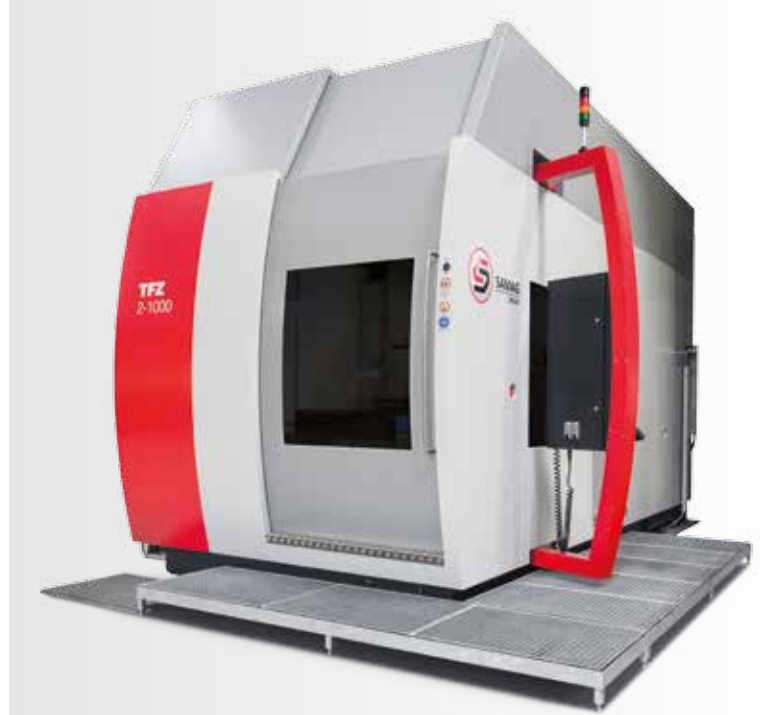


SAMAG TFZ

DEEP-HOLE DRILLING AND MILLING CENTERS

The efficient chipping solution
for highly complex cubic workpieces.



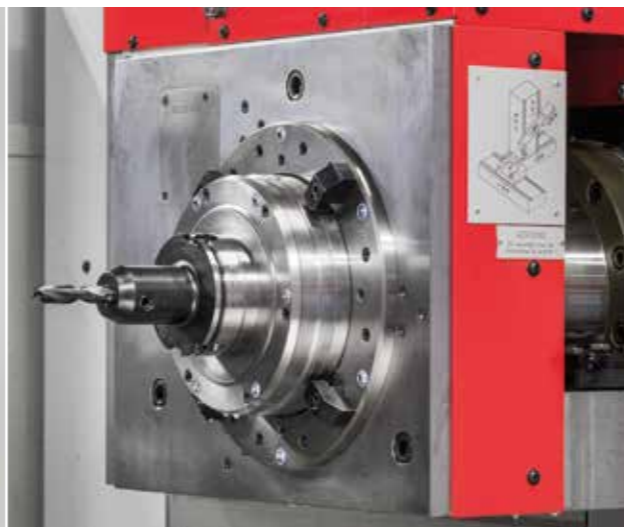
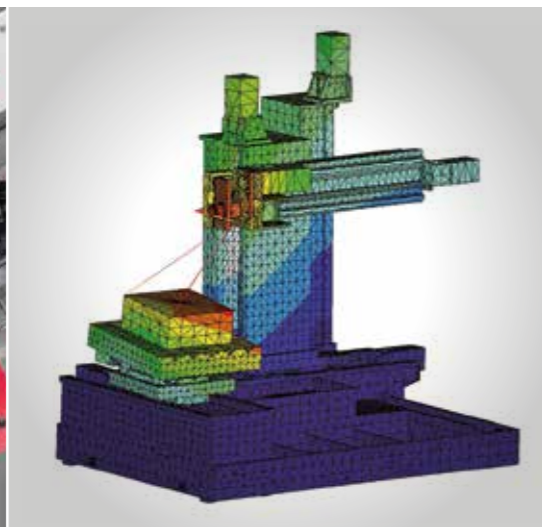
SAMAG
GROUP

www.samag.de

Expertise in Deep-Hole Drilling and Milling technology

- Two technologies in one machine
- 4-sided complete machining of cubic workpieces up to a weight of 50 metric tons
- High drilling and milling performances
- Swiveling drilling and milling unit
- Easy to load and access via walk-able machine grating

The working areas of TFZ machines are from all sides accessible. This simplifies the work of the machine operator and optimizes the setup times.



Compact and extremely rigid machine structure Developed using FEM (finite element method): In the TFZ series all components in the power transmission are optimized by static and dynamic considerations.

High machine safety

- The Quick Check Kinematics function (QCK) measures and corrects the kinematic accuracy of the machine.
- Safety prompt prevents collision of drilling and milling spindle with chip box cartridge and steady rests.
- Collision detection by machine sensor; the sensor reacts within one millisecond and switches the machine off.
- The dynamic collision monitoring (DCM) detects imminent collisions of the tool and stops the corresponding axis.

High energy efficiency

- Efficiently designed main spindle and feed drives
- Optimized hydraulic unit
- Energy-efficient control cabinet cooling
- Replacement of large pneumatic drives by servo motor drives
- Use of highly efficient state-of-the-art asynchronous motors
- Use of drives with mains feedback functions during braking operations
- Large coolant tank replaces cooling units

● X-Module with NC rotary table (B-axis)

- 360-degree rotation, four sides can be fully machined in one clamping.
- Machining at two angles is possible in connection with the A-axis

● Machine cladding

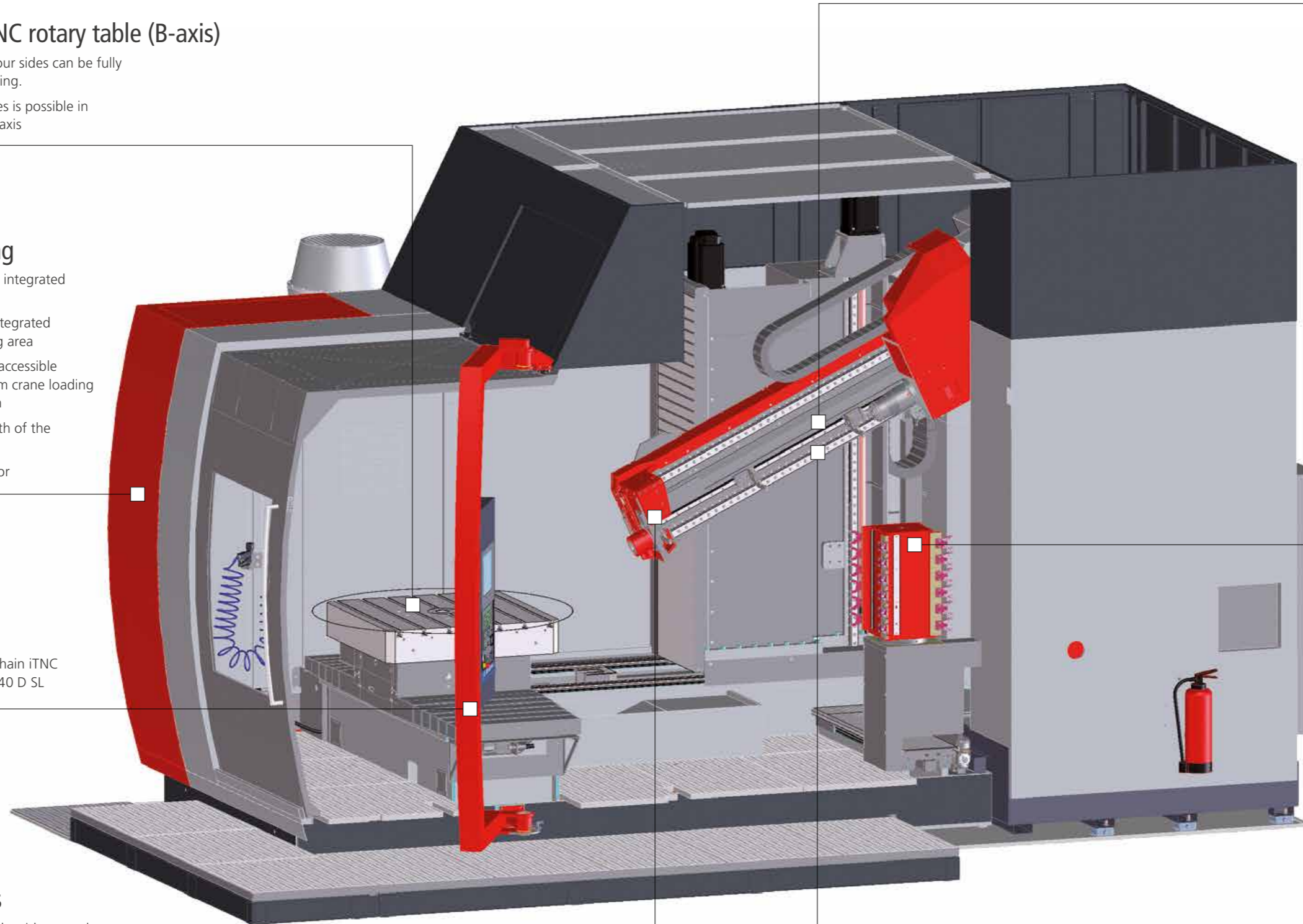
- Machine guarding with integrated oil return
- 2 loading doors with integrated covering of the working area
- Complete table area is accessible from above for optimum crane loading with loading door open
- Clearance opening width of the loading door
- Additional operator door

● Control panel

- CNC controller: Heidenhain iTNC 530 HSCI or Siemens 840 D SL

● Tool steady rests

- Simple and fast assembly without tools
- low loss lengths through steady rest nesting
- number of steady rests is flexible
- can be positioned flexibly thanks to easy-to-operate steady rest retraction system



● Swiveling drilling and milling unit (A-axis)

- Pivoting angle TFZ 2/2L $-30^{\circ}/+15^{\circ}$, TFZ 3/3L and TFZ 4 $\pm 30^{\circ}$
- Step-less positioning axis
- Zero point offset is carried out by the CNC controller
- Short lever arm thanks to two swivel bearings, resulting in optimum dynamic behavior
- Reach of the drill bushing/spindle nose 500 to 800 mm above the table enables optimum four-sided machining
- Drilling and milling unit is easily accessible

● Tool changer

- 24 to 64 places for tools

● Chip removal

- Chip box cartridge can be removed / changed with little effort
- The chip box cartridge can be fitted outside of the machine and in parallel to the machining process, thus reducing the setup time.
- Chip conveyor in the X-bed with non-slip safety grating, no steps or tripping edges



● Installation on factory-floor via leveling elements, no anchoring

● If the machine is installed in a recessed foundation, operation and loading take place on the same level as the factory floor.

TECHNICAL DATA	TFZ 2-1000	TFZ 2L-1000	TFZ 3-1500	TFZ 3L-1500	TFZ 4-2000
• Gun drilling ELB method					
Bore diameter min./max.	4-30 (3-36)* mm	4-30 (3-36)* mm	5-40 (65)* mm	5-40 (65)* mm	5-40 (65)* mm
max. drilling depth in one pass	1,000 / 1,250 mm	1,000 / 1,250 mm	1,500 / 1,800 mm	1,500 / 1,800 (2,000 / 2,300)* mm	2,000 / 2,300 mm
Spindle holder according to DIN	SK 40 (HSK 63)*	SK 40 (HSK 63)*	SK 50 (HSK 100)*	SK 50 (HSK 100)*	SK 50 (HSK 100)*
Rated spindle power (S1 = 100%, S6 = 40% duty cycle)	9 / 13 (15 / 23)* kW	9 / 13 (15 / 23)* kW	17 / 25 kW	17 / 25 kW	17 / 25 kW
Spindle speed, infinitely adjustable	6,000 (10,000)* rpm	6,000 (10,000)* rpm	6,000 rpm	6,000 rpm	6,000 rpm
Rated spindle torque (S1 = 100%, S6 = 40 % duty cycle)	85 / 124 Nm	85 / 124 Nm	216 / 320 Nm	216 / 320 Nm	216 / 320 Nm
Rapid traverses X, Y, W and Z-axis	20 m / min	20 m / min	20 m / min	20 m / min	15 m / min
Milling performance (S1=100%)	250 (475)* cm ³ / min	250 (475)* cm ³ / min	475 cm ³ / min	475 cm ³ / min	475 cm ³ / min
Thread cutting (larger threads by circular milling) (Performance specifications for material 1.2312)	M 24	M 24	M 30	M 30	M 30
• Travels					
X-axis (table crosswise)	1,200 mm	1,600 mm	2,000 mm	2,500 mm	3,200 mm
Y-axis (drilling/milling unit vertical)	1,050 (1,250)* mm	1,050 (1,250)* mm	1,250 (1,650)* mm	1,250 (1,650)* mm	1,250 (1,650)* mm
Z-axis (drilling/milling unit horizontal)	1,100 mm	1,100 mm	1,250 mm	1,550 mm	2,000 mm
W-axis (drilling/milling spindle)	1,600 mm	1,600 mm	2,250 mm	2,250 / 2,775 mm	2,775 mm
• CNC rotary table					
B-axis	360 degrees	360 degrees	360 degrees	360 degrees	360 degrees
Table area (other dimensions on enquiry)	1,100 x 1,100 mm	1,500 x 1,100 mm	1,800 x 1,800 mm	2,400 x 1,800 mm (2,200 x 2,000)* mm	2,500 x 2,000 mm (3,000 x 2,000)* mm
Table load (central)	7,000 (10,000)* kg	7,000 (10,000)* kg	15,000 (20,000)* kg	20,000 kg	20,000 (40,000)* kg
• Coolant supply					
Coolant pressure	max. 100 (90)* bar	max. 100 (90)* bar	max. 90 bar	max. 90 bar	max. 90 bar
Coolant flow rate	max. 40 (90)* l / min	max. 40 (90)* l / min	max. 90 l / min	max. 90 l / min	max. 90 l / min
• Process monitoring					
Tool breakage monitoring, coolant pressure and coolant flow checking	✓	✓	✓	✓	✓
• 3D path control					
Heidenhain iTNC 530, optionally Siemens 840 D	✓	✓	✓	✓	✓
Coordinate transformation	✓	✓	✓	✓	✓
Deep-drilling technology programs	✓	✓	✓	✓	✓
Milling cycles	✓	✓	✓	✓	✓
• Machine cladding, chip conveyor options					
• Options					
Two-speed manual gearbox at i = 4 (S1 = 100%/S6 = 40% duty cycle)			648 / 952 Nm	648 / 952 Nm	648 / 952 Nm
Drilling/milling unit swiveling A-axis	-30/+15 degrees	-30/+15 degrees	-30/+30 degrees	-30/+30 degrees	-30/+30 degrees
Follow rest	2	2	4	4	4
Tool changer for conventional tools	24 (32)* places	24 (32)* places	24 (32)* places	24 (32 / 64) places	24 (32 / 64)* places
Required footprint	approx. 5,700 x 7,400 x 4,050	approx. 6,300x8,100x4,300	approx. 7,700 x 8,900 x 5,500	approx. 9,000x9,900x5,800	approx. 10,600x10,900x5,800

*optional; subject to technical changes; status as of August 2015

For larger travels, table dimensions, drilling depths, bore diameters please inquire.

Universal Deep-Hole Drilling and Milling Machines

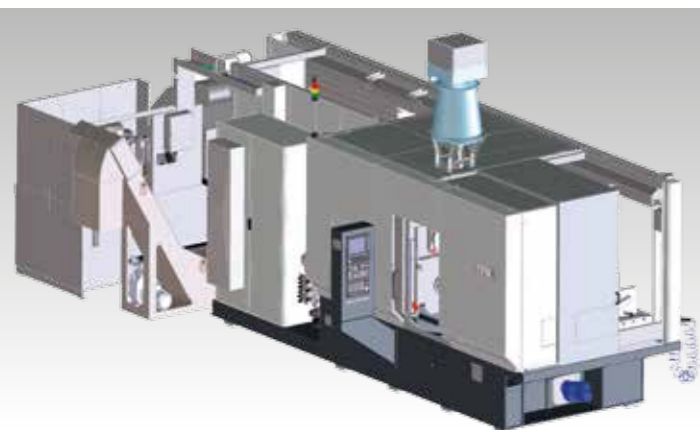
- Combined drilling and milling based on TFZ technology
- Can easily be customized for flexibility
- Ideal for hard materials (cast iron, steel, hard metals)
- In one clamping, individually or in combination, with the TFM concept, the following machining tasks can be accomplished:
 - deep-hole drilling (BTA or gun drilling method)
 - milling
 - thread cutting
 - burnishing



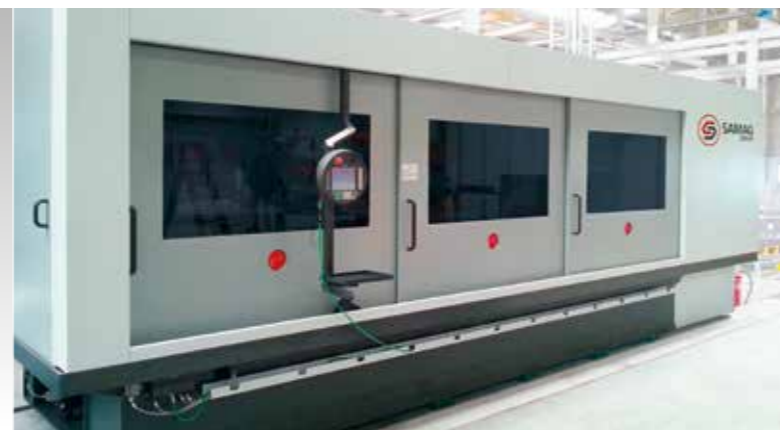
TECHNICAL DATA	TFM-1600 (2000)
Drill diameter	6-65 mm
Max. drilling depth	1,600 (2,000)* mm
• BTA /gun drilling spindle holder	SK6-BTA/ELB
Rated spindle power	17/25 kW
Spindle speed	4,000 rpm
Coolant pressure	depending on pump
Coolant flow rate	depending on pump
• Spindle holder	HSK63 DIN 69893
Rated spindle power	9/13 kW
Spindle speed	6,000 rpm
Tool changer	min. 6 places
• Coolant supply	
Coolant pressure	max. 90 bar
Coolant flow rate	depending on pump
• Travels	
X-axis	1,200 mm
Y-axis	320 mm
Z-axis	2,500 mm
Z2-axis	550 mm
Table dimensions	1,600 x 400 mm

*optional; subject to technical changes; status as of August 2015

For larger travels, table dimensions, drilling depths, bore diameters please inquire.



Main control panel with Siemens 840D SL

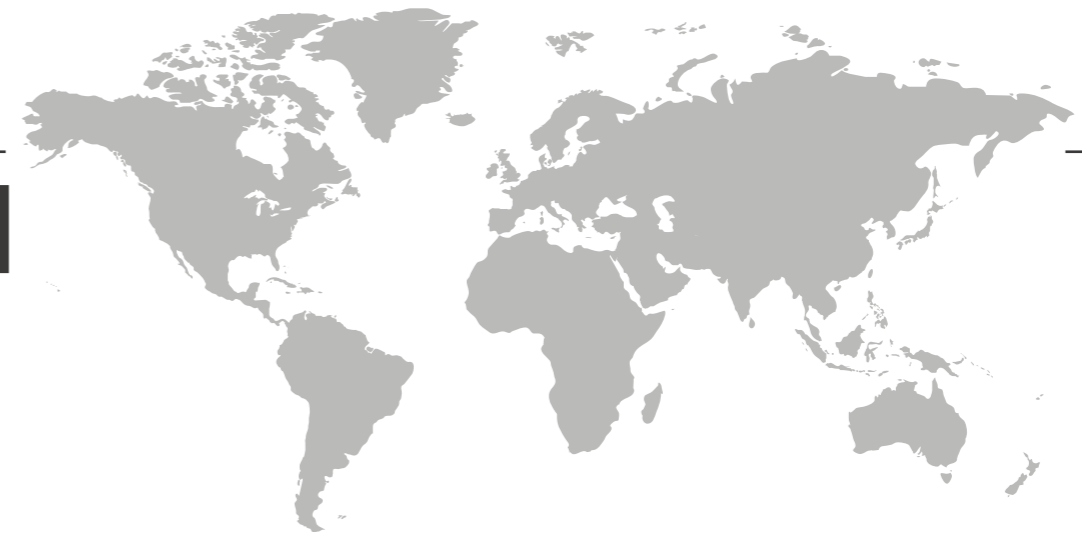


The TFM-series has been developed for the combined drilling and milling.

● The advantages of the SAMAG TFM series

- High productivity through combined machining
- Choice of drilling method and number of milling stations
- High stability ensures extreme precision
- Cooling lubricant supply and chip removal according to drilling method
- Tool magazine with at least 6 places
- CNC controller Siemens 840 D SL
- Easy operation via access from two sides

Always there for you anytime, anywhere in the world



Top quality and absolute reliability equally define our customer service. Because our customer service naturally doesn't end with the handover of the machines. When you need us, we are there for you as quickly as possible – no matter whether it's a question of maintenance, repair or any issues with operation.

Among other things our services include:

- Machine installation, commissioning and production launch support
- Customer service, maintenance and repair, including express service and rapid repairs
- Spare part supply and delivery of spare parts on short notice
- User-specific training programs
- Support for all technological issues
- Remote diagnosis via Ethernet interface (network)

As part of our service contracts we offer a wide range of custom solutions for your SAMAG-machinery and for other makes. For example:



Our experienced service team is always looking for ways to minimize downtime.



SAMAG expertise in your vicinity: Our international service partner are trained by us.

- Maintenance, overhauling and retrofitting of SAMAG machines and other makes
- Machine relocations
- Retooling to other components
- Conversion to NC control

We will be happy to provide you with a personal service quotation.

MFZ TFZ
WBM



Whether TFZ, WBM or MFZ - the systems are adapted exactly to the requirements of the customer.



Diversity is _____ _____ our program

● SAMAG machine tool engineering in Saalfeld, Thuringia, has a tradition which stretches back over 140 years. At the end of the 19th century the company started to manufacture the first drilling machines here. Since that time, SAMAG engineers have repeatedly contributed to the improvement of the quality and economy of production processes with innovative designs and outstanding technological achievements. Now SAMAG is one of the pioneers in the field of multi spindle process systems.



Our machine tools have a sophisticated safety concept and are extremely easy to service due to their good accessibility.

● Today, SAMAG Saalfelder Werkzeugmaschinen GmbH is a leading manufacturer of

- Multi-spindle horizontal machining centers: MFZ series for individual workpiece machining for medium to large-scale series production
- Deep-hole drilling and milling centers: TFZ series for the 4-sided complete machining of cubic workpieces
- Multi-spindle production deep-hole drilling machines: WBM series for the machining of rotationally symmetrical workpieces
- Special purpose machines, for example for the interior machining of differential housings.

Bundled technological competency

The SAMAG GROUP unites four divisions under one roof. Along with machine tool engineering, they focus on the manufacture of components for the automotive and commercial vehicle industry.

In this division of the company, metal cutting, forming and joining processes are used to manufacture ultra-high quality components in small, medium and large series, primarily for vehicle chassis and drive trains. The SAMAG GROUP has access to state of the art production plants including laser cutting, stamping, forming, welding, bonding, cathodic dip-paint coating, powder coating and assembly equipment.

Customers value SAMAG GROUP products precisely for their high quality production and high delivery reliability.



Since 2001, we have introduced the environmental management system and participate voluntarily in the EC Eco-Audit according to the EMAS Regulation.

In order for Samag to receive and pass along their expertise and knowledge, the SAMAG GROUP educates their own employees from within with an apprentice program.



Head office in Saalfeld/Thuringia
Total no. of employees > 650

- The company**
SAMAG Saalfelder Werkzeugmaschinen GmbH in Saalfeld
 Divisions: Machine Tools and Automotive
 Machine tool manufacturing for the chipping industry;
 Machined component production for the automotive industry
- Subsidiaries:**
SAMAG Truck Components GmbH in Rottenbach
 Division: Truck Components
 Processing sheet, profile and tubing (forming) for the automotive industry (cars and commercial vehicles), electrical, medical and mechanical engineering
AGA Zerspanungstechnik Gera GmbH in Gera
 Division: Automotive
 Machined series production of turned, milled and broached parts for automotive and industrial clients

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partners worldwide

Multi-spindle machining centers, special purpose machines

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