

HELLER



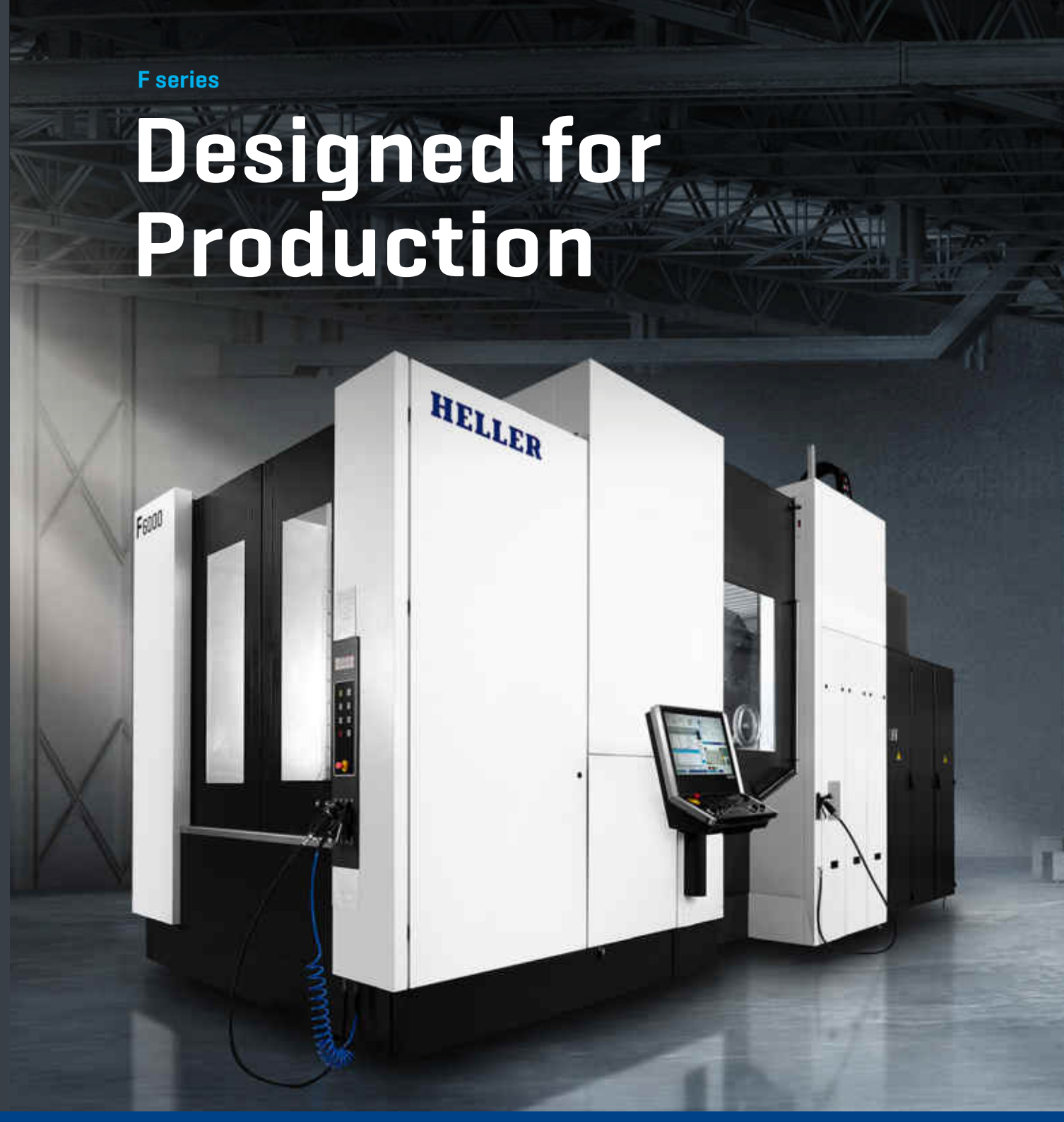
5-axis
machining centres

F

F series

Designed for Production

F series	02
Machine concept	04
Equipment	06
Mill-Turn	08
Machining units	10
Tool management	12
Workpiece management	14
Supply and disposal	16
Control technology	18
Operation	20
Automation solutions	22
Technical data	24



With its head kinematics, the new generation of the 5-axis F series has been designed from the ground up for flexible series production. Like all HELLER machines, they set a benchmark for cutting performance and precision. Other highlights include free chip fall, short idle times, optimum automation capability and compatibility with the H and FP series for a wide range of workpieces. In addition, the new models come with top-of-the-range specifications and the option to add 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 unit and up to 1,146 Nm
- _designed for flexible series production from 24/7 to single-part production
- _narrow 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 removal due to free chip fall and wide central chip conveyor
- _easy automation with the 'Automation-READY' option, even at a later date without a rebuild

More information at: www.heller.biz/en/f



Machine concept

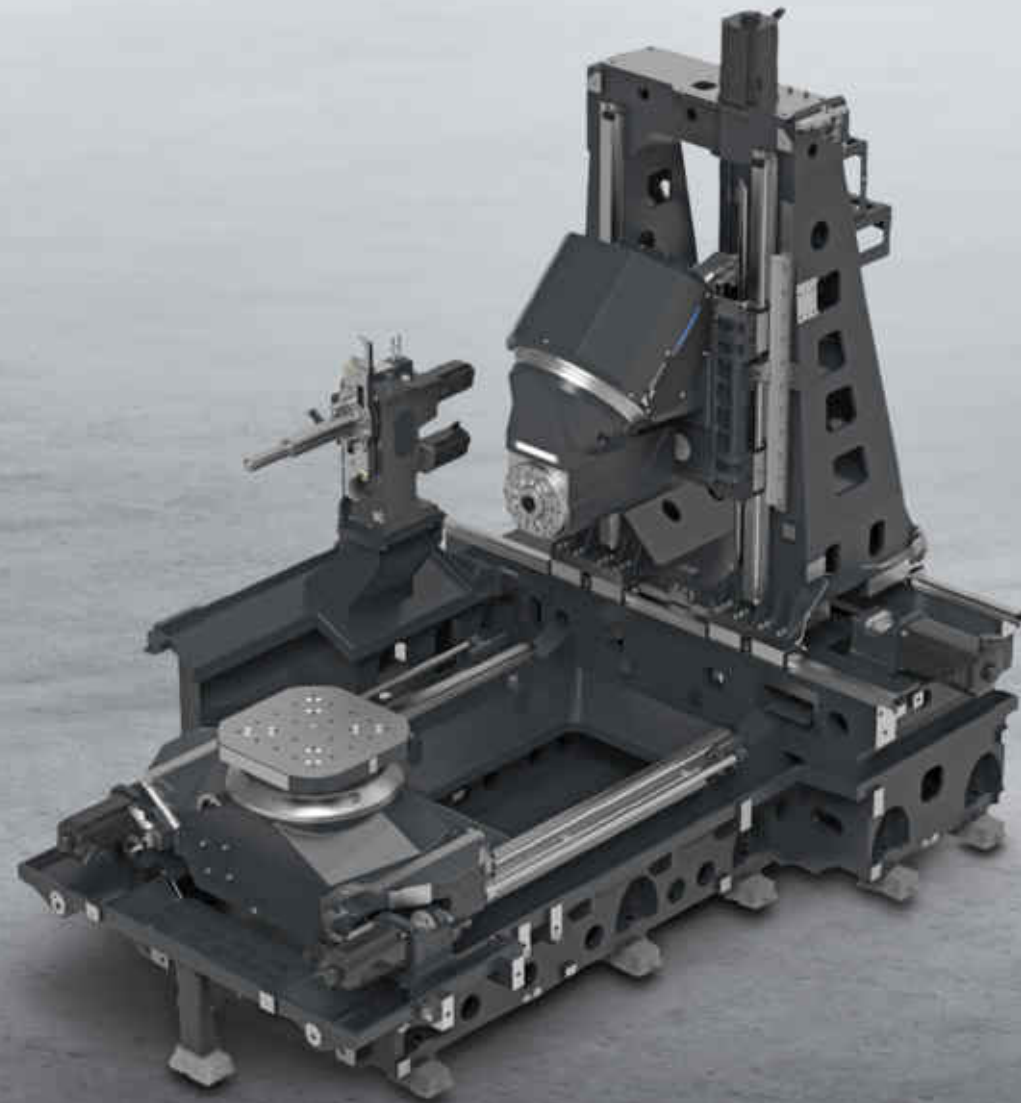
Maximum performance with lasting precision

Only the perfect combination of rigidity and lightweight construction results in a machine design that ensures optimum surface finish and a long tool life. As with all HELLER machines, the main components of our new generation F series have been designed using FEM. The result is a machine bed optimised for rigidity and a mass-reduced column that ensure reliable productivity and high dynamics combined with perfect precision.



APC

Automatic Pallet Changer



FLEX
Front Loading **EXtended**

Basic structure

- _ 5-axis 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
- _ pallet changer with lift-swivel principle, designed as a fork-type changer 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 provided by the tool
- _ machine bed supporting the X and Z axes in cross bed design
- _ machine column moves in X-direction and supports the machining unit
- _ machining unit moves in Y-direction, compact and robustly integrated into the machine column
- _ rotary table [B-axis] moves in Z-direction and rotates the workpiece continuously [360,000 x 0.001°]
- _ 5th axis designed as swivel head [C-axis, 350,000 x 0.001°] or optionally as tilting head [A-axis, 175,000 x 0.001°]

Drive concept

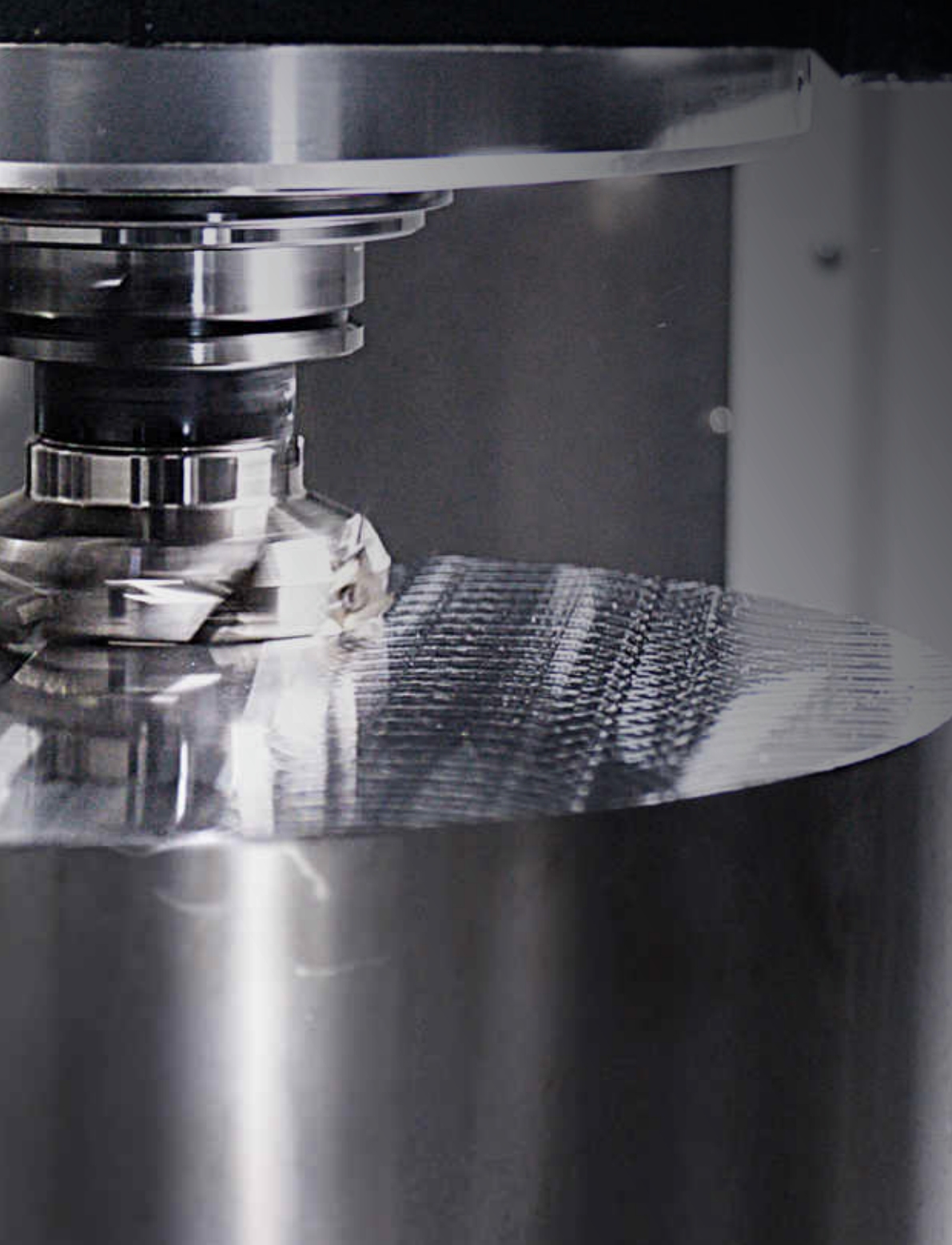
- _ linear axes with wide roller guides driven by precision ball screws with cooled drives or drive flanges
- _ direct, absolute measuring systems with low positional tolerance for maximum precision
- _ rotary axes with large YRT bearing and automatic clamping for maximum stability and high tangential moments
- _ rotary table with duplex worm gear for maximum performance in 5-axis machining
- _ direct driven high-speed rotary table for mill-turn applications [optional]

Highest performance for flexible series production

The PRO equipment package for the new F series offers maximum performance, optimum conditions for simultaneous 5-axis machining and class-leading specifications in every respect. Perfect conditions for powerful and flexible series production.

			F 5000	F 6000	F 8000	
Equipment			PRO	PRO	POWER	PRO
Rapid traverse speed	X/Y/Z	m/min	65 / 65 / 65	65 / 65 / 65	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
Chip-to-chip time	HSK-A 100 [HSK-A 63]	s	4.0 [3.9]	4.2 [4.1]	4.6 [4.5]	4.4 [4.3]
Positioning Tolerance Tp	X/Y/Z	µm	5 / 5 / 5	5 / 5 / 5	8 / 8 / 8	6 / 6 / 6
Positioning Tolerance Tp	B/C	arcsec	7 / 7	7 / 7	8 / 8	7 / 7
Feed forces	X/Y/Z S3 40%	kN	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]

[] = Optional values 1) PCUe different 2) In Y-



PRO equipment package

Maximum performance

- _two ball screws in the Z-axis
- _increased feed force in the Z-axis
- _reduced positional tolerances in all axes

Simultaneous 5-axis machining

- _milling technology package (ONE Dynamics) for optimum path guidance and perfect surface finish
- _highest dynamics in the linear axes
- _fast, backlash-free swivel drive in the 5-axis head

Class-leading specifications

- _optimum set-up of all components
- _AutoSet function for optimum drive parameters to suit the current clamping load
- _AutoCal function for optimum accuracy of 5-axis kinematics

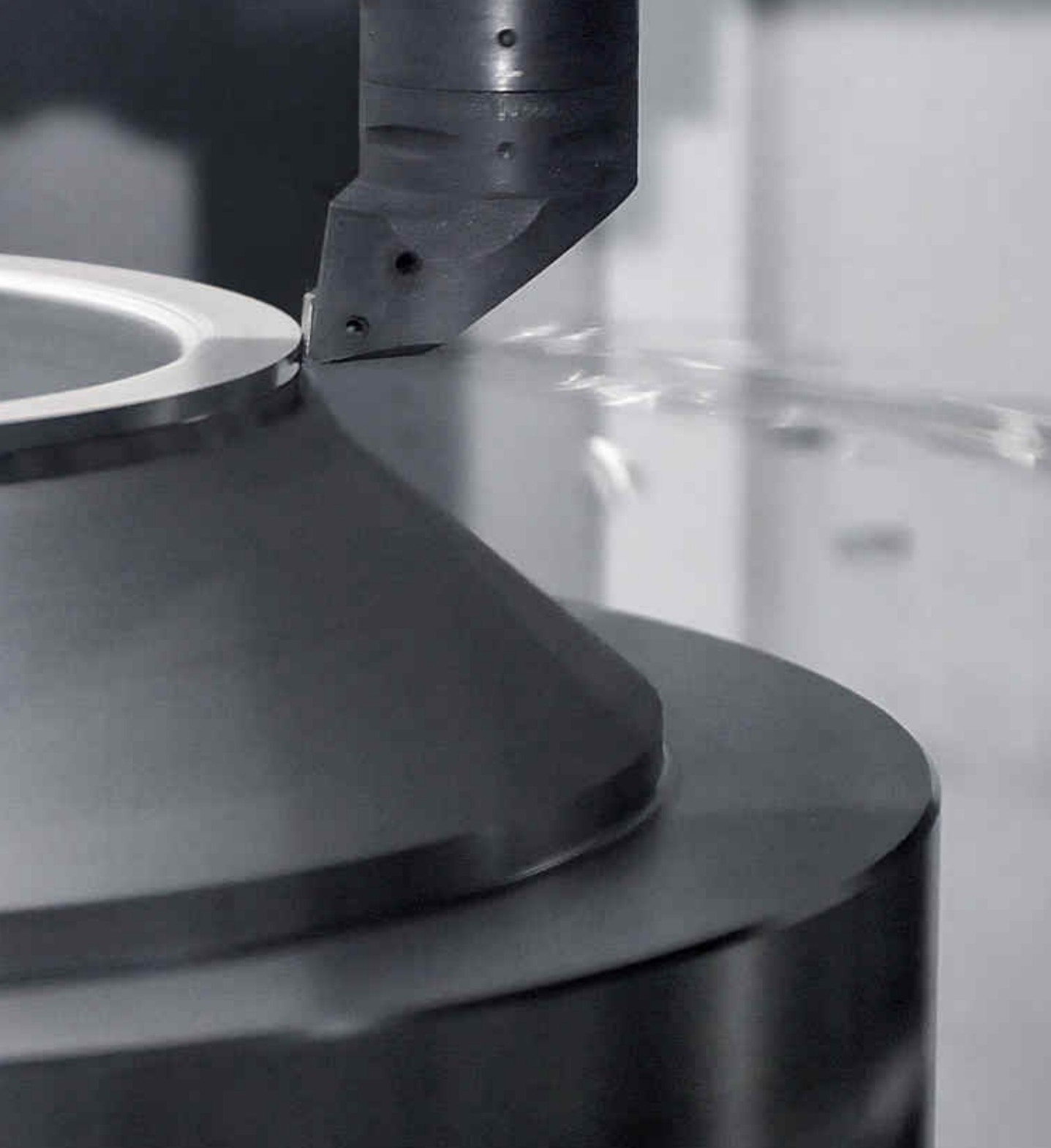
Mill-Turn

Complete machining on a single machine

The optional Mill-Turn functionality enables combined milling and turning on a single machine – giving you even greater flexibility for the machining of your workpieces. Machining in a single set-up provides maximum component accuracy, while the use of a high-torque rotary table ensures maximum productivity.

			F 5000	F 6000	F 8000
Speed	S3 40%	min ⁻¹	700	700	500
Torque		Nm	2,600	2,600	4,270
Workpiece diameter	APC / FLEX [Full circle]	mm	Ø 900 / Ø 1,300	Ø 1,000 / Ø 1,540 ^{1]}	Ø 1,400

^{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 optimum turning accuracy
- _ spindle locking for secure hold of the turning tools
- _ balancing technology cycle for balancing of the workpieces and fixture in the machine
- _ Siemens NC turning cycles for easy programming of turning operations

NC rotary table with rotary function

- _ direct drive rotary table for high speeds in turning operation and high milling dynamics
- _ permanent cooling for optimum accuracy at high speeds
- _ large YRT bearing for maximum stability and high tilting moments
- _ hydraulic clamping with integrated automatic clamping for maximum tangential moments
- _ integrated media interface for hydraulic workpiece clamping (80 bar, optional)

Options

- _ media interface in Mill-Turn version for hydraulically operated universal power chucks
- _ tool measurement with precision laser and probe for turning tools
- _ oscillating speed: technology cycle to eliminate vibration in critical processes
- _ ChipBreak: technology cycle to prevent long chips and thread chips

Machining units

High cutting performance

Optimum process stability in 5-axis machining is also a question of having the right spindle. With our new generation F series you can choose from a range of swivel head and tilting head designs. Whether it is heavy-duty cutting of cast iron or steel, high-volume machining of light metals or vertical, horizontal and tilted turning with the optional Mill-Turn functionality – we have the right solution to suit your requirements.



			PCUe 100 G	DCU 100 M	SCU 100 M	DCU 63 M	SCU 63 M	PCTe 100 G	DCT 100 M	SCT 100 M	DCT 63 M	SCT 63 M
Tool shank	SK/BT for PCUe/PCTe available as an option 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	100	282	228	121

Standard: DCU 100 M



Powerful machining units

- _ machining units with 5th axis provided by the tool with robust swivel head or tilting head kinematics
- _ 8 machining units with high-speed motor spindles for universal use
- _ 2 machining units with gear-driven spindles, perfect for cutting difficult-to-machine materials
- _ HSK-A 100 tool shank as standard for machining units with motor and gear-driven spindles (HSK-A 63 optional)
- _ automatic clamping of the 5th axis, optional hydraulic clamping for maximum stability in heavy-duty machining with tilted rotary axes
- _ sturdy cast iron guide slide with high dynamic rigidity and damping

Swivel head

- _ high projection length in vertical position for precise machining behind the rotary centre of the rotary table
- _ compact design and high rigidity thanks to the robust 45° swivel head kinematics and short distance between bearing and tool shank
- _ dynamic, backlash-free swivel drive with electrically pre-loaded motors
- _ large C swivelling range of 350° for high flexibility in 5-sided machining
- _ integrated LED light (WorkLIGHT) as standard and remaining path display as part of the optional SETUP-Assist function

Tilting head

- _ large swivel range enables machining of negative angles and undercuts
- _ bearings on both sides provide maximum rigidity during roughing and finishing operations
- _ HSK-A 100 spindle with a gearbox unit and a maximum torque of 1,146 Nm
- _ 175° swivel range for maximum flexibility in 5-sided machining

Options

SETUP-Assist

- _ assistance system that actively supports the operator when running in processes
- _ remaining path display integrated into the machining units **1**
- _ collision monitoring between machine components and tools **2**
- _ utilisation display for linear axes, rotary table and spindle

HELLER attachment head support (MSK)

- _ precondition for the use of attachment heads, [e.g. angular heads]
- _ enlarged support basis with three-point rest
- _ integrated torque input and media transfer



Fast, precise, reliable

Particularly in 5-axis and mill-turn machining, you work with a wide variety of tools and large tool geometries on a daily basis. No problem for our machining machining centres: they allow you to continue to use your tooling flexibly, while ensuring short tool loading times, short downtimes and short non-productive times.

			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	[3.9]	4.0	[4.1]	4.2	[4.5 [4.3] ³⁾]	4.6 [4.4] ³⁾
Tool weight¹⁾		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 [800] / Ø 280	[600 / Ø 188]	600 [800] / Ø 280	[600 / Ø 188]	600 [800] / Ø 280
Rack-type magazines	Magazine places	Number	[315 / 489]	[200 / 260 / 340 / 425]	[315 / 489]	[200 / 260 / 340 / 425]	[315 / 489]	[200 / 260 / 340 / 425]
	Tool length/diameter ²⁾	mm	[600 / Ø 188]	[600 / Ø 280]	[600 / Ø 188]	[600 / Ø 280]	[600 / Ø 188]	[600 / Ø 280]

[] = Optional values 1) Consider total load capacity 2) With free adjacent places 3) Equipment package PRO



Chain-type magazines 1

- _ 3 chain-type magazines with up to 150 positions
- _ double chain with high traversing dynamics and sturdy tool holders mounted on both sides
- _ short tool-to-tool times due to tool provisioning parallel to machining
- _ tool shank in enclosed holders: protection against contamination and optimum hold during positioning
- _ tool loading station with optimum accessibility for fast and ergonomic tool loading

Rack-type magazines 2

- _ 2 rack-type magazines with up to 489 positions for machines with HSK-A 63
- _ 4 rack-type magazines with up to 425 positions for machines with HSK-A 100
- _ small footprint due to space-saving positioning of the magazine alongside the machine
- _ fast tool handling with highly dynamic tool loader
- _ integrated rotary station for loading of multiple tools parallel to machining

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
- _ sturdy double gripper for a secure hold with heavy tool weights and moments of weight
- _ 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

Automated from the ground up

Whether with pallet changer [APC] for flexible series production or in the FLEX version with an interchangeable pallet for maximum flexibility in terms of workpiece dimensions: the new generation of the F series comes perfectly prepared for both concepts and offers you 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
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]
	Workpiece dimensions						
Workpiece dimensions	Diameter D Full circle	mm	Ø 900	Ø 1,300	Ø 1,300	Ø 1,540 ²⁾	Ø 1,400
	Depth T x Width W	mm	900 x 1,300	-	1,300 x 1,540	-	1,400 x 1,810
	Height H	mm	1,100	1,100	1,300 ¹⁾	1,300 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
Load pallet changer	Total / load difference	kg	2,000 [3,000] / 1,500	-	2,000 [3,000] / 1,500	-	4,000 / 2,000 ¹⁾
Pallet change time	Standard [with increased load]	s	15 [18]	-	14.5 [17]	-	21

[] = Optional values - = Not available ¹⁾ Consider limitations ²⁾ Stand-Alone [IN-Automation: Ø 1,400 mm]



APC

Automatic Pallet Changer

- _ automatic pallet changer with lift/swivel principle
- _ high maximum clamping load with robust, hydraulic drive
- _ 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 more flexibility in production (optional)

FLEX

Front Loading EXtended

- _ machine with interchangeable pallet for maximum flexibility
- _ large workpiece diameter without restrictions due to pallet changer
- _ increased load as standard
- _ reduced machine length
- _ interchangeable pallet as standard for quick setup outside the machine
- _ 'IN-Automation' version with optimised design for the integration into pallet automation

Rotary table 1

- _ rotary table with duplex worm gear
- _ 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 tilted rotary axes
- _ pallet mounting with diamond-type dowel pin and indexing pin for maximum pallet change accuracy
- _ integrated swivel clamps with high clamping force



1

Supply and disposal

For maximum chip removal rates

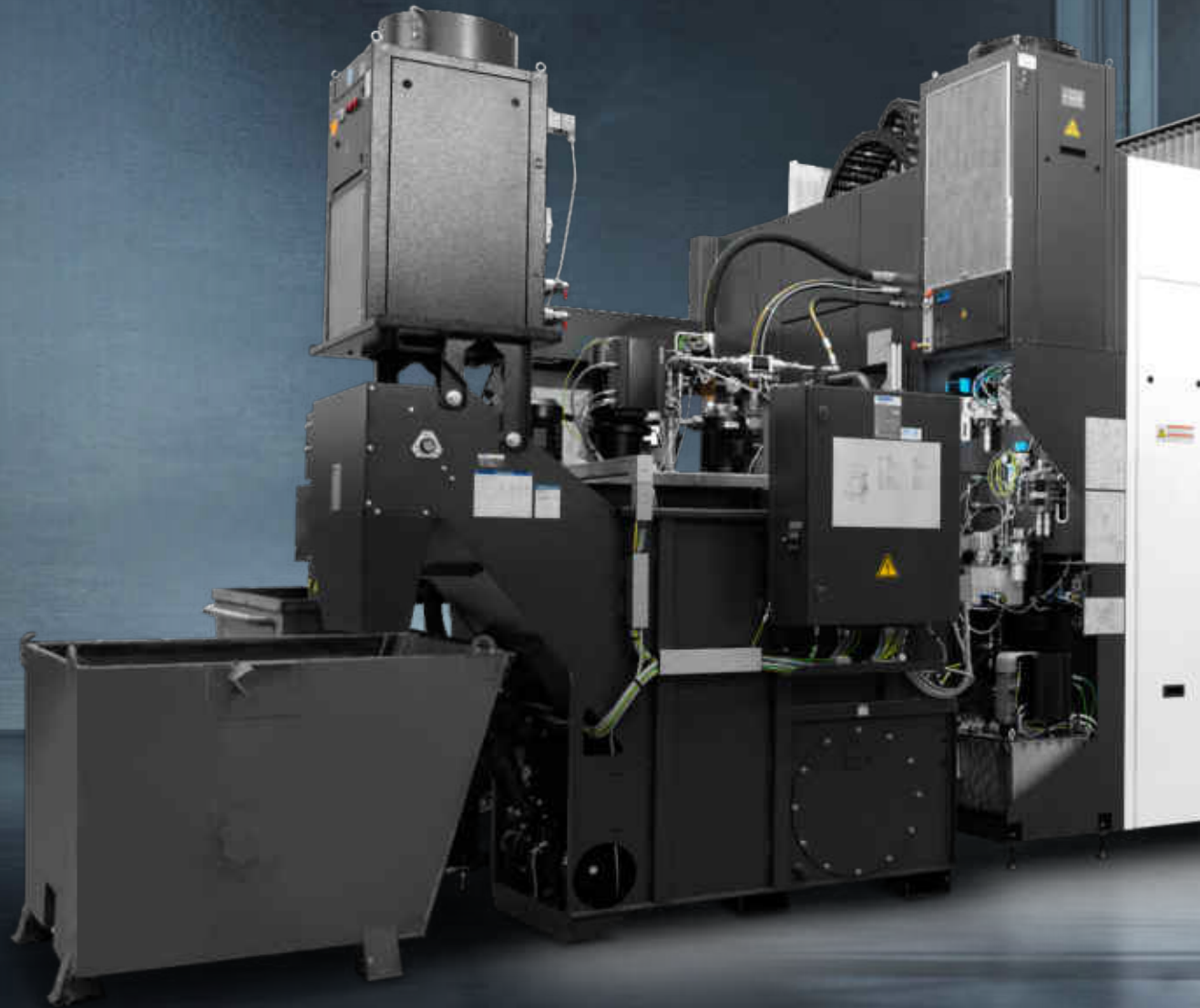
Fast and effective chip removal is a top priority with our machining centres. The design of the work area prevents the accumulation of chips and ensures that they are quickly removed from the machine. You can select the most suitable conveyor design and coolant unit for your individual work processes. Precision and process are assured!

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 high pressure 50 bar [optional: 70 bar]
- _internal coolant supply with up to 7 pressure steps freely programmable via NC program
- _external tool cooling (AKZ) with flushing nozzles [optional] integrated into the spindle
- _integrated work area shower with adjustable nozzles for optimum 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



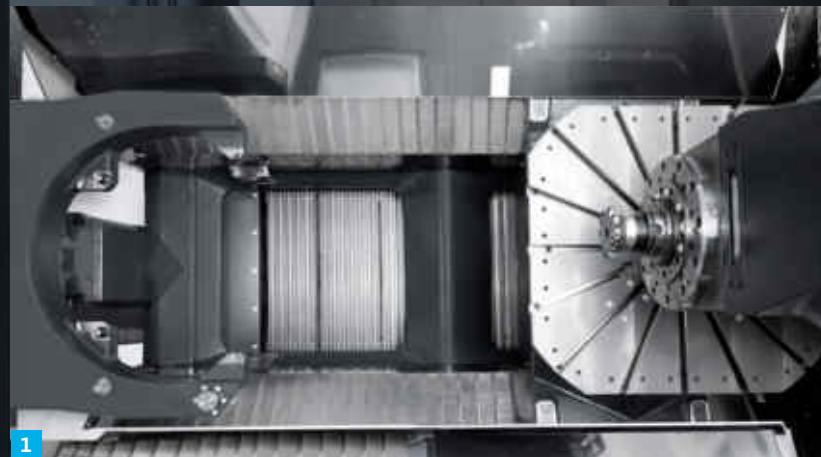


Chip disposal

- _ F 5000/6000: free chip fall below the spindle and quick removal from the work area
- _ F 8000: chip removal 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 (optional)
- _ 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) (optional)

Media supply

- _ easy maintenance with optimum accessibility, all supply units at a glance
- _ central oil-air lubrication for key components
- _ sealing air and selective blow-off of interfaces for continuous, smooth machine operation
- _ media interface for hydraulic workpiece clamping with up to 250 bar (optional)
- _ compressed air and water guns integrated into the machine housing at the workpiece loading station and operating station **2**



1



2



2

Control technology

Perfect performance for complete machining

In everyday working life, speed is of the essence. 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
- _console-design main operating unit 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 (ITC 2400)
- _convenient operating panel at the tool loading station **2**
- _HT 2 or HT 10 handheld operating unit
- _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 3 overrides for optimum control in all operating situations
- _third override reduces rapid traverse, helping to eliminate the risk of a collision during manual operation

Options

- _in-process monitoring (IPM)
- _damage reduction
- _tool requirements planning
- _automatic loading/unloading sequence
- _maintenance manager
- _job management
- _interpolation turning (IPT)
- _SETUP-Assist (process setup wizard)
- _PRODUCTION-Assist
- _HELLER Services Interface (HSI) and other HELLER4Industry products



Operation

Optimal access to all working areas

Working with HELLER machines, you can feel every day how much engineering experience 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 are always in the foreground.





1

Operating station 1

- _ ergonomically arranged operating elements and control screens
- _ swivelling main operating unit with clamping function integrated into the machine enclosure to save space
- _ good view into the work area thanks to large safety window
- _ smooth-running, linear-guided work area door opens the work area roof in the operating area
- _ 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



2

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 setting station door
- _ automatically rotating setting NC setting 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



3

Tool setting station 3

- _ ergonomically arranged operating elements
- _ optimum-height insertion position with integrated unclamping function for easy handling
- _ tool loading at the magazine while the spindle is running

Options

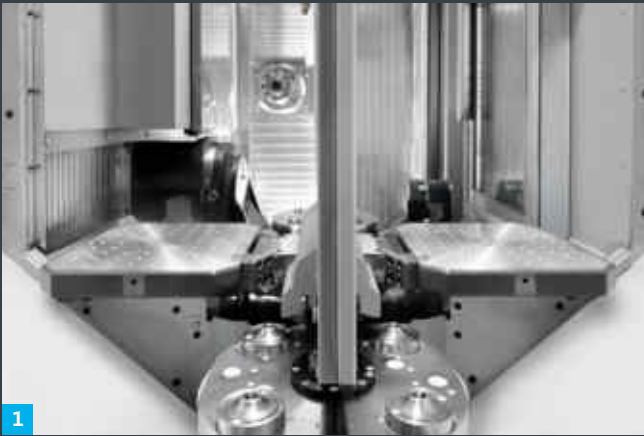
- _ convenient operating panel at the tool loading station
- _ tool loading during machining
- _ tool coding with RFID chip
- _ HELLER TRP [Tool Requirement Planning] for automatic generation of loading and unloading lists

Automation solutions

Open to standards – flexible for customised solutions

The main objective of automated manufacturing and production centres is to reduce downtime and optimise system availability. For this purpose, HELLER has developed its own automation solutions that work perfectly with HELLER's highly productive machining centres. To meet the diverse needs of the market, this portfolio is complemented by a range of specialised solutions that HELLER is able to offer through best-in-class partnerships.





1



4

Pallet automation

Pallet changer 1

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

Linear pallet storage 2

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

Rotary pallet storage 3

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



2



5

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



3



6

Workpiece automation

Robots 4

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 loader 5

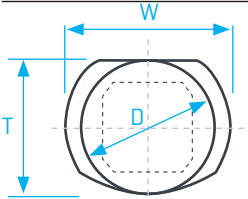
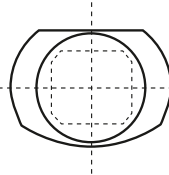
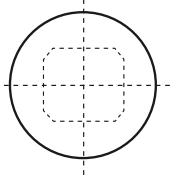
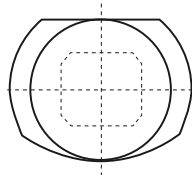
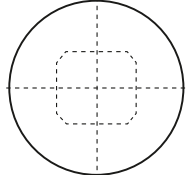
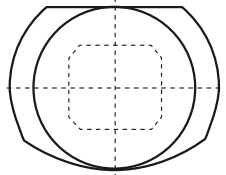







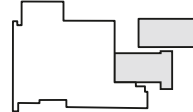
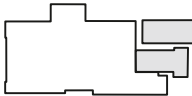
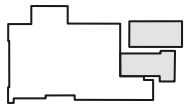
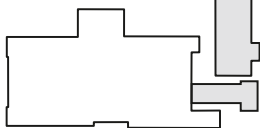
Linking of system components in production lines for maximum output. Perfect for series production with highest production volumes and short runtimes.

Tool automation

Background tool magazine 6

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

Technical data			F 5000		F 6000		F 8000	
LINEAR AXES								
Positioning range	X/Y/Z	mm	800/850 ¹⁾ /1,100		1,000/1,000/1,400		1,400/1,200/1,400	
Rapid traverse speed	X/Y/Z	m/min	65		65		50 [6] ⁸⁾	
Acceleration	X/Y/Z	m/s ²	6/7 ¹⁾ /7		6/7 ¹⁾ /7		4 [6] ⁸⁾	
Feed forces	X/Y/Z S3 40%	kN	15/27 ²⁾ /20		15/27 ²⁾ /20		15/27 ²⁾ /20	
Positioning tolerance Tp/At ³⁾	X/Y/Z VDI/DGQ 3441 / ISO 230	mm	0.005		0.005		0.008 [0.006] ⁸⁾	
ROTARY AXES								
NC rotary feed table	B Speed / Torque S3 40%	min ⁻¹ /Nm	25/2,900		25/2,900		10/2,900	
NC rotary feed table: Mill-Turn	B Speed S3 40% / Torque	min ⁻¹ /Nm	700/2,600		700/2,600		500/4,270	
Positioning tolerance Tp/At ³⁾	B VDI/DGQ 3441 / ISO 230	arcsec	7		7		8 [7] ⁸⁾	
5th axis		Type	Swivel head U [Tilting head T]		Swivel head U [Tilting head T]		Swivel head U [Tilting head T]	
MACHINING UNITS								
Tool shank	SK/BT available as an alternative for PCUe/PCTe Mill-Turn: HSK-T	Size	[HSK-A 63]	HSK-A 100	[HSK-A 63]	HSK-A 100	[HSK-A 63]	HSK-A 100
Gear spindles	Type: Speed / Power S6 40% / Torque S6 40%	min ⁻¹ /kW/Nm						[PCTe: 6,000/60/1,146]
				[PCUe: 8,000/60/1,146]		[PCUe: 8,000/60/1,146]		[PCUe: 8,000/60/1,146]
Motor spindles	Type: Speed / Power S6 40% / Torque S6 40%	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	[DCU: 16,000/50/228]	DCU: 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]	[SCU: 18,000/45/121]	[SCU: 15,000/45/282]
TOOL MANAGEMENT								
Chip-to-chip time	t _{2,3} VDI 2852	s	[3.9]	4.0	[4.1]	4.2	[4.5 [4.3] ⁸⁾	4.6 [4.4] ⁸⁾
Tool weight ⁴⁾		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 ⁵⁾	mm	[600/Ø 188]	600 [800]/Ø 280	[600/Ø 188]	600 [800]/Ø 280	[600/Ø 188]	600 [800]/Ø 280
	Tool shank	Size	[HSK-A 63]	HSK-A 100	[HSK-A 63]	HSK-A 100	[HSK-A 63]	HSK-A 100
Rack-type magazines	Magazine places	Number	[315/489]	[200/260/340/425]	[315/489]	[200/260/340/425]	[315/489]	[200/260/340/425]
	Tool length/diameter ⁵⁾	mm	[600/Ø 188]	[600/Ø 280]	[600/Ø 188]	[600/Ø 280]	[600/Ø 188]	[600/Ø 280]
	Tool shank	Size	[HSK-A 63]	[HSK-A 100]	[HSK-A 63]	[HSK-A 100]	[HSK-A 63]	[HSK-A 100]

Technical data			F 5000		F 6000		F 8000		
WORKPIECE MANAGEMENT									
Type			APC	FLEX	APC	FLEX	APC		
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)		
Workpiece dimensions									
	Diameter D Full circle Depth T x Width W	mm	Ø 900 900 x 1,300	Ø 1,300 -	Ø 1,300 1,300 x 1,540	Ø 1,540 ⁷⁾ -	Ø 1,400 1,400 x 1,810		
									
	Height H	mm	1,100	1,100	1,300 ⁶⁾	1,300 ⁶⁾	1,500 ⁶⁾		
Clamping load		kg	1,500 [2,000]	1,500 [2,000]	1,500 [2,000]	1,500 [2,000]	2,000		
Load pallet changer	Total / load difference	kg	2,000 [3,000] / 1,500	-	2,000 [3,000] / 1,500	-	4,000 / 2,000 ⁶⁾		
Pallet change time	Standard [with increased load]	s	15 [18]	-	14.5 [17]	-	21		
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	6,900 x 3,900 x 3,950	8,550 x 4,200 x 4,300		
	approx. L x W x H Basic machine with standard chain-type magazine, coolant unit with backflush 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	6,900 x 3,900 x 3,950	8,450 x 4,200 x 4,300		
									
Weight	approx. Basic machine with standard chain-type magazine, without coolant unit	t	20	19	22	20	27		
CONTROL TECHNOLOGY									
Machine control			Siemens SINUMERIK ONE						

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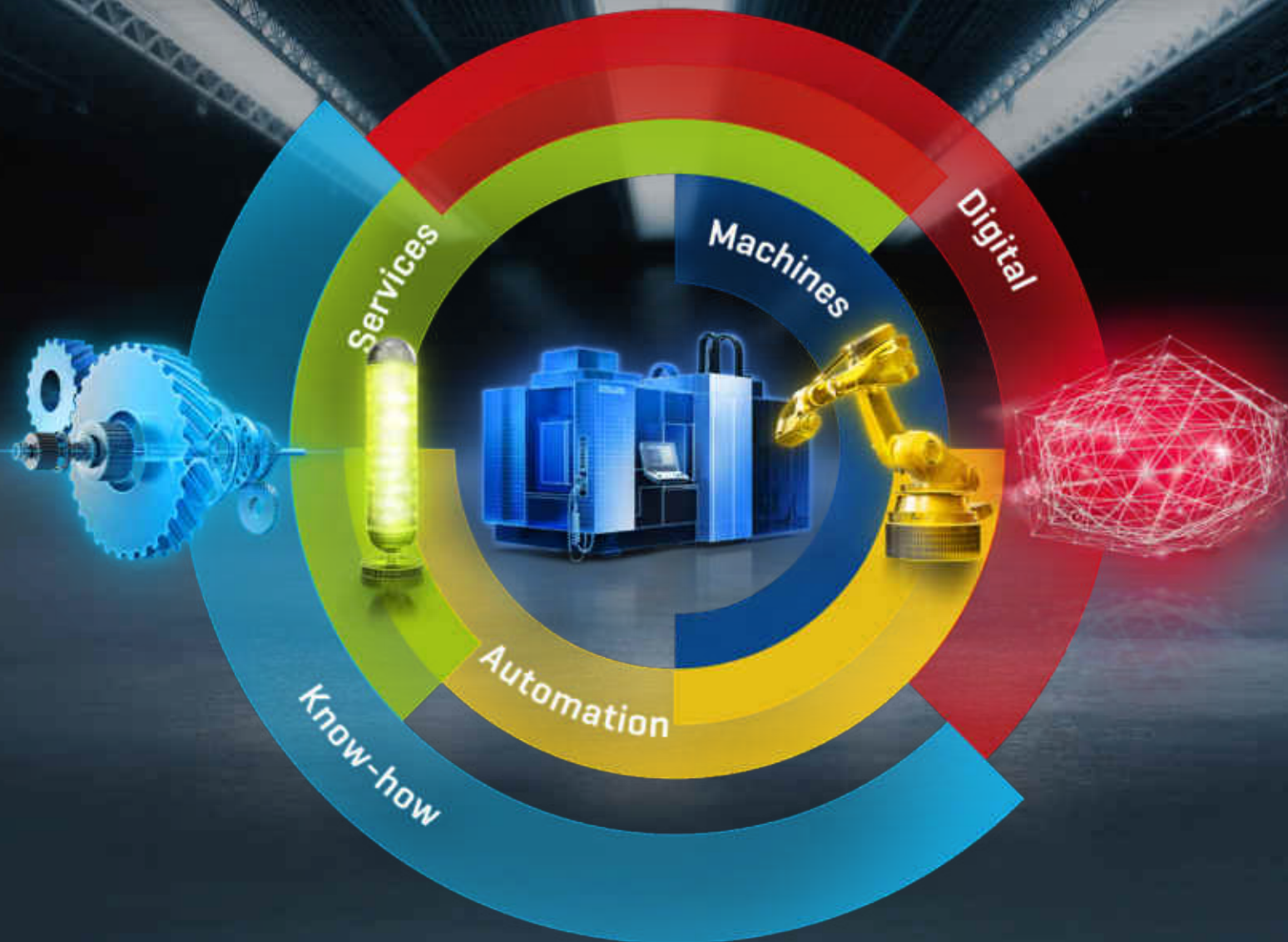


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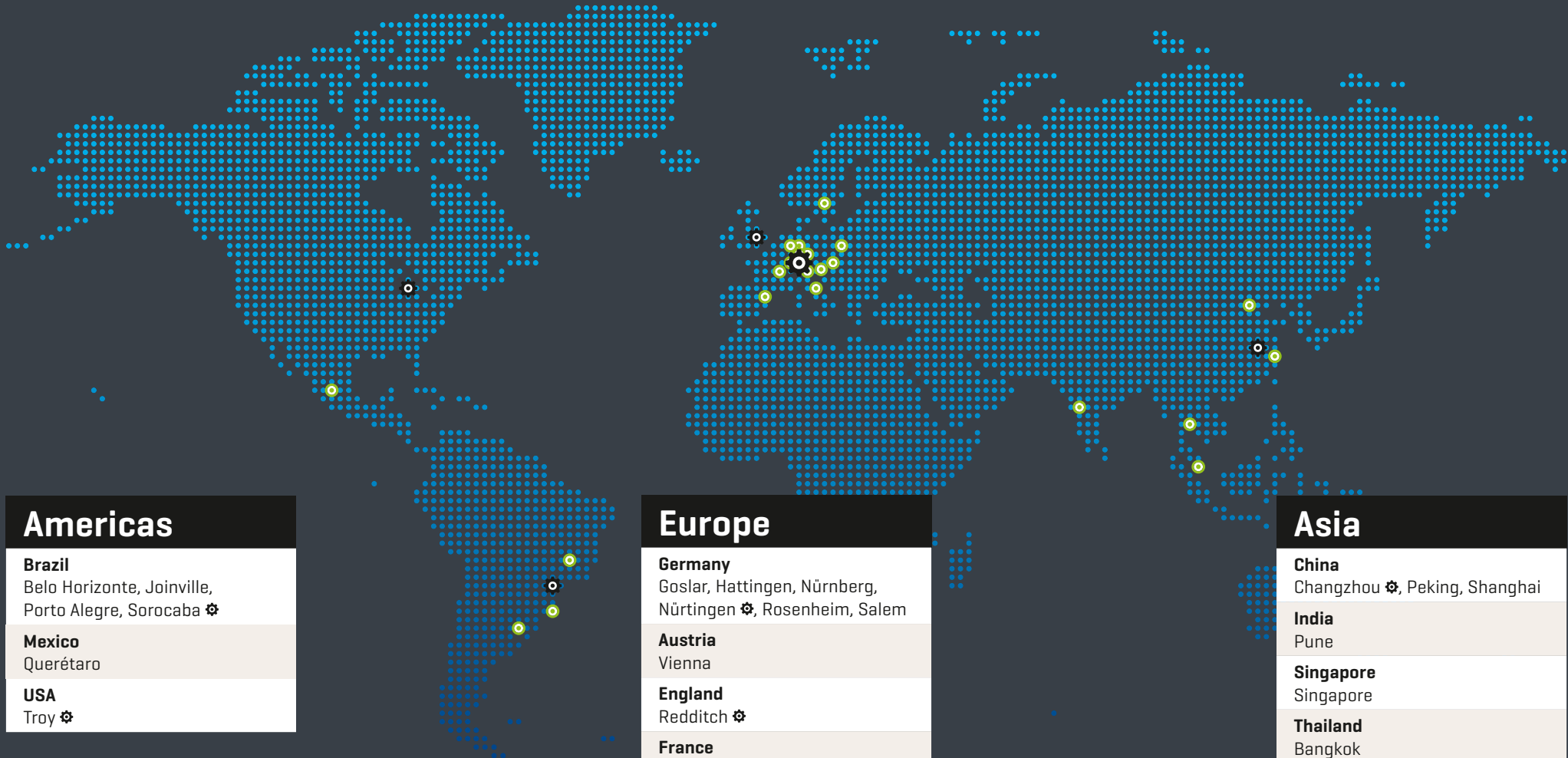
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