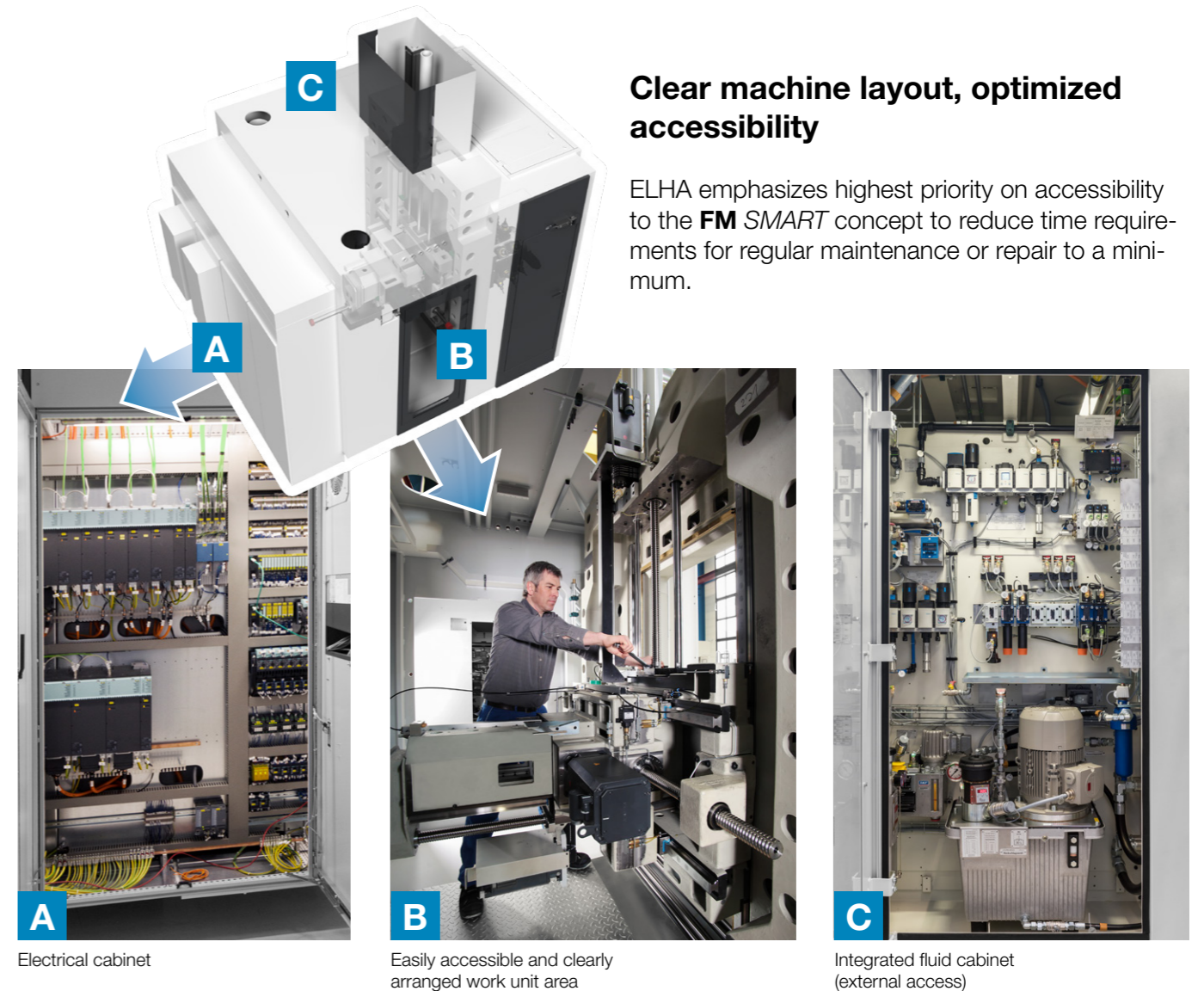
ELHA customers also benefit from further services such as:

- Preventive maintenance
- Machine retrofit
- Training

** Please ask for available service point in your region*

Clear machine layout, optimized accessibility

ELHA emphasizes highest priority on accessibility to the **FM SMART** concept to reduce time requirements for regular maintenance or repair to a minimum.



A
Electrical cabinet

B
Easily accessible and clearly arranged work unit area

C
Integrated fluid cabinet (external access)

ELHA offers a great variety of peripheral equipment to optimize the **FM SMART** for the specific machining tasks.



Fixture change support unit



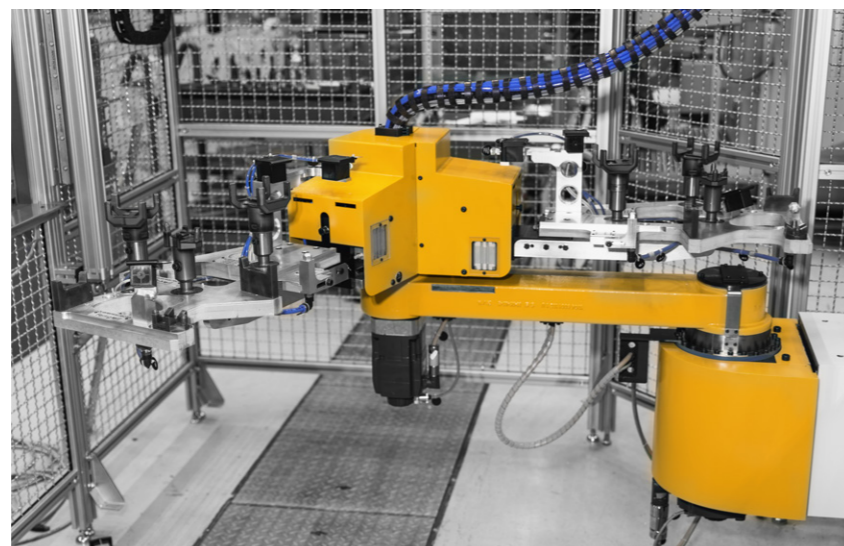
Measuring probe



Chip conveyor & high pressure coolant/filtering unit



Exhausting unit



2 axis work loading robot system

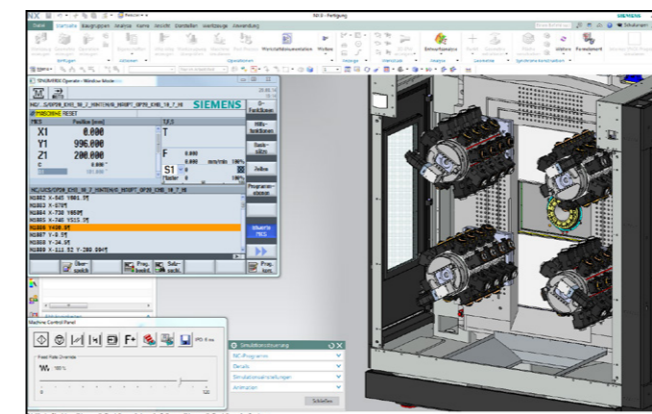
CNC control SIEMENS 840D sl

The standard CNC for highly productive machining solutions.



Virtual Machine

The ELHA virtual machine is a productive simulation tool, which connects all relevant machine parameters with the process data from customers CAD/CAM system. Therefore it is possible to generate very precise process studies and simulations incl. 3D collision control. This solution helps to evaluate and improve machining processes and to reduce time for machine setup.



Interface Virtual Machine

FM SMART Series	1	2
COOLANT / CHIP DIPOSAL		
Coolant system, water based	<input type="radio"/>	<input type="radio"/>
Coolant system, oil based	<input type="radio"/>	<input type="radio"/>
High pressure pump size I or II	<input type="radio"/>	<input type="radio"/>
Duplex filter	<input type="radio"/>	<input type="radio"/>
Chip conveyor	<input type="radio"/>	<input type="radio"/>
Coolant gun	<input type="radio"/>	<input type="radio"/>
MECHANICS		
Exhausting unit	<input type="radio"/>	<input type="radio"/>
Fixture change support unit	<input type="radio"/>	<input type="radio"/>
Preparation for additional unit	-	<input type="radio"/>
Cone cleaning	<input type="radio"/>	<input type="radio"/>
High dynamic package	-	<input type="radio"/>
AUTOMATION		
Level I	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Level II (with pallet conveyor)	<input type="radio"/>	<input type="radio"/>
ELECTRIC / CNC		
Remote diagnosis	<input type="radio"/>	<input type="radio"/>
Load monitoring	<input type="radio"/>	<input type="radio"/>
Shop mill	<input type="radio"/>	<input type="radio"/>
Virtual machine	<input type="radio"/>	<input type="radio"/>
Measuring probe	<input type="radio"/>	<input type="radio"/>
PROCESS ENGINEERING		
Geometry approval	<input type="radio"/>	<input type="radio"/>
Tool scheme	<input type="radio"/>	<input type="radio"/>
NC-programming	<input type="radio"/>	<input type="radio"/>
Work fixture design	<input type="radio"/>	<input type="radio"/>
SERVICES		
Simulation	<input type="radio"/>	<input type="radio"/>
Cycle time calculation	<input type="radio"/>	<input type="radio"/>
Transport	<input type="radio"/>	<input type="radio"/>
Reassembly and commissioning	<input type="radio"/>	<input type="radio"/>
Production support	<input type="radio"/>	<input type="radio"/>
TRAINING		
Mechanics / Hydraulics	<input type="radio"/>	<input type="radio"/>
Electrics / Electronics	<input type="radio"/>	<input type="radio"/>
Operation / Programming	<input type="radio"/>	<input type="radio"/>
Work fixture	<input type="radio"/>	<input type="radio"/>

● = standard ○ = option - = not available

Industries & Products



Automotive



FM
Production Modules

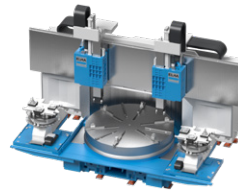


FM SMART
Transfer Centers



Energy

Large bearings



VTM
Vertical Turn-Milling Centers

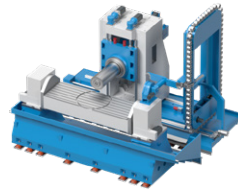


RTX
Rotary Table Machining Centers

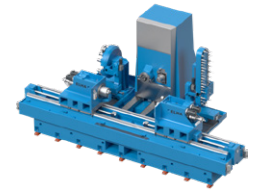


Aerospace

General machining



SMX
Special Machining Centers



SPX
Special Purpose Machines

ELHA-MASCHINENBAU Liemke KG

ELHA is a family-owned company known for customized machine tools and process solutions. Many industries in the metalworking industry trust ELHA's experience and competence in the development and realisation of highly productive machining processes as well as the design and manufacture of cutting machine tools and turn-key solutions.

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