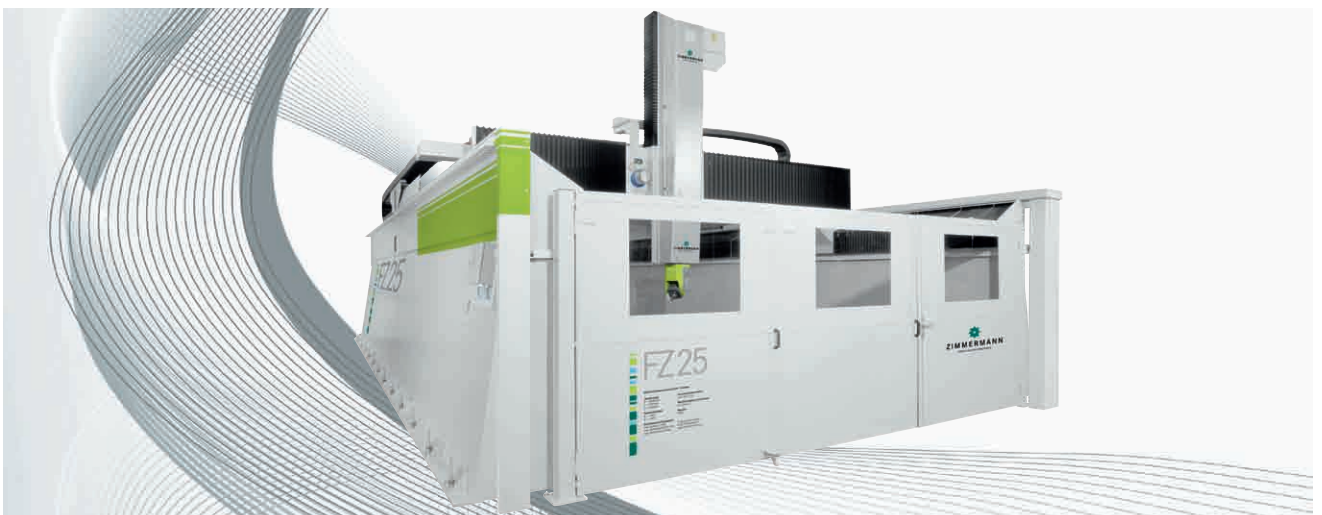




ZIMMERMANN

PORTAL MILLING MACHINES

FZ 25
Portal Milling Machine



THE PORTAL TO SUCCESS

GREAT TASKS REQUIRE



SPECIAL SOLUTIONS

Gigantic and yet filigree – who has not gazed in awe at the enormous rotor blades of a modern wind turbine. These aerodynamic wings often machined in one piece are an example of the ultramodern, futuristic products of energy industry. Their manufacture requires laminating moulds of the highest quality and enormous size – ideal for portal milling machines from Zimmermann. Major challenges which are also to be found in similar form in the automobile, aircraft and boat-building industries as well as in many other sectors.

Learn more in the following pages about this very special portal milling machine.



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Large, accurate and cost-effective – three advantages at your disposal

The 5-axis portal milling machine FZ25 is a universal solution for the machining of highly complex and at the same time voluminous components. Model materials as well as composites through to light alloys can all be machined with this HSC gantry machine. This machine range fulfils the specific requirements of many sectors:

- In the automobile design where large models need to be produced (e. g. cars on a scale of 1:1).
- In pattern and tool making, especially in connection with very large workpieces with deep contours need to be machined (e. g. large rotation-symmetric moulds such as tanks and pools, etc.).
- In the boatbuilding and shipbuilding industries, where huge work areas are required in all three axes, since the components are often elongated in shape.
- In the aircraft industry, e. g. for milling panels, other large parts and components with extreme contours.
- In the wind energy industry with its long thin blades and bulbous hubs.

The FZ 25 is ideally suitable for dry machining of very large workpieces and is particularly well positioned for the following areas of application:

- Extremely large work areas of up to 6 000 mm in the Y-axis, 3 000 mm in the Z-axis and – through the use of rack-and-pinion drives – practically unlimited lengths to over 40 000 mm in the X-axis.
- Very high accuracy and surface finish.
- Tried and proven 5-axis technology.



Racing car model



Front part of a train



Boatbuilding

Materials

- Light alloys
- Composite materials such as CRP and GRP
- Epoxy resins
- Wood
- Polyurethane
- Polystyrene
- Clay

Portal design – the key to success

Portal milling machines are masters of versatility. From their construction with fixed side walls and overhead driven portal in the X-direction result the very low and constant moving masses. Thus the machine has a consistent dynamic response, leading to outstanding surface finish even with very large workpieces. The 5-sided, 5-axis machining makes it possible to mill even very complex shapes in a short time. To achieve the ideal machine layout, the dynamically stiff construction was optimized in several stages through FEM calculations. Continuous, trapezoidal side columns reduce any vibrations which occur to a minimum, making it possible to achieve high dimensional accuracy and surface finish.

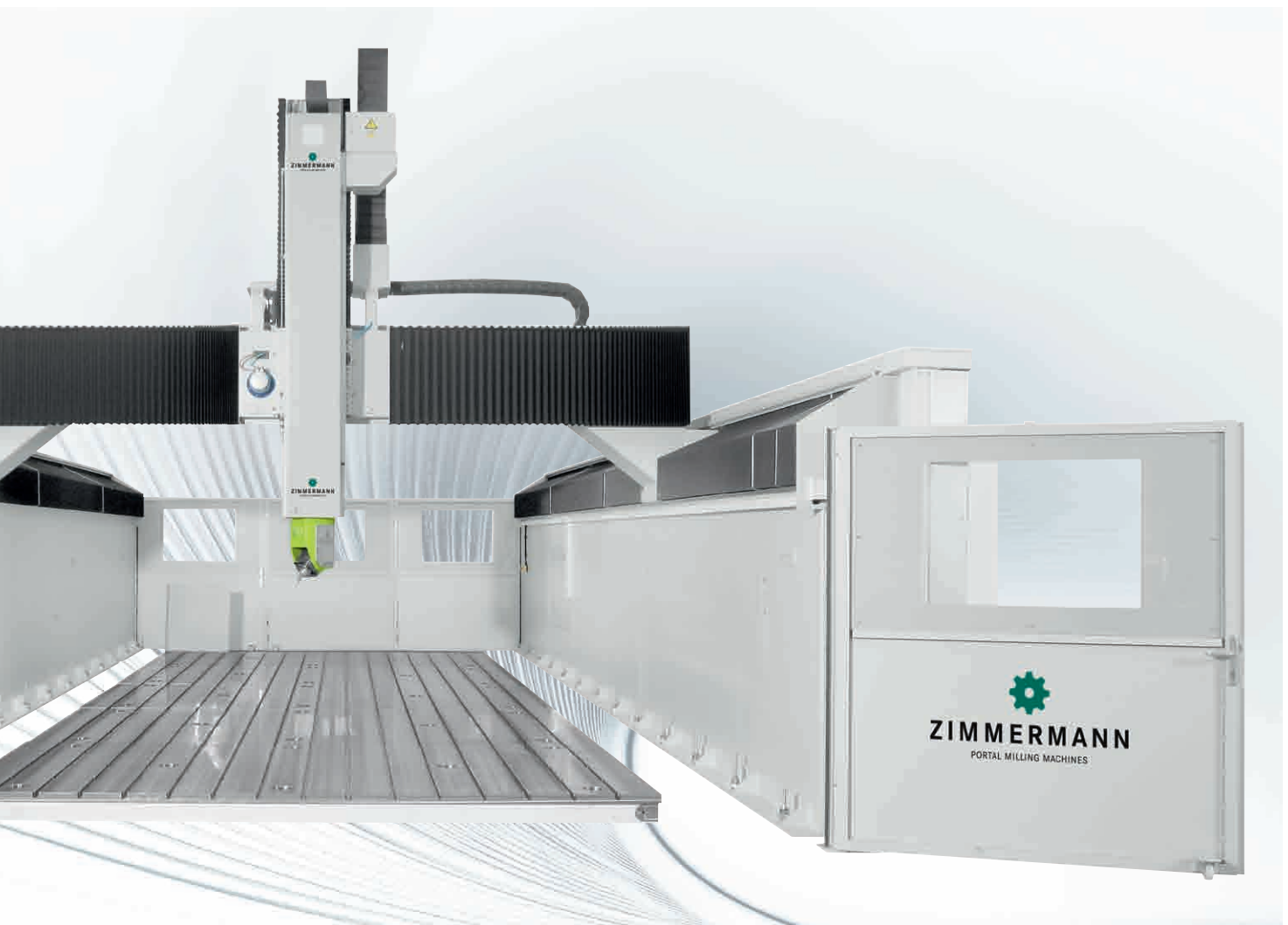
To obtain a particularly rigid structure, they are made of welded steel, filled with a fiber-reinforced special concrete (DemTec) for optimal vibration absorption and high temperature stability. This structural design and the resulting machine rigidity ensure highest dynamics and excellent contour accuracy. This technology is clearly superior to conventional casting or welded structures. The overhead dynamically driven portal permits 5-axis – or 5-sided – machining with high precision and speed.

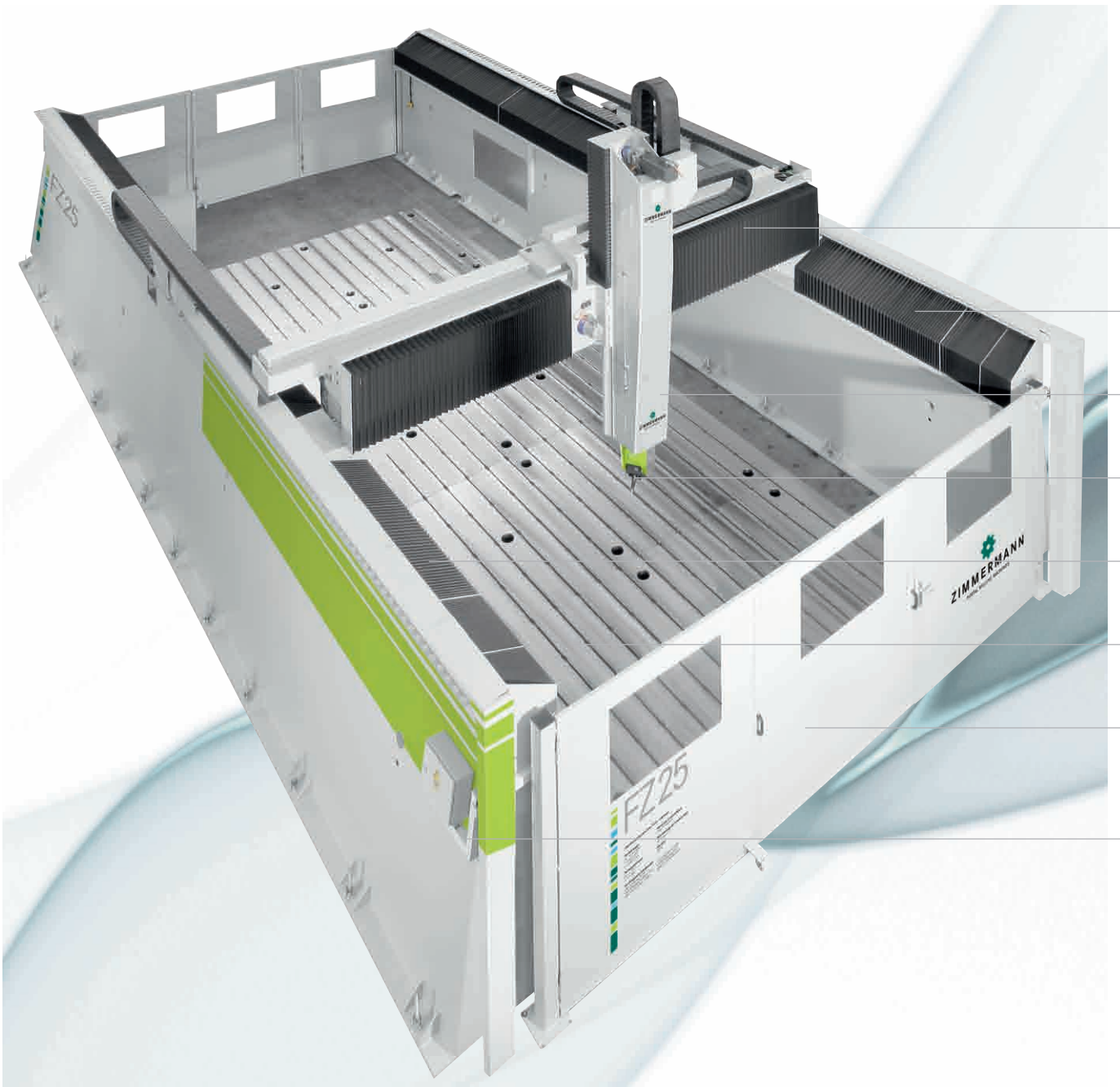
The basic structure chosen based on a modular system design offers nearly no limits to the flexible adaptation of the work areas to the customer's specific requirements.



The special portal construction achieves the highest precision and dynamics through high structural rigidity and constant moving masses.

Decisive for the performance of the machine is the adaptation of the overall design to suit the materials to be machined – starting in each case with the appropriate spindle power.





The advantages of a remarkable design

The combination of the robust design with very small moved masses (weight-optimized portal, Z-carriage and milling head), leads to unique dynamic performance in this class. The machine makes it possible to machine huge workpiece with very high cutting performance and extraordinary accuracy. The surface quality obtained requires little or no subsequent manual finishing.

The large travel paths of the linear axes and large degrees of freedom of the rotational axes permit complete machining in a single setup. The harmonious balance between kinematics, drive technology and milling-head design regarding geometry and rigidity leads to optimal dynamics and process quality.

The results are short operating times, high surface quality and the highest economy, unique in this class of machine.

Overhead, weight-optimized and structurally rigid portal moving in the X-direction, for high dynamic performance and precision.

Portal drives on both sides with rack-and-pinion mechanism well away from the dirt zone, guided on both sides.

Weight-optimized vertical slide with high bending strength for large Z-ranges.

Dynamic weight-optimized 2-axis milling head with double planetary gear.

Dust-proof bellows, particularly important for protection against dust from materials like CRP and GRP.

Worktable made of steel or cast iron with T-slots, permanently anchored to the foundation.

Completely enclosed protective housing through closed side walls, back wall (optional) and a front sliding door with large inspection windows.

Compound-filled trapezoidal side columns with enlarged base areas.

Highlights

- Robust portal design with overhead portal and low moving masses
- Very large work areas of 40 000 x 6 000 x 3 000 mm and above
- High dynamics and precision 5-axis and 5-sided machining
- Axial feeds up to 50 000 mm/min.
- Large swivel ranges of the rotational axes
- Compact milling head

The intelligence is in the detail



Modularity

The FZ 25 is extremely flexible with regard to the work areas, make and type of control system as well as accessories and equipment and can be easily adapted to individual requirements.

Drives

The FZ 25 is designed for simultaneous 5-axis machining. The portal is driven on both sides. The X-, Y- and Z-axes are equipped as standard with high-precision, preloaded roller bearing guides. In the X- and Y-axes the latest rack-and-pinion drives (in the X-axis on both sides) are used, in the Z-axis ball screw drives.

Measuring systems

The three linear axes X, Y and Z have direct Heidenhain linear measuring systems. The measuring systems are pressurized to protect them against contamination. As an option the rotary axes A and C can be equipped with high-resolution angular measuring systems.



Ball screw drive

The classic among drive systems for short axes is characterized by high precision and low cost. As a result it is extremely cost-effective.

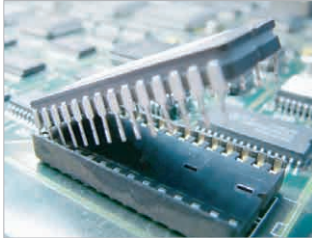


Rack-and-pinion

The highly dynamic rack-and-pinion drive offers a very good balance between costs and benefit. Any desired axis length can be achieved, covering the widest possible range of applications.

High performance package

For particularly demanding applications the FZ 25 is optionally available in a high performance package. It is equipped with electronic preloaded double motors on both sides in the X- and Y-axes for backlash-free drives and higher positional accuracy. Thus the machine can achieve even greater surface quality and higher accelerations.



Control systems

The FZ 25 can be supplied with different control systems. Functions like “look ahead”, stick-slip limitation, spline interpolation as well as 5-axis machining are included as standard. There is an almost infinite range of options, for example measuring probes and tool measuring systems can be supplied on request. For optimal integration into your own production environment, we offer the flexibility of being able to choose between a number of control system manufacturers.



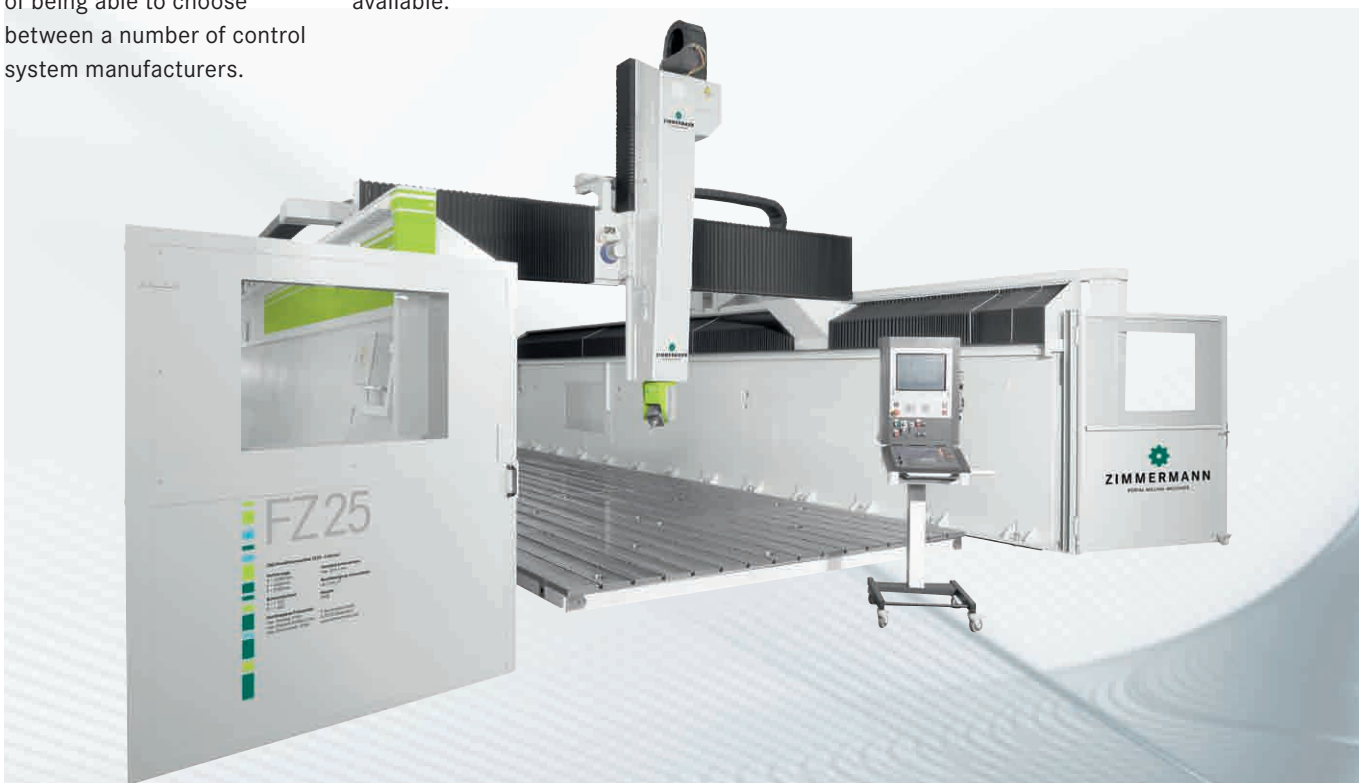
Contamination

The portal has been designed from the start to be resistant to dirt, since all the key components are positioned well away from the area where dirt can accumulate. Guides, drive and measuring systems are covered with dust-proof bellows to protect them from external influences. A wide range of systems for providing a compressed-air barrier, protective covers and extraction devices and systems are available.



Clamping table

The clamping table made of steel is secured permanently to the foundation, so that the clamped workpiece does not have to be moved. Machining is independent of the workpiece weight and thus highly accurate.



Milling head VH 1 – designed for highest dynamic performance

In order to achieve the vision of a highly dynamic portal milling machine for voluminous workpieces requiring huge working ranges in all axes, it was first necessary to develop a new milling head. Particularly for lighter materials, the VH 1 offers several important advantages. It is the most compact milling head in the Zimmermann range. Through its design it can achieve very high dynamic performance, leading to very large chip removal rates during HSC milling. On the other hand its relatively low weight means there is less stress on the portal of the milling machine, resulting in lower torsional and bending forces. Together with the high precision of the overall machine concept, this leads to very high surface quality.

The extremely compact milling head with a slender, rounded-off fork makes it possible to machine narrow, deep contours, thus enabling complete machining of very intricate surfaces.



The intelligent design focuses on the optimization of performance and accuracy-related criteria. The pre-loaded backlash-free drive is a key part of this philosophy. It is dynamic, light, has a soft damping characteristic and exceeds the precision necessary for this kind of application.



Highlights

- Extremely small interference circle for narrow, deep contours
- Reduced weight for high dynamic performance – weighs only 140 kg incl. the spindle
- Standard spindle with 10 kW/10 Nm and 24 000 rpm



Individual system solutions for all applications

In addition to the machine itself, Zimmermann offers turn-key solutions which satisfy all additional auxiliary technical requirements.

We bring in our technical expertise and customized project management from the initial idea to the end of the project. Zimmermann supplies everything from a single source.

Dust and swarf

Whether to do with the health aspects of fine dust or questions of contamination with swarf, from chip conveyors to full enclosure of the FZ 25, there are a wide range of solutions.

Clamping table

Logistical considerations, size, weight, part geometry, etc. – there are many aspects to consider when choosing the right clamping table and the appropriate loading systems.

Tool changer

As the link between the workpiece and the machine, tool changers of different designs can be supplied.

Clamping technology

The FZ 25 can be equipped with a variety of clamping devices, depending on batch sizes, the range of components or the changeover times required.



VH 12

The milling head VH 12 is available for particularly demanding machining tasks. It is equipped with extremely rigid bearings to provide high retention forces during simultaneous movements and a very high performance brand spindle with application-friendly characteristics. Its single-sided guideway makes it easily accessible.



FZ 25

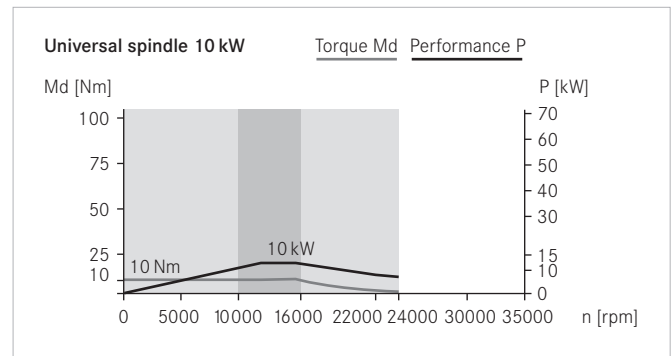
Technical data

Machine	FZ 25
Working ranges	
X-axis	4 000 – 40 000 mm ¹
Y-axis	2 500 – 6 000 mm ¹
Z-axis	1 000 – 3 000 mm ¹
Table size	
Length	4 000 – 40 000 mm
Width	2 500 – 6 000 mm
Height	220 mm
Table load	max. 5 000 kg/m ²
T-slots (longitudinal)	18 ^{H12} (optional 18 ^{H8})
Distance between T-slots	250 mm
Feed rates	
Feed X- und Y-axis	bis 50 000 mm/min.
Feed Z-axis	bis 30 000 mm/min.
Acceleration of linear axes ²	bis 5 m/s ²
Accuracies²	
Positioning accuracy X-axis	0,050 mm
Positioning accuracy Y-axis	0,030 mm
Positioning accuracy Z-axis	0,030 mm
Repeatability X-axis	0,040 mm
Repeatability Y-axis	0,040 mm
Repeatability Z-axis	0,015 mm

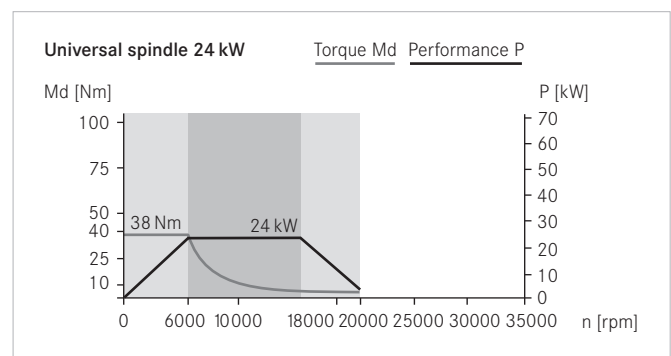
Milling head	VH 1	VH 12
Swiveling range		
A-axis	± 100°	± 100°
C-axis	± 360°	± 360°
Performance		
A-axis torque	238 Nm	430 Nm
C-axis torque	430 Nm	430 Nm
Feed rate A-, C-axis	90°/s	100°/s
Accuracies²		
Positioning accuracy A-, C-axis	50"	30" ³
Repeatability A-, C-axis	20"	20"

Milling spindle	VH 1	VH 12
Performance S1 max. (100% ED)	10 kW	24 kW
Torque S1 max. (100% ED)	10 Nm	38 Nm
Max. speed	24 000 rpm	18 000 rpm
Constant performance	10 000- 16 000 rpm	6 000- 18 000 rpm
Tool holder	HSK 63 F	HSK 63 F
Swiveling axis – spindle nose	135 mm	135 mm
Tool clamping	spring clamp	spring clamp
Tool release	pneumatic	pneumatic
Lubrication	permanent grease lubri.	permanent grease lubri.

VH 1 Milling spindle – performance diagram



VH 12 Milling spindle – performance diagram



¹ Other dimensions on request

² According to VDI 230 – 2 / DGQ 3441, based on basic machine, depending on the length

³ With direct measuring systems

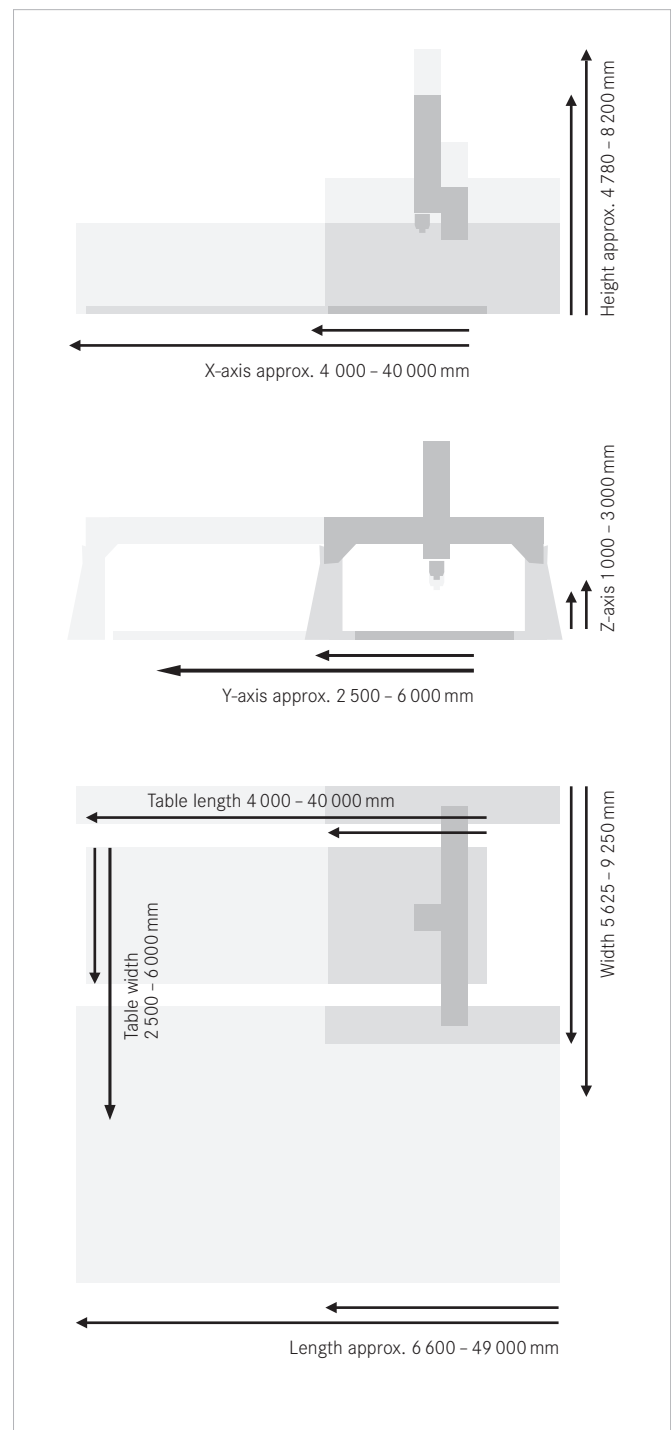
Equipment options

FZ 25

Simultaneous A-axis	■
Simultaneous C-axis	■
Air-conditioning of control cabinet	■
Housings	■
Minimum quantity lubrication	■
Tool changer 10, 20 pockets or more	■
Measuring probe	■
Tool measurement system	■
Special voltage	■
Special painting	■
Chip conveyor	■
Dust extraction	■
Clamping fixtures	■
Clamping table variants	■

■ Standard ■ Option

Dimensions



All dimensions given are examples of the minimum and / or maximum configurations of the FZ 25 delivered so far. Special models with dimensions deviating from these sizes can also be supplied.



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FZ 100



M3 ABC



FZ 42



VH 6



FZ 38



VH 5



FZ 37



VH 4



FZ 35



VH 3



FZ 32



VH 2



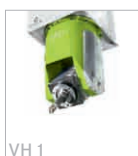
FZ 30



VH 12



FZ 25



VH 1



FZ 15

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