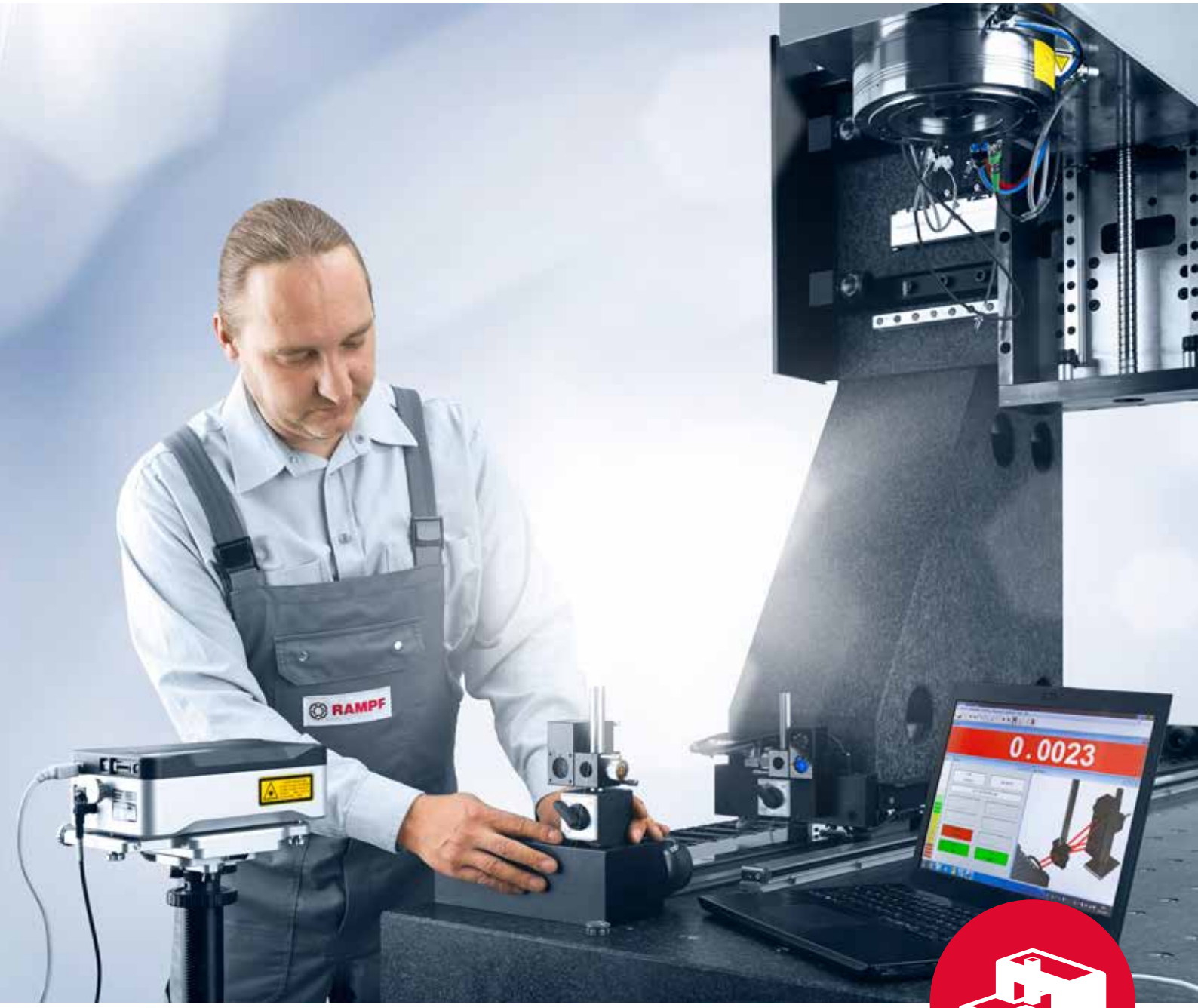
RAMPF
discover the future



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RAMPF MACHINE SYSTEMS

EPUSTONE

Machine beds made of natural hard stone

RAMPF #DiscoverTheFuture

Chemical and Engineering Solutions

Advanced Polymers | Composite Solutions | **Machine Systems** | Production Systems

RAMPF Machine Systems is a company of the international RAMPF Group.
Find out more on page 12.

RAMPF Machine Systems
Innovative solutions for highly dynamic production technology

We are the market-leading development partner and system supplier of complete machine beds and machine systems.

Our product portfolio encompasses
> System solutions, trunk and base machines, as well as multi-axis positioning and motion systems built on machine beds and frame components made from high-performance materials such as mineral casting, hard stone, and ultra-high-performance concrete
> Contract grinding of high-precision machine components

With this holistic approach, RAMPF Machine Systems serves as the ideal partner for the development and manufacture of pioneering machinery and production technology in a wide range of industries, including electronics, semiconductor, and solar module production, laser, woodworking and textile machines, measuring, testing, and inspection technology, as well as machine tool manufacturing.

Your industry | Your application

Customized, sustainable, and used worldwide in a wide range of applications

BATTERY PRODUCTION

DISPENSING TECHNOLOGY

GRAPHIC MACHINES

MEASURING AND TESTING STANDARDS

PICK & PLACE APPLICATIONS

MACHINE TOOLS

FLAT PANEL TECHNOLOGY

ELECTRONICS PRODUCTION

MEDICAL TECHNOLOGY

OPTICAL PRODUCTION

SOLAR MODUL PRODUCTION

LASER APPLICATION

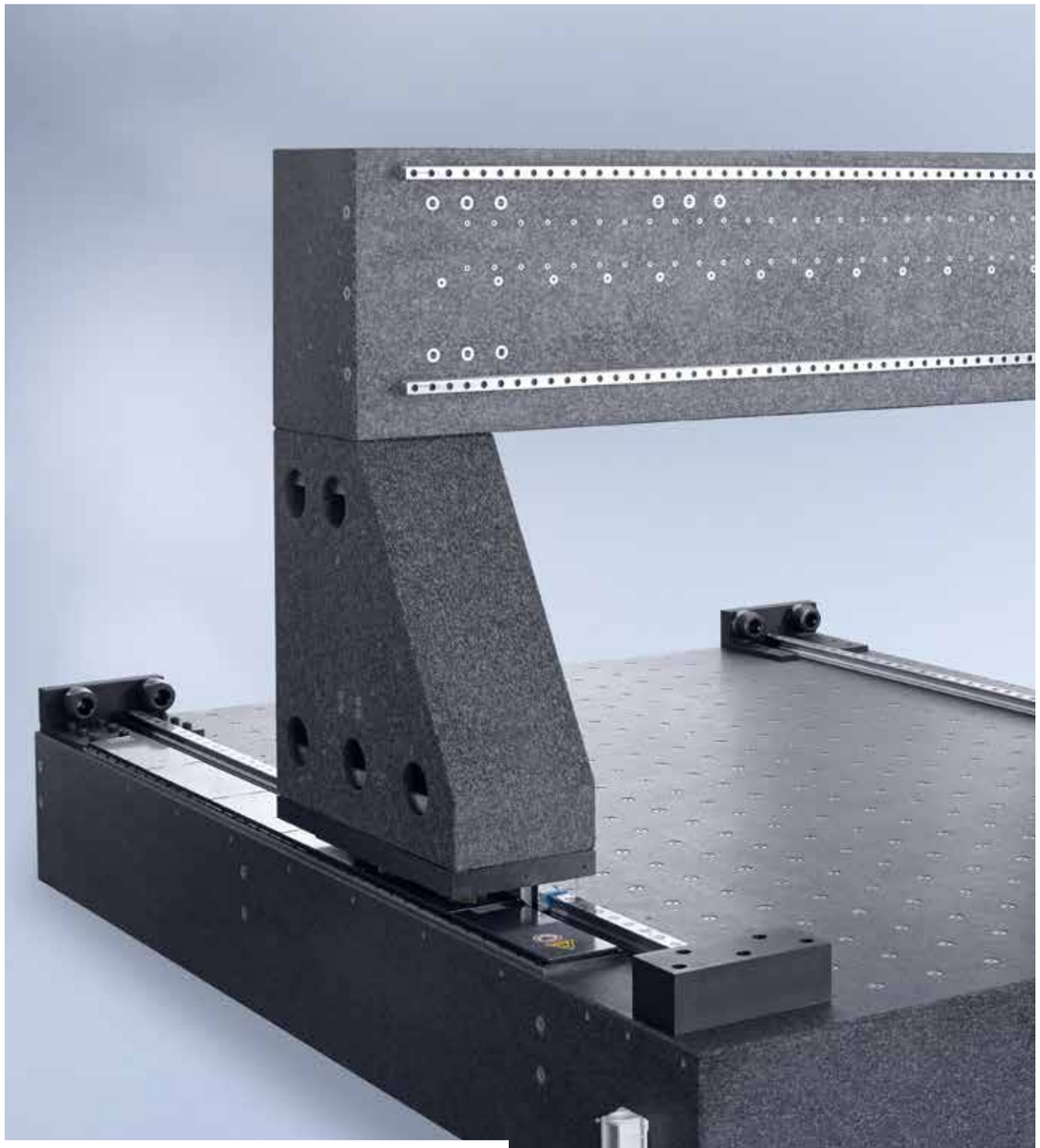
EPUSTONE as the basis for innovative laser applications including cutting, removing, coating, joining, scoring, testing, and marking

MEASURING, TESTING, & INSPECTION TECHNOLOGY

EPUSTONE for machine beds, stands, cross bars, and gantries in measuring, testing, and inspection technology

MICROPRODUCTION

EPUSTONE for components and base frames in machines for producing microsystems, miniaturized products, and functional microstructures



+ YOUR BENEFITS

- Hard stone is a virtually tension-free material as a result of the slow cooling process during its creation and its mellenia long aging process.
- In addition, hard stone :
  - > is non-magnetic
  - > does not conduct electricity
  - > does not rust
  - > does not form burrs
- Hard stone is ideal for guide systems employing pneumatic or oil bearings due to its extreme hardness (HV: 850–900), good abrasion resistance (8 cm^3/50 cm^2), and homogeneous surface.

EPUSTONE

Specific material selection

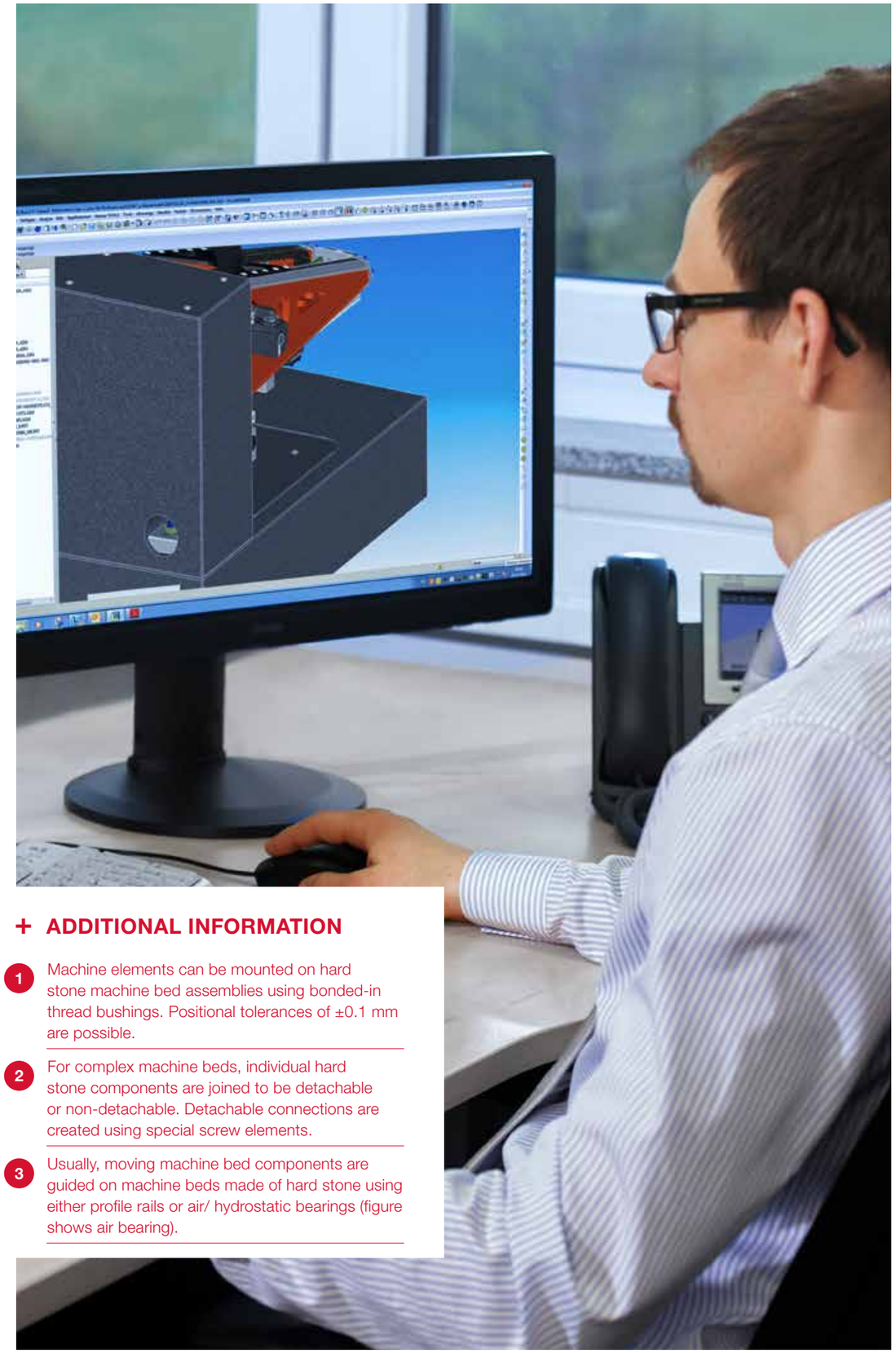
for high-performance machine beds and machine bed components subjected to dynamic loads

Industrially mined hard stone (commonly known as granite) has been used for several decades for measuring plates, straightness and angle standards, and machine bed components for measuring and high-precision production machinery. Hard stone is an isotropic, homogeneous material that follows Hooke's law and can be analyzed using linear-elastic FEM modeling. The high moduli of elasticity (up to a maximum of 90 kN/mm^2) and the very low coefficient of linear thermal expansion (as low as $5 \cdot 10^{-6}$ K^{-1}) are of particular interest for machine beds in mechanical engineering applications.

On the basis of its superior properties, hard stone has proved a reliable and stable machine bed material for applications in the micrometer range involving short production runs, customizations, and prototypes.

	IMPALA	BLACK GALAXY	JI NAN BLACK	TARN
Origin	South Africa	India	China	France
				
Density kg/dm³	2.90	2.90	3.00	2.60
Compressive strength N/mm²	300	190	250	180
Flexural strength N/mm²	20	19	26	24
Modulus of elasticity kN/mm²	90	44	70	46
Thermal expansion 10^{-6} K^{-1}	6.5	6.0	5.0	6.0

Technical values for various types of hard stone for machine bed components in mechanical engineering



EPUSTONE

Engineering, design, modeling

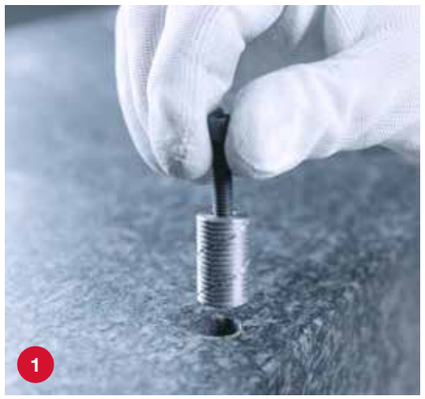
for material-specific and cost-conscious design of hard stone machine beds

The initial shapes of hard stone machine bed components are cuboids or cubes. Each functional space and each weight reduction needs to be machined out. For economic reasons, thin-walled, ribbed, and complex designs that deviate from the cube shape are best avoided.

Due to the specific properties of hard stone, a number of factors are key to the quality and durability of products made using this material. These include engineering the design to accommodate compressive loading, taking into account the flow of forces, and selecting the optimum cross-sections.

+ ADDITIONAL INFORMATION

1. Machine elements can be mounted on hard stone machine bed assemblies using bonded-in thread bushings. Positional tolerances of ±0.1 mm are possible.
2. For complex machine beds, individual hard stone components are joined to be detachable or non-detachable. Detachable connections are created using special screw elements.
3. Usually, moving machine bed components are guided on machine beds made of hard stone using either profile rails or air/ hydrostatic bearings (figure shows air bearing).



+ ADDITIONAL INFORMATION

1. Grinding of a hard stone plate using cutting-edge flat and guideway grinding equipment – for workpieces up to a size of 7,000 x 2,650 x 2,000 mm (L x W x H) and a weight of 25,000 kg
2. Hand-lapping of a hard stone gantry with high-precision requirements
3. Precision assembly of complete and complex machine systems of hard stone
4. Documented precision – measurement in fully climate-controlled inspection facilities using calibrated equipment including laser interferometers, autocollimators, and electronic inclination balances

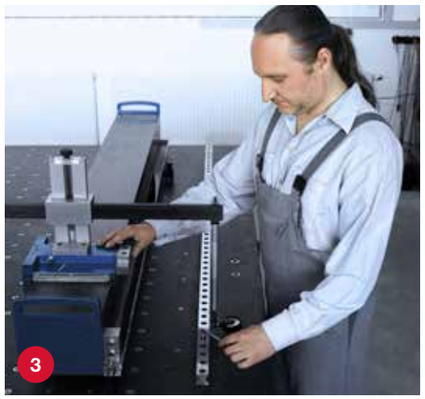
EPUSTONE

Production and precision

machine beds and systems in climate-controlled production and assembly halls

After mining, the hard stone blocks are cut into prismatic structures, and continuous grooves and recesses and two-dimensional contours are carved. Boreholes and recesses for transportation and reducing weight, as welll as for fastening and connecting elements such as thread bushings, clamping pins, and T-slot rails are produced at state-of-the-art milling and drilling centers.

Special grinding and hand-lapping processes, screwing, and bonding are used to produce complex, high-precision machine beds, moving systems, and basic machinery.



We are inventors. Team players. And a strong partner.

RAMPF stands for pioneering chemical solutions and visionary engineering. Worldwide.

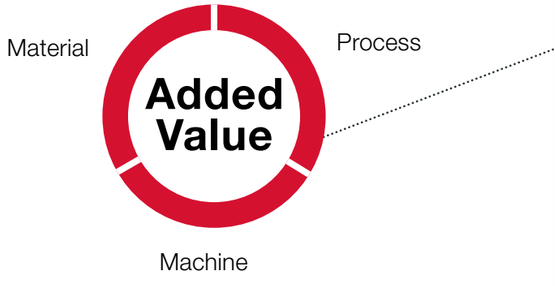
From a one-man operation to an international group with twelve sites spread across three continents – with our products and solutions centered around reactive resins, machine systems, and lightweight construction with composites, we rank among the market leaders in a whole host of industries.

Discover the future – this is both our corporate slogan and the foundation of our long-standing success story. In close cooperation with our customers and partners, we develop tomorrow's products and solutions today – for the decisive competitive advantage.

Sustainability has been a priority right from the outset. This is no mere buzzword but an integral part of our day-to-day activities. As pioneers of chemical recycling, we have been contributing to an effective circular economy for decades. The raw materials that we recycle are used both by our customers and within our Group.

We are also a sustainable employer. RAMPF grows with its employees – we invest in our staff and are keen for them to work with us in the long term. We achieve this by openly showing appreciation and offering extensive training and development opportunities.

A forward-looking, sustainable, and value-creating family-run business – as a partner to industry and as an employer, we attach the greatest of importance to trust and reliability. These qualities are an absolute must when it comes to establishing long-term, successful partnerships.



RAMPF – Chemical and Engineering Solutions. Utilize our wide-ranging innovative potential for Added.Value.

RAMPF –
discover the future

Developing the Solutions
of Tomorrow – Today.

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Mass production?
Not at RAMPF.

**We engineer
made-to-order solutions.**

www.rampf-group.com

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