HELLER

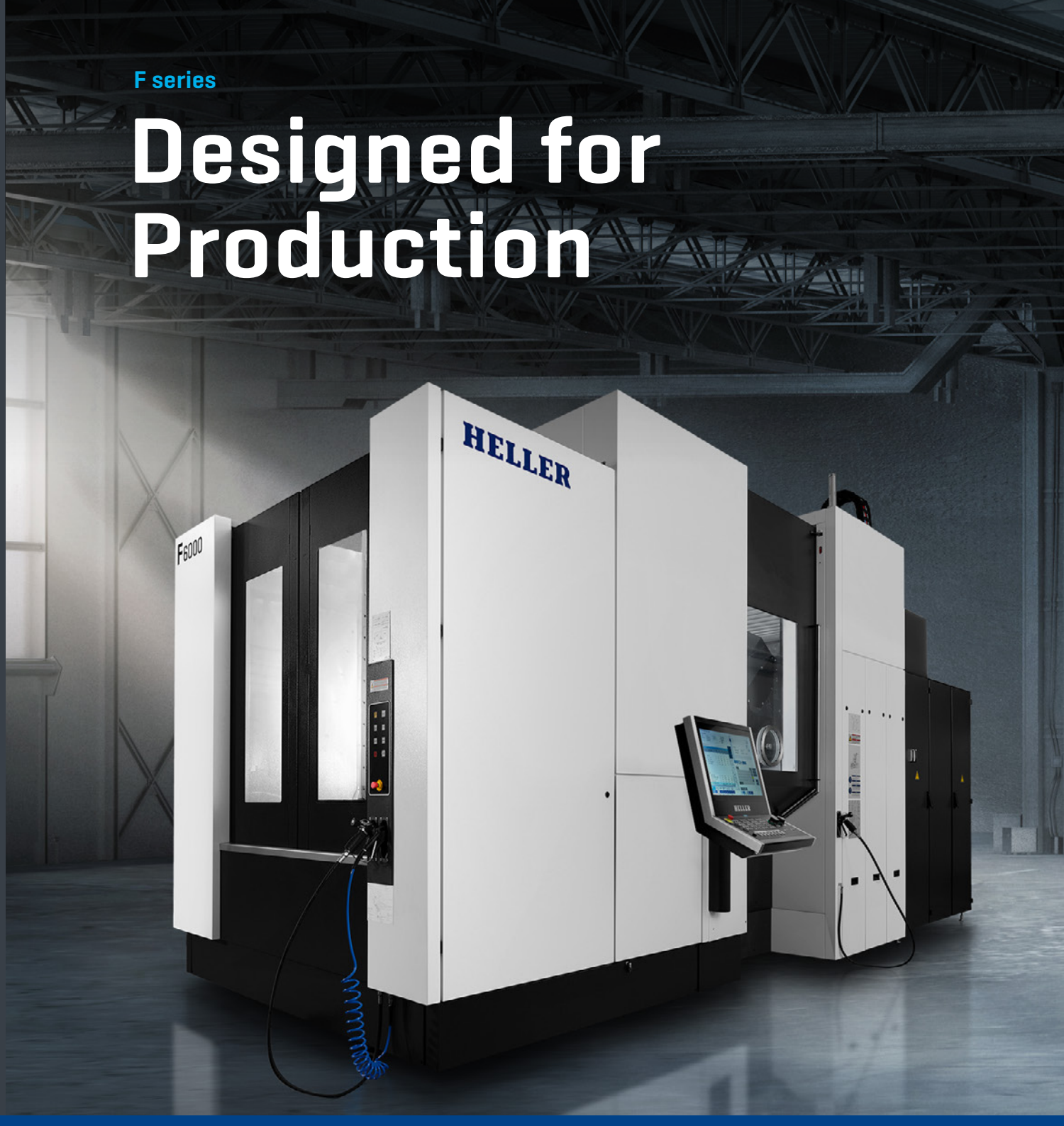
5-axis
machining centres

F

Contents

F series

Designed for Production



With its head kinematics, the new generation of the 5-axis F series has been engineered from the ground up for flexible series production. As with all HELLER machines, it sets the benchmark for cutting performance and precision. Additional highlights include free chip fall, minimal idle times, optimal automation capability and compatibility with the H and FP series for a wide range of workpieces. Furthermore, the new models boast premium-level specifications and can be expanded with technologies such as Mill-Turn, interpolation turning or power skiving.

Key facts

_robust HSK-A 100 class machining centres with powerful motor spindles or gear units delivering 1,146 Nm

_designed for flexible series production, from 24/7 to single-part production

_compact footprint and low machine height

_best-in-class cutting performance due to high-torque spindles and robust traversing column design

_upgradable with technologies such as Mill-Turn as an option for effective complete machining

_PRO equipment package for high dynamics, low positional tolerances and simultaneous 5-axis machining

_key components “made by HELLER” for maximum cutting performance and long-term reliability

_fast chip evacuation through free chip fall

_easy automation with the “Automation-READY” option, even at a later date without modifications

For more infomration go to: **www.heller.biz/en/f**

Machine concept

Maximum performance with lasting precision

The perfect combination of rigidity and lightweight construction is key to achieving a machine design that delivers superior surface finish and long tool life.
As with all HELLER machines, the key components of the new-generation F series have been engineered using FEM. The result is a stiffness-optimised machine bed and a mass-reduced column, delivering reliable productivity, high dynamics and uncompromising precision.

APC
Automatic **P**allet **C**hanger

FLEX
Front Loading EXtended

Basic structure

_5-axis machining machining centres in horizontal orientation

_machine bed in cross-bed design for maximum rigidity even with high clamping loads

_traversing column in gantry-design for fast positioning and short idle times

_cast iron structural components with topology-optimised design for maximum stability and damping in the force flow

_lift-and-swivel pallet changer in fork-type design for high clamping load and short pallet change time

_chain-type or rack-type tool magazines combined with fast NC tool changer for shortest tool provisioning times

Kinematics

_robust 5-axis kinematics with 5th axis in the tool

_5th axis designed as swivel head (C-axis, 350,000 x 0.001°) or optionally as tilt head (A-axis, 175,000 x 0.001°)

_machine bed supports the X- and Z-axis in cross-bed arrangement

_machine column traverses in X-direction and supports the machining unit

_machining unit traverses in Y-direction with compact and robust integration into the machine column

_rotary table (B-axis) traverses in Z-direction and rotates the workpiece continuously (360,000 x 0.001°)

Drive concept

_linear axes with wide roller guides, driven by precision ball screws with cooled drives or drive flanges

_direct, absolute measuring systems with low positional tolerance for maximum precision

_rotary axes with large YRT bearing and automatic clamping for maximum stability and high tangential moments

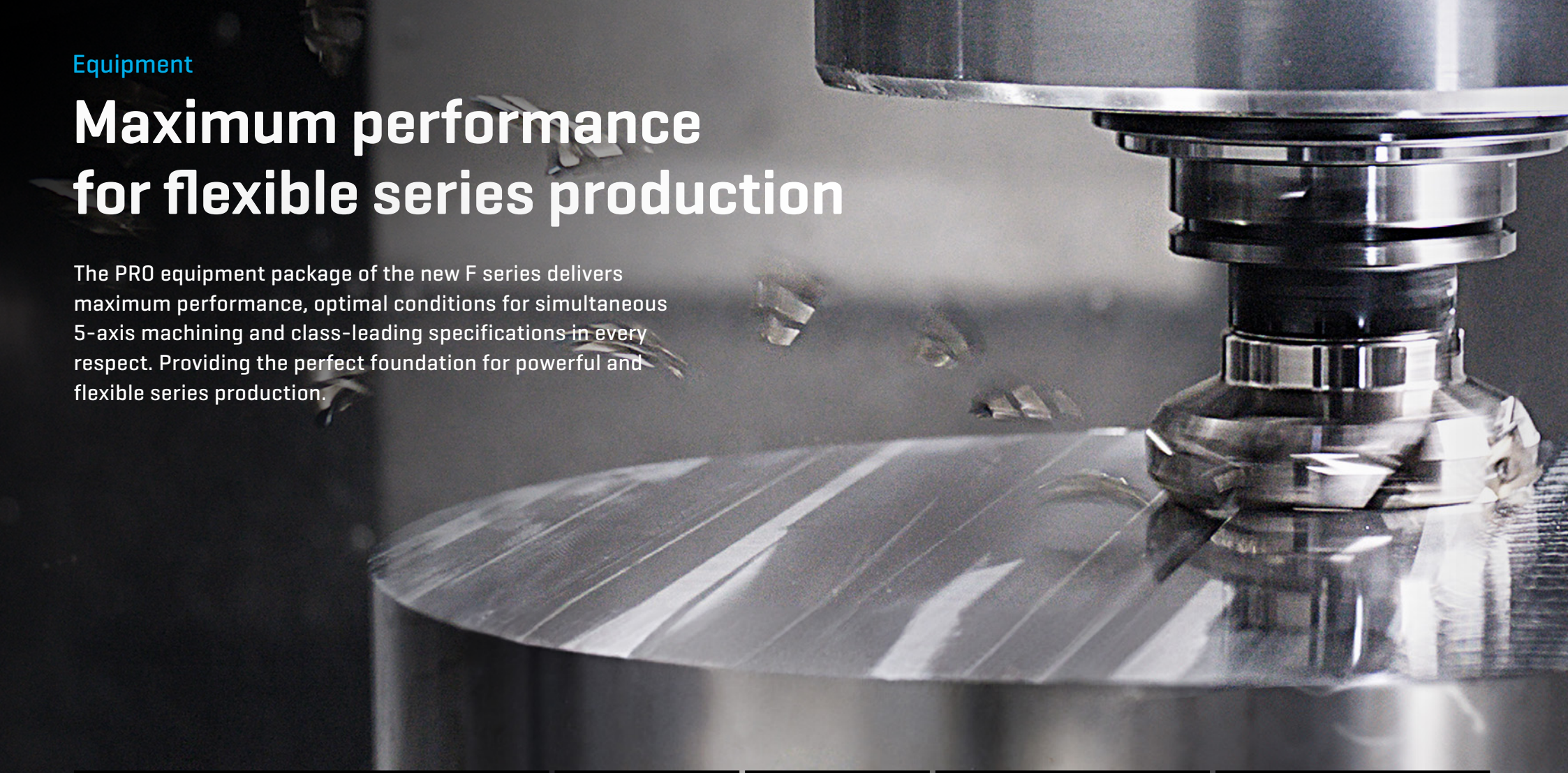
_rotary table with gearbox for maximum performance in 5-axis machining

_direct driven high-speed rotary table for mill-turn applications (option)

Equipment

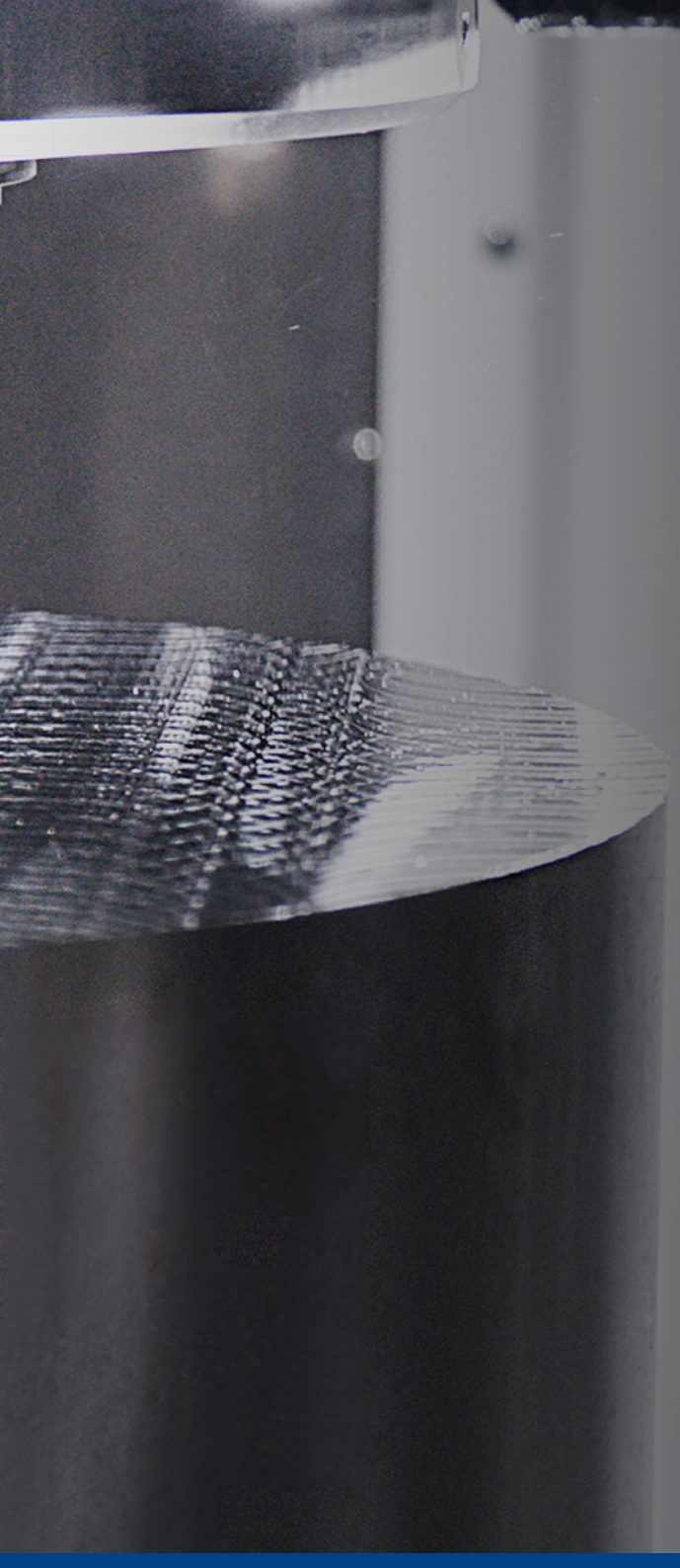
Maximum performance for flexible series production

The PRO equipment package of the new F series delivers maximum performance, optimal conditions for simultaneous 5-axis machining and class-leading specifications in every respect. Providing the perfect foundation for powerful and flexible series production.



			F 5000	F 6000	F 8000		F 10000	
Equipment			PRO	PRO	POWER	PRO	POWER	PRO
Rapid traverse speed	X/Y/Z	m/min	65 / 65 / 65	65 / 65 / 65	50 / 50 / 50	60 / 60 / 60	50 / 50 / 50	60 / 60 / 60
Acceleration	X/Y/Z	m/s^2	6 / 7[1] / 7	6 / 7[1] / 7	4 / 4 / 4	6 / 6 / 6	4 / 4 / 4	6 / 6 / 6
Chip-to-chip-time[3]	HSK-A 100 (HSK-A 63)	s	4.1 (4.0)	4.3 (4.2)	4.6 (4.5)	4.4 (4.3)	5.0 (4.9)	4.8 (4.7)
Positioning Tolerance Tp	X/Y/Z	µm	4 / 4 / 4	4 / 4 / 4	8 / 8 / 8	4 / 4 / 4	8 / 8 / 8	4 / 4 / 4
Positioning Tolerance Tp	B/C	arc sec	5 / 5	5 / 5	8 / 8	5 / 5	8 / 8	5 / 5
Feed force	X/Y/Z | S3 40 %	kN	15 / 27[2] / 20	15 / 27[2] / 20	15 / 27[2] / 20	15 / 27[2] / 20	15 / 27[2] / 20	15 / 27[2] / 20
Clamping load		kg	1,500 (2,000)	1,500 (2,000)	2,000 (3,000)	2,000 (3,000)	4,000 (5,000)	4,000 (5,000)

( ) = Optional values **1)** PCUe differs **2)** In Y- **3)** Swivel head



PRO equipment package

Maximum performance

_reinforced drives in the linear axes – two ball screws in the Z-axis for F 5000 / F 6000

_short idle times

_reduced positioning tolerances in the linear and rotary axes

Simultaneous 5-axis machining

_milling technology package (ONE Dynamics) for optimal path control and superior surface finish

_highest dynamics in the linear axes

_fast, backlash-free swivel drive in the 5-axis head

Class-leading specifications

_optimal setup of all components

_AutoSet function for optimal drive parameters matched to the current clamping load

_AutoCal function for optimal accuracy of the 5-axis kinematics

Assistance systems

SETUP-Assist

_assistance system providing active support to the operator during process run-in

_remaining path display integrated into the machining units

_collision monitoring between machine components and tools

_utilisation display for linear axes, rotary table and spindle

PRODUCTION-Assist

_production status cockpit and tech calculator

_predictive planning of tool requirements

_support in setting up tools

_display of the current axis positions

QUALITY-Assist

_accuracy cockpit – high machine accuracy at a glance

_automatic logging of measurement results (optional probe)

_easy re-entry into NC programme, e.g. after quality control

ASK.me AI chatbot

_chat about machine-specific documents

_Search in machine-specific documents (operating manuals, maintenance instructions, ...)

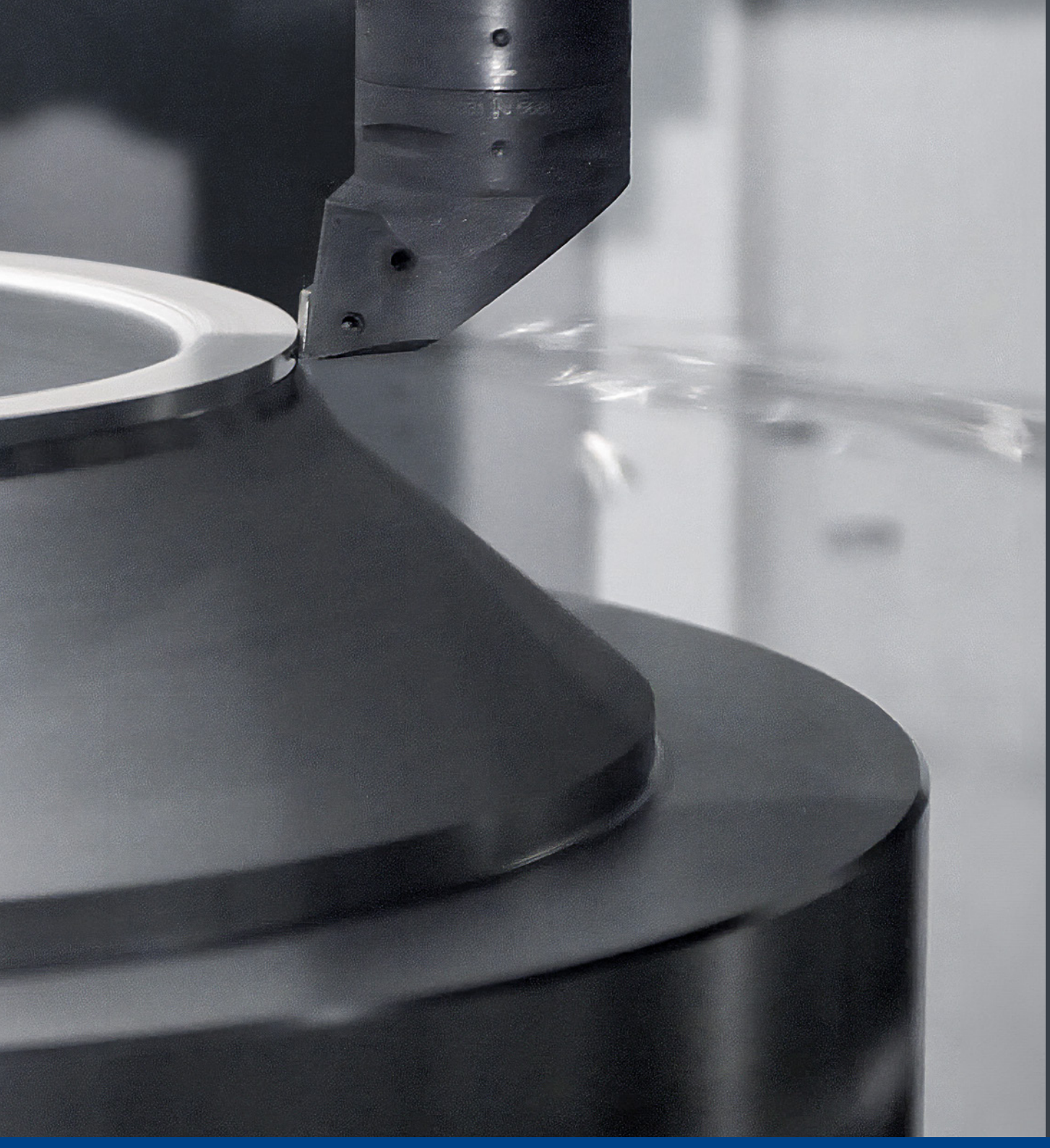
Mill-Turn

Complete machining on a single machine

The optional Mill-Turn functionality enables combined milling and turning on a single machine – providing greater flexibility for the machining of your workpieces. For highest workpiece accuracy with single-setup machining and maximum productivity using a high-torque rotary table.

			F 5000	F 6000	F 8000	F 10000
Speed	S3 40%	min^{-1}	700	700	500	360
Torque		Nm	2,600	2,600	4,270	6,560
Workpiece diameter	APC / FLEX (full circle)	mm	Ø 900 / Ø 1,300	Ø 1,000 / Ø 1,540[1)]	Ø 1,400 / Ø 1,940	Ø 1,600 / Ø 2,240

1) Stand-alone (IN-Automation: Ø 1,400 mm)



Mill-Turn

_NC rotary table in DDT (Direct Drive Turning) design

_HSK-T tool holder for optimal accuracy in turning operations

_spindle locking for secure clamping of turning tools

_balancing technology cycle for balancing of the workpieces and the fixture in the machine

_Siemens NC turning cycles for easy programming of turning operations

NC rotary feed table with turning function

_direct-drive rotary table for high turning speeds and dynamic milling performance

_permanent cooling for optimal accuracy at high speeds

_large YRT bearing for maximum stability and high tilting moments

_hydraulic clamping with integrated automatic clamping for maximal tangential moments

_integrated media interface for hydraulic workpiece clamping (80 bar with proportional technology, option)

Options

_tool measurement with precision laser and probe for turning tools

_oscillating speed: technology cycle to prevent vibrations in critical processes

_ChipBreak: technology cycle to prevent long and tangled chips

Machining units

High cutting performance

Optimal process stability in 5-axis machining also depends on using the right spindle. Our new generation of the F series is offered with a range of swivel-head and tilt-head designs. Whether you are performing heavy-duty cutting of cast iron or steel, high-volume machining of light metals or vertical, horizontal and inclined turning operations using the optional Mill-Turn functionality – we have the perfect solution to meet your requirements.










			PCUe 100 G	DCU 100 M [1]	SCU 100 M	DCU 63 M	SCU 63 M	PCTe 100 G [2]	DCT 100 M	SCT 100 M	DCT 63 M	SCT 63 M
Tool shank	SK/BT for PCUe/PCTe also available | Mill-Turn: HSK-T	Size	HSK-A 100			HSK-A 63		HSK-A 100			HSK-A 63	
Speed		min^{-1}	8,000	12,000	15,000	16,000	18,000	6,000	12,000	15,000	16,000	18,000
Power	S6 40 %	kW	60	52	45	50	45	60	52	45	50	45
Torque	S6 40 %	Nm	1,146	400	282	228	121	1,146	400	282	228	121

1) Standard: DCU 100 M **2)** For F 8000 / F 10000

Powerful machining units

_machining units with 5th axis in the tool with robust swivel head or tilt head kinematics (option)

_4 machining units with HSK-A 100 motor spindles, perfect for universal applications requiring high rigidity

_4 machining units with HSK-A 63 motor spindles, offering high speeds for efficient machining of light metals

_1 machining unit (F 5000 / F 6000) or 2 machining units (F 8000 / F 10000) with HSK-A 100 gear spindles offering maximum torque, perfect for the machining of difficult-to-cut materials

_HSK-A 100 tool shank as standard for machining units with motor and gear spindles (HSK-A 63 as an option)

_thermal stability and precision through permanent cooling, precision cooling unit and thermal growth compensation of the spindle

_robust cast iron guide slide with high dynamic rigidity and damping

Swivel head kinematics

_long projection length in vertical position for precise machining behind the rotary table's rotary centre

_compact design and high rigidity thanks to the robust 45° swivel head kinematics and the short distance between the bearing and the tool shank

_dynamic, backlash-free swivel drive with electrically pre-loaded motors

_large 350° swivel range for maximum flexibility in 5-sided machining

_integrated LED light (WorkLIGHT) as standard and remaining path display as part of the optional SETUP-Assist function

_swivel-head clamping provides maximum stability during heavy-duty machining with inclined rotary axes, can be deactivated in-process

Tilt head kinematics 1

_large swivel range enables machining of negative angles and undercuts

_bearings on both sides for maximum rigidity in roughing and finishing operations

_HSK-A 100 spindle with gear unit and a maximum torque of 1,146 Nm

_175° swivel range for maximum flexibility in 5-sided machining

Options

SETUP-Assist

_assistance system providing active support to the operator during process run-in

_remaining path display integrated into the machining units 2

_collision monitoring between machine components and tools

_utilisation display for linear axes, rotary table and spindle

QUALITY-Assist

_accuracy cockpit with quality report

_NC recovery and re-entry

_initial-cut strategy

HELLER attachment head adapter (MSK)

_precondition for the use of attachment heads, (e.g. angular heads)

_enlarged support base with three-point support

_integrated torque pickup and media transfer

HELLER zero-spindle system

_spindle replacement without time-consuming adjustment

_short repair times

_cost-effective service solution for machining units with gear spindles

1

2

Tool management

Fast, precise, reliable

Especially 5-axis machining and mill-turning involve working with a wide variety of tools and large tool geometries on a daily basis. Our machining centres can handle this with ease, allowing you to continue using your tooling with complete flexibility, while keeping tool loading times short and minimising downtime and non-productive time.

			F 5000		F 6000		F 8000	
Tool shank		Size	(HSK-A 63)	HSK-A 100	(HSK-A 63)	HSK-A 100	(HSK-A 63)	HSK-A 100
Chip-to-chip time	$t_{2.3}$ | VDI 2852	s	(4.0 (4.3))	4.1 (4.4)	(4.2 4.5))	4.3 (4.6)	(4.5 (4.3)[3])	4.6 (4.4)[3]
Tool weight[1]		kg	(15)	25 (35)	(15)	25 (35)	(15)	25 (35)
Chain-type magazines	Magazine places	Number	(50 (100 / 150))	50 (100 / 150)	(50 (100 / 150))	50 (100 / 150)	(50 (100 / 150))	50 (100 / 150)
	Tool length/ diameter[2]	mm	(600 / Ø 188)	600 / Ø 280	(600 / Ø 188)	600 (800) / Ø 280	(600 / Ø 280)	600 (800) / Ø 280
Rack-type magazines	Magazine places	Number	(324 / 498)	(200 / 260 / 340 / 425)	(324 / 498)	(200 / 260 / 340 / 425)	(324 / 498)	(200 / 260 / 340 / 425)
	Tool length/ diameter[2]	mm	(600 / Ø 188)	(600 / Ø 280)	(600 / Ø 188)	(600 (800)[4] / Ø 280)	(600 / Ø 188)	(600 (800)[4] / Ø 280)

( ) = Optional values **1)** Note total clalmping load **2)** With free adjacent places **3)** PRO equipment package **4)** Only R 260 and R 340

F 10000	
(HSK-A 63)	HSK-A 100
(4.9 (4.7))	5.0 (4.8)
(15)	25 (35)
(50 (100 / 150))	50 (100 / 150)
(600 / Ø 280)	600 (800) / Ø 280
(324 / 498)	(200 / 260 / 340 / 425)
(600 / Ø 188)	(600 (800)[4] / Ø 280)

Chain-type magazines 1

_3 chain-type magazines with up to 150 places

_double chain with high traversing dynamics and robust tool holders mounted on both sides

_tool provisioning parallel to machining for short tool-to-tool times

_tool shank in enclosed holders: protection against contamination and optimum hold during positioning

_tool setting station with optimal accessibility for fast and ergonomic tool loading

Rack-type magazines 2

_2 rack-type magazines with up to 498 places for machines with HSK-A 63

_4 rack-type magazines with up to 425 places for machines with HSK-A 100

_compact footprint resulting from the extremely space-saving arrangement alongside the machine

_rapid tool handling with highly dynamic tool loader

_integrated rotary station for loading of multiple tools parallel to machining

_loading of tool sets via integration of mobile racks (option, available in Manual or AGV version)

Tool changer

_rapid tool change for short chip-to-chip times

_two NC axes with lift/swivel principle for high dynamics and long-term precision

_robust double gripper for secure handling of heavy tools and high moment loads

_integrated tool provisioning place for supply of the next tool during machining and short tool-to-tool times

Options

_tool loading during machining (HZPR) without affecting the ongoing machining process

_rapid tool breakage detection (SBBK) enables shank tools to be checked for breakage parallel to machining

_cleaning of tool shanks and pockets at the tool provisioning position of the chain-type magazines

_tool coding for automatic storage and transfer of tool data in the tool

_precision laser measurement and checking of the tools in the spindle

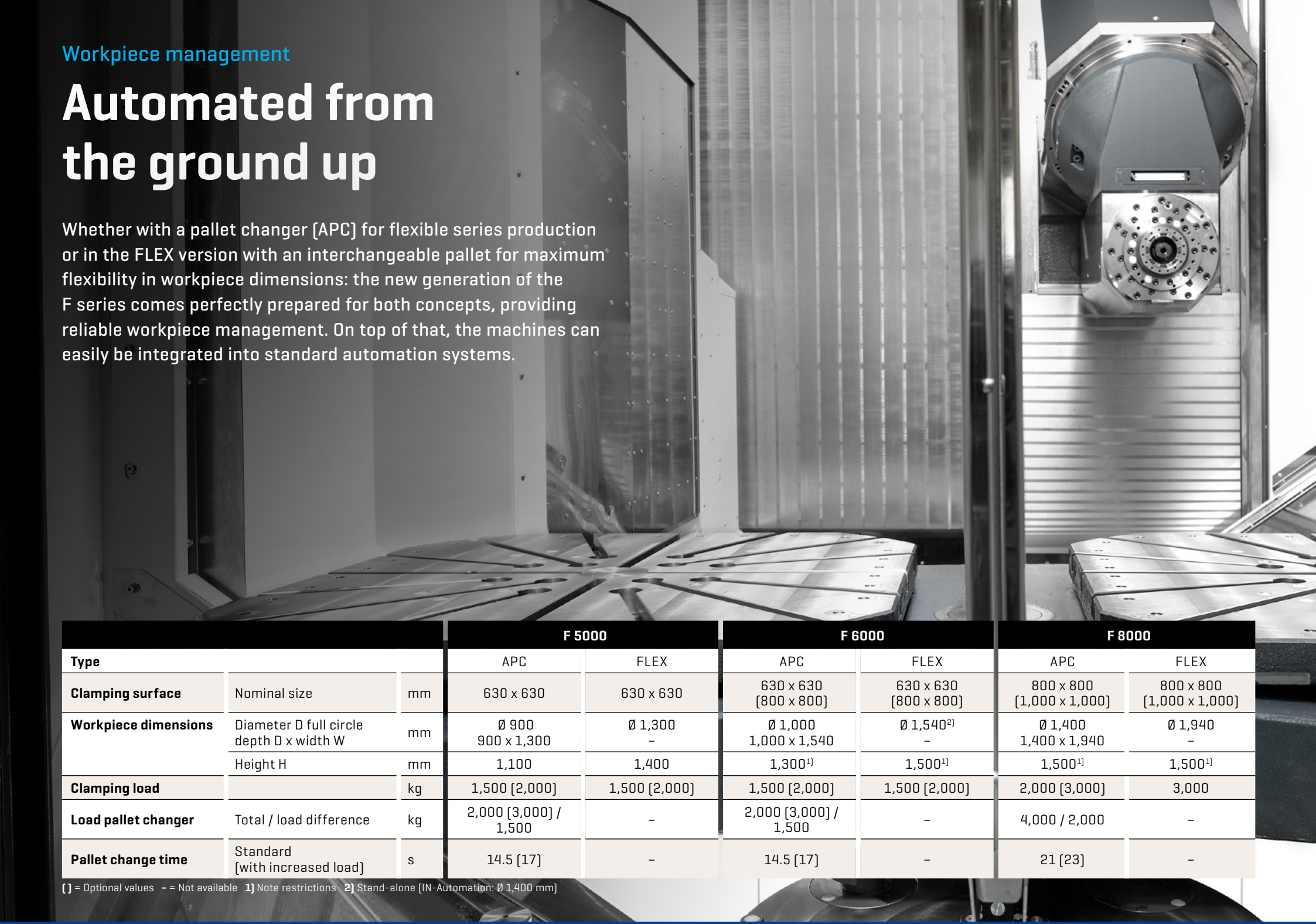
1

2

Workpiece management

Automated from the ground up

Whether with a pallet changer (APC) for flexible series production or in the FLEX version with an interchangeable pallet for maximum flexibility in workpiece dimensions: the new generation of the F series comes perfectly prepared for both concepts, providing reliable workpiece management. On top of that, the machines can easily be integrated into standard automation systems.



			F 5000		F 6000		F 8000	
Type			APC	FLEX	APC	FLEX	APC	FLEX
Clamping surface	Nominal size	mm	630 x 630	630 x 630	630 x 630 (800 x 800)	630 x 630 (800 x 800)	800 x 800 (1,000 x 1,000)	800 x 800 (1,000 x 1,000)
Workpiece dimensions	Diameter D full circle depth D x width W	mm	Ø 900 900 x 1,300	Ø 1,300 –	Ø 1,000 1,000 x 1,540	Ø 1,540[2] –	Ø 1,400 1,400 x 1,940	Ø 1,940 –
	Height H	mm	1,100	1,400	1,300[1]	1,500[1]	1,500[1]	1,500[1]
Clamping load		kg	1,500 (2,000)	1,500 (2,000)	1,500 (2,000)	1,500 (2,000)	2,000 (3,000)	3,000
Load pallet changer	Total / load difference	kg	2,000 (3,000) / 1,500	–	2,000 (3,000) / 1,500	–	4,000 / 2,000	–
Pallet change time	Standard (with increased load)	s	14.5 (17)	–	14.5 (17)	–	21 (23)	–

( ) = Optional values **-** = Not available **1)** Note restrictions **2)** Stand-alone (IN-Automation: Ø 1,400 mm)

F 10000	
APC	FLEX
1,000 x 1,000	1,000 x 1,000
Ø 1,600 1,600 x 2,240	Ø 2,240 –
1,700	1,700
4,000	5,000
8,000 / 2,500	–
AA	–

APC

Automatic Pallet Changer

_automatic pallet changer with lift-and-swivel principle

_robust hydraulic drive enables high maximum clamping load

_optimum application of force to machine pallets due to the fork shape of the lift-and-swivel bridge

_consistently high tool change accuracy due to robust alignment elements and extensive blow-off of functional surfaces

_hydraulic pallet clamping for secure hold, even under high process forces

_machine pallets with DIN hole pattern and standardised alignment elements for rapid mounting of clamping fixtures

_increased clamping load for even greater flexibility in production (option)

FLEX

Front Loading EXtended

_machine with interchangeable pallet for maximum flexibility

_workpiece loading onto the machine table directly into the work area

_large workpiece diameter without restrictions

_higher load as standard

_reduced machine length

_interchangeable pallet as standard for quick setup outside the machine

_optimal accessibility to the workpiece thanks to a large door and low loading edge at the workpiece setting station

_IN-Automation version with optimised design for the integration into the pallet automation

Rotary table 1

_rotary table with duplex worm drive

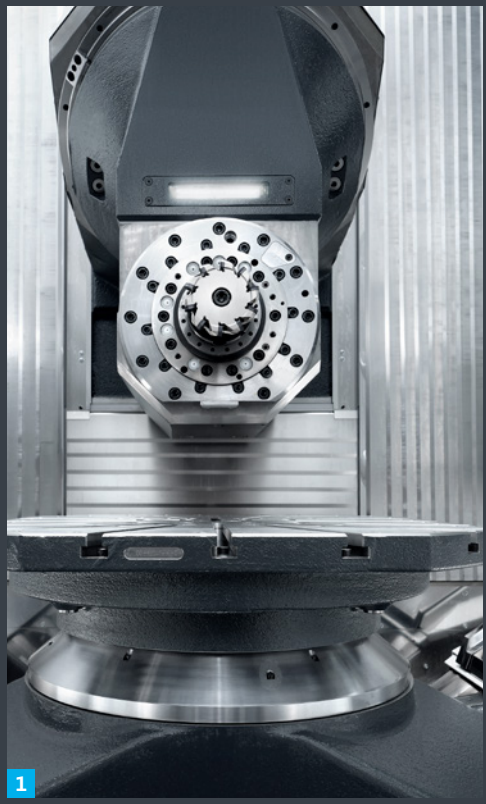
_high damping for heavy-duty machining

_direct, absolute measuring system for maximum positioning accuracy

_hydraulically operated rotary table clamping with automatic clamping for maximum stability when machining with inclined rotary axes

_pallet mounting with diamond-type dowel pin and indexing pin for maximum pallet change accuracy

_integrated swivel clamps with high clamping force



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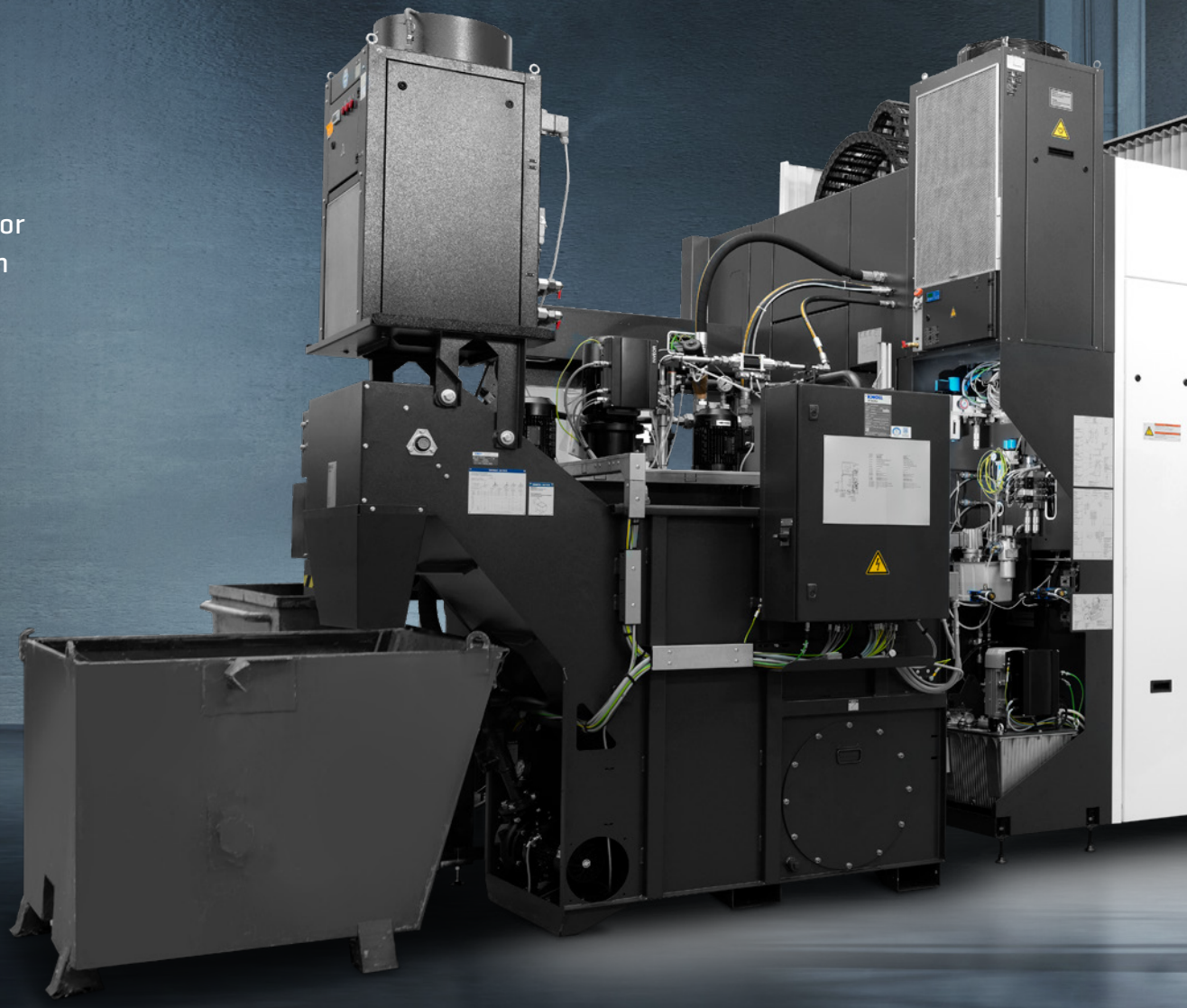
Supply and disposal

For maximum chip removal rates

Fast and effective chip evacuation is a top priority with our machining centres. The work area is designed to prevent chips from accumulating and to ensure their rapid removal from the machine. You can select the most suitable conveyor design and coolant unit to match your individual production process. Assuring precision and process reliability.



Cooling lubricant supply

_coolant units: paper band filter or backflush filter with high tank volumes available as options

_internal coolant supply (IKZ) through the tool with 50 bar high pressure (option: 70 bar)

_internal coolant supply with up to 7 pressure steps freely programmable via the NC program

_external tool cooling (AKZ) with spindle-integrated flushing nozzles (option)

_integrated work area shower with adjustable nozzles for optimal flushing of the work area and cooling of the workpiece

Options

_coolant cooler

_coolant temperature control unit for high thermal stability and precision

_automatic filling of the coolant unit

_oil skimmer for separation of foreign oil from the cooling lubricant tank

_automatic setting station flushing

Chip disposal

_F 5000/6000: free chip fall below the spindle and quick evacuation from the work area

_F 8000/10000: chip evacuation from the work area to the rear of the machine via spiral conveyors

_chip conveyor either as scraper belt or hinged conveyor, depending on the application (option)

_steep stainless steel side panels and slat coverings with self-cleaning effect to prevent chip deposits 1

_integrated work area shower to support rapid chip removal

_extraction unit for the removal of coolant mist from the work area (operating principle: mechanical air filter) (option)

Media supply

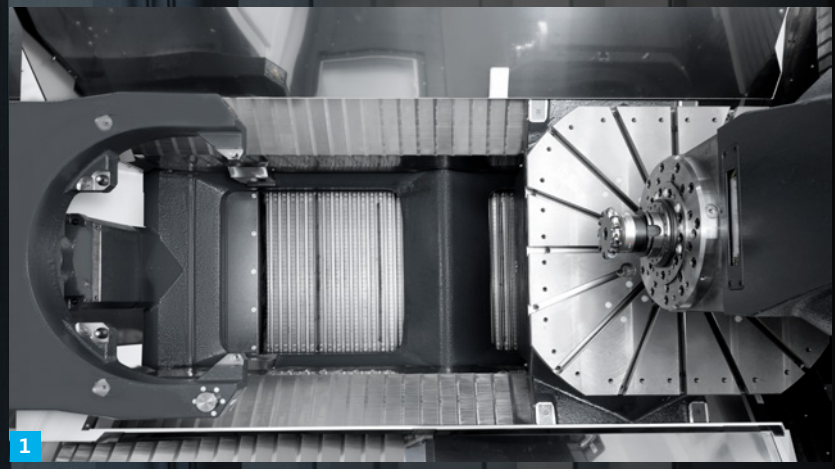
_easy maintenance with optimal accessibility, all supply units clearly visible at a glance

_central oil-air lubrication for key components

_sealing air and targeted blow-off of interfaces ensure consistently smooth machine operation

_media interface for hydraulic workpiece clamping with up to 250 bar (option)

_compressed air and water guns integrated into the machine housing at the workpiece setting station and operating station 2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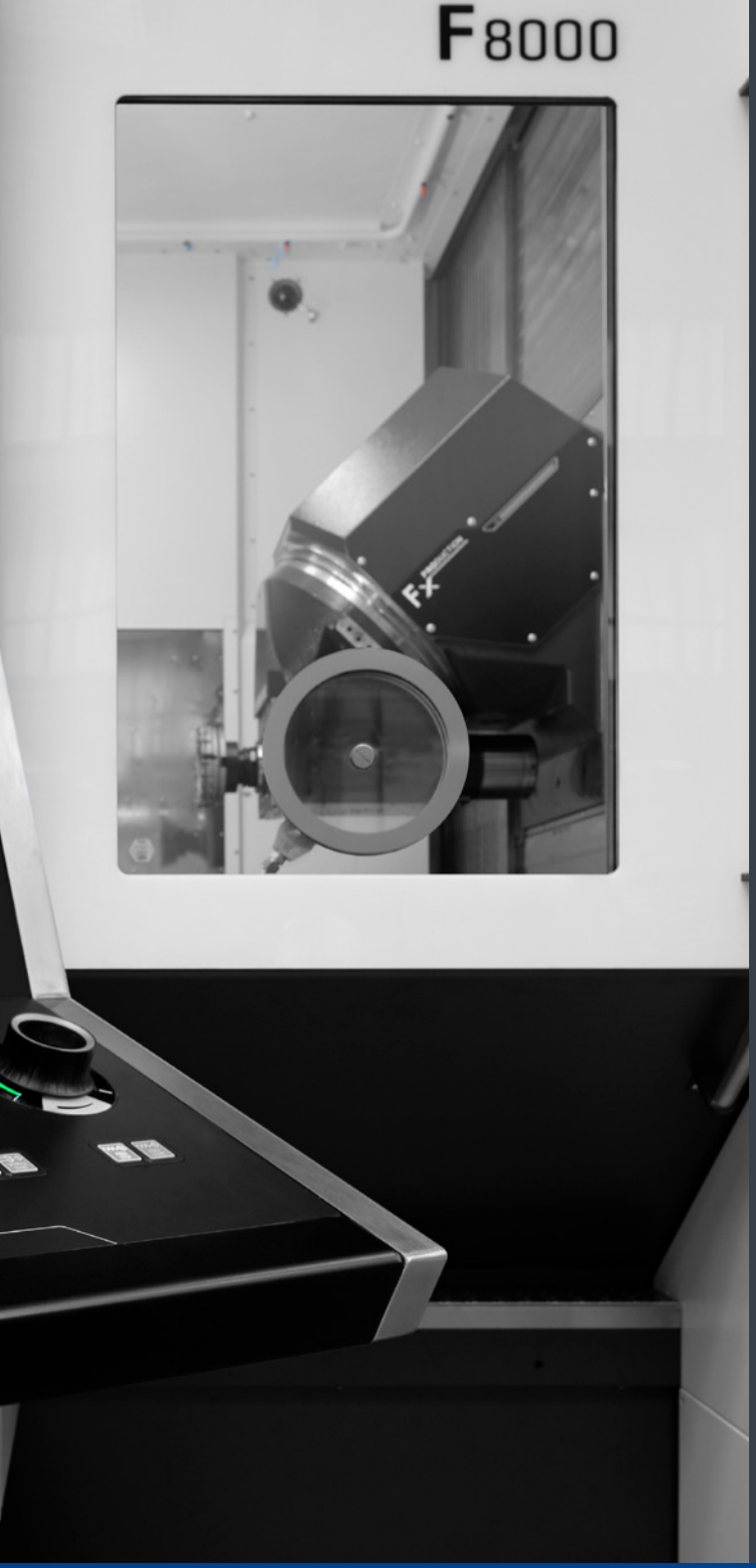
2

Control technology

Perfect performance for complete machining

In daily operations, every second matters. The modern, high-performance Siemens SINUMERIK ONE control with HELLER Operation Interface makes things easy for you and provides perfect support for your tasks: with intuitive operation, easy programming, cycle support and key information always at your fingertips.



Machine control

_high-performance control Siemens SINUMERIK ONE to meet the highest standards of performance and machining precision

_main operating unit in console-design and ergonomic control panels around the machine 1

_digital drive technology and modern system architecture

_Profinet bus system for ultra-fast real-time communication

_IO link system for direct diagnostics and parametrisation of sensors

Options

_panel-design main operating unit

_convenient operating panel at the tool setting station 2

_hand-held operating unit HT 2 or HT 10

_additional keyboard

_work area camera

HELLER Operation Interface

_HELLER user interface with 4 function areas for more information at a glance

_practical HELLER applications (Xtends) with useful additional functions

_24” screen and multi-touch function, ideal for viewing documents and drawings

_machine control panel with pushbuttons and 2 overrides for optimum control in all operating situations

_third override reduces rapid traverse, helping to lower the risk of a collision during manual operation

_ASK.me AI chatbot

Options

_SETUP-Assist

_PRODUCTION-Assist

_QUALITY-Assist

_in-process tool monitoring (IPM)

_damage reduction

_tool requirements planning

_automatic loading/unloading sequence

_maintenance manager

_job management

_interpolation turning (IPT)

_HELLER Services Interface (HSI) and other HELLER4Industry products

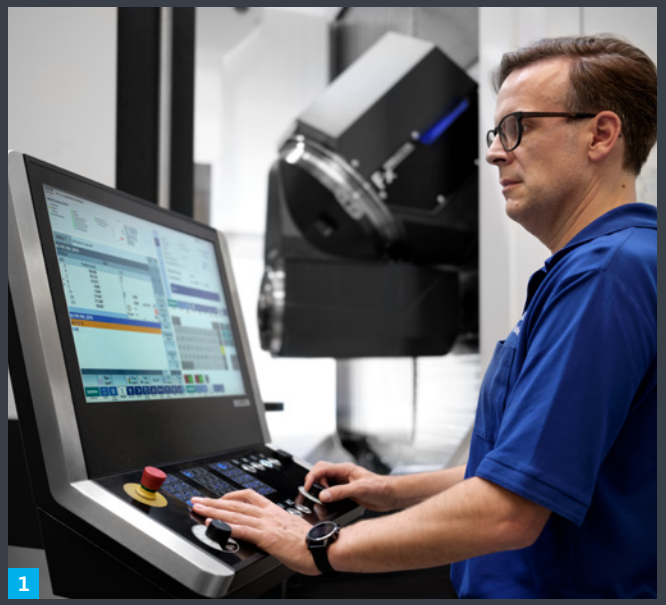

1


2

Operation

Optimal access to all working areas

When working with HELLER machines, you can feel every day how much engineering expertise has gone into these machining centres. Whether at the workpiece setting station, during tool loading, programming or maintenance – your comfort, safety and above all, the productivity of your manufacturing operations always come first.



Operating station 1

_ergonomically arranged operating elements and control screens

_swivelling main operating unit with clamping function seamlessly integrated into the machine enclosure to save space

_large safety window for an unrestricted view of the work area

_smooth-running work area door with linear guide opens the roof of the work area in the operator zone

_operating modes 2 and 3 included in the standard scope of supply

Options

_HT 2 or HT 10 handheld operating unit

_screen blow-off system or Roto Clear for a clear view during wet machining

_walk-in work area

Workpiece setting station 2

_large smooth-running doors for optimum access during loading and set-up using a crane or other handling equipment

_workpiece setting station lockable in 90° indexing positions

_easy-to-reach operating elements and media guns

Options

_automatically operated loading station door

_automatically rotating NC loading station

_software options: automatic loading and unloading sequence

_elevated position of operating units and media access at the operating station and workpiece setting station

_Automation-READY version

Tool setting station 3

_ergonomically arranged operating elements

_optimal-height insertion position with integrated release function for easy handling

_tool loading at the magazine while the spindle is running

Options

_Convenient operating panel at the tool setting station

_tool loading during machining

_tool coding with RFID chip

_HELLER TRP (Tool Requirement Planning) for automatic generation of loading and unloading lists

Automation solutions

Open to standards – flexible for customised solutions

In automated manufacturing and production centres, the primary focus is on reducing downtime and thus maximising system availability. HELLER has developed its own automation solutions that integrate seamlessly with its highly productive machining centres. To address the wide range of market requirements, this portfolio is complemented by specialised solutions offered by HELLER through best-in-class partnerships.

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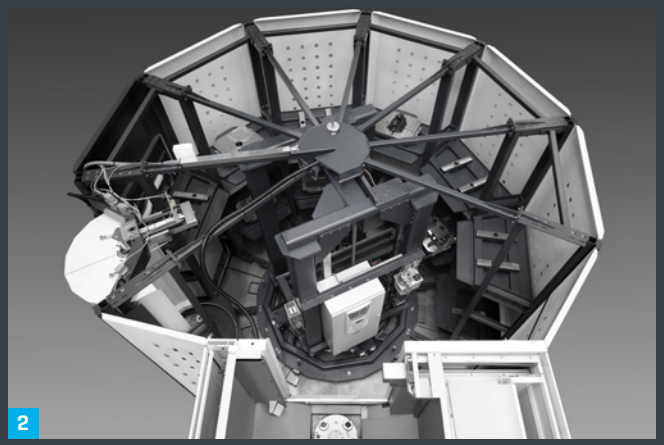
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5

Pallet automation

Pallet changer

First level of automation, integrated into the machine. Perfect for series production with medium to large batch sizes.

Linear pallet storage 1

Automatic handling of pallets for maximum flexibility. Perfect for series production with small to medium batch sizes.

Rotary pallet storage 2

Automatic handling of pallets for maximum flexibility in a minimum of space. Perfect for series production with small to medium batch sizes.

Options

Automation-READY

Cost-effective, subsequent integration into standardised pallet automation systems

IN-Automation

Optimised interface for fast, immediate integration into standardised pallet automation systems

Workpiece automation

Robots 3

Automatic loading and unloading of workpieces, fixtures and pallets, and automation of other handling operations. Perfect for series production with medium to large batch sizes.

Linear gantry

Linking of system components into production lines for maximum output. Perfect for high-volume production, delivering maximum output with minimal cycle times.

Tool automation

Mobile rack 4

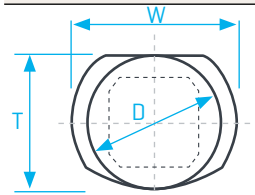
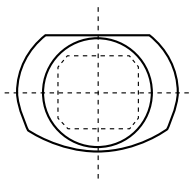
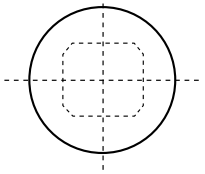
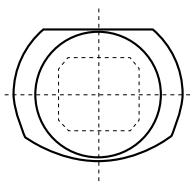
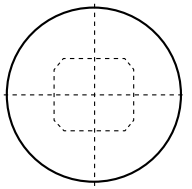
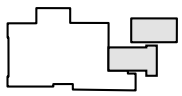
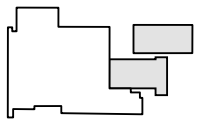
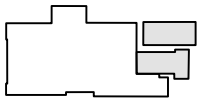
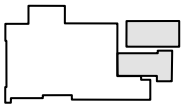
Efficient loading of tool sets on rack-type magazines Portable cassette for tool storage, transport, loading and unloading. The mobile rack can be transported using an automated guided vehicle (AGV).

Background tool magazine 5

Central tool supply for multiple machines. Perfect for production systems with the highest levels of flexibility and automation.

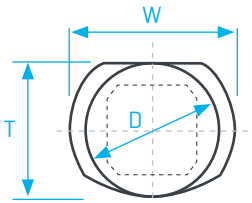
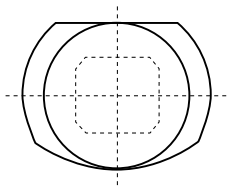
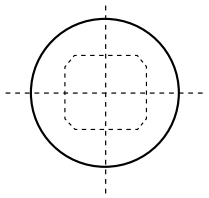
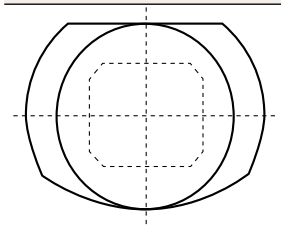
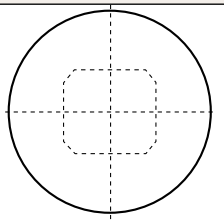
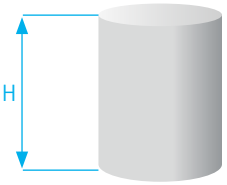
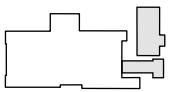
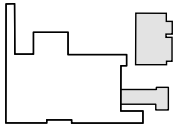
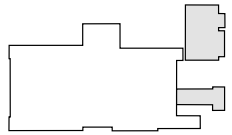
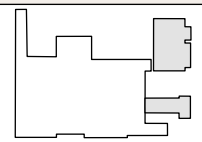
Technical data			F 5000		F 6000	
LINEAR AXES						
Positioning range	X/Y/Z	mm	800/850[1]/1,100		1,000/1,000/1,400	
Rapid traverse speed	X/Y/Z	m/min	65		65	
Acceleration	X/Y/Z	m/s^2	6/7[1]/7		6/7[1]/7	
Feed forces	X/Y/Z | S3 40 %	kN	15/27[2]/20		15/27[2]/20	
Positioning tolerance Tp / At[3]	X/Y/Z | VDI/DGQ 3441 / ISO 230	mm	0,004		0,004	
ROTARY AXES						
NC rotary feed table	B | speed / torque S3 40 %	min^{-1}/Nm	25/2,900		25/2,900	
NC rotary feed table: Mill-Turn	B | speed S3 40 % / torque	min^{-1}/Nm	700/2,600		700/2,600	
Positioning tolerance Tp / At[3]	B | VDI/DGQ 3441 / ISO 230	arc. sec.	5		5	
5th axis		Type	Swivel head U (tilt head T)		Swivel head U (tilt head T)	
MACHINING UNITS						
Tool shank	SK/BT for selected units also available | Mill-Turn: HSK-T	Size	(HSK-A 63)	HSK-A 100	(HSK-A 63)	HSK-A 100
Gear spindles	Type: Speed /drive power S6 40 %/ Torque S6 4%	min^{-1}/ kW/Nm				
				(PCUe: 8,000/60/1,146)		(PCUe: 8,000/60/1,146)
Motor spindles	Type: Speed /drive power S6 40 %/ Torque S6 4%	min^{-1}/ kW/Nm	(DCU (DCT): 16,000/50/228)	DCU (DCT): 12,000/52/400	(DCU (DCT): 16,000/50/228)	DCU (DCT): 12,000/52/400
			(SCU (SCT): 18,000/45/121)	(SCU (SCT): 15,000/45/282)	(SCU (SCT): 18,000/45/121)	(SCU (SCT): 15,000/45/282
TOOL MANAGEMENT						
Chip-to-chip time	$t_{2.3}$ | VDI 2852	s	(4.0)	4.1	(4.2)	4.3
Tool weight[4]		kg	(15)	25 (35)	(15)	25 (35)
Chain-type magazines	Magazine places	Number	(50 (100/150))	50 (100/150)	(50 (100/150))	50 (100/150)
	Tool length/diameter[5]	mm	(600/Ø 188)	600/Ø 280	(600/Ø 188)	600 (800)/Ø 280
	Tool shank	Size	(HSK-A 63)	HSK-A 100	(HSK-A 63)	HSK-A 100
Rack-type magazines	Magazine places	Number	(324/498)	(200/260/340/425)	(324/498)	(200/260/340/425)
	Tool length/diameter[5]	mm	(600/Ø 188)	(600/Ø 280)	(600/Ø 188)	(600 (800)[9]/Ø 280)
	Tool shank	Size	(HSK-A 63)	(HSK-A 100)	(HSK-A 63)	(HSK-A 100)

( ) = optional values **–** = not available **1)** PCUe differs **2)** in Y- **3)** Positional uncertainty **4)** Note total clamping load **5)** with free adjacent places
6) Note restrictions **7)** Stand-alone (IN-Automation: Ø 1,400 mm) **8)** PRO equipment package **9)** only R 260 and R 340

Technical data			F 5000		F 6000	
WORKPIECE MANAGEMENT						
Type			APC	FLEX	APC	FLEX
Clamping surface	Nominal size	mm	630 x 630	630 x 630	630 x 630 (800 x 800)	630 x 630 (800 x 800)
Workpiece dimensions	 Diameter D full circle depth D x width W	mm	 Ø 900 900 x 1,300	 Ø 1,300 –	 Ø 1,000 1,000 x 1,540	 Ø 1,540[7] –
	 Height H	mm	 1,100	 1,400	 1,300[6]	 1,500[6]
Clamping load		kg	1,500 (2,000)	2,000	1,500 (2,000)	2,500
Load pallet changer	Total / load difference	kg	2,000 (3,000)/1,500	–	2,000 (3,000)/1,500	–
Pallet change time	Standard (with increased clamping load)	s	15 (18)	–	14.5 (17)	–
MACHINE						
Dimensions	approx. L x W x H | Basic machine with standard chain-type magazine, coolant unit with paper band filter and platforms, if required.	mm	7,400 x 3,650 x 3,700	6,450 x 3,800 x 3,700	7,850 x 3,750 x 3,950	7,200 x 4,200 x 3,950
	approx. L x W x H | Basic machine with standard chain-type magazine, coolant unit with backflush filter and platforms, if required.	mm	7,550 x 3,650 x 3,700	6,950 x 4,150 x 3,700	8,000 x 3,750 x 3,950	7,350 x 4,200 x 3,950
						
Weight	approx. | Basic machine with standard chain-type magazine, without coolant unit	t	20	19	22	20
CONTROL TECHNOLOGY						
Machine control			Siemens SINUMERIK ONE			

Technical data			F 8000		F 10000	
LINEAR AXES						
Positioning range	X/Y/Z	mm	1,400/1,200/1,400		1,700 / 1,400 / 1,600	
Rapid traverse speed	X/Y/Z	m/min	50 (60)[8]		50 (60)[8]	
Acceleration	X/Y/Z	m/s^2	4 (6)[8]		4 (6)[8]	
Feed forces	X/Y/Z | S3 40 %	kN	15/27[2]/20		15/27[2]/20	
Positioning tolerance Tp / At[3]	X/Y/Z | VDI/DGQ 3441 / ISO 230	mm	0.008 (0.004)[8]		0.008 (0.004)[8]	
ROTARY AXES						
NC rotary feed table	B | speed / torque S3 40 %	min^{-1}/Nm	10/2,900		10/3,000	
NC rotary feed table: Mill-Turn	B | speed S3 40 % / torque	min^{-1}/Nm	500/4,270		360/6,560	
Positioning tolerance Tp / At[3]	B | VDI/DGQ 3441 / ISO 230	arc. sec.	8 (5)[8]		8 (5)[8]	
5th axis		Type	Swivel head U (tilt head T)		Swivel head U (tilt head T)	
MACHINING UNITS						
Tool shank	SK/BT for selected units also available | Mill-Turn: HSK-T	Size	(HSK-A 63)	HSK-A 100	(HSK-A 63)	HSK-A 100
Gear spindles	Type: Speed /drive power S6 40 %/ Torque S6 4%	min^{-1}/ kW/Nm		(PCTe: 6,000/60/1,146)		(PCTe: 6,000/60/1,146)
				(PCUe: 8,000/60/1,146)		(PCUe: 8,000/60/1,146)
Motor spindles	Type: Speed /drive power S6 40 %/ Torque S6 4%	min^{-1}/ kW/Nm	(DCU (DCT): 16,000/50/228)	DCU (DCT): 12,000/52/400	(DCU (DCT): 16,000/50/228)	DCU (DCT): 12,000/52/400
			(SCU (SCT): 18,000/45/121)	(SCU (SCT): 15,000/45/282)	(SCU (SCT): 18,000/45/121)	(SCU (SCT): 15,000/45/282)
TOOL MANAGEMENT						
Chip-to-chip time	$t_{2.3}$ | VDI 2852	s	(4.5 (4.3)[8])	4.6 (4.4)[8]	(4.9 (4.7)[8])	5.0 (4.8)[8]
Tool weight[4]		kg	(15)	25 (35)	(15)	25 (35)
Chain-type magazines	Magazine places	Number	(50 (100/150))	50 (100/150)	(50 (100/150))	50 (100/150)
	Tool length/diameter[5]	mm	(600/Ø 280)	600 (800)/Ø 280	(600/Ø 280)	600 (800)/Ø 280
	Tool shank	Size	(HSK-A 63)	HSK-A 100	(HSK-A 63)	HSK-A 100
Rack-type magazines	Magazine places	Number	(324/498)	(200/260/340/425)	(324/498)	(200/260/340/425)
	Tool length/diameter[5]	mm	(600/Ø 188)	(600 (800)[9]/Ø 280)	(600/Ø 188)	(600 (800)[9]/Ø 280)
	Tool shank	Size	(HSK-A 63)	(HSK-A 100)	(HSK-A 63)	(HSK-A 100)

( ) = Optional values **–** = Not available **1)** PCUe differs **2)** in Y- **3)** Positional uncertainty **4)** Note total clamping load **5)** With free adjacent places
6) Note restrictions **7)** Stand-alone (IN-Automation: Ø 1,400 mm) **8)** PRO equipment package **9)** Only R 260 and R 340

Technical data			F 8000		F 10000	
WORKPIECE MANAGEMENT						
Type			APC	FLEX	APC	FLEX
Clamping surface	Nominal size	mm	800 x 800 (1,000 x 1,000)	800 x 800 (1,000 x 1,000)	1,000 x 1,000	1,000 x 1,000
Workpiece dimensions						
	Diameter D full circle depth D x width W	mm	Ø 1,400 1,400 x 1,940	Ø 1,940 –	Ø 1,600 1,600 x 2,240	Ø 2,240 –
						
	Height H	mm	1,500[6]	1,600[6]	1,700	1,700
Clamping load		kg	2,000 (3,000)	3,000	4,000	5,000
Load pallet changer	Total / load difference	kg	4,000/2,000[6]	–	8,000/2,500[6]	–
Pallet change time	Standard (with increased clamping load)	s	21 (23)	–	AA	–
MACHINE						
Dimensions	approx. L x W x H | Basic machine with standard chain-type magazine, coolant unit with paper band filter and platforms, if required.	mm	8,600 x 5,000 x 4,300	7,400 x 5,100 x 4,300	9,200 x 5,400 x 4,700	7,800 x 5,900 x 4,700
	approx. L x W x H | Basic machine with standard chain-type magazine, coolant unit with backflush filter and platforms, if required.	mm	8,500 x 5,300 x 4,300	7,300 x 5,400 x 4,300	9,100 x 5,700 x 4,700	7,700 x 5,900 x 4,700
						
Weight	approx. | Basic machine with standard chain-type magazine, without coolant unit	t	28	25	35	31
CONTROL TECHNOLOGY						
Machine control			Siemens SINUMERIK ONE			

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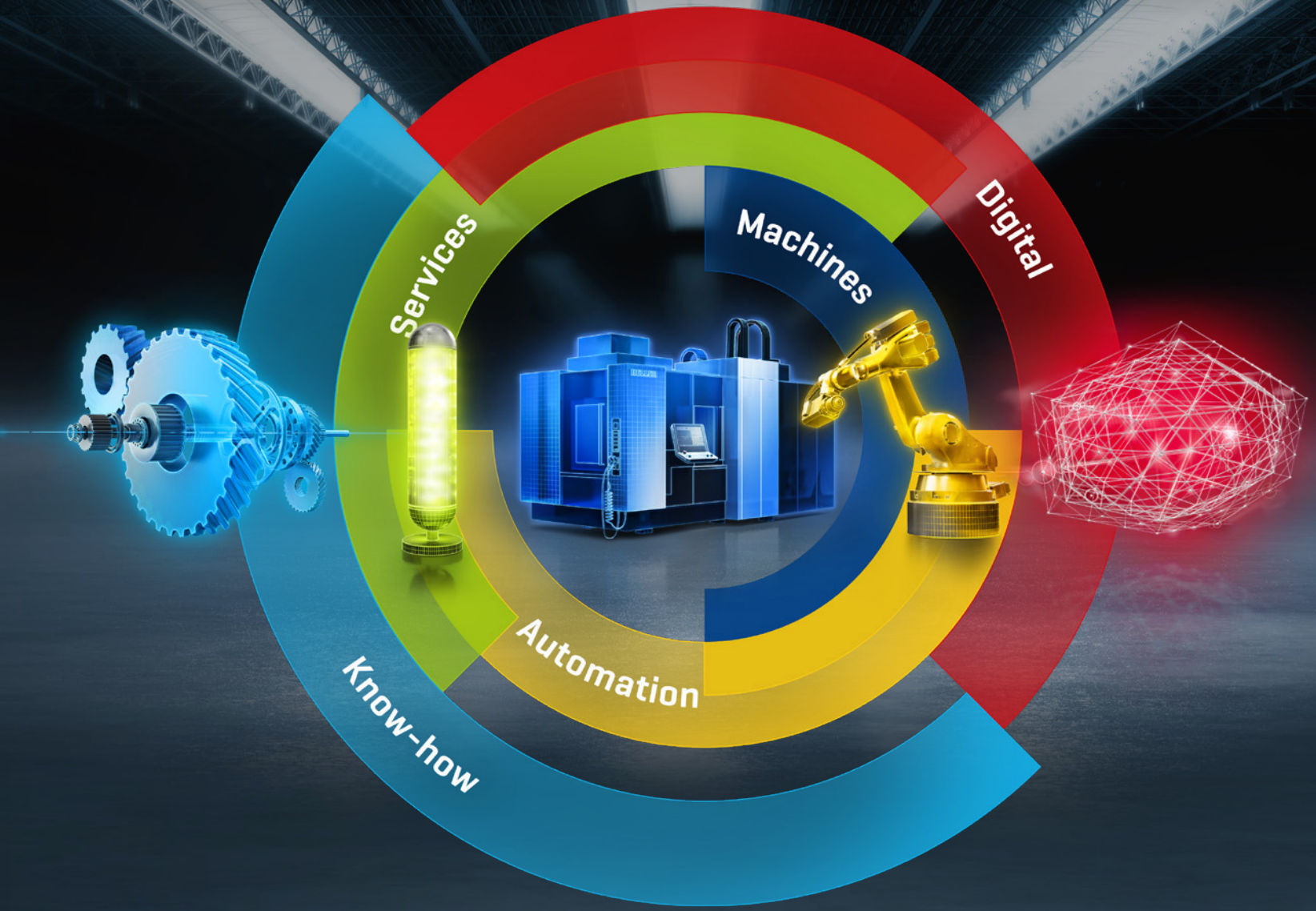

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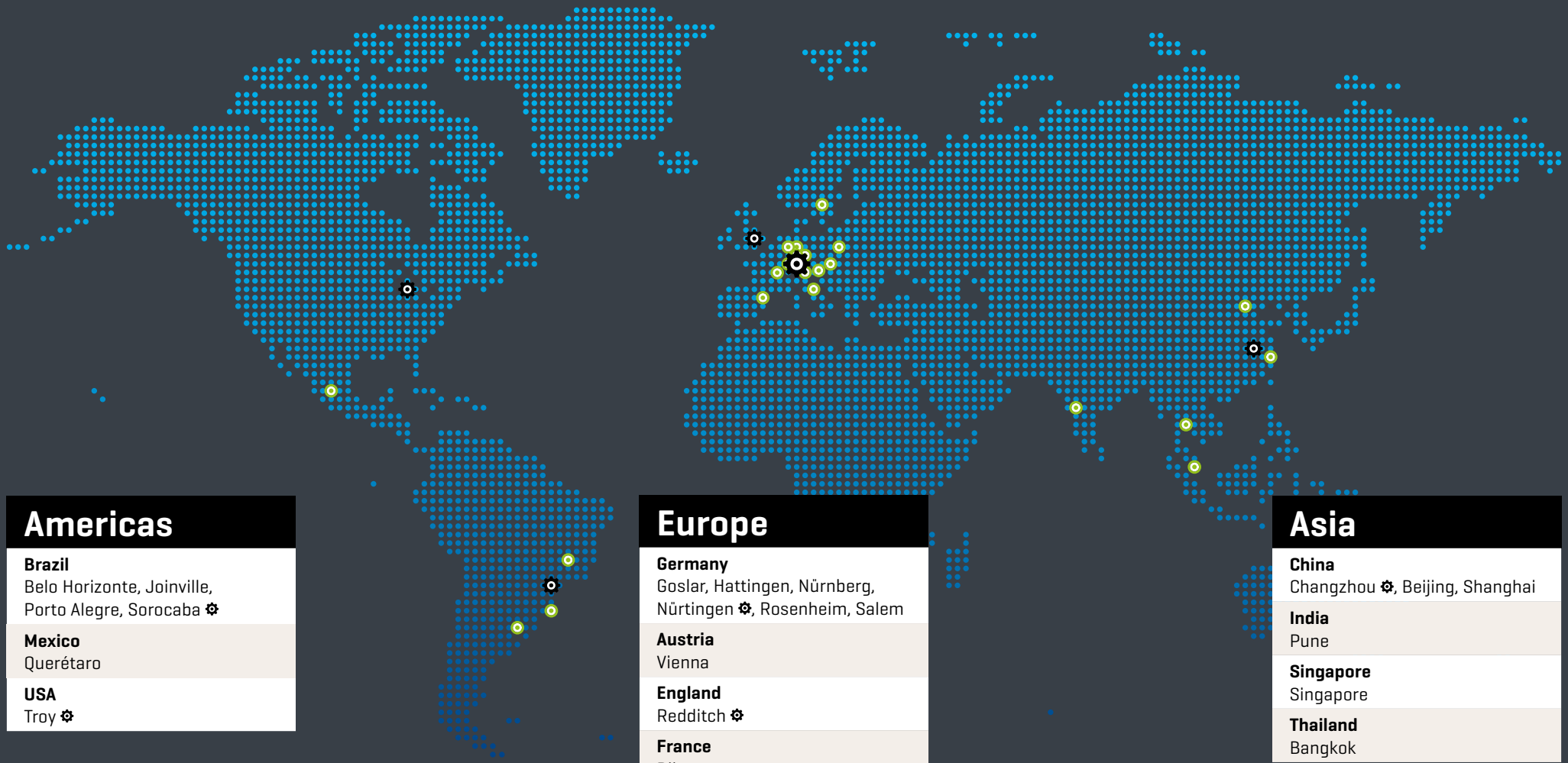

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