FORMING EXCELLENCE

WF

OUR MACHINES
FOR SPINNING COMPONENTS

Contents

The first machine delivered by WF Maschinenbau in 1976 was an AHD. Nowadays, this range of machines produces much more than pots and plates!

Five good reasons for working with us

We are the leaders in innovation in metal spinning and flow-forming.

We are unique in our industry in having our own well-equipped R&D Center complete with its own range of test machines. And you can always rely on what we consider the most important thing of all: The rich experience and exceptional expertise of every one of our long-serving staff.

We allow you to test our machines.

At our home works in Germany, we keep two spinning machines available for our customers, enabling them to familiarise themselves with our technologies. We then have the opportunity of presenting our processes to them and imparting deeper insights into our machines and methods.

We are your quality guarantor.

Our machines are produced at Sendenhorst with the greatest possible depth of in-house production. We cooperate only with high-quality German subsuppliers, enabling us to be sure that all the components installed satisfy our own high standards. Minimum waiting times and long machine service-lives are your benefits.

We deliver service.

We support you throughout the entire procurement process, to ensure that you get exactly the machine you need. We don't simply assemble a standard, “one size fits all” product; instead our machines are tailored exactly to your needs. After commissioning, our comprehensive service team, regular maintenance and guaranteed spare parts availability assure you of many years of trouble-free operation of your machine.

We assure sustainability.

Chipless forming ensures the effective use of all the material processed. On all of our machines, without exception, material efficiency has been carefully optimised (up to 60% savings of material). Production of certain complex drive-train components is only made possible by the use of our machines. The benefits include lower per item production costs, reduced end-product weight and high mechanical strength. In addition, the processes used on these machines save emissions.

Our machines – an overview

	Spinning components	Spinning components
	Rotationally symmetrical workpieces with a constant or a variable wall-thickness profile, and with cylindrical, tapered, concave and/or convex external contours	Complex spinning and other chipless-formed end products
End products	Nozzles, fan components, gas cylinders, tank ends and vessel heads, separator components, wheels, large bearing components, reflectors, lamp components, food preparation/processing vessels (pots, bowls, etc.) and similar items	Spun or flow-formed end products as per the AHD machine, but in addition with complex spinning components; also useful for practically all other chipless-formed end products
End products in detail	Aerospace, as well as extremely diverse industrial applications, including: Tank and vessel engineering Wind-energy installations, Automotive, Domestic products, lighting, etc.	Aerospace, as well as extremely diverse industrial applications, e.g.: Tank and vessel engineering, Automotive, Research & Development, etc.
Applications	All formable metal materials, including steel, aluminium, copper, brass and their alloys	All formable metal materials, including steel, aluminium, copper, brass and their alloys
Materials	Round blanks, pipes and tubing, punched blanks / forged or cast preforms	Round blanks, pipes and tubing, punched blanks / forged or cast preforms
Starting products	Metal spinning / Shear forming / Profiling	Metal spinning / Shear forming / Flow-forming / Necking-in / Profiling / Hub forming
Technologies	Production of thin-walled precision components with elevated mechanical-strength requirements, machine for one-offs, small, medium and large batch sizes, permitting cost-effective production, short setting-up times and extremely versatile use	The same benefits as obtained with the AHD but, in addition, use as the world's only Research & Development machine; the only machine that masters virtually all chipless-forming processes
Benefits	Automatic hydraulic spin-forming machine	Vertical universal spin-forming machine
Designation	AHD	VUD
Series		

AHD

The AHD – the automatic hydraulic spin-forming machine – enables you to produce the most diverse range of flow-formed components with the ultimate in flexibility. From pots to propeller bosses can be flow-formed from a single blank disc. Very recent developments make the machines of this range even more versatile, even faster and even easier to operate.

Your benefits from using our AHD

- **Precision:** High-precision forming of high-strength materials, thick-walled blank discs and soft-material thin-walled discs with no sacrifices of tolerance and surface quality
- **Variable forming processes:** Practically unrestricted forming using metal spinning to shape constant or variable wall thicknesses, with components tapered, cylindrical or any variation of rotationally symmetrical
- **An individual machine:** Adaptation of all machines individually to customers' requirements and/or local circumstances

Highlights of our machines

- Extremely robust and durable machine concept applying high forming forces
- Automatic recognition of support positions on the machine bed
- Centring system can be programmed using the control system
- Some machines also suitable for hot forming (from AHD 1800)

Machine description

- Horizontal spin-forming machine
- New roller-changing mechanism design for extreme shortening of roller-changing times in any support position with no danger of collision
- Centrally lubricated guide system newly developed for the tailstock sleeve
- New tailstock design for mounting of special units (e.g. eccentric roller units) in addition to the standard forming head
- Fully automated calculation of the possible working area for any support position

Special equipment for the AHD series

- **Second support-table:** Moveable along the machine axis for easy loading/unloading and flexible operation even when using only one forming support
- **Stripper ring:** Mounted on the headstock for stripping off of the finished workpiece in the outer area
- Fully integrated **second tailstock cylinder**
- **A range of different spin-forming machine options:** Centring system, blank-disc machining unit, etc., etc.

The “hidden champions” in the commercial-scale kitchen: stainless-steel cooking utensils can be spun on the AHD.

Not only tank ends and vessel heads, propeller bosses and pots, but also satellite dishes, are good examples of the AHD's end products.

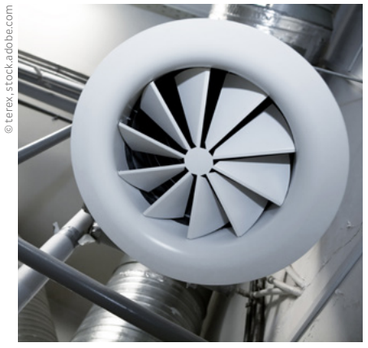
In-company R&D Centre

We are the only player in our industry with our own well-equipped R&D Centre. A series AHD machine is available to our customers here for their research and test activities.

The expertise of our R&D team, four test machines, a robot test chamber, heat-treatment furnaces, induction systems and an attached measuring laboratory enable us to significantly reduce the lead times for forming, treatment and handling processes.

AHD 1500 L

Automatic hydraulic spin-forming machine (AHD)
For cold forming of rotationally symmetrical workpieces of up to 1,500 mm



Example: Rings for ventilation systems

Feed material/blank disc diameter	max.	1,500 mm
Material thickness (dependent on material)	max.	12 mm
Workpiece height	max.	450 mm
Main spindle – Drive rating	ca.	60 kW
Main spindle – Speed		200 – 1,600 min^{-1}
Main spindle – Tool radial mounting	DIN 55027	Gr. 11
Slide stroke	Z-axis	800 mm
Slide force	Z-axis	75 kN
Radial stroke	X-axis	400 mm
Radial force	X-axis	75 kN
Tailstock force		800 mm
Tailstock – Tool Mounting		100 kN

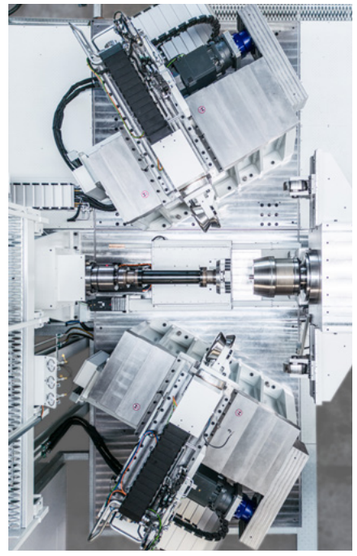
The AHD is available in a large range of other sizes and configurations. Engineering our machines precisely as-needed to conform to customers' requirements makes us unique in our industry.

New:
- Newly developed roller-changing design permitting shorter roller change over time in any support position and even for more than two rollers
- Newly defined blank support tool for short setting-up times featuring extremely sensitive blank support force and adjustment via the CNC control system
- New tailstock design permitting, for example, mounting of eccentric rollers instead of a forming head

Optional:
- Industry 4.0 components
- Feed/discharge systems
- Robots
- Transfer systems
- Gripper systems, etc.

AHD 2500 S

Automatic hydraulic spin-forming machine (AHD)
Hot and cold forming of rotationally symmetrical workpieces of up to 2,500 mm



AHD work area

Feed material/blank disc diameter	max.	2,500 mm
Material thickness (dependent on material)	max.	20 mm
Workpiece height	max.	700 mm
Main spindle – Drive rating	ca.	155 kW
Main spindle – Speed – Gear Ratio 1	ca.	60 – 200 min^{-1}
Main spindle – Speed – Gear Ratio 2	ca.	200 – 600 min^{-1}
Main spindle – Tool radial mounting	DIN 55027	Gr. 15
Slide stroke	Z-axis	800 mm
Slide force	Z-axis	300 kN
Radial stroke	X-axis	600 mm
Radial force	X-axis	300 kN
Tailstock force		1,000 mm
Tailstock – Tool Mounting		300 kN

Worth knowing:

From the “1800” version upward, the AHD is also available as a hot-forming machine.
Heating up to 1250° C and maintenance of this temperature is the function of a completely automated burner portal.

New:
- Software for transmission of programs between two machines, even when of differing sizes
- Moveable support-table for easy feed and discharge and ability for use as a one- and two-support machine
- New tailstock design permitting, for example, mounting of eccentric rollers instead of a forming head
- Continuous visual display of instantaneous heat distribution in the workpiece thanks to the use of a thermal-imaging camera

Optional:
- Industry 4.0 components
- Cooling-lubricant booth
- Safety systems
- Crane systems for workpiece handling
- etc.

VUD

Our vertical universal spin-forming machine is the only R&D machine on the global market. It has been conceived and designed in cooperation with a number of renowned universities and masters practically all technologies in the field of chipless metal forming. It is, nonetheless, perfectly suitable for mass production purposes.

Your benefits from using our VUD

- **Versatility:** The world's most versatile machine in its field (mastering practically all chipless technologies in metal forming, as well as hot and cold forming, and with capability for both mass and short-run production).
- **Robustness:** The closed frame-type design assures transmission of all forming forces into the workpiece and not into the machine.
- **Optimised access:** The machine is accessible both from the front and the rear, and features large windows for easy and trouble-free programming and process analysis.

Highlights of our machines

- Vertical design
- Easy and fast tool changing
- Easy maintenance and servicing
- Easy feed and discharge

Machine description

- Closed frame-type design
- Heavy-duty, welded and stress-relieved steel for all main components

Special equipment for the VUD series

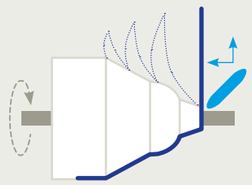
- A range of roller-changer mechanisms, each tailored to the particular forming task
- Special designs with up to three machining supports possible, enabling e.g. forming operations from inside to out in hollow chucks
- Use of eccentric tools
- Pressure-tight machine enclosure, permitting forming, for example, under inert-gas atmospheres
- Integrated induction system for heating of workpieces and tools

Pneumatic-suspension element

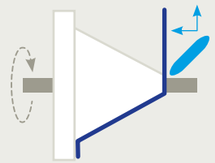
Complex geometry in a drive-train component

VUD – our all-rounder

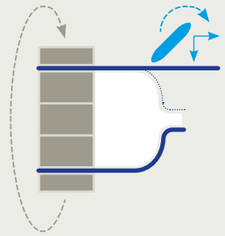
One machine for all forming technologies:



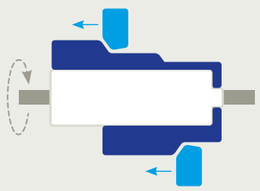
Metal spinning



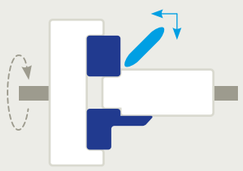
Shear forming



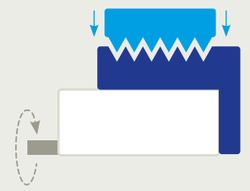
Necking-in



Flow-forming



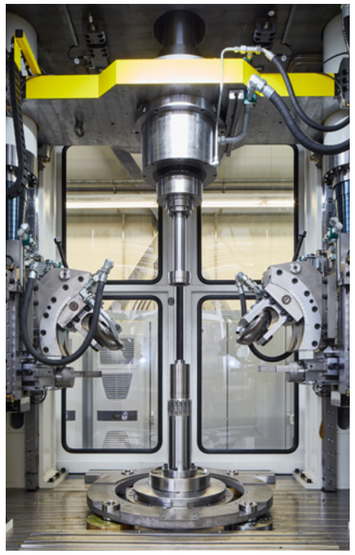
Hub forming



Profiling

VUD 600-2 L

Vertical universal spin-forming machine (VUD)
for cold forming up to 600 mm workpiece diameter using up to six forming rollers, extra-light type



VUD working area

Workpiece diameter	max.	600 mm
Workpiece height	max.	350 mm
Main spindle – Drive rating	ca.	32 kW
Main spindle – Speed	max.	1,550 min^{-1}
Main spindle – Tool mounting	DIN 55027	Gr. 6
Vertical stroke	Z-axis	2 x 560 mm
Vertical force	Z-axis	2 x 30 kN
Radial stroke	X-axis	2 x 350 mm
Radial force	X-axis	2 x 30 kN
Tailstock stroke, programmable	max.	400 mm
Tailstock force		5 – 50 kN
Tailstock – Tool mounting	DIN 55027	Gr. 4

New:
- Two times 3-fold roller-changer with programmable roller working angle
- Working area designed as a “steep gradient” for optimum swarf discharge during machining operations
- Integrated swarf conveyor
- “One-plate machine” permits extremely easy assembly
- All-electric design – no hydraulic fluid or compressed-air connection needed

Optional:
- Integrated feed system for blank discs
- Loading system with automatic disc-diameter calculation and centring
- Industry 4.0 components
- Transfer system

Pump housing – a typical application

VUD 1500-2 S

Vertical universal spin-forming machine (VUD)
for cold forming of workpiece diameters of up to 1,500 mm using up to six forming rollers, extra-heavy-duty version

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Aircraft engine components

Workpiece diameter	max.	1,500 mm
Workpiece height	max.	600 mm
Main spindle – Drive rating	ca.	300 kW
Main spindle – Speed	max.	600 min^{-1}
Main spindle – Tool mounting	DIN 55027	Gr. 20
Vertical stroke	Z-axis	2 x 1,100 mm
Vertical force	Z-axis	2 x 800 kN
Radial stroke	X-axis	2 x 800 mm
Radial force	X-axis	2 x 660 kN
Tailstock stroke, programmable	max.	660 mm
Tailstock force		50 – 500 kN
Tailstock – Tool mounting	DIN 55027	Gr. 11

New:
- Double or 3-fold roller-changer with programmable roller working angle

Optional:
- Hydraulically slewable rollers, clamped using a Hirth coupling, which can be programmed without restriction during running of the program
- Industry 4.0 components
- Transfer system

Worth knowing:

The VUD 1500-2 S is a genuine heavyweight, with a machine mass of 120 metric tons. This makes it significantly robuster than any other spinning machine on the market.

Our service packages

	Includes	★ Basic	★★ Advanced	★★★ Excellence
Troubleshooting	**WF helpdesk:** Service portal linked with digital lifecycle record for trouble-free service processes	●	●	●
	Personal contact		●	●
	Remote support: For identification of cause(s) of problems with the machine via on-line link		●	●
	SMART glasses support: Determination of causes of problem(s) using augmented-reality goggles			●
	On-site support: For identification of cause(s) of problems on the actual machine			●
Training online and offline	**General operation:** General instruction in the operation of the machine during pre-commissioning at WF	●	●	●
	Machine operation: User knowledge on setting machine up, tool changing, programming and safe handling and use of operating equipment		●	●
	Machine maintenance: Know-how on machine mechanics and hydraulics, fault diagnosis and troubleshooting		●	●
	Programming and forming process: Detail knowledge on programming and technologies			●
	Follow-up: Individual practical training for advanced practitioners, around four months after commissioning, for optimisation of operation			●
Maintenance	**Spares package 4000:** Recommended spare parts for the first 4,000 hours of operation		●	
	Spares package 8000: Recommended spare parts for the first 8,000 hours of operation			●
	Remote maintenance: Remote inspection for ascertainment of machine condition, including recommendations for action		●	●
	SMART glasses maintenance: Inspection using AR goggles and remote access for ascertainment of machine condition, including recommendations for action			●
	On-site maintenance agreement: Entire on-site maintenance of the machine at specified maintenance intervals			●

With our service packages, we ensure long and reliable operation of your machine.
The “Basic” package is included in the purchase price of your machine.
Please contact us for customised packages or to book individual services!

Further services	
SMART FORMING tools – WF Maschinenbau's Industry 4.0 solutions	**SMART FORMING assistant** for graphical programming support for NC programs **SMART FORMING viewer** for visual display and evaluation of forming forces on the product **SMART FORMING cam** for video supervision of the machine's working area **SMART FORMING inspector** for quality assurance of the forming process **SMART FORMING diagnostics** for support of preventative maintenance and continuous self-diagnosis
Automation	**Set-up of load/unload** systems, robots and transfer systems
Innovation engineering	**Product developments,** feasibility studies and fundamental tests in our R&D Center **Small production runs** to bridge shortages of machine capacity or peak orders, performance of small runs **“WF Future Zone” workshop –** What else is possible? YOU shape the future of your industry! **Machine set-up** for optimised start of a new production line
Retrofitting and uprating	**General overhaul** for minimisation of risk of failures and/or **retrofitting** to assure regular production operation

You can book additional services as you need them.
Please contact us directly for more information, we'll be pleased to help you!

ENGINEERED FOR THE WORLD.
BUILT IN SENDENHORST.

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Headquarter

WF Maschinenbau
Sendenhorst, Germany

Locations

WF Machinery
Schaumburg, USA

WF China
Beijing, China

WF Korea
Incheon, Korea

Representations

Canada – England – France – India – Italy – Japan – Mexico – Portugal – Spain – Taiwan – Turkey

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