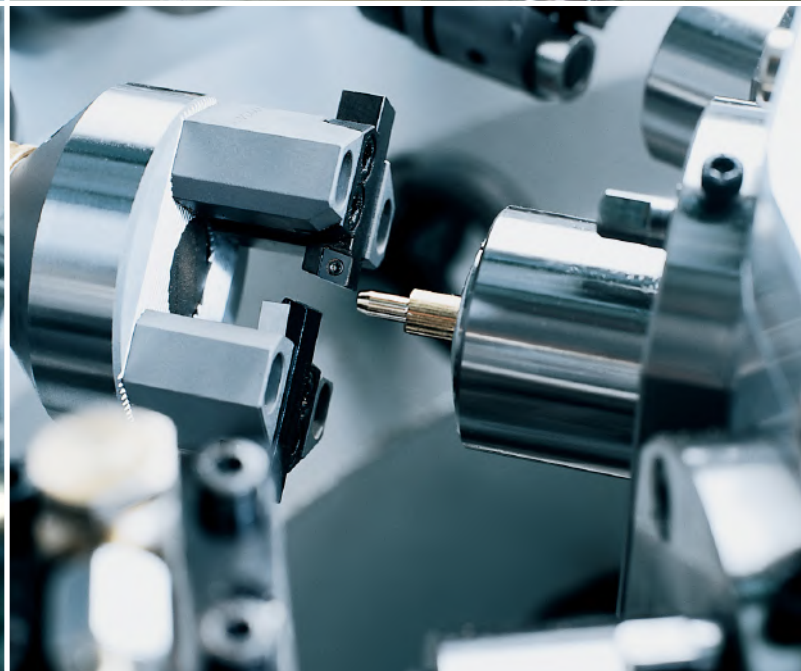
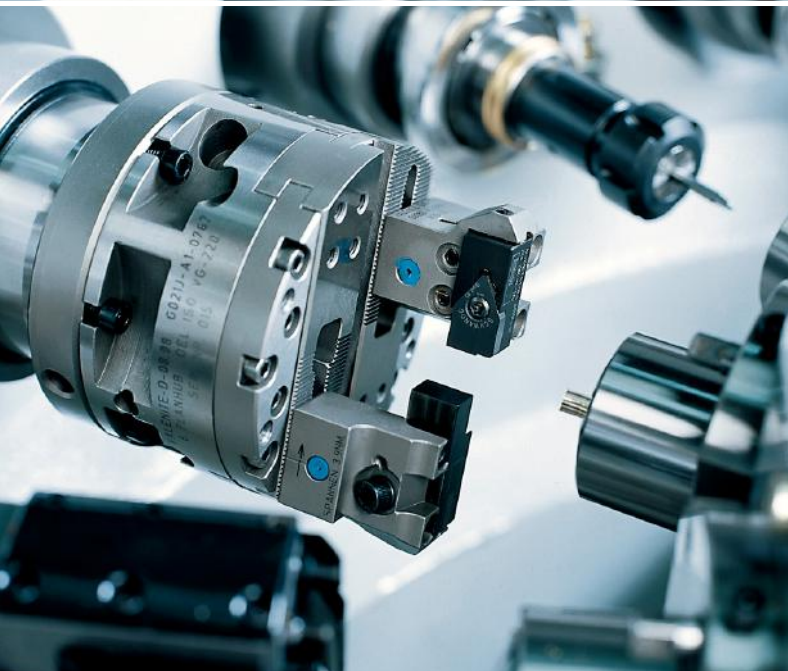
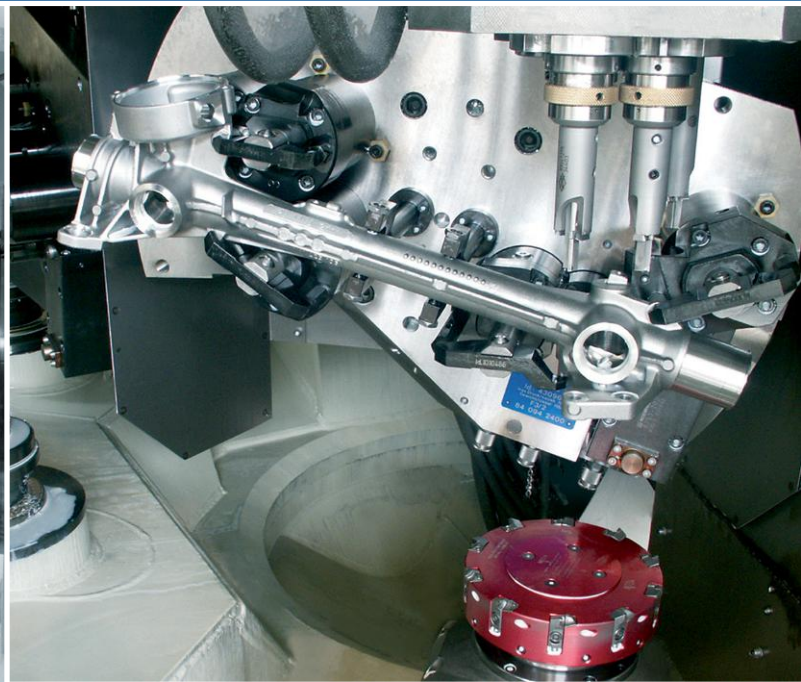
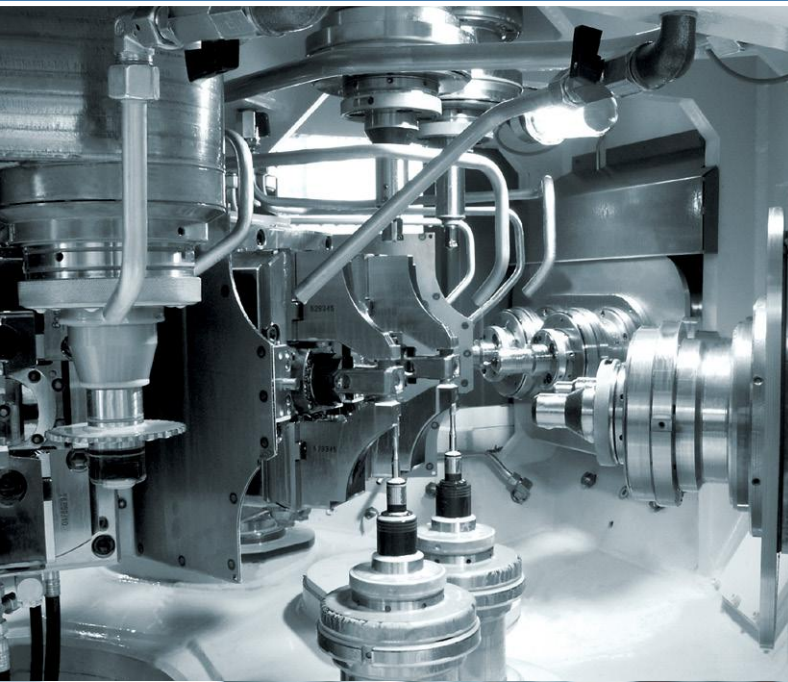




WITZIG & FRANK

ROTARY TRANSFER AND MULTISPINDLE MACHINES



Flexible Multi-Way Machining



The FFG Rotary Transfer Platform

Flexible Multi-Way Machining

Precise, modular and efficient – The FFG Group is the world's leading manufacturer of rotary transfer machines and offers the best solutions for workpiece at the high volume end.

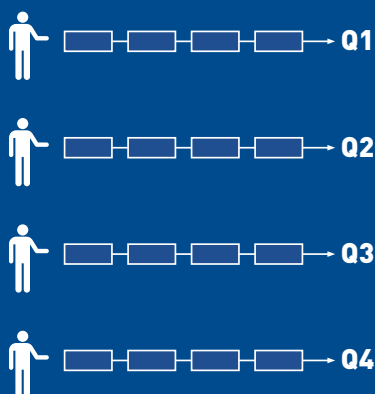
United under the roof of the FFG group: with the rotary transfer machines of the tradition brands IMAS, Pfiffner and Witzig & Frank you are always one cycle ahead.

The rotary transfer machines program covers all exigencies on the serial production of complex metal parts. Rotary transfer machines are designed for the handling of bar, coil materials or automatic part feeding. They assure high precision machining of each workpiece, being carried out simultaneously on each station. Every rotary transfer machine is specified, build for, and customized to the pieces it will handle.

The ability to set up workstations horizontally as well as vertically allows big machining jobs with the highest output just-in-time. The enormous flexibility of the rotary transfer machines gives our clients a major advantage in dealing with the growing challenges of today's global markets:

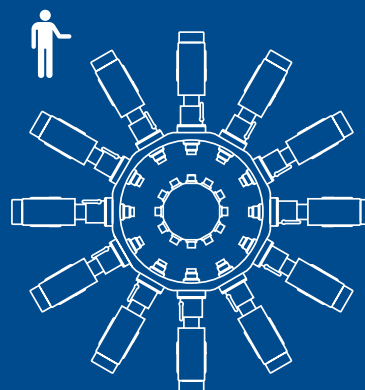
- ▶ The best cost-effective solutions
- ▶ Maximum precision and process reliability in mass production
- ▶ High investment security thanks to extensive modularity
- ▶ High reusability thanks to reconfigurable machine systems
- ▶ High flexibility and variability (simpler retooling, reduced setup times)
- ▶ High machine availability
- ▶ Low maintenance costs (TCO)
- ▶ Turnkey Solutions
- ▶ Process optimization
- ▶ Global After-Sales-Management

Sequential machining



- ▶ 4 operators
- ▶ 4 varying qualities
- ▶ 4 interfaces
- ▶ 4 x larger footprint

Simultaneous machining on rotary transfer machines



- ▶ Faster
- ▶ More precise
- ▶ More productive
- ▶ Safer process



Highest profitability

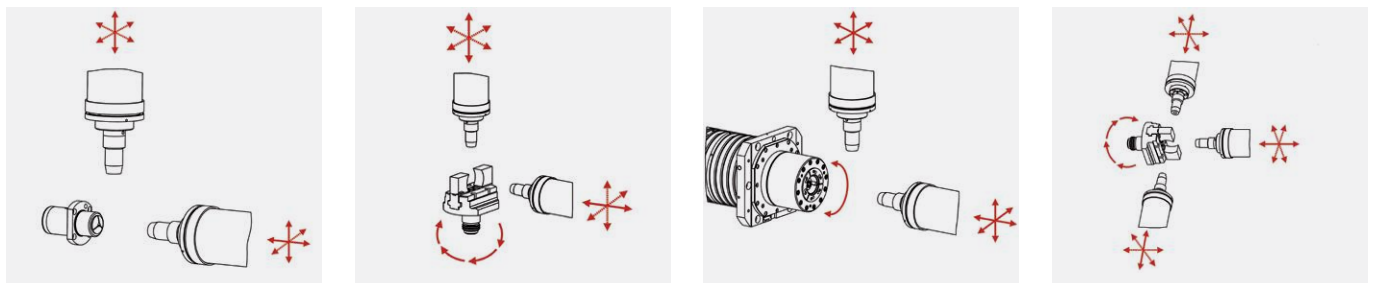
The Benchmark for High Volume Manufacturing

Unmatched Quality by the Second

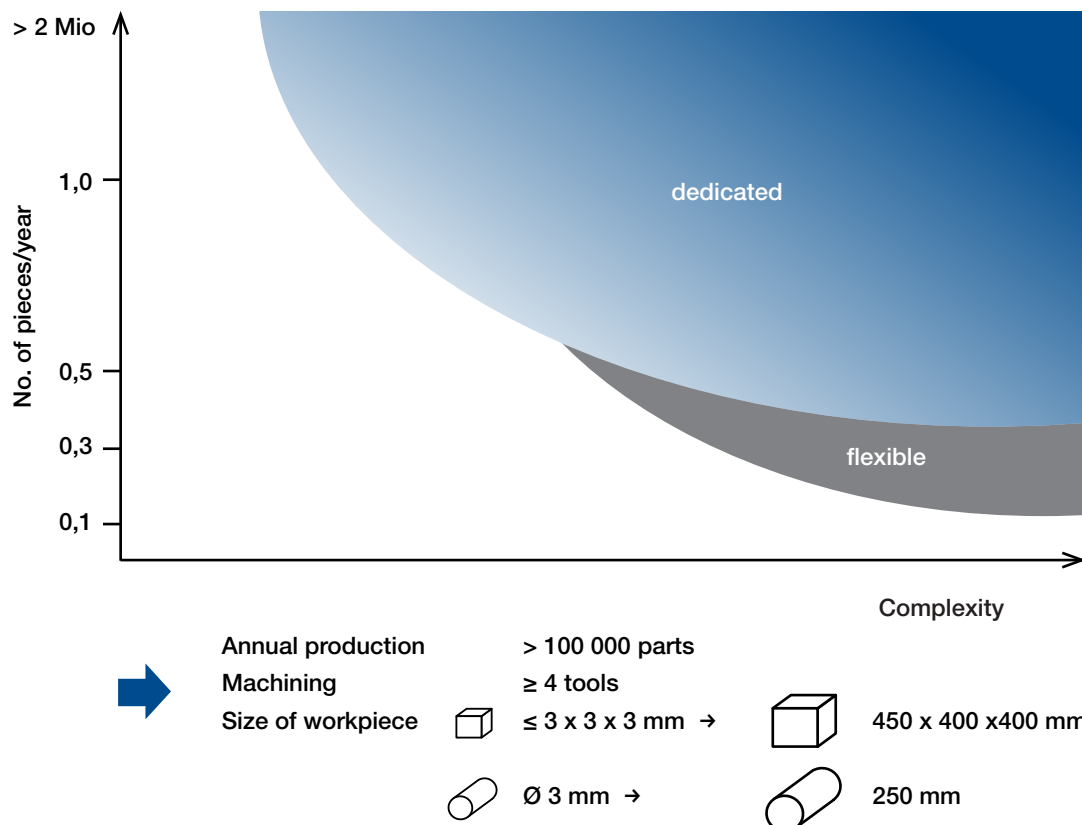
Rotary transfer automatic: precision in a fraction of a second

In the indexing table the workpiece will be simultaneously finish machined in multiple operating workstations: The heart of the machine is the indexing table with fixed clamping of the parts in collets, jaw chucks or special fixtures for round stock material with diameters from 3 to 250 mm or for cubic parts up to maximum 400 x 400 x 400 mm. Machining units are available for 4 to 16 workstations for variable machining operations.

In addition further technologies allow to apply grinding, honing, forming, mounting, press fitting, clearing, pushing, wobbling. All operations are carried out simultaneously, which gives extraordinary short production times. In any situation where complex metal parts are required in high volumes and at high speed with maximum precision: FFG offers the best solution.



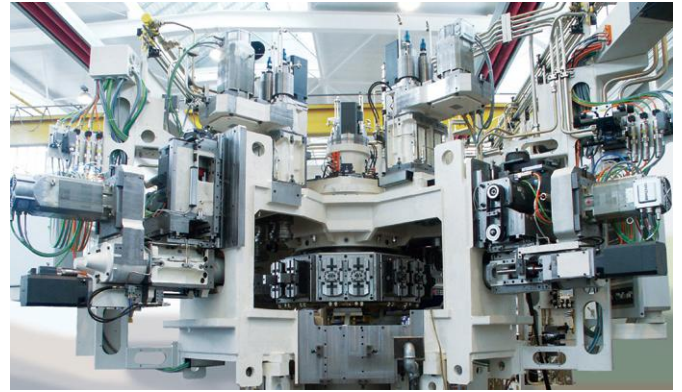
Machine kinematics



Areas of application for FFG multi-way machines by production volume and complexity

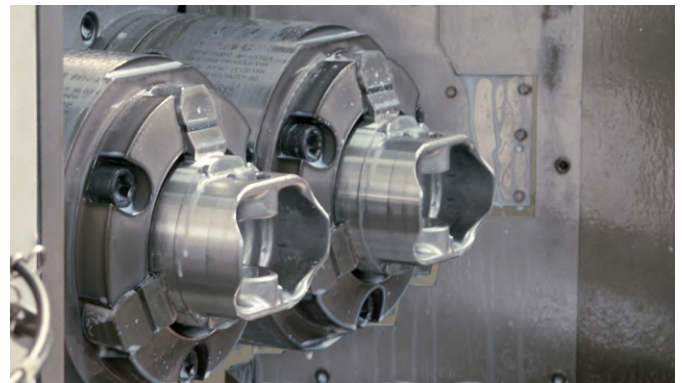
Witzig & Frank

Product Portfolio

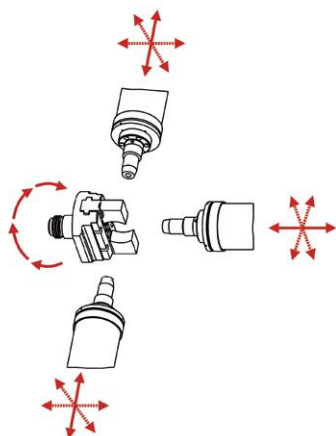


TURMAT – vertical rotary transfer machine

- ▶ 3-5-sided machining
- ▶ Sealed work area with self-supporting machine structure
- ▶ Hanging rotary transfer unit => free chip fall
- ▶ Option for dry machining / MQL
- ▶ Simultaneous machining on up to 5 stations
- ▶ Separate loading/unloading station
- ▶ Easy access to all units and fixtures
- ▶ Loading and unloading parallel to cycle time
- ▶ Simultaneous machining with up to 20 machining units



TURMAT Duo



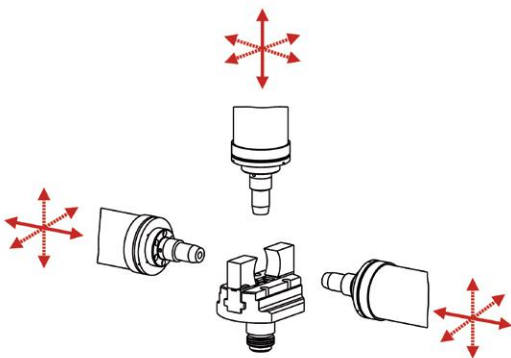
3-sided parallel machining





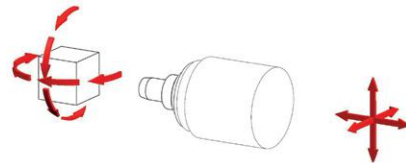
LSA – horizontal rotary transfer machine

- ▶ Multi-Way machining center for 3-sided machining in one clamping
- ▶ Modular standard platform, 3-7 stations
- ▶ 3-4-sided single setup machining
- ▶ Capability to machine tough materials like unleaded brass
- ▶ Standard interfaces for bar feeder and further loading concepts
- ▶ Simultaneous single spindle 5-axis machining



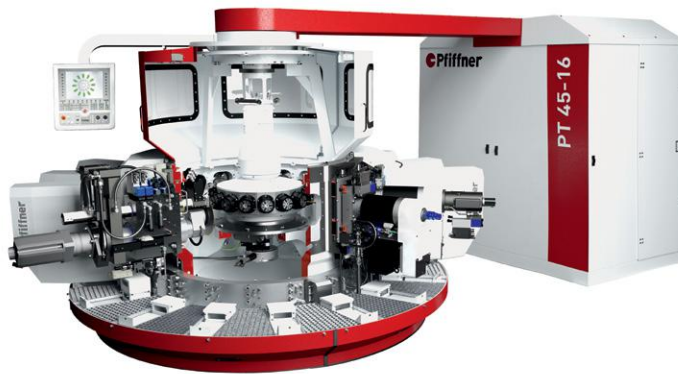
TIRFLEX 5X – multi-station machining center

- ▶ Simultaneous single spindle 5-axis machining
- ▶ Highest productivity with five spindles simultaneously in operation
- ▶ Parallel 5-sided machining in one clamping
- ▶ Part loading and unloading during machining
- ▶ Compact design with a footprint of 9 x 8 m
- ▶ High power density with optimized energy efficiency
- ▶ Free chip fall into the chip conveyor, dry machining-ready
- ▶ Five 8-station turret heads with max. 300 Nm



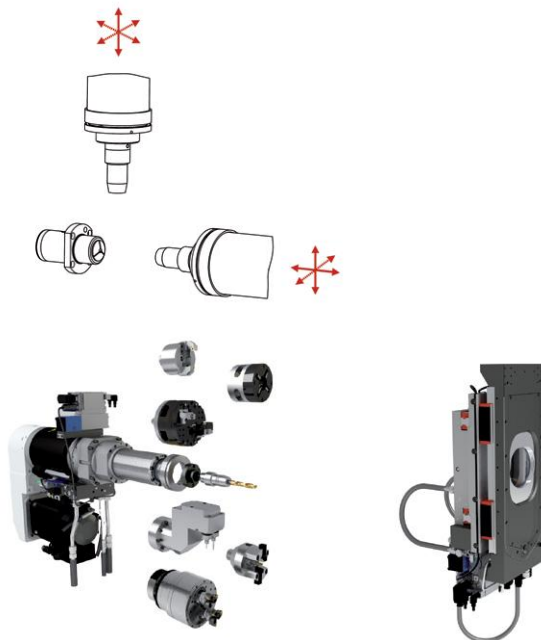
Pfiffner

Product Portfolio



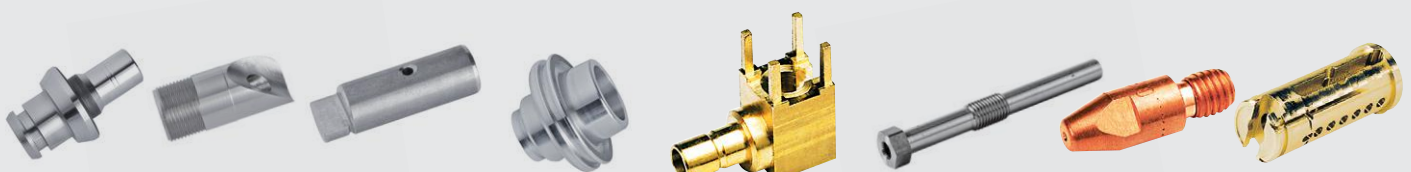
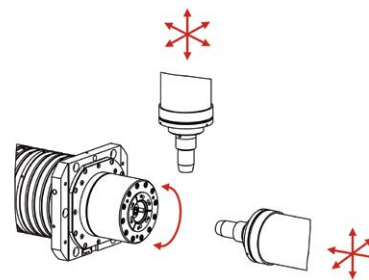
PT – Production Transfer

- ▶ Completely CNC-controlled with Bosch MTX
- ▶ Reliable inverting
- ▶ Single module technology
- ▶ Automatic chucking compensation (mapping)
- ▶ Convertible clamping system
- ▶ Each station scalable up to 5 CNC-axes



RT – Rotary Transfer

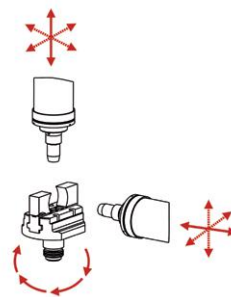
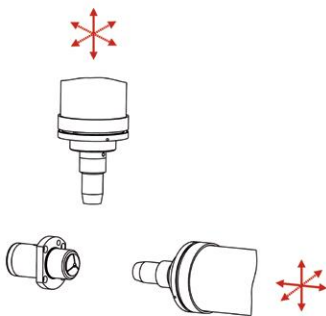
- ▶ Completely CNC-controlled with Bosch MTX
- ▶ Modular unit concept
- ▶ 3 up to 6 multiple turrets
- ▶ Processing on stationary and rotating work piece
- ▶ Multiple fixed and rotating tools
- ▶ Free combinable horizontal and vertical processing





Hydromat® Rotary Transfer Machines Product Line HC *EPIC^{plus}*

- ▶ Completely CNC controlled with Bosch MTX
- ▶ Minimal set-up times
- ▶ Modular unit concept
- ▶ Highest productivity (machine availability)
- ▶ Lowest maintenance costs (TCO)
- ▶ 5-sided machining in one clamping (HC-U line)



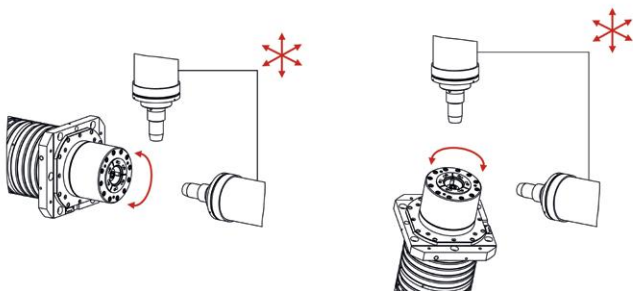
IMAS

Product Portfolio



IMASFLEX 300 V & H – cutting cost/part with uncomparable flexibility

- ▶ 7 fully CNC driven machining modules, twin-drive CNC rotary table
- ▶ Up to 440 x 440 x 650 mm axes travels (300 V)
- ▶ Wide range of machining heads: single, twin, high-speed, 6-tools turret head
- ▶ Automatic lock/release for clamping fixture coupling
- ▶ CNC driven satellites: direct drive stepless vertical axis (300 V), 1 degree pitch indexing horizontal axis (300 H)
- ▶ Stepless adjustment by part program of clamping force, station by station



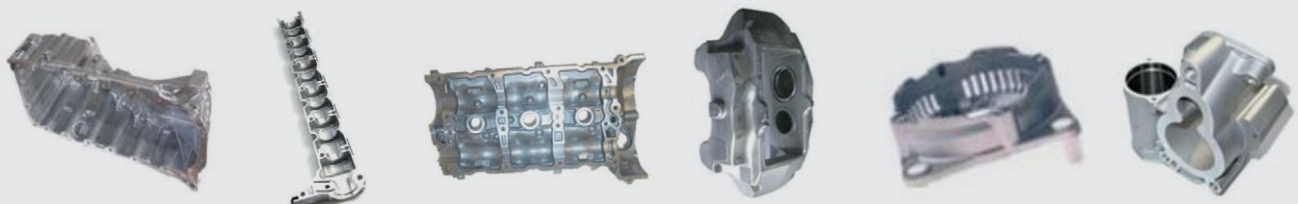
300 H – internal view showing a typical configuration with revolver head modules and a special application as regards the clamping fixtures



300 V – Wide axes travels allow to work most of the large size car engine components



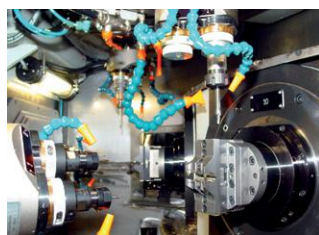
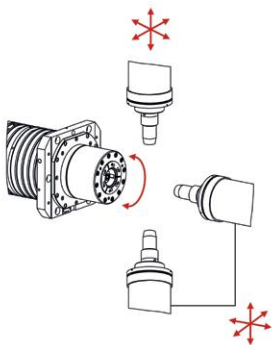
300 V – Engineered machining heads, horizontal six spindles turret and vertical single/twin spindle heads which are assembled on the same module





IMASFLEX 150 – the fully flexible system with the productivity of a dedicated machine

- ▶ 10 stations, up to 18 3-axes CNC modules, up to 18 CNC-spindles simultaneously at work
- ▶ Axes travels 130 x 150 x 130 mm
- ▶ Integration with bar feeding and on-board special devices
- ▶ Wide range of machining heads, up to 40 000 rpm
- ▶ Large availability of tools, adapters for fixed tools
- ▶ Rugged triple Hirth Gear CNC indexing table, CNC driven satellites with lathe capability

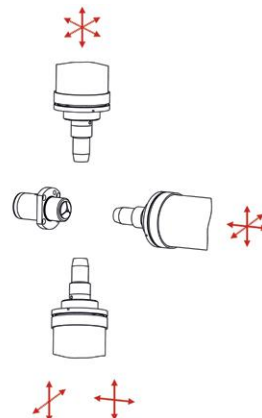


IMASFLEX 150 – Horizontal and vertical twin spindle heads, the cheapest way to substantially increase the number of available tools with tool change time of 0.15 s.



IMASTRANSFER – the custom-made solution for high volume production systems

- ▶ From 2 to 24 stations with 1, 2 or more parts per station
- ▶ Axes travels up to 350 mm
- ▶ Manual, robotized or bar-feeding raw parts loading
- ▶ From 1 to 3 cast iron, high rigidity mechanical CNC-axes modules
- ▶ Vertical, horizontal, inclined and bottom-to-top machining directions
- ▶ Double setting for 6-sided machining, with special devices for automatic setting change



IMASTRANSFER – Up to three modules simultaneously working along orthogonal directions with large use of CNC axes.



FFG – The Leading Global Manufacturer of Rotary Transfer and Multispindle Machines

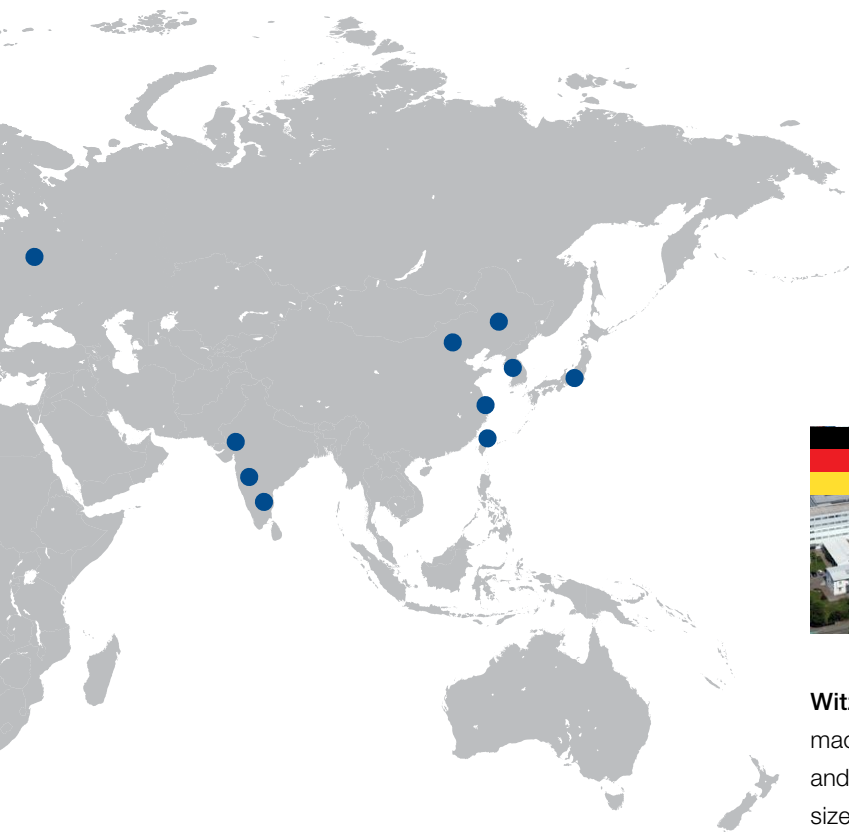


IMAS originated from a well-known manufacturer of carburetors, who decided to appoint a group of mechanical engineers to design a machining system suitable for high-volume and high-consistency productions. Since 1948, IMAS has continuously built up its reputation of a trusted and competent manufacturer of precise, long-lasting mass-production means, applied to the most different fields, with a special focus in Automotive, Access Control and Refrigeration components. Today, IMAS provides state-of-the-art rotary table machining solutions, ranging from high-efficiency, completely dedicated equipment up to fully flexible production isles, with all the possible intermediate configurations, according to the actual needs of our customers and always with the leading target to minimize the cost per machined part.

- ▶ 1948: IMAS was established as a manufacturer of fixed and rotary transfer machines
- ▶ Middle 80s: IMAS develops and introduces CNC driven modules
- ▶ Early 90s: First concept of flexible rotary transfer machine called Imasflex
- ▶ Early 2000s: Introduction of Imasflex 150, merging flexibility and high-productivity; Imasflex 300H for the production of middle-sized parts
- ▶ Early 2010s: New Imasflex 300V was introduced to enlarge the machining-envelope for running large dimension components
- ▶ 2016: At the end of March IMAS moved to a more suitable facility in Mariano Comense and on 6th of July was acquired by FFG



For more than 40 years, **Pfiffner** has been developing rotary transfer systems of highest precision and flexibility. Thanks to our indefatigably spirit of inventiveness, solution-oriented practice and fully developed knowledge of the market, Pfiffner has today become a world-leading partner of the most innovative industries. Pfiffner has established itself as one of the largest machine tool manufacturers throughout Switzerland. This success approves the position of Pfiffner's corporate philosophy in all ranks, which is to keep one step ahead at all levels, from conception to production, right the way through to sales and service. Our goal is to offer our satisfied customers viable solutions for the requirements of the market.



WITZIG & FRANK

Witzig & Frank develops and manufactures highly productive machining systems for the Faucet and Fittings, Automotive, and Industrial Equipment industries, machining small to medium sized parts. The approach includes workpiece dedicated applications, the integration of multiple technologies and turn-key system development and design, handled by experienced engineers. Manufactured in Germany, the Witzig & Frank systems are installed in all industrialized nations. Life time productivity is ensured by providing maintenance, service and support during the entire machine life cycle, including retooling, retrofit and service contracts.

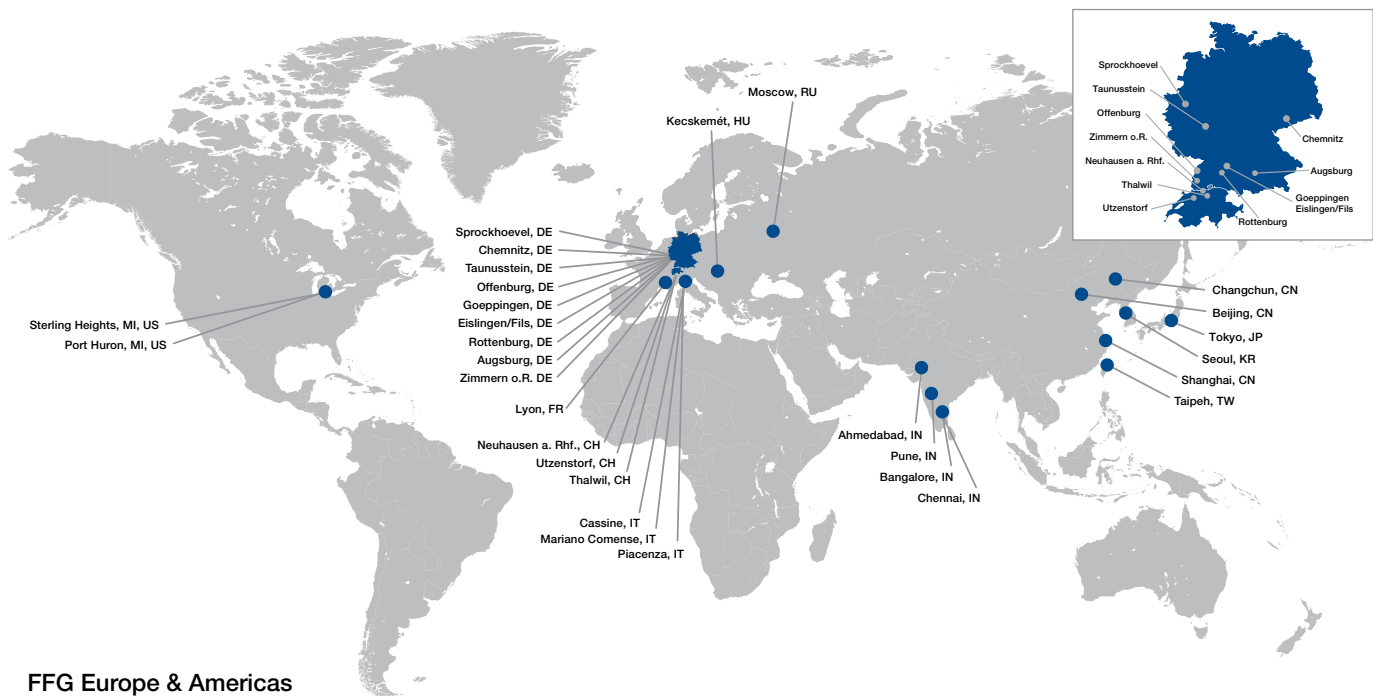
Our major milestones:

- ▶ 1970 Karl Richard Pfiffner incorporates K.R. Pfiffner AG in Zurich
- ▶ 1976 Development of the Hydromat – Rotary Transfer Machines
- ▶ 1977 Delivery of the 1st Hydromat – Rotary Transfer Machine
- ▶ 1989 Foundation of K.R. Pfiffner GmbH (Germany)
- ▶ 2005 Delivery of the 2000th Hydromat – Rotary Transfer Machine
- ▶ 2007 Market introduction of the product lines RT / AT
- ▶ 2013 Market introduction of the product line PT
- ▶ 2014 Establishment of Pfiffner Japan Co., Ltd., Japan
- ▶ 2015 10th June Pfiffner Group joins the international FFG Group
- ▶ 1865: founded as „mechanische Werkstätte“ K. Martin Maschinenfabrik
- ▶ from 1919: production of machine tools
- ▶ 1954 Foundation of Witzig & Frank Maschinenbau-gesellschaft mbH
- ▶ 1975 market launch of the patented rotary multi-way transfer machine TURMAT
- ▶ 1981 Fusion of K. Martin Maschinenfabrik and Witzig & Frank to form Witzig & Frank-Martin GmbH, Maschinenfabrik
- ▶ 1993 Multi-station CNC machining center TRIFLEX
- ▶ 1996: inclusion of Diedesheim LSA series
- ▶ 2013: December – integration into FFG

**VDF BOEHRINGER****HESSAPP****meccanodora****MORARA****TACCHELLA****WITZIG & FRANK**

About FFG Europe & Americas

The FFG entities in Europe and the Americas unite major players from the German, Italian, Swiss and American machine tool industry with a broad range of milling, turning, grinding, and gear manufacturing technology, and the knowhow of the renowned machine tool brands VDF Boehringer, Hessapp, IMAS, Jobs, MAG, Meccanodora, Modul, Morara, Pfiffner, Rambaudi, Sachman, Sigma, SMS, Tacchella and Witzig & Frank. Since 1798, 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.



FFG Europe & Americas

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