



H 600–H 800, H 900–H 2300



Large Gear Cutting Machines



Full Speed Ahead Hobbing and Form Milling of Large Gears



H 600



H 900

Our H-series hobbing machines are designed for the efficient production of geared workpieces with diameters up to 2400 mm and Modul 28.0 mm. By choosing optional application-specific features and extensions we offer the best solution for every manufacturing task.

Our machines are suited for all gear hobbing and form milling tasks including skive hobbing of hardened gears. Machine models can be equipped for dry or wet hobbing. Depending on your application you may employ HSS, solid carbide or inserted blade hobs. Our specific PowerCutting hobbing heads provide high speed cutting capability with highest removal rates.

Apart from straight and helical gears as well as crowned and tapered gears, you can manufacture shafts with multiple gears, worm gears, internal gears, chain gears and special profiles like rotors via optional hardware and software packages.

Highlights

- ▶ Modular designs with specific adaption to your application
- ▶ Thermally stable and vibration-damped machine structures
- ▶ Wet or dry hobbing processes
- ▶ PowerCutting for maximum removal rates
- ▶ Special equipment for rotor cutting
- ▶ Direct removal of chips
- ▶ Choice of different drive packages
- ▶ Quick-change or pallet clamping systems
- ▶ Latest control technology
- ▶ MODUL dialogue programme
- ▶ Safety-integrated and HMI-Pro
- ▶ Service-friendly auxiliary units
- ▶ Machine, tool and process from a single source



H 600 – H 800

High-Performance Hobbing and Milling of Large Gears and Shafts

Powerhouse for gears, shafts, worms and rotors

The H 600 – H 800 is a very stable and rigid machine series which is designed for the most demanding cutting tasks. The models employ all hobbing techniques (axial, radial/axial, tangential, diagonal) of spur and helical gearings using one or multiple cut technology with climb or conventional feed as well as form milling exploiting the different tool solutions available on the market. The H 600 – H 800 series is equipped with an exceptionally strong tool spindle drive and a very stable and stiff tool head to live up to all gear cutting tasks. The H 600 – H 800 series can be automated with a standard ring loader for heavy workpieces.



Cutting train gear



Swing-away tailstock arm and steady rest



Automated with ring loader

Highlights

- ▶ Workpiece diameter nominal 600 mm and 800 mm
- ▶ Very stable and rigid structure
- ▶ Wet and dry cutting
- ▶ Direct drive work table with table plate options
- ▶ Standard and special workpiece support solutions
- ▶ Machine without counter column possible, if only for gears
- ▶ Ring loader
- ▶ Centering unit
- ▶ Compact layout with integrated auxiliary units

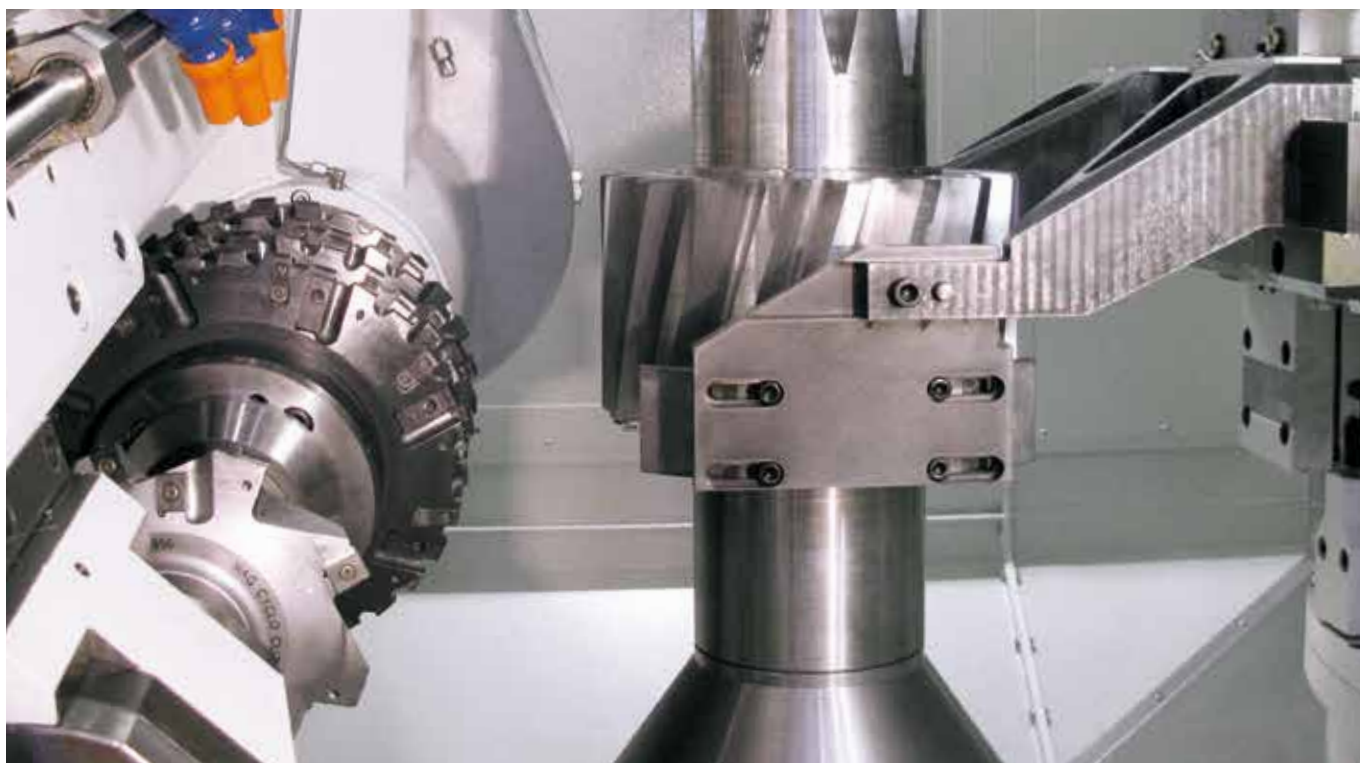
High-Performance Hob Head

- ▶ Up to module 14.0 mm
- ▶ Strong torque with 1000 Nm
- ▶ Up to 210 mm in hob diameter
- ▶ Air-cooled drives
- ▶ Minimum maintenance required



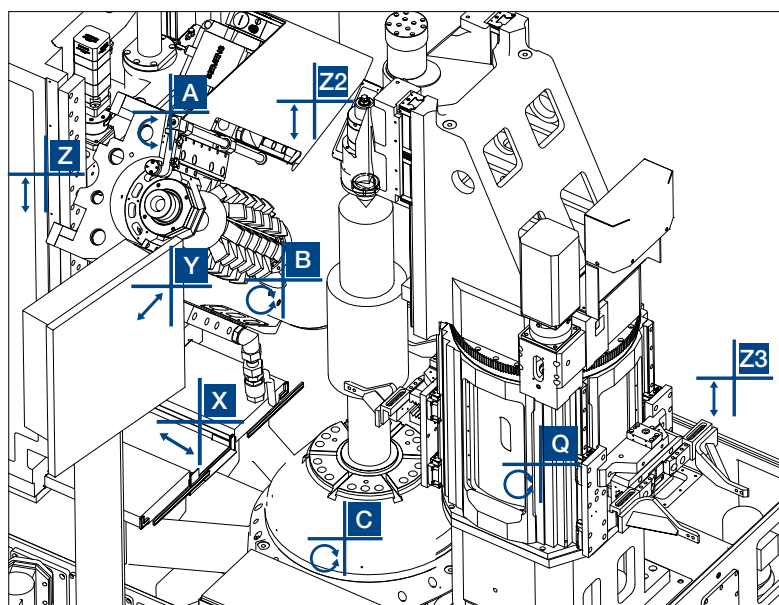
H 600 Hobbing machine

Integrated Automation with Freely Selectable Positions



The H 600 – H 800 series can be equipped with a NC ring loader. The gripper stroke is operated independently.

The loader positions are freely selectable (cam-free) and can be saved in the MODUL HMI / Operator Dialogue program for each specific workpiece.



- A** Hob head swivel
- B** Hob spindle rotation
- C** Work table rotation
- X** Radial slide movement
- Y** Tangential slide movement
- Z** Vertical slide movement
- Q** Ring loader swivel
- Z2** Tailstock stroke (hydraulic)
- Z3** Gripper stroke (hydraulic)

H 600 – H 800 PowerCutting for Extreme Requirements

For workpieces with larger modules and tooth depths the H 600 – H 800 PowerCutting Version featuring an extra high-torque hob spindle with an enlarged swivel angle range.

Highlights PowerCutting

- ▶ Up to module 24.0 mm (form milling)
- ▶ Very stable and rigid structure
- ▶ PowerCutting head
- ▶ Direct drive worktable
- ▶ Workpiece support solutions (steady rest)
- ▶ Automation option via ring loader
- ▶ Dedicated worktable design option for rotor cutting
- ▶ Compact layout with integrated auxiliary units

PowerCutting Head

- ▶ High-torque hob head for heavy-duty cutting with 1500 Nm
- ▶ Water-cooled motor
- ▶ Larger hob diameters up to 300 mm
- ▶ Enlarged swivel angle for high helix angles

With the PowerCutting head the performance of inserted blade tools can be exploited to the maximum. Workpieces can be hobbled or milled depending on lot sizes and tool cost considerations. Especially when cutting larger modules, extreme tooth depths, high helix angles, tough and ductile materials or very long or heavy workpieces the PowerCutting hob head and the special machine options become a very useful choice.

Highlights

- ▶ Larger modules and extreme tooth depths
- ▶ Applications with high helix angles
- ▶ Tough and ductile materials
- ▶ Very long and heavy workpieces

Highest Productivity Guaranteed

With the optional ring loader the workpiece change can be automated. Together with the automated tailstock the H 600 – H 800 in PowerCutting execution guarantees highest productivity.



Power Milling with the H 600 PowerCutting



The H 600 equipped with PowerCutting options is especially suited for the milling or hobbing of large rotors



Hobbing of large pinions



Ideal for cutting ductile materials



Automated tailstock with cam-free adjustment



Siemens 840 D Solution Line with easy-to-use MODUL HMI

H 900 – H 2300

Heavy-duty Cutting of Large Gears, Pinons, Rings and Shafts

The H 900 – H 2300 series is designed for the production of large gears, bearing rings, pinions, shafts and internal gears. All configurations are based on a modular set of table and counter column components. Maximum attention is paid to the stability and rigidity of the machine to avoid vibrations and to guarantee thermal stability: The grey cast-iron machine bed with maximum static and dynamic rigidity is supported by an integrated fluid circulation for thermal stability. All linear slides are fitted with backlash-free preloaded ball screws, actuated by AC servo-drives, running on cast-iron guideways which are resin-coated for optimum vibration absorption. The guideways are supported by PLC-controlled pulse lubrication with minimum maintenance requirements.

Highlights

- ▶ Up to workpiece diameter 2300 mm and module 28.0
- ▶ High performance motorized hob heads
- ▶ Backlash-free work table drive with double worm gear
- ▶ High precision results at low worktable speeds
- ▶ Adjustable steady rest bearing for longer workpieces
- ▶ Optional milling heads for internal gears
- ▶ Siemens 840 D Solution Line
- ▶ MODUL HMI for easy and error-proof operator guidance



SIEMENS
HMI-PRO



Core of Power

The high-precision, backlash-free double worm gear drive guarantees best quality results with constant velocities and feeds even at low work table speeds.



Maximum Rigidity and Stability for Highest Precision

Processes

- ▶ All hobbing and form milling techniques
- ▶ Dry or wet machining
- ▶ Skiving / finish hobbing of hardened gears
- ▶ Milling of internal gears
- ▶ Chamfer-Cutting

Applications

- ▶ Pinions, ring gears and shafts
- ▶ Geared rotary bearings
- ▶ Multiple gears
- ▶ Worm gears and rotors
- ▶ Sprocket gears
- ▶ Internal gears

Optional features

- ▶ Counter column with steady rest or swing-away tailstock with center pin
- ▶ Extension of column and counter column for increased axial travel
- ▶ Hydraulic clamping of column and axial slide
- ▶ Hydraulic workpiece clamping with digital monitoring of clamping stroke
- ▶ Form milling head for internal gears
- ▶ Remote diagnostics system
- ▶ Tool Condition Monitor
- ▶ Centering unit
- ▶ Various chip disposal systems and filters, according to the workpiece material



The smart swing-away tailstock arm can be opened completely to leave the workarea free for the workpiece change from above



Form milling of large sprocket gears



Worm gear hobbing



Hobbing of large pinions and shafts

H 900 – H 2300

Form Milling of Internal Gears

Milling of internal gears is far more productive than shaping in case gear geometries permit. The H 900 – H 2300 series can be equipped with milling heads for internal gear manufacturing. MODUL milling heads feature stiff and sturdy designs to keep vibrations to a minimum. Various internal milling heads can be used to cut larger gear face widths. With the easy-to-use MODUL operator interface users can apply special milling strategies which are developed based on our long application experience in gear milling. The integrated indexing system guarantees even heat distribution across the workpiece to avoid part deviations and subsequent losses in workpiece quality.

Highlights

- ▶ Up to workpiece diameter 2800 mm and module 18.0
- ▶ Stiff and sturdy head design
- ▶ Machine without counter column possible, if only for gears
- ▶ Fast exchange of internal and external hob heads
- ▶ Hob head versions for different diameters and face widths
- ▶ Well suited for the use of inserted-blade tools
- ▶ Power reserves to benefit from future tool developments
- ▶ Dry and wet cutting
- ▶ Milling strategies for maximum precision and productivity
- ▶ Optional chip evacuation through table center
- ▶ Complete manufacturing lines including automation



Machine, Tools, Process and Application Knowhow from One Source

Power reserves for all tool options

To exploit the full potential of the powerful drives of our milling heads we recommend the use of inserted blade tools to achieve maximum stock removal rates. The drives bear sufficient power reserves to live up to future tool developments as well. We recommend tool choices which fit your application.

Solutions from one source

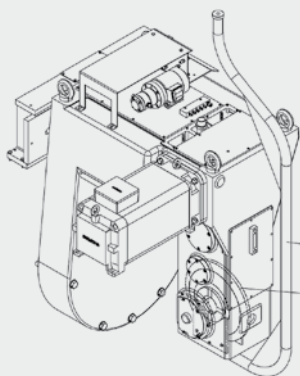
With the joined forces of the companies of FFG Werke we are able to supply complete line solutions for the manufacturing of large gears out of one hand considering optimum productivity throughout the complete process flow.



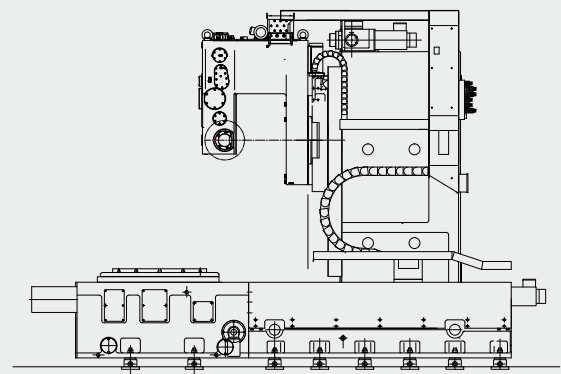
MODUL recommends the best tool technology for your application



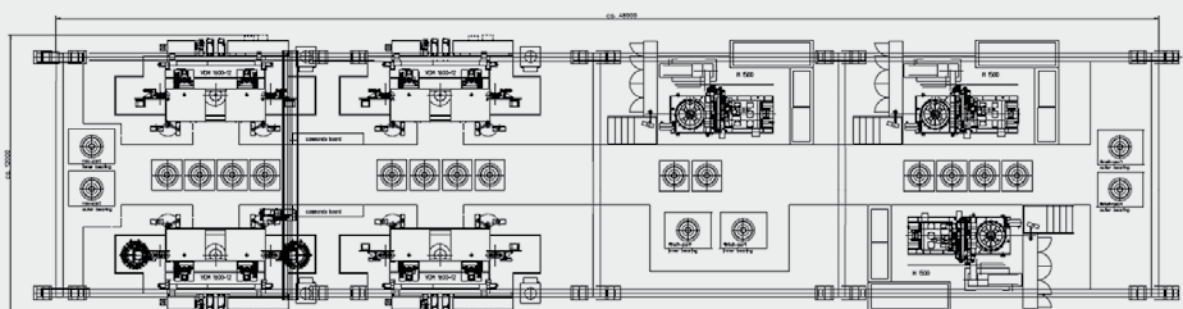
With our application experience we support your setup and process to find the most reliable, precise and productive manufacturing strategy



Internal milling head with tool change support



H 1500 with internal milling head



Example for automated line for the manufacture of large geared bearing rings for construction machinery.

1 x area gantry-type loading system, 2 x infloor chip conveyors with integrated coolant equipment, 4 x HESSAPP VDM 1600 vertical turning centers, 3 x H 1500 gear cutting machines

Technical Data

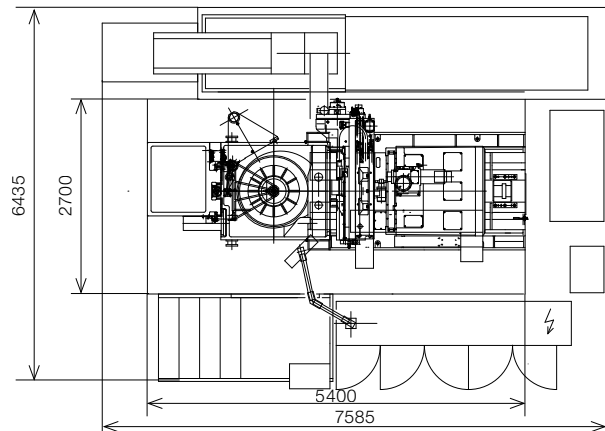
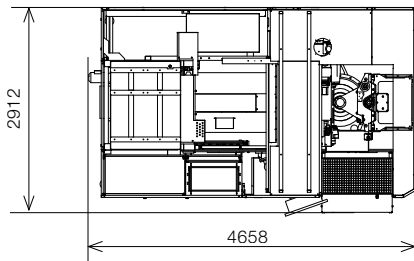
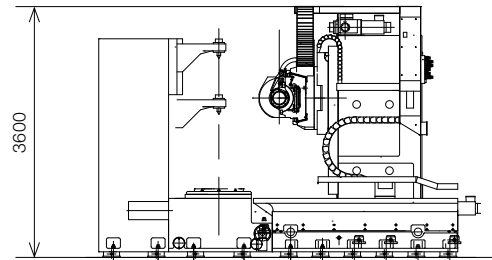
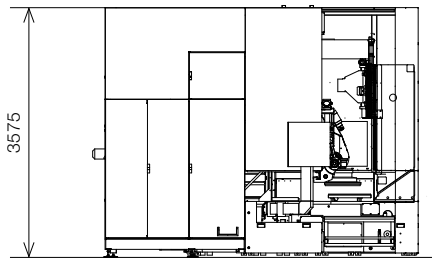
Technical Data		H 600	H 800
Workpiece diameter max.	mm	600	800
Module hobbing / form milling max.	mm	12 / 14 (18 / 22)	12 / 14
Radial travel (X-axis)	mm	70 – 495 (10 – 435)	70 – 595
Feed rate radial max.	mm/min	5000	5000
Tangential travel (Y-axis)	mm	320 (350)	320
Feed rate tangential max.	mm/min	3000	3000
Axial travel (Z-axis)	mm	310 – 760 (310 – 1110)	310 – 760 (310 – 1110)
Feed rate axial max.	mm/min	8000	8000
Spindle speed (B-axis)	rpm	50 – 400 / 75 – 600 / 100 – 800 (75 – 600)	50 – 400 (75 – 600 / 100 – 800)
Spindle power	kW	22 (30)	22
Spindle torque	Nm	1000 (1500)	1000
Tool head swivel angle (A-axis)	degree	± 45 (+45/-120)	± 45
Tool arbour clamping fixture taper main bearing / counter bearing		SK50 / cylindrical SK50 / SK30 (HSK-A100 / cylindrical)	SK50 / cylindrical SK50 / SK30
Tool diameter max.	mm	210 (300)	210
Tool length bore type / shank type	mm	210 / 400 (300 / 400)	210 (400)
Table speed (C-axis) max.	rpm	0.1 – 100	0.1 – 100
Table diameter	mm	500 (400)	630
Spindle bore diameter	mm	180 H6	220 H6
Total connected load, approx.	kVA	110	110
Control		Siemens 840 D Solutionline Safety integrated	Siemens 840 D Solutionline Safety integrated
Number of NC axes hobbing		6	6
Machine weight, approx.	kg	17 000 – 19 000	17 000 – 19 000
Dimensions, l x w x h, approx.	mm	4650 x 2700 x 3200 (3550)	4650 x 2700 x 3200 (3550)

Technical data subject to change



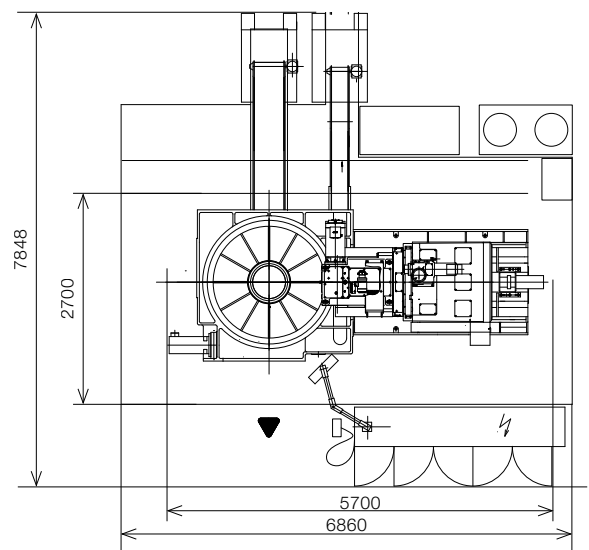
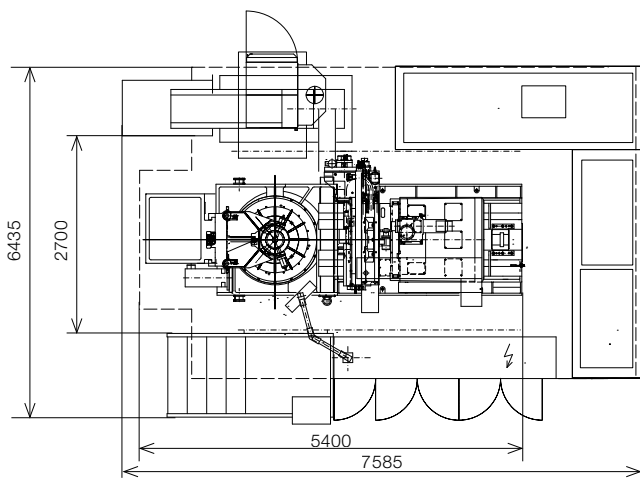
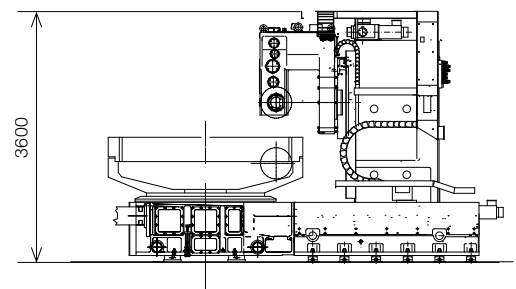
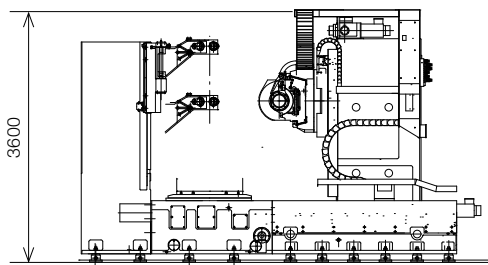
H 900	H 1500	H 2300
900	1500	2400 (2300)
24 / 28	24 (20 / 16) / 28 (24 / 18)	24 (20 / 16) / 28 (24 / 18)
65 – 695	80 – 1000	460 – 1480
3000	3000	3000
350 (520)	350 (520)	350 (520)
1500	1500	1500
310 – 1310 (310 – 1710)	310 – 1310 (310 – 1710)	310 – 1310 (310 – 1710)
3000	3000	3000
25 – 250 (32 – 320)	25-250 (32-320)	25-250 (32-320)
46	46	46
3800	3800	3800
± 45 (± 60)	± 45 (± 60)	± 45 (± 60)
SK60 / cylindrical	SK60 / cylindrical	SK60 / cylindrical
450	450	450
500 (600)	500 (600)	500 (600)
0.1 – 16 (0.2 – 32)	0.1 – 12 (0.2 – 24)	0.1 – 5 (0.2 – 9)
700	950	1700
270	270	420
100	100	100
Siemens 840 D	Siemens 840 D	Siemens 840 D
Solutionline	Solutionline	Solutionline
Safety integrated	Safety integrated	Safety integrated
6	6	6
26 000	30 000	32 000
7300 x 4800 x 4000	7300 x 5100 x 4000	7300 x 6000 x 4000

Machine Dimensions



H 600 / H 800

H 900 with counter column



H 1500 with counter column

H 2300 with internal milling head

Latest Drive Technology and Easy Menu Guidance Guarantee Maximum Process Reliability

We build machines for efficient, error-free and safe manufacturing, for daily use and for people.

The H series is equipped with the latest Siemens 840 D Solution Line control unit.



SIEMENS
HMI-PRO



Highlights

- ▶ Latest control technology ready for direct networking
- ▶ USB interface included
- ▶ Modular software packages
- ▶ Profile and flank correction possibilities
- ▶ Safety-Integrated and HMI-Pro
- ▶ Menu-guided operator interface
- ▶ Integrated tool monitoring system

Remote diagnostics system

Connect our machines via a local network or the internet directly and safely with our service department for remote maintenance and fast software updates.

Energy efficiency package

- ▶ Energy saving drive concepts
- ▶ Automatic shut down depending on raw part feed
- ▶ Minimized hydraulics use

Advantages

- ▶ Faster data transfer to machine
- ▶ Fast data validation and error correction
- ▶ Safe operation
- ▶ Fast and easy online updating and trouble-shooting



MODUL operator dialogue

The userfriendly MODUL operator interface with full Windows environment provide step-by-step guidance. Easy and intuitive data entry interfaces facilitate operation and provide for continuous process data monitoring and error correction via software features.

- 1 Transline 2000 for line integration requirements
- 2 Easy and intuitive data entry interface
- 3 Fast and immediate correction possibilities
- 4 Safety-integrated for superior safety functions



Our machine design concept incorporates service units in the hull of the machines

Self-sufficient units reduce the overall amount of time spent on regular maintenance work thanks to functions such as automatic part lubrication or maintenance intervals. Preventive maintenance requirements are therefore limited to periodic inspection and are automatically prompted by the CNC. All service components are located in clearly visible and accessible areas.

Highlights

- ▶ Auxiliary units incorporated in the hull of the machine
- ▶ Service-friendly auxiliary units
- ▶ Easily accessible auxiliary units
- ▶ Automatic preventive maintenance cycles
- ▶ Automatic periodic inspection prompts

Advantages

- ▶ Easily transported
- ▶ No special hoisting equipment required
- ▶ Fast and simple installation and setup
- ▶ Simple relocation
- ▶ Reduced maintenance requirements
- ▶ Easier and more efficient maintenance
- ▶ Less machine downtime for servicing purposes
- ▶ Fast and easy servicing

Service for all Brands and Legacy Brands of FFG Werke GmbH

VDF BOEHRINGER **FEELER** **LEADWELL**



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Stuttgarter Strasse 169, DE-73066 Uhingen
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JOBS **RAMBAUDI** **SACHMAN**



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HESSAPP



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MODUL



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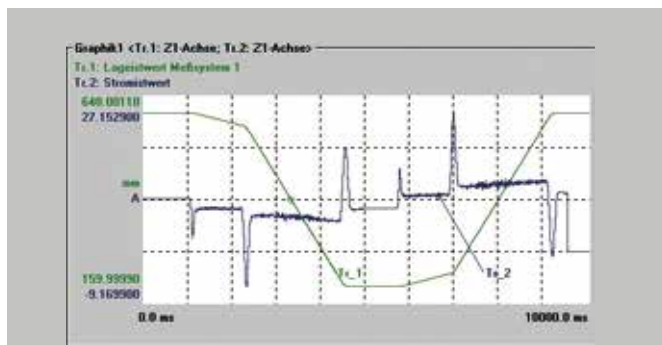
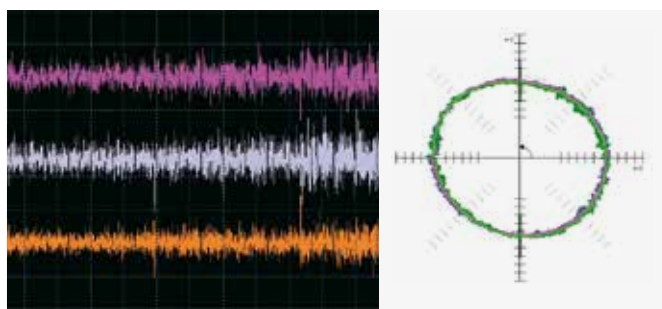
Service and support

- ▶ Commissioning
- ▶ Maintenance and inspections
- ▶ Repair service
- ▶ Spindle service
- ▶ Overhaul and retrofit
- ▶ Used machines
- ▶ Service contracts
- ▶ Machine relocation



Process and production optimization

- ▶ Process optimization
- ▶ Programming
- ▶ Software: machine data acquisition, diagnosis, condition monitoring, energy management, virtual machine



Machine condition monitoring "Finger print" via vibration analysis, ballbar test and trace measurement.

Spare parts

- ▶ 24/7 delivery
- ▶ Central warehouse
- ▶ Individual service concepts



Training

- ▶ Operator training
- ▶ Maintenance training (mechanical, electrical)
- ▶ Programming training



FFG 24/7 Service and Support:
www.ffg-werke.com/24x7



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JOBS



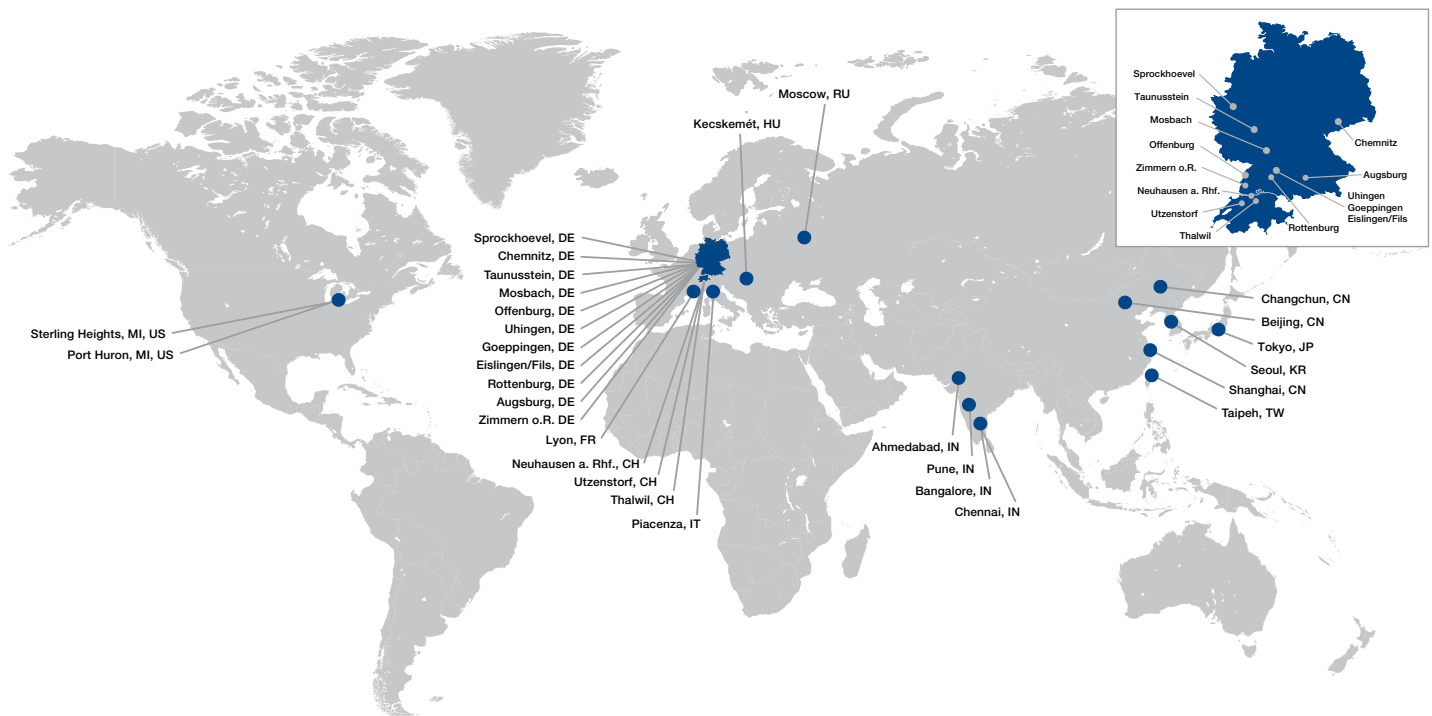
Pfiffner



WITZIG & FRANK

About FFG Europe & Americas

The FFG entities in Europe and North America unite major players from the German, Italian, Swiss and North American machine tool industry with a broad range of milling, turning, gear manufacturing technology and the knowhow of the renowned machine tool brands VDF Boehringer, Hüller Hille, Hessapp, Jobs, MAG, Modul, Pfiffner, Rambaudi, Sachman, Sigma, SMS and Witzig & Frank. Since 1789, these brands have substantially contributed to the progress in industrial manufacturing and are well known as reliable and innovative equipment and systems solutions suppliers for the automotive and truck, aerospace, machine building, general machining, railway industry, energy and heavy engineering industries. While being an independent group, these entities benefit from the strengths and opportunities of the global Fair Friend Group. They stand for premium technology within FFG.



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Made in Germany since 1789