

HELLER



5-axis
machining centres

HF

HF series

Productivity in 5 axes

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The 5-axis machining centres from the HF series are optimally equipped to meet the exacting requirements of modern production processes. Enabling 5-sided and simultaneous 5-axis machining, they allow you to handle many different tasks on a single machine. Highly productive and flexible, with easy operation and maintenance, available with pallet changer or table loading.



Key facts

- _horizontal 5-axis machining centres with pallet changer or table loading
- _universal machining centres with 5th axis in the workpiece
- _swivelling NC rotary table with counter bearing and AB kinematics with highly dynamic torque drives as standard
- _Mill-Turn: combination of milling and turning [option for HF 5500]
- _3 equipment packages: POWER, SPEED and PRO
- _short chip-to-chip times thanks to quick NC tool changer and highest axis speed with equipment packages SPEED and PRO [option]
- _5-axis machining with optimised performance: simultaneous [option] and with positioned rotary axes
- _machining units with HSK-A 63 or HSK-A 100
- _gantry drive in Z-axis [option]
- _horizontal spindle for optimum chip fall
- _short idle times for maximum productivity
- _optimum accessibility for simple operation and maintenance
- _main operating unit designed as console with 24" multi-touch screen and HELLER Operation Interface
- _easy to automate with workpiece or pallet automation
- _machines with pallet changer optimal for series production
- _machines with table loading optimal for workshop-based production

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



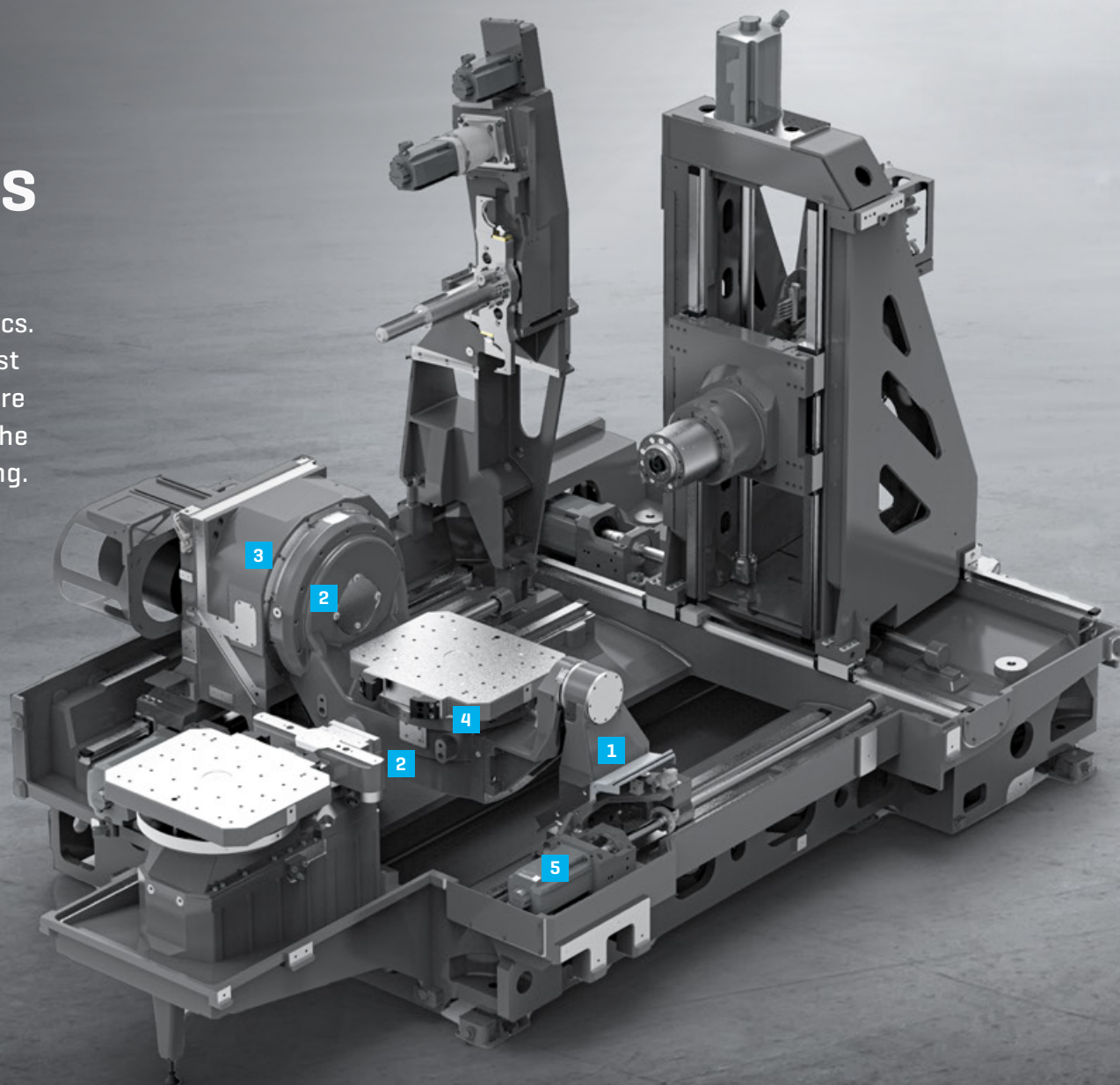
 Watch in Augmented Reality

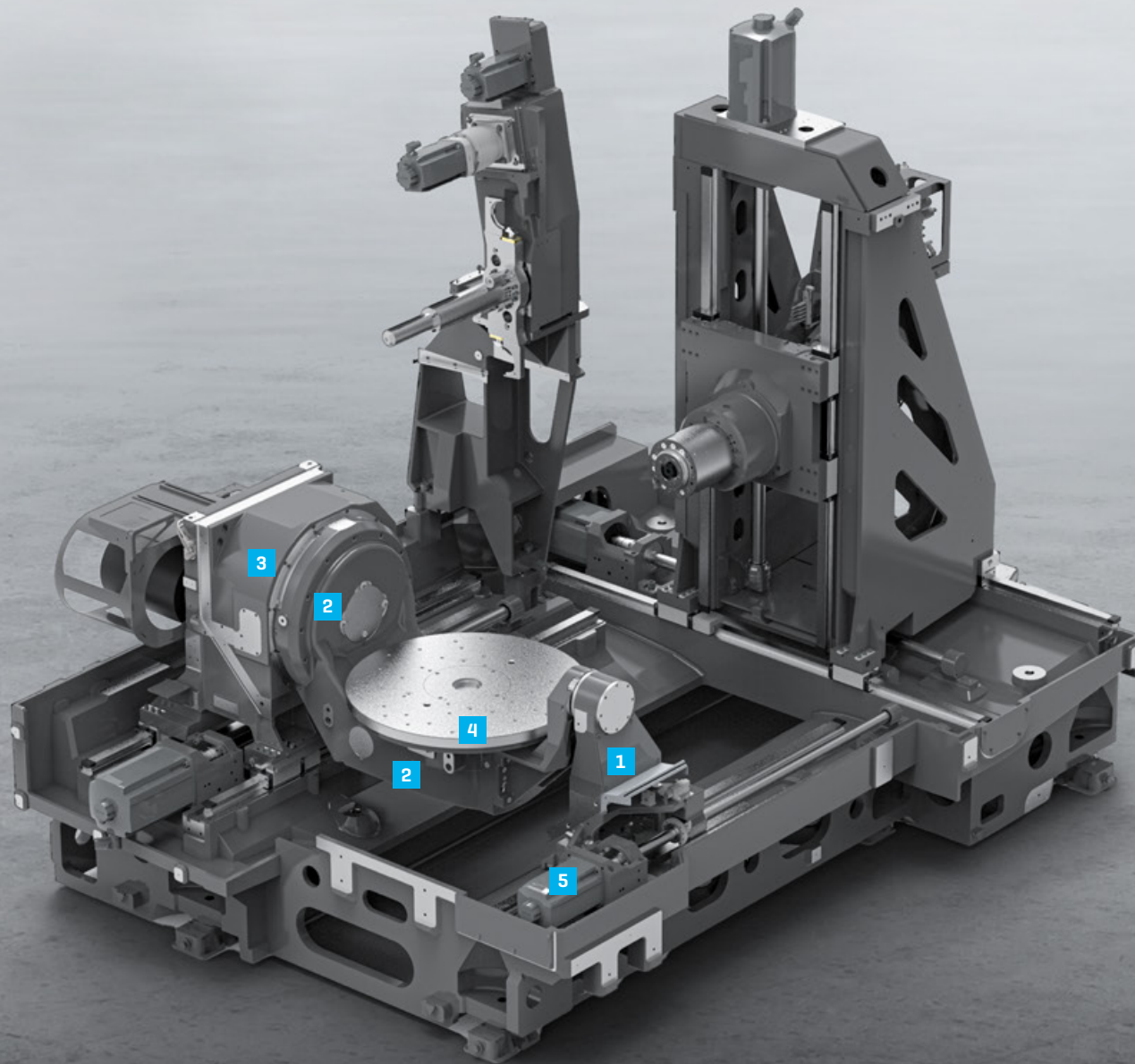


Machine concept

Perfect balance of rigidity and dynamics

The HF series 5-axis machining centres are the perfect combination of apparent contrasts – stiffness and dynamics. The basis is the rigid machine bed. Highly precise and fast machining cycles guarantee the unique machine structure of the HF: the fifth axis is located inside the workpiece, the directly-driven A/B-axis is supported by a counter bearing.





Counter bearing [standard] **1**

A/B with torque drive [standard] **2**

Reinforced A-axis [option] **3**

Rotary table DDT for Mill-Turn [option HF 5500] **4**

Z-axis with two drives, gantry version [option] **5**

Basic structure

- _rigid cast iron machine bed in combination with weight-optimised machine columns from steel
- _horizontal spindle with lean spindle neck for perfect reach into the workpiece
- _NC rotary swivel table with counter bearing for optimum force flow and compact design
- _gantry drive in Z-axis [option] with two ball screw drives and two direct measuring systems
- _chain-type or rack-type tool magazine for fast tool provisioning and high storage capacity
- _tool changer with two NC axes for fast automatic tool change
- _pallet changer with lifting/swivelling principle and robust HF pallet interface
- _machine variant with table loading available as an alternative

Kinematics

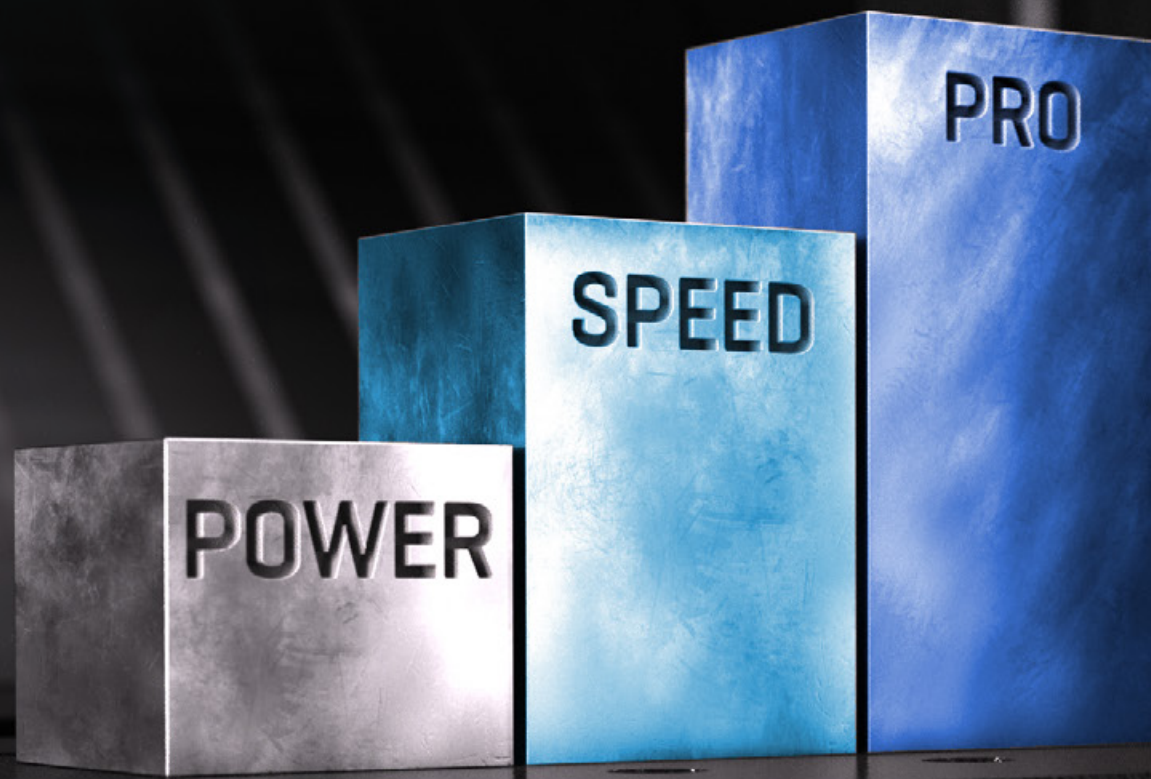
- _machine bed carries the X- and the Z-axis in a cross bed arrangement
- _the machine column traverses in the X direction and carries the machining unit
- _machining unit moves in Y direction, compact and stably integrated in machine column
- _NC rotary swivel table with counter bearing traverses in Z direction and executes the feed movement
- _NC rotary indexing table [B rotary axis] turns the workpiece continuously [360,000 x 0.001°]
- _swivel table [A rotary axis] swivels the rotary table continuously [225,000 x 0.001°]

Drive concept

- _linear axes with roller guides, driven by ball screws for a high dynamics
- _direct, absolute measuring systems for optimised precision and low position tolerance
- _highest dynamics of linear axis with the equipment package PRO [option]
- _A and B rotary axes with large YRT bearings and automatic clamping for maximum stability and high tilting moments
- _direct drives in both rotary axes for high dynamics
- _swivelling NC rotary table with counter bearing and lowest moments of inertia for fast positioning
- _gantry drive in Z-axis [option]

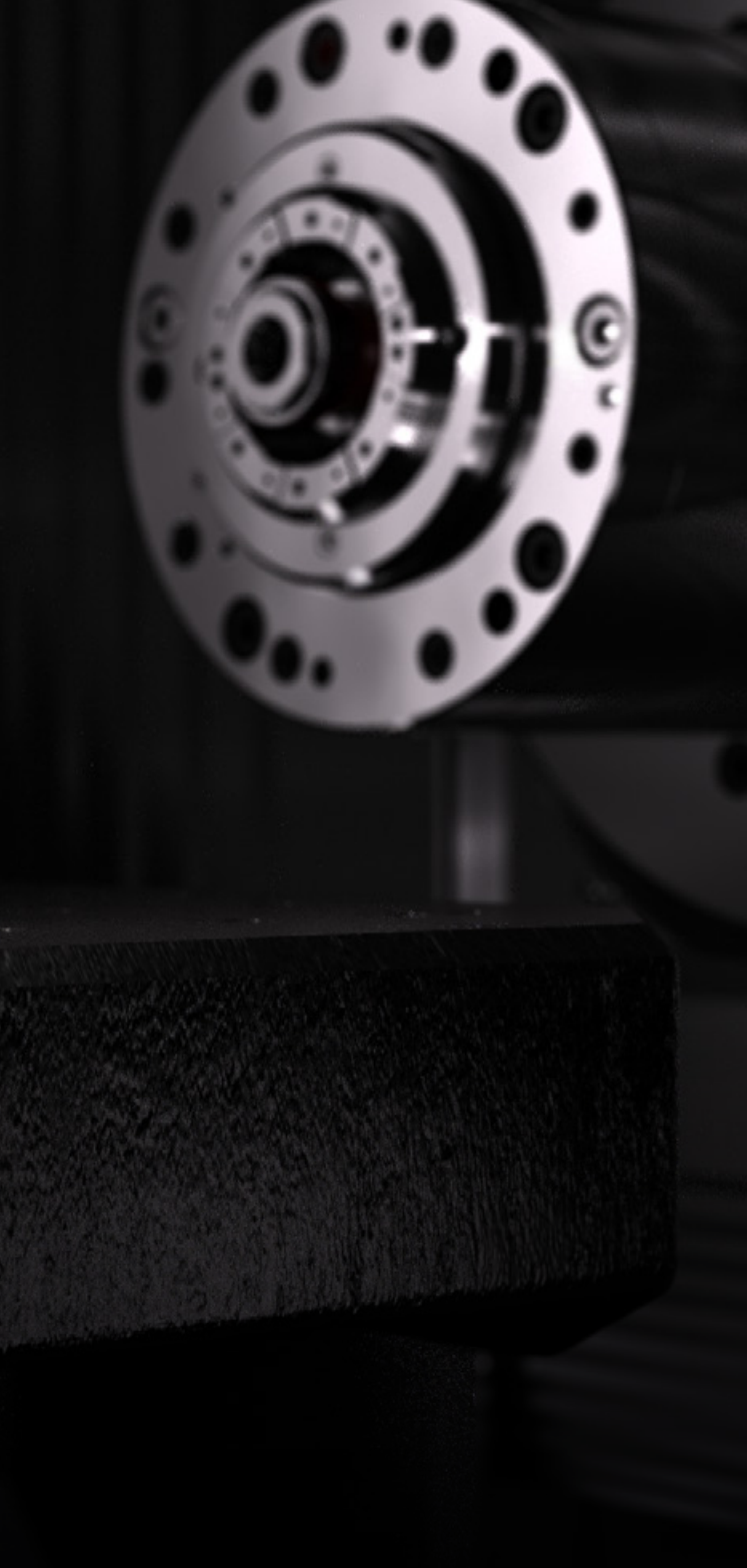
Features for tailored applications

Even the standard equipment of the HF series offers numerous advantages in day-to-day manufacturing. Increased productivity or flexibility are also important to you? Do you use your HF for serial production or do you prefer simultaneous 5-axis machining? Depending on your specific requirements, you can choose from a range of equipment packages: POWER, SPEED or PRO. Our flexibility in terms of equipment is your advantage for creating a manufacturing solution that meets your specific needs.



			HF 3500			HF 5500		
Equipment packages			POWER	SPEED	PRO	POWER	SPEED	PRO
Rapid traverse speed	X/Y/Z	m/min	65 / 65 / 65	90 / 90 / 80	90 / 90 / 80	65 / 65 / 65	90 / 90 / 80	90 / 90 / 80
Acceleration	X/Y/Z	m/s ²	8 / 8 / 8	10 / 10 / 8	10 / 10 / 10	8 / 8 / 8	10 / 10 / 8	10 / 10 / 10
Chip-to-chip time	HSK-A 63 [A 100]	s	2.6 [3.2]	2.4 [3.0]	2.4 [3.0]	2.7 [3.3]	2.5 [3.1]	2.5 [3.1]
Positioning tolerance Tp	X/Y/Z	µm	5 / 5 / 5	5 / 5 / 5	4 / 4 / 4	5 / 5 / 5	5 / 5 / 5	4 / 4 / 4
Positioning tolerance Tp	A/B	arcsec	9 / 8	9 / 8	7 / 7	9 / 8	9 / 8	7 / 7
Feed forces	X/Y/Z	kN	8 / 8 / 8 [10] ¹⁾	8 / 8 / 8	8 / 8 / 10	10 / 10 / 10 [12] ¹⁾	10 / 10 / 10	10 / 10 / 12
Clamping load		kg	550	550	650	750	750	750

1) In connection with Enforced Drive in Z



POWER

Swivel/rotary table with counter bearing

- _robust kinematics with 5th axis in the workpiece
- _integrated counter bearing in the standard version
- _high load capacity and large workpiece interference contour

Directly driven rotary axes A and B

- _fast positioning thanks to high dynamics
- _robust, wear-proof drives
- _integrated clamping with automatic clamping mechanism in the standard version

SPEED

Shortest chip-to-chip time

- _reinforced drive technology of the tool-related linear axes X and Y
- _powerful acceleration and high speed
- _SPEED tool change sequence with shortest idle times

Maximum speed in the linear axes

- _ball screw drives in the linear axes designed for high speed ranges
- _reinforced drive technology in all linear axes [compared to POWER]
- _AutoSet function determines optimal drive parameters of the Z-axis according to the current load

PRO

Optimal setup with the best technical data

- _AutoSet function determines optimal drive parameters according to the current load
- _AutoCal function for optimal axis calibration
- _improved technical data compared to the standard version [SPEED advantages included]

Ready to handle the tough cases

- _two ball screw drives in the Z-axis in the gantry version [two measuring systems]
- _increased feed force in Z-axis
- _higher load capacity for more flexibility in production

Maximum flexibility in configuration

- _second ball screw drive in the Z-axis [gantry version, option]
- _configuration for simultaneous 5-axis machining [option]
- _combined with Mill-Turn [HF 5500, option]

Perfect for 3+2 machining in series production

- _shortened machining times thanks to short idle times
- _configuration optimised for minimum part costs
- _optimal in combination with short run-up times of the HELLER spindles

Ideal for simultaneous 5-axis machining

- _milling technology package [MDynamics 5x] for optimum path guiding and surface quality
- _highest dynamics in the linear axes and reinforced drive in the swivel axis A
- _reduced positioning tolerances in the five axes

Mill-Turn

Complete machining on a single machine

The optional mill-turn functionality available for the HF 5500 enables combined milling and turning on a single machine – for even greater flexibility in production. Machining in a single set-up provides maximum component accuracy, whilst the use of a high-torque rotary table ensures maximum productivity.

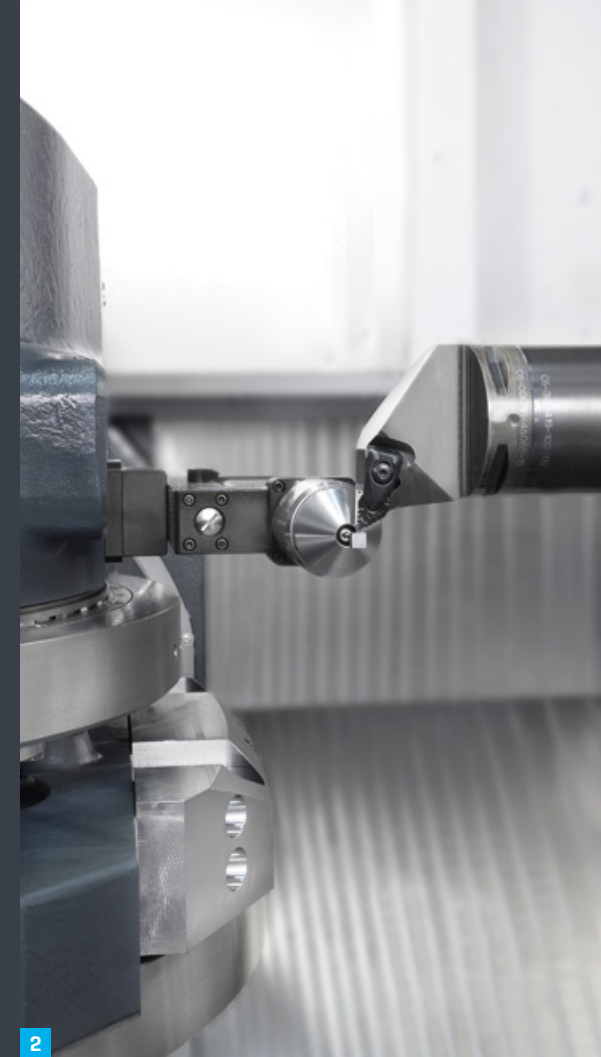
			HF 5500
Speed	S3 40%	min ⁻¹	800
Torque	S3 40%	Nm	750
Workpiece diameter		mm	Ø 720 [Pallet changer] Ø 900 [Table loading]



1

Mill-Turn features

- _ NC rotary table version DDT (Direct Drive Turning)
- _ spindle lock to ensure stable hold of the turning tools
- _ balancing technology cycle for balancing the workpieces and fixture in the machine **1**
- _ Siemens NC turning cycles for simple programming of turning operations



2

Required preconditions

- _ tool shank HSK-T for optimum accuracy of turning operation
- _ Enforced Drive in Z [option for POWER, included in PRO]
- _ Enforced Drive in A [option for POWER, included in PRO]
- _ installation with anchoring for optimum turning results
- _ Mill-Turn machine pallets with counter weight and swivel clamping system

Further available options

- _ media interface with multi-line clamping technology for mill-turn operations at 80 bar
- _ tool measurement with high precision laser and probe for turning tools **2**
- _ oscillating speed to avoid vibrations in critical processes
- _ ChipBreak to avoid long chips

The right spindle for every task

5-axis machining requires all components of a machining centre to deliver a top performance. The spindle must be particularly efficient: highly flexible, with torque characteristic curve adapted for the task in hand and suitable for a range of materials. The HF series 5-axis machining centres offer seven robust and powerful versions, so you work with a spindle that best suits your requirements.



			PC 63 i	DC 63 i	SC 63 i	HSC 63 M	PC 100 i	DC 100 i	SC 100 i
Tool shank¹⁾		Size	HSK-A 63	HSK-A 63	HSK-A 63	HSK-A 63	HSK-A 100	HSK-A 100	HSK-A 100
Speed		min ⁻¹	12,000	16,000	18,000	30,000	10,000	12,000	13,000
Power	S6 40%	kW	45	56	45	65 ²⁾	45 ³⁾	45 ³⁾	45 ³⁾
Torque	S6 40%	Nm	228	180	103	34 ²⁾	360 ³⁾	400 ³⁾	228 ³⁾

Standard: SC 63 i 1) Mill-Turn: HSK-T 2) Cycle time 2 min 3) Cycle time 5 min

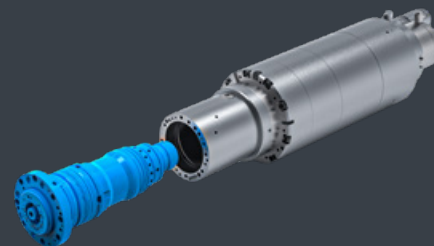


Machining units “made by HELLER”

- _ 7 spindles to choose from, with the new Dynamic Cutting spindles (DC 63 i and DC 100 i) perfect for universal use
- _ tool shank HSK-A 63 or HSK-A 100 optionally available for both machine sizes
- _ maximum performance in operation with compact overall dimensions and robustly dimensioned spindle bearing
- _ thermal stability and precision thanks to continuous cooling: precision cooling unit and spindle thermal growth compensation
- _ rigid cast iron guide slide with high dynamic rigidity and damping
- _ slim spindle neck for perfect reach into the workpiece
- _ horizontal spindle for optimum chip fall

HELLER zero spindle system

- _ easy replacement without time-consuming tuning work due to spindle tuned to zero dimension
- _ maximum machine availability through short repair times
- _ cost-effective service solution for low TCO [Total Cost of Ownership]



Options

HELLER torque support

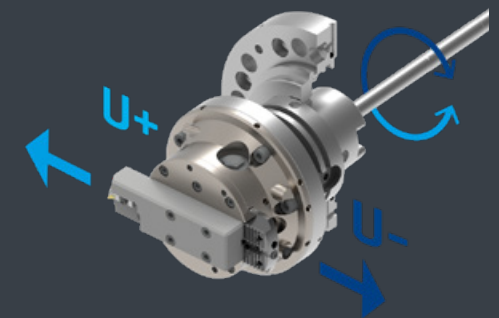
- _ absorbs the torque generated on the tool

HELLER attachment head support (MSK)

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

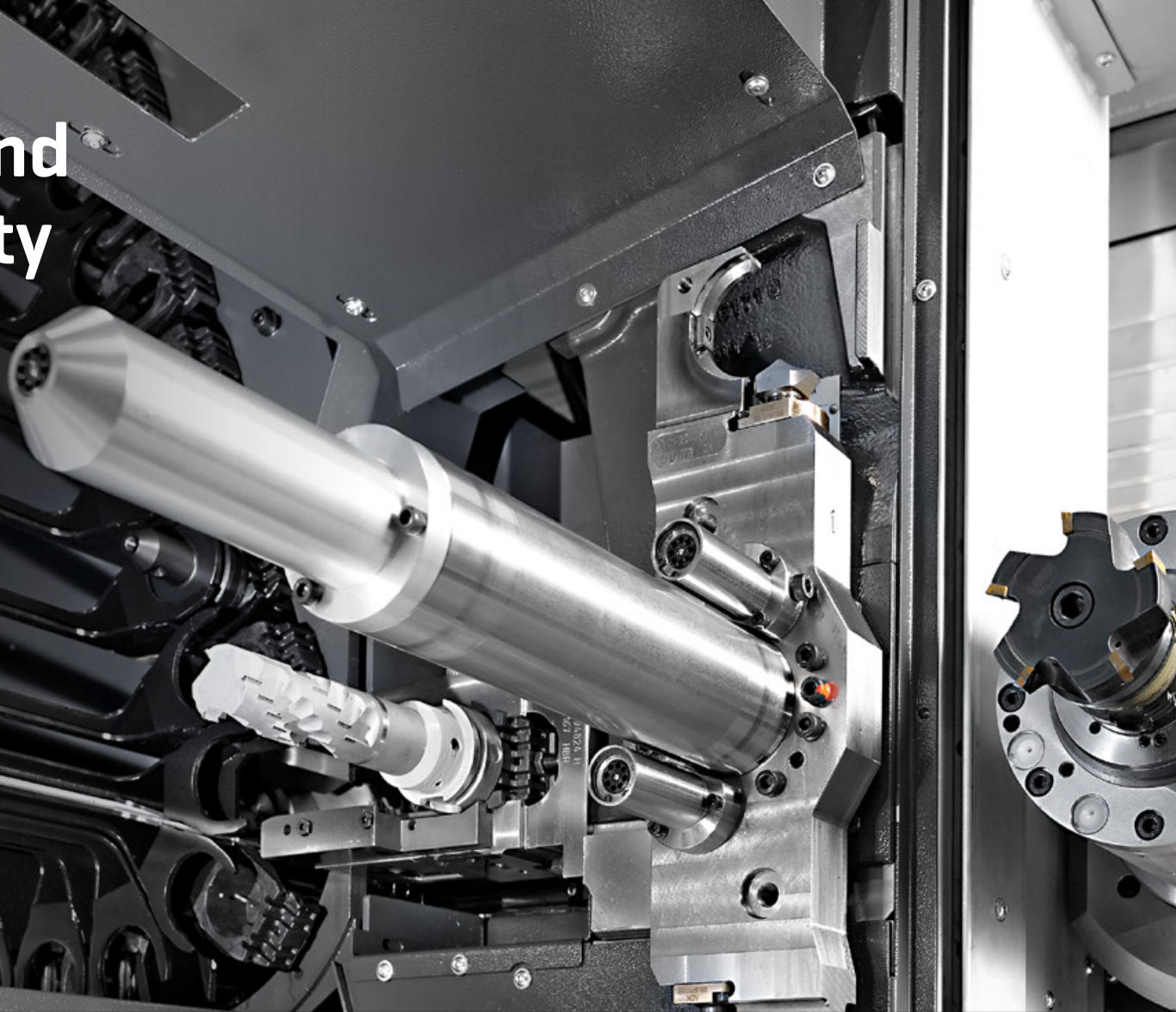
HELLER facing slide system

- _ for automatic adjustment of actuating tools
- _ actuation with a full-fledged NC axis (U) integrated in the machine control system
- _ ideal for boring contours or facing work



Dynamic handling and high storage capacity

If you have to work with a broad range of tools and respond flexibly to new production requirements, our HF series 5-axis machining centres are the ideal solution for you. Powerful tool magazines and a precise high-speed tool changer for optimum chip-to-chip times guarantee you constantly short non-productive times.

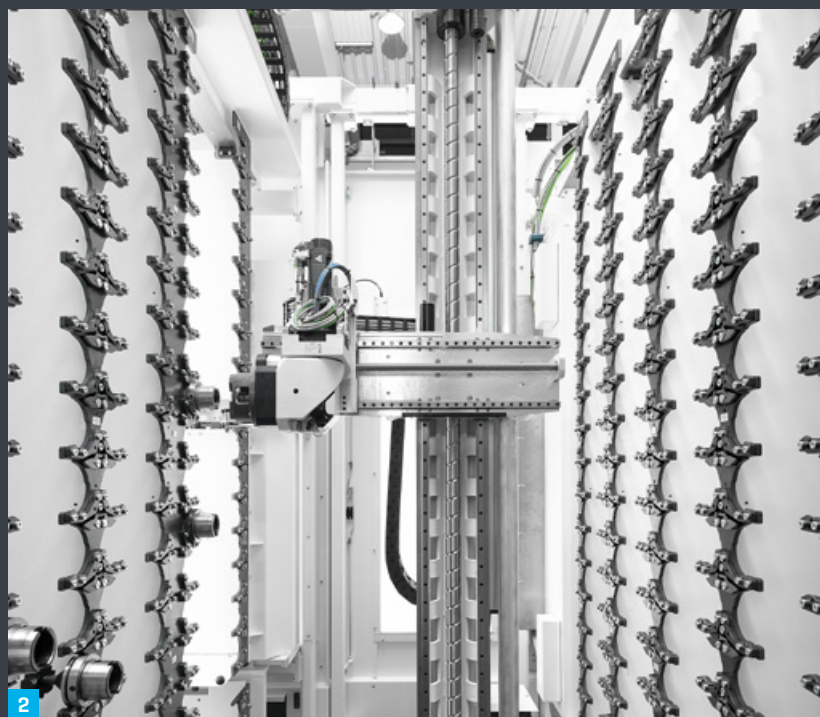


			HF 3500		HF 5500	
Tool shank		Size	HSK-A 63	[HSK-A 100]	HSK-A 63	[HSK-A 100]
Chip-to-chip time	$t_{2,3}$ VDI 2852 POWER [SPEED]	s	2.6 [2.4] ⁴⁾ / [7.2] ³⁾	[3.2 [3.0] ⁴⁾ / [9.5] ³⁾	2.7 [2.5] ⁴⁾ / [7.2] ³⁾	[3.3 [3.1] ⁴⁾ / [9.5] ³⁾
Tool weight¹⁾		kg	12	[25]	12	[25]
Chain-type magazines	Magazine places	Number	54 [80/160/240]	[50 [100/150]]	54 [80/160/240]	[50 [100/150]]
	Tool length/diameter ²⁾	mm	500/Ø160	[500/Ø280]	550/Ø160	[550/Ø280]
Rack-type magazines	Magazine places	Number	[375]	[245/405]	[375]	[245/405]
	Tool length/diameter ²⁾	mm	[450/Ø160]	[500/Ø280]	[450/Ø160]	[550/Ø280]

[] = Optional values 1) Consider total load capacity 2) With free adjacent places 3) In conjunction with rack-type magazines 4) Also applies to equipment package PRO



1



2

Chain-type magazines 1

- _4 chain-type magazines with up to 240 locations for machines with HSK-A 63 to choose from
- _3 chain-type magazines with up to 150 locations for machines with HSK-A 100 to choose from
- _double chain with high traversing dynamic and rigid tool holders mounted on both sides
- _short tool-to-tool times achieved through tool provisioning during machining
- _convenient operating panel at the tool loading station [option]
- _tool loading station with optimum ergonomic design

Rack-type magazines 2

- _2 rack-type magazines with up to 405 locations for machines with HSK-A 100 to choose from
- _1 rack-type magazine with 375 locations for machines with HSK-A 63
- _fast tool handling with highly dynamic NC loader
- _tool provisioning place for an optimised tool change process
- _convenient operating panel at the tool loading station
- _tool loading station with integrated rotary station with multiple locations for loading during machining

Tool changer

- _two NC axes with lifting/swivelling principle for high dynamic and constant precision
- _rigid double gripper for a secure hold with high weights and moments of weights
- _tool shank in enclosed holders protects against contamination and optimum hold during positioning
- _tool loading station with optimum accessibility for ergonomic and fast tool set-up
- _integrated tool provisioning place for provision of next tool during machining and short tool-to-tool times

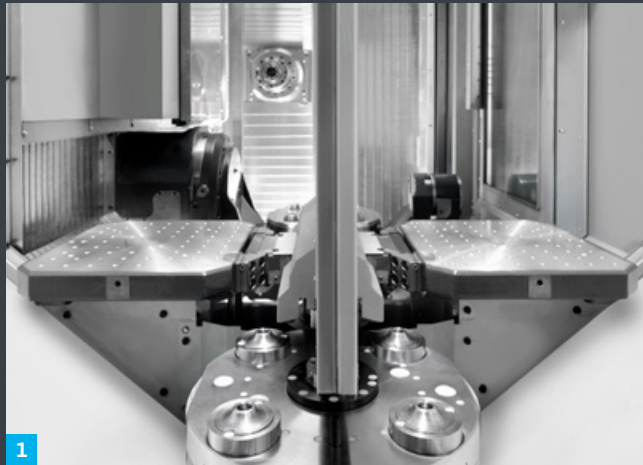
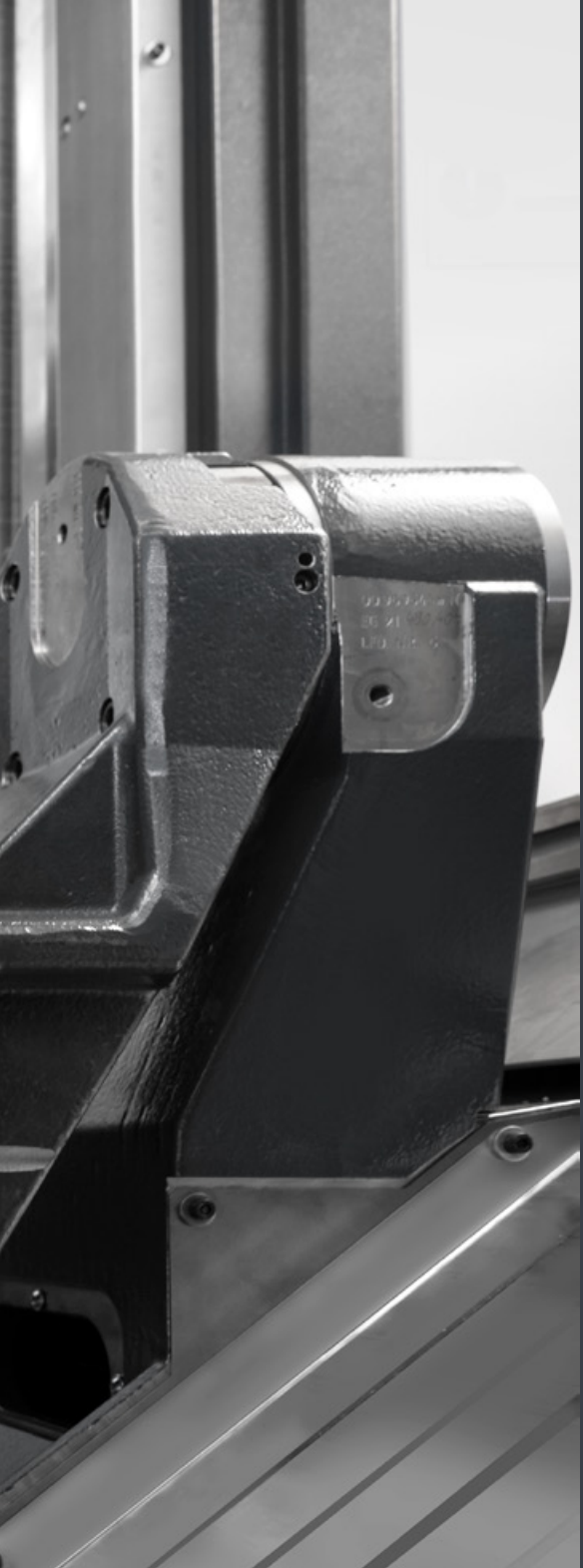
From workshop-oriented use through to series production

No matter whether with pallet changer or as table loading – HF-series 5-axis machining centres are best prepared for both feeding concepts. Various table sizes or pallet dimensions and numerous options to suit different sizes. So you can configure the machine to suit your specific requirements.



			HF 3500		HF 5500	
Type			Pallet changer	Table loading	Pallet changer	Table loading
Clamping surface	Nominal size	mm	400 x 500	Ø 630 [Ø 710] ¹⁾	500 x 630	Ø 810 [Ø 880] ¹⁾
Workpiece dimension	Diameter W / Full circle D Depth T x Width W	mm	Ø 710 ²⁾ / Ø 570 Full circle 640 x 710	Ø 710 -	Ø 900 ²⁾ / Ø 720 Full circle 810 x 900	Ø 900 -
	Height H	mm	630	690	800	870
Clamping load	POWER [SPEED] [PRO]	kg	550 [550] [650]	550 [550] [650]	750	750
Load pallet changer	POWER [SPEED] [PRO] Total / load difference	kg	1,100 / 550 [1,100 / 550] [1,300 / 650]	-	1,500 / 750	-
Pallet change time	POWER [SPEED] [PRO] / [Mill-Turn]	s	12 [12] [12.5] / -	-	13 / [15]	-

[] = Optional values - = Not available 1) Clamping plate 2) Consider limitations



1

Pallet changer 1

- _ automatic pallet changer with lifting/swivelling principle
- _ high maximum payload with robust, hydraulic drive
- _ secure force application on machine pallets via HF interface with integrated pallet pick-up check
- _ continuously high changeover accuracy through integrated zero point pallet clamping system
- _ high process reliability thanks to integrated pallet location check [option]
- _ machine pallets with DIN hole pattern and standardised aligning elements for fast mounting of clamping fixtures



2

Table loading 2

- _ workpieces loaded onto the machine table directly into the work area
- _ wide, smooth-running work area door opens the work area roof for crane loading
- _ short distance to the workpiece thanks to inclined protective enclosure
- _ optimum workpiece accessibility due to additional loading stroke in the Z-axis
- _ easy to automate with interchangeable pallet [option]
- _ round machine table with large clamping surface and DIN hole pattern
- _ optimum accessibility to the workpiece thanks to low "loading edge"



3

Rotary table 3

- _ swivelling NC rotary table with counter bearing as standard
- _ driven rotary axes A and B with high dynamics
- _ large YRT bearings for maximum stability and high tilting moments
- _ integrated automatic fail-safe clamping for high tangential moments in high performance machining
- _ fast positioning due to minimal moment of inertia

Options

- _ integrated media interface for hydraulic workpiece clamping with 80 or 200 bar pressure and multi-line clamping technology
- _ additional pneumatic functions: support control and release control via media interface
- _ automatic door at loading station
- _ DIN T-slot design

Supply and disposal

Quick, efficient and reliable

Thermal stability is one of the decisive factors for reliable and highly-precise machining processes. The heat input into the machine structure and workpiece as a result of hot chips can impair accuracy. Our aim is therefore: fastest-possible chip disposal and coolant supply directly through the spindle.

Cooling lubricant supply

- _coolant units: paper band filter or reversible flow filter with high tank volumes optionally available
- _internal coolant supply through the tool with high-pressure 50 bar (optional: 70 bar)
- _internal coolant supply with up to 7 pressure stages freely programmable via the NC program
- _external tool cooling with multiple integrated spindle flushing nozzles
- _integrated work area shower with adjustable nozzles for optimum flushing of work area and cooling of workpiece

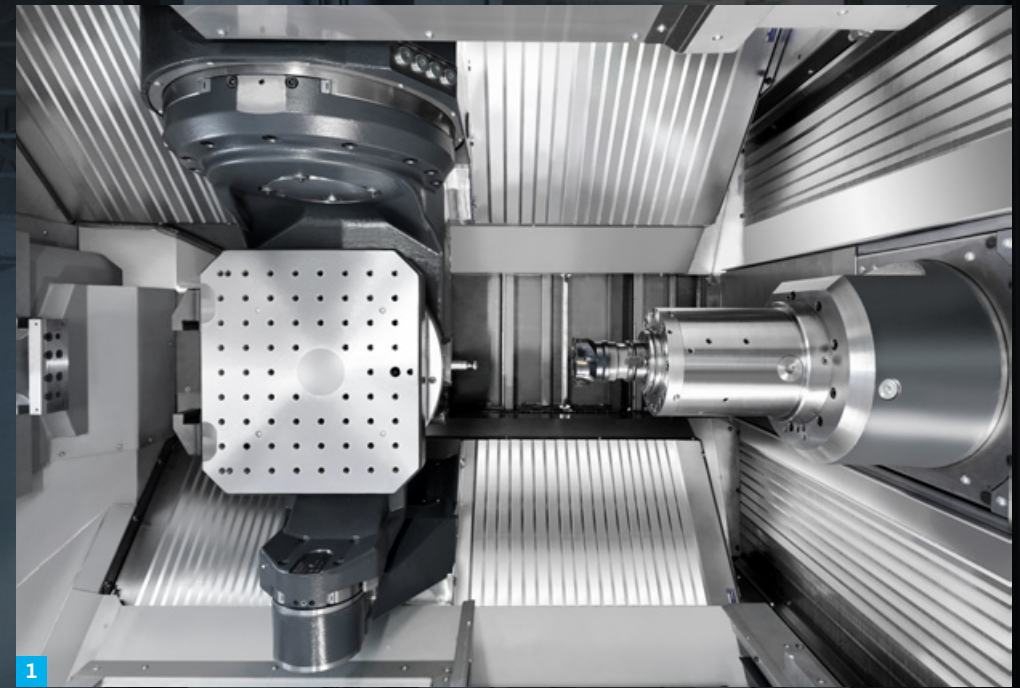
Options

- _coolant cooler
- _coolant temperature control for high thermal stability and precision
- _automatic filling of the coolant unit
- _oil skimmer for removing foreign oil from the cooling lubricant tank by oil separation



Chip disposal

- _ free chip fall below the spindle and rapid removal from work area
- _ central chip conveyor for rapid disposal to the rear
- _ model: scraper or hinged belt conveyor (option), selectable depending on application
- _ work area flushing and work area shower support fast chip disposal for machines with coolant units
- _ extraction unit (option) for extraction of cooling lubricant mist from the work area
- _ steep side walls and stainless steel lamella covers with self-cleaning effect prevent chip deposits **1**
- _ interior work area enclosure made from electrolytically galvanized sheets provides long-term resistance against dirt and coolant



Media supply

- _ easy maintenance with optimum accessibility, all supply units at a glance
- _ central oil-air lubrication for the key components
- _ seal air and selective blow-out of interfaces for permanently smooth machine operation
- _ media interface for hydraulic workpiece clamping at 80 bar or 200 bar (option)
- _ compressed air and flushing gun at the workpiece setting station integrated into the machine enclosure **2**



Control technology

Full view of information – full control of manufacturing

Speed is always of the essence during the daily working routine. The Siemens SINUMERIK ONE, a state-of-the-art high-performance controller with HELLER Operation Interface, makes your work easy through efficient support: with intuitive operation, simple programming, cycle support and all important information at a glance.





Machine control

- _ Siemens SINUMERIK ONE, main operating unit designed as console
- _ high-performance control for machining centres that have to meet the highest performance and machining precision requirements
- _ optimally integrated and selectively matched to the requirements of HELLER machining centres
- _ digital drive technology and modern system architecture
- _ Profinet bus system for fastest possible real-time communication
- _ IO-Link for direct diagnostics and parametrisation of sensors
- _ SINUMERIK Operate user interface for efficient machine operation

HELLER Operation Interface

- _ HELLER user interface with extended range of functions
- _ main operating unit designed as a console for optimum operating comfort
- _ 24" screen and multi-touch function ideal for displaying documents and drawings
- _ HELLER Operation Interface with 4 function areas for extra information at a glance
- _ practical Xtends: HELLER extensions with additional functions
- _ machine control panel with pushbuttons and 3 overrides for optimum control in all operating situations

Options

- _ convenient operating panel at tool loading station
- _ HT2 or HT10 hand-held operating unit
- _ HELLER Services Interface (HSI) and further HELLER4Industry products
- _ pallet management system for multiple setups
- _ alternative strategy
- _ job management
- _ automatic setting/de-setting sequence
- _ interpolation turning
- _ power skiving
- _ gear hobbing
- _ friction stir welding

Operation and maintenance

Optimal access to all working areas

When you work with HELLER HF series machines, just how much machine construction has gone into these 5-axis machining centres will be tangible. No matter whether on the workpiece setting station, during tool setting, programming or maintenance – your comfort and safety and, above all, the productivity of your manufacturing facility is paramount at all times.





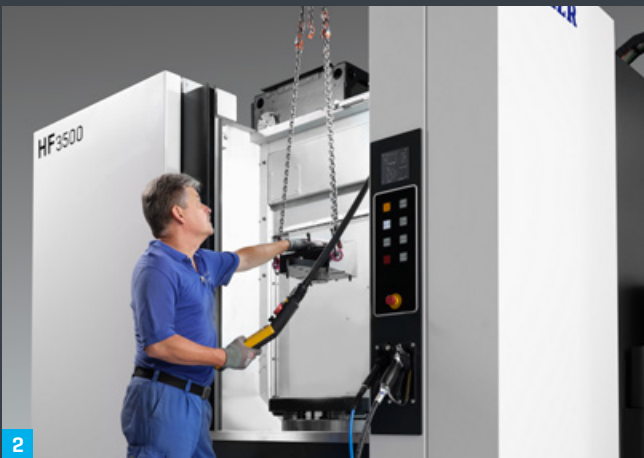
1

Operating station 1

- _ main operating unit designed as a console for optimum operating comfort
- _ good view into the work area thanks to large safety glass
- _ smooth-running work area door with linear guide opens the work area roof in the operating area
- _ operating modes 2 and 3 included in standard scope of supply
- _ LED work area lighting (blue/white, adjustable)
- _ 24" screen with multi-touch function and HELLER Operation Interface
- _ double rotatable main operating unit designed as console
- _ additional holder for flushing gun within reach, integrated into the machine enclosure
- _ work-cam: work area camera to display on the main operating unit

Options

- _ hand-held operating unit HT2 or HT10
- _ screen blow-off device for a clear view when machining with cutting fluid
- _ LED status lamp with machining progress display



2

Workpiece setting station 2

- _ large, smooth-running setting station door with large viewing panel
- _ optimum accessibility for loading and setting work with crane or handling systems
- _ workpiece setting station lockable with 90° increments, with foot unlocking mechanism
- _ LED lighting at the workpiece setting station (blue/white, adjustable)
- _ operating elements as well as media guns within reach, integrated into the machine enclosure
- _ low "loading edge" and short distance to the pallet

Options

- _ automatically actuated setting station door
- _ automatically rotatable NC setting station
- _ automatic setting station flushing
- _ automatic loading sequence
- _ automatic desetting sequence



3

Tool loading station

- _ tooling during spindle operation for more flexibility
- _ ergonomically arranged operating elements and operating unit with touch function
- _ insertion location at optimum height and with integrated unclamping function for simple handling
- _ LED lighting at the tool loading station (blue/white, adjustable)

Options

- _ convenient operating panel at tool loading station
- _ loading during machining
- _ tool coding with RFID chip
- _ tool requirement planning (TRP) for automatic creation of loading and unloading lists

Simple maintenance 3

- _ all supply units at a glance with good accessibility
- _ easily removable metal enclosure elements for fast access to the maintenance points
- _ control cabinet with smooth running, lockable doors
- _ quick-response HELLER spare part service for optimum supply of genuine spare parts

Options

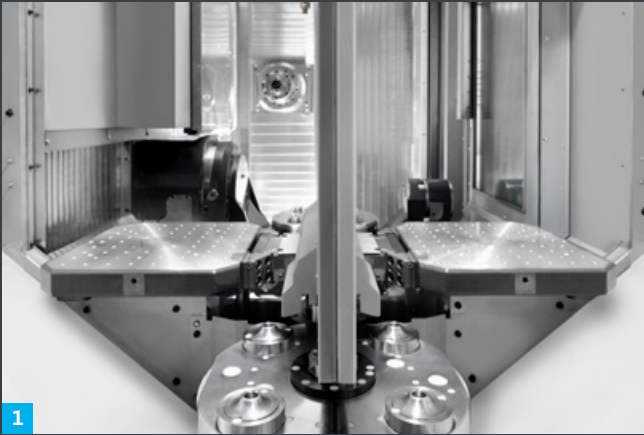
- _ maintenance manager for maintenance planning and operator support on the machine itself
- _ HELLER TPS (Total Productive Services): service contracts for inspection, service and maintenance measures

Automation solutions

Open to standards – flexible for customised solutions

The main purpose of automated manufacturing and production centres is to reduce downtime to optimise system availability. For this purpose, HELLER offers proprietary automation solutions that combine perfectly with the highly productive HELLER machining centres. Due to the wide variety of market requirements, this portfolio is complemented by a range of specialised solutions that HELLER is able to offer through best-in-class partnerships.





Pallet automation

Pallet changer 1

First automation level, integrated into the machine. Perfect for serial production with medium and large lot sizes.

Linear pallet storage 2

Automatic handling of pallets for optimised flexibility. Perfect for serial production with medium and large lot sizes.

Rotary pallet storage 3

Automatic handling of pallets for optimised flexibility with low space requirement. Perfect for serial production with medium and large lot sizes.



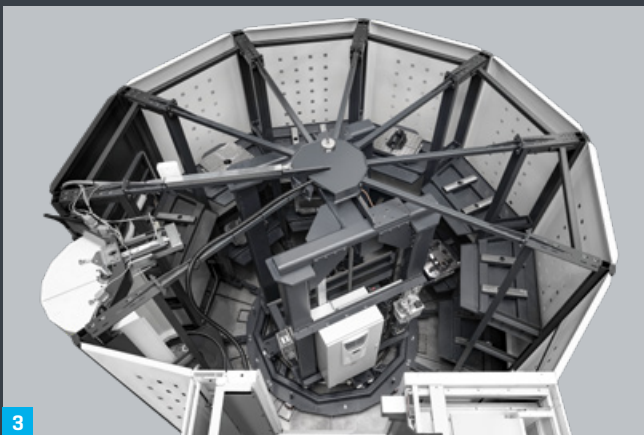
Workpiece automation

Robot 4

Automatic loading and unloading of workpieces, fixtures and pallets as well as automation of additional handling jobs. Perfect for serial production with medium and large lot sizes.

Linear gantry loader 5

Linking of plant components in production lines with maximum output. Perfect for serial production with short durations and highest production volume.



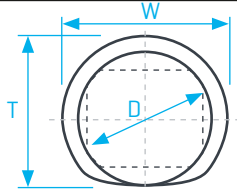
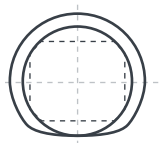
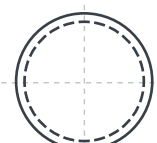
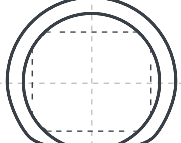
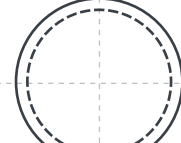





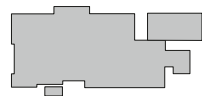
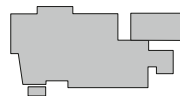


Tool automation

Background tool magazine 6

Central tool provision for several machines. Perfect for production systems with maximum of flexibility and automation.

Technical data			HF 3500		HF 5500	
LINEAR AXES						
Positioning range	X/Y/Z	mm	710/750/710		900/950/930	
Rapid traverse speed	X/Y/Z POWER [SPEED] [PRO]	m/min	65 [90/90/80] [90/90/80]		65 [90/90/80] [90/90/80]	
Acceleration	X/Y/Z POWER [SPEED] [PRO]	m/s ²	8 [10/10/8] [10/10/10]		8 [10/10/8] [10/10/10]	
Feed forces	X/Y/Z S3 40% POWER [SPEED] [PRO]	kN	8 [8/8/8] [8/8/10]		10 [10/10/10] [10/10/12]	
Positioning tolerance Tp / At ¹⁰⁾	X/Y/Z VDI/DGQ 3441 / ISO 230 POWER [SPEED] [PRO]	mm	0.005 [0.005] [0.004]		0.005 [0.005] [0.004]	
ROTARY AXES						
NC rotary feed table	B Speed/Torque S3 40%	min ⁻¹ /Nm	80/580		60/740	
NC rotary feed table: Mill-Turn	B Speed S3 40% / Torque S3 40%	min ⁻¹ /Nm	-		[800/750]	
Positioning tolerance Tp / At ¹⁰⁾	B VDI/DGQ 3441 / ISO 230 POWER [SPEED] [PRO]	arcsec	8 [8] [7]		8 [8] [7]	
5th axis		Type	Swivel table		Swivel table	
MACHINING UNITS						
Tool shank		Size	HSK-A 63	[HSK-A 100]	HSK-A 63	[HSK-A 100]
Variants	Type: Speed/Power S6 40%/ Torque S6 40%	min ⁻¹ / kW/ Nm	[PC: 12,000/45/228]	[PC: 10,000/45 ⁷⁾ /360 ⁷⁾	[PC: 12,000/45/228]	[PC: 10,000/45 ⁷⁾ /360 ⁷⁾
			[DC: 16,000/56/180]	[DC: 12,000/45 ⁷⁾ /400 ⁷⁾	[DC: 16,000/56/180]	[DC: 12,000/45 ⁷⁾ /400 ⁷⁾
			SC: 18,000/45/103	[SC: 13,000/45 ⁷⁾ /228 ⁷⁾	SC: 18,000/45/103	[SC: 13,000/45 ⁷⁾ /228 ⁷⁾
			[HSC: 30,000/65 ⁸⁾ /34 ⁸⁾		[HSC: 30,000/65 ⁸⁾ /34 ⁸⁾	
TOOL MANAGEMENT						
Chip-to-chip time	t _{2,3} VDI 2852 POWER [SPEED]	s	2.6 [2.4] ⁵⁾ / [7.2] ⁴⁾	[3.2 [3.0] ⁵⁾ / [9.5] ⁴⁾	2.7 [2.5] ⁵⁾ / [7.2] ⁴⁾	[3.3 [3.1] ⁵⁾ / [9.5] ⁴⁾
Tool weight ²⁾		kg	12	[25]	12	[25]
Chain-type magazines	Magazine places	Number	54 [80/160/240]	[50 [100/150]]	54 [80/160/240]	[50 [100/150]]
	Tool length/diameter ³⁾	mm	500/Ø 160	[500/Ø 280]	550/Ø 160	[550/Ø 280]
	Tool shank	Size	HSK-A 63	[HSK-A 100]	HSK-A 63	[HSK-A 100]
Rack-type magazines	Magazine places	Number	[375]	[245/405]	[375]	[245/405]
	Tool length/diameter ³⁾	mm	[450/Ø 160]	[500/Ø 280]	[450/Ø 160]	[550/Ø 280]
	Tool shank	Size	[HSK-A 63]	[HSK-A 100]	[HSK-A 63]	[HSK-A 100]

[] = Optional values - = Not available 1) Clamping plate 2) Consider total load capacity 3) With free adjacent places 4) In conjunction with rack-type magazines 5) Also applies to equipment package PRO 6) Position uncertainty 7) Cycle time 5 min 8) Cycle time 2 min 9) Consider limitations

			HF 3500		HF 5500	
WORKPIECE MANAGEMENT						
Type			Pallet changer	Table loading	Pallet changer	Table loading
Clamping surface	Nominal size	mm	400 x 500	∅ 630 [∅ 710] ¹⁾	500 x 630	∅ 810 [∅ 880] ¹⁾
Workpiece dimension						
	Diameter W / Full circle D Depth T x Width W	mm	∅ 710 ⁹⁾ / ∅ 570 Full circle 640 x 710	∅ 710 -	∅ 900 ⁹⁾ / ∅ 720 Full circle 810 x 900	∅ 900 -
						
	Height H	mm	630	690	800	870
Clamping load	POWER [SPEED] [PRO]	kg	550 [550] [650]	550 [550] [650]	750	750
Load pallet changer	POWER [SPEED] [PRO] Total / load difference	kg	1,100 / 550 (1,100 / 550) [1,300 / 650]	-	1,500 / 750	-
Pallet change time	POWER [SPEED] [PRO] / [Mill-Turn]	s	12 [12] [12.5] / -	-	13 / [15]	-
MACHINE						
Dimensions	approx. Length x Width x Height, Basic machine with standard chain-type magazine, coolant unit with paper band filter and with platforms where applicable	mm	7,110 x 2,990 x 3,410	6,600 x 2,990 x 3,410	7,560 x 3,180 x 3,460	7,080 x 3,180 x 3,460
	approx. Length x Width x Height, Basic machine with standard chain-type magazine, coolant unit with reversible flow filter and with platforms where applicable	mm	7,150 x 3,250 x 3,410	6,640 x 3,250 x 3,410	7,600 x 3,420 x 3,460	7,120 x 3,420 x 3,460
						
Weight	approx. Basic machine with standard chain-type magazine, without coolant unit	t	14	13	16	14
CONTROL TECHNOLOGY						
Machine control			Siemens SINUMERIK ONE		Siemens SINUMERIK ONE	

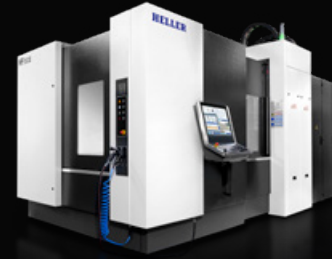
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H

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5-axis machining centres

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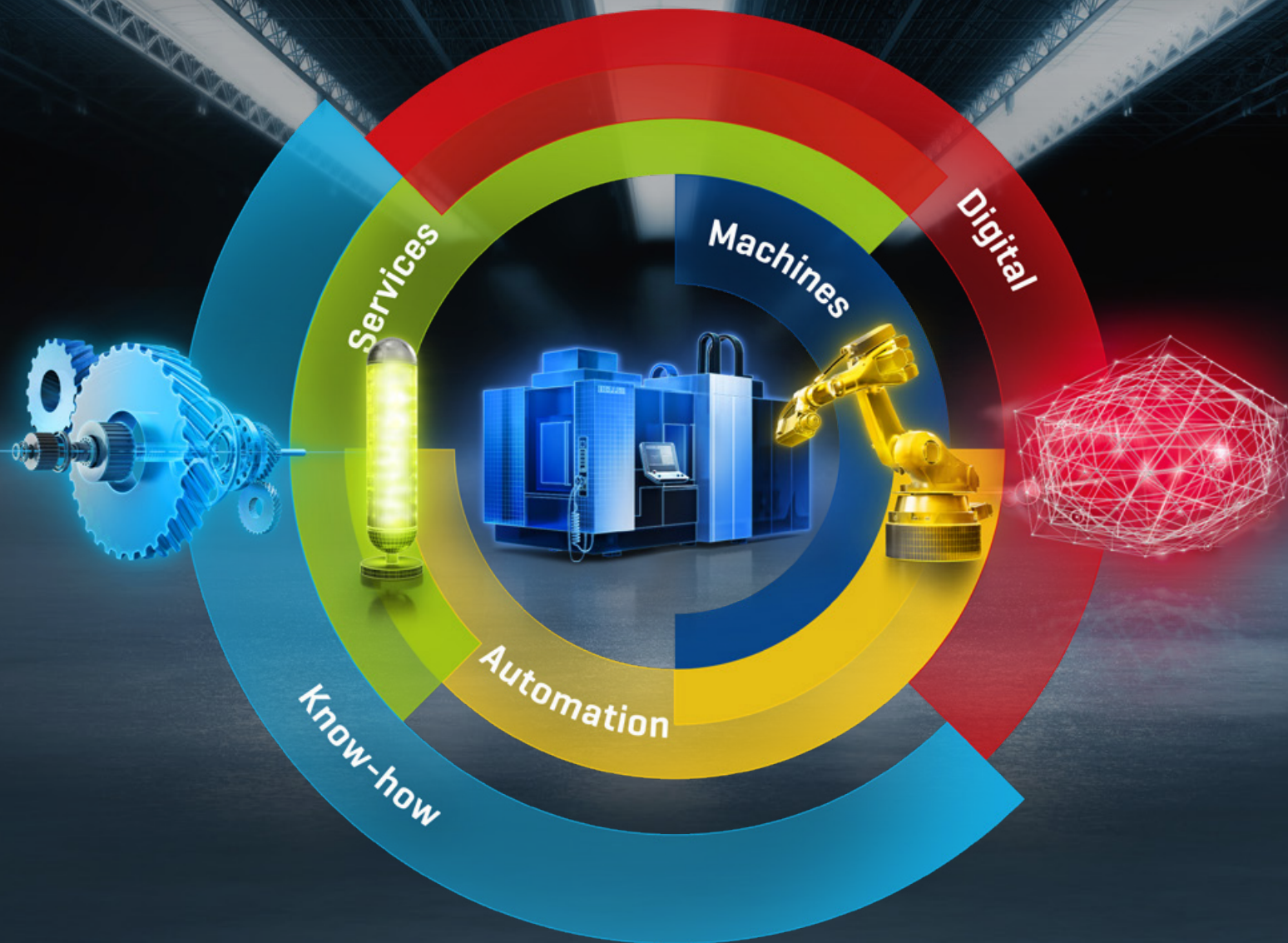


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