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Thermoplastic engineering and high-performance plastics from Ensinger are used in almost every important sector of industry today. Their economic efficiency and performance benefits have seen them frequently supplant classically used materials.

www.ensinger-online.com

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Ensinger

Engineering plastics

Facts and figures

Headquarters
Nufringen, Germany

Workforce
approx. 1,800

Year founded
1966

Production sites in Germany
3

Locations and branches worldwide
25

Managing Directors
Klaus Ensinger, Dr. Roland Reber

Products
- → Compounds
- → Stock shapes (extruded, cast, sintered)
- → Profiles
- → Finished parts (machined, injection moulded)
- → Custom castings (direct formed, cast polyamide)

Applications in the sectors
- → Mechanical and plant engineering
- → Construction industry
- → Automotive engineering
- → Medical technology
- → Aerospace industry
- → Oil and gas industry
- → Electrical and semiconductor engineering
- → and many other sectors of industry

We are fascinated by engineering plastics. We work day to day in our locations across Europe, the USA, South America and Asia to ensure the successful application of these modern materials.

Whether compounds, stock shapes, profiles or finished parts – Ensinger products play an essential role in ensuring more efficient and consequently more competitive applications for our customers. We achieve this through critical scrutiny and by keeping a close ear to the ground – because it is only with a thorough understanding of problem issues that solutions can be developed which really address market needs.

Pacemakers for innovation

New and improved materials provide a vital driving force for technological progress. Plastics have a whole array of benefits to offer and in many cases can effectively replace materials or ceramics. And what's more: They often provide the only alternative when it comes to the implementation of unusual technical applications. Which makes them a true pacemaker for innovation.

We process a comprehensive range of plastics and modifications to produce our compounds, stock shapes, precision profiles and finished parts. Our work focuses particularly on temperature-resistant high-performance and engineering plastics.

High-performance plastics

The success achieved by high-performance plastics is based on a combination of material benefits which are brought to bear even at raised temperature levels. These include, in particular, good mechanical properties supported by extreme chemical resistance. The long-term service temperatures achieved by materials such as PEEK, PPS and PSU are between 160 and 260 °C. Polyimides will not melt or soften even when heated briefly to as high as 350 °C.

Other important benefits include radiation resistance, excellent fire resistance and good electrical properties. Using special additives, thermal dimensional stability and rigidity can be enhanced, tribology improved, or electrical conductivity adjusted.

Engineering plastics

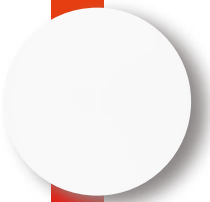
Engineering plastics can be used continuously at temperatures between 100 °C and 150 °C. Polyamides (PA), polyacetals (POM) and polyethylenterephthalates (PET) which also belong to this group are referred to as technical thermoplastics. These materials demonstrate good mechanical characteristics and a high degree of chemical and wear resistance. They also offer easy machining properties.

Standard plastics

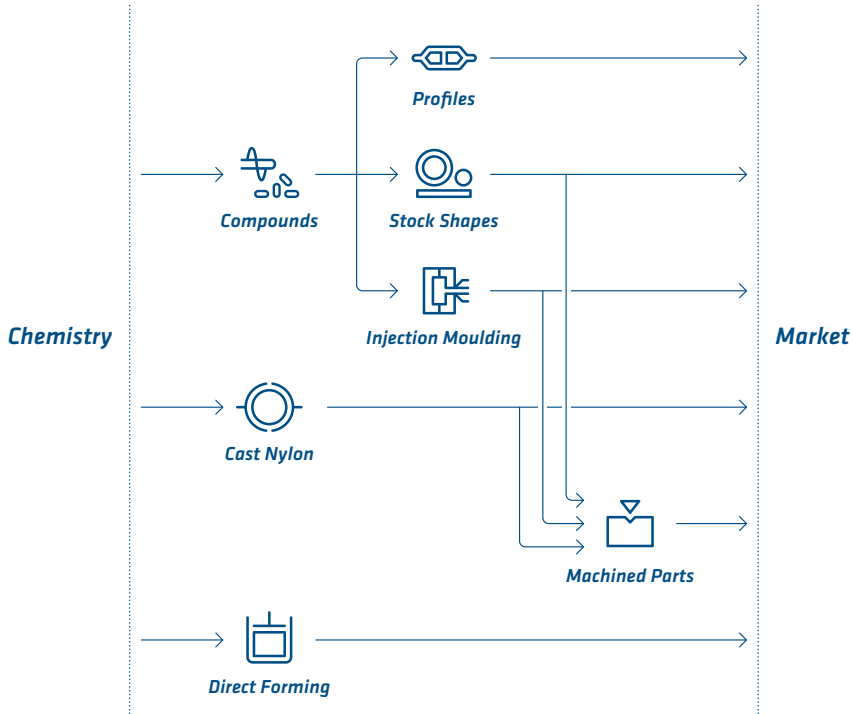
This category includes polyolefines such as PMP, PP and PE. These materials offer an ideal characteristic profile for a wide range of standard requirements in the temperature range up to 100 °C.

TECASINT
Polyimid (PI)

TECAPEEK
Polyetheretherketon (PEEK)



TECAMID
Polyamid (PA6, PA66)



From compounding through to application
Our value chain is tailored to the demands of the market.

TECAFORM
Polyacetal (POM-C, POM-H)

Application advice
Service excellence starts with comprehensive technical support. Precisely aligned to your requirement profile, our experts will find the most suitable material and the right production technology for your needs.

Distribution network
An efficient system of stock management ensures that our branches and trading partners receive all their deliveries – whether extremely high quantities or special one-off supplies – within the shortest possible delay or else "just in time". Which gives you the assurance that you can plan safely and be sure of receiving your plastics just when you need them.

Order and delivery service
The stock shapes division is also expanding its internet-based service on the Ensinger website. Convenient calculation and purchase order tools can be accessed to maximize the ease and speed of order placement.

A solid foundation for quality products

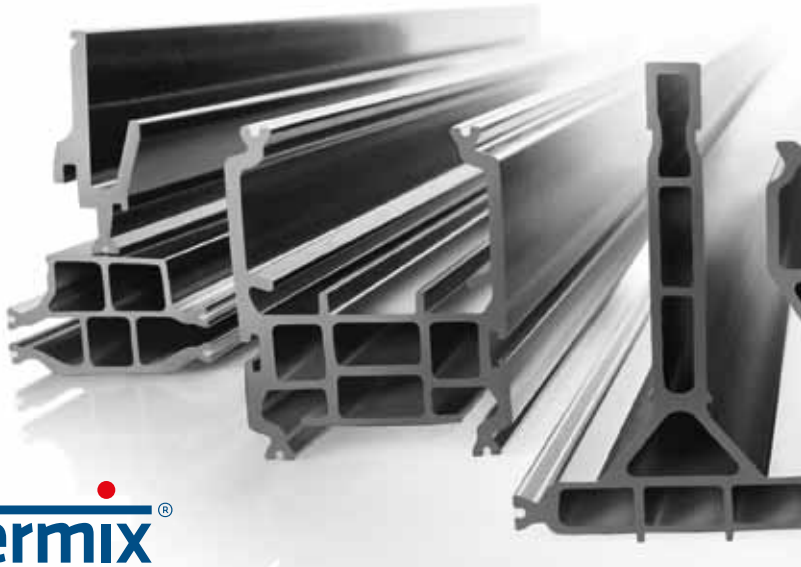
Stock shapes made of engineering plastics form the basis for a wide range of new uses. The application scope is extensive and customer requirements are varied. Ensinger offers extruded round rods, sheets and tubes in a wide range of dimensions and colours.

We keep a permanent stock of popularly used high-temperature and engineering plastics always on hand in our European warehouse in Nufringen. We also manufacture semi-finished products specifically to customer order. Where existing materials do not match the requirement profile, our compounders and process technicians work in close co-operation with customers to develop new formulations.

Our stock shapes are cut and machined to individual customer order with close tolerances guaranteed. Finished part manufacturers who require only minimal quantities of stock shapes for a small production run or to produce a prototype derive just as much benefit from our cutting and surface machining services as do large-scale buyers. By planing, grinding and contour planing we are able to achieve wide-ranging high-precision solutions.

And our customers may rest easy in the assurance of compliance with stringent quality standards every time. Strict guidelines and the deployment of a skilled workforce safeguard the individual process steps from incoming raw materials right through to the finished product.

Perfect insulation for frames and glazing



insulbar®

insulbar® insulation profiles for metal windows, metal doors and facades

Ensinger is one of the world's leading developers and producers of thermal insulation profiles for windows, doors and facades. insulbar® profiles achieve thermal separation of the inner and outer shells of metal frames.

More than almost any other Ensinger product, insulbar® stands for sustainability. And has done so for over thirty years. The profiles improve insulation and make a major contribution toward maintaining an optimum room climate. The positive environmental impact is not just down to the marked reduction in energy costs, but also the extreme durability of our profiles, which will survive the complete life cycle of windows and facades. This saves resources in production and minimizes maintenance costs.

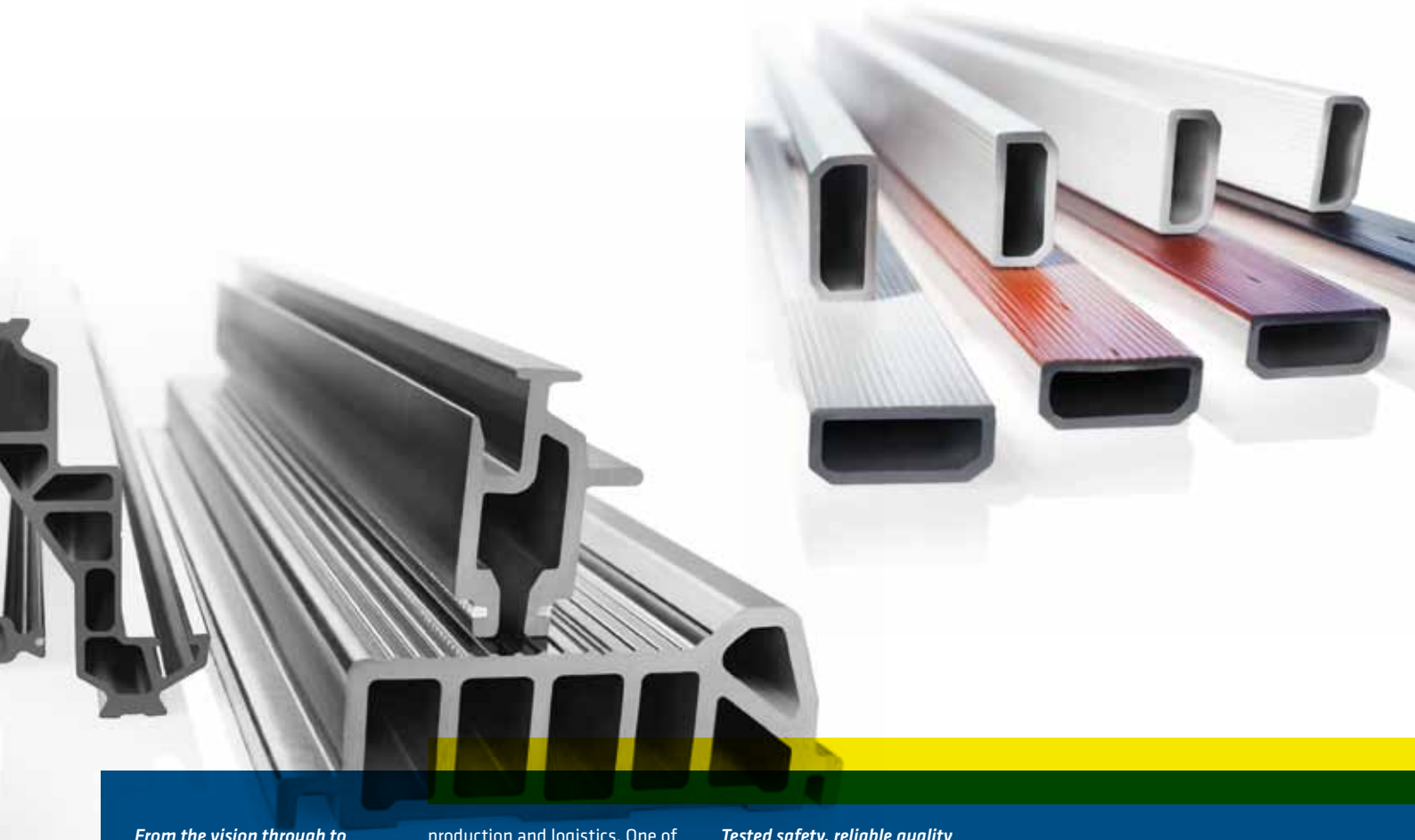
Thermix®

Thermix® TX.N® spacers and Thermix® muntin bars for double glazing

The product range Thermix® TX.N® is the culmination of over 15 years spent in the development, production and application of spacers and over 40 years of experience in high-performance plastics. Thermix® “warm edge” spacers bridge the thermal gap which occurs at the transition from glass to frame. By preventing condensation and mildew at the glass edge, Thermix® makes a major contribution to a healthy room climate. Windows stay dry.

Thermix® muntin bars lend the optical impression of a conventional muntin window with glazing bars. The integrated bar profiles correspond in terms of both their design and function with the Thermix® TX.N® spacers and are not in direct contact with the glass surface. Configured as rectangular hollow chamber profiles, Thermix® muntin bars are far easier to process than any duplex solution using spacer profiles.

As well as offering added convenience, our spacers also pay dividends in terms of saved energy costs. The use of Thermix® TX.N® also reduces the necessary energy required for air conditioning in summer.



From the vision through to application: 360° support
Each individual aspect of any project is part of a greater whole and can be decisive to success. No matter whether customers opt for a profile from the standard range or require a bespoke new development. Our specialists will be there to guide you through every step of the way: from advice on the most suitable materials, to development and design through to production and logistics. One of the methods used in developing the perfect insulbar® design is finite element calculation to determine thermal transmission coefficients precisely in line with individual customer specifications. High process transparency and efficiency lay the foundation for optimum control of this project.

Tested safety, reliable quality
Before any components under development are used, they are subjected to stringent testing and controls. Only products which have proven their quality in practical application are admitted into the standard range. Ongoing, state-of-the-art testing and inspection methods – also in the form of in-process testing – provide the assurance that our customers will receive precisely the product they envisage.

Precision for small production runs

Machining is the fastest, most economical way to create a finished plastic component. Particularly when it comes to small production runs. In this field, Ensinger can provide a complete production service for your precision components, systems and assemblies.

The company is able to draw on decades of experience in the machining of engineering and high-temperature plastics. In our Cham location, our highly skilled engineers produce precision components to the very narrowest tolerances. The Sales Department assumes an important service function, providing customers with advice and support – also on their own premises – in the selection of suitable materials and the design of finished parts.

The technological facilities include CNC milling machines (5-axis machining centres), lathes with sub-spindles, driven tooling and a cleanroom. For processing high-grade finished parts, tempering ovens are available in our factory which lend the material an even, stress-relieved structure.

In-process records, documentation and batch traceability are essential pillars of our quality assurance system. For projects in the medical technology and pharmaceutical fields, we also perform biocompatibility tests. In addition to standard audits, our operations are regularly audited by our customers.

Quality assurance in the machined finished parts division. Working in the background: Alois Haimerl, co-ordinate measurement technician

Efficiency and security

Our state-of-the-art injection moulding plant in Rottenburg-Ergenzingen produces sophisticated precision components and complete assemblies using our entire range of high-performance plastics and individually tailored filled compounds.

From the initial idea through to the volume production stage, the individual requirements of our customers form the focus of all our actions. Our engineers offer you their support in the selection of materials and offer a precisely tailored, economical solution – no matter what the application.

Using an optimized material flow concept, the injection moulding factory is ideally designed for the efficient volume production of precision components.

Above and beyond certification to DIN EN ISO 9001, we are also geared to various sector-specific requirements. Our processes are designed in line with the automotive standard ISO / TS 16949 and the standard governing medical devices DIN EN ISO 13485, as well as the requirements imposed by the aerospace industry. We confirm our adherence to these standards by internal and external audits and strive to continuously further improve our work procedures.

Because the components we produce are frequently required to guarantee elementary and safety-relevant functions, we impose the most stringent requirements in terms of quality and use automated test methods such as industrial image processing. Zero defects production is the benchmark we aspire to.

Formulations for success

Ensinger develops and produces high-performance compounds which can be optimized in line with specific customer requirements with the aid of fillers and additives.

The new building completed in 2009 in the company's Nufringen location is home to one of Europe's most modern and flexible compounding operations. Whether individual formulations for customer developments or tried and tested granulates from our standard range, whether materials for small production runs or mass manufacture – at Ensinger everything comes from a single reliable source, whether products with improved sliding friction values, materials with defined electrical properties or compounds used in medical applications. A cleanroom is available for the production of materials which are required to comply with special requirements.

A high profile the world over

Experienced in the extrusion of thermoplastics for more than 40 years, the Industrial Profiles and Tubes division carries out projects and case studies in co-operation with customers.

To meet customers' requirements the technology of profile and pipe extrusion, as well as co-extrusion of different thermoplastics, can be completed by inline or offline processes such as printing and knurling, winding or cutting to size, thermoforming and welding, annealing and conditioning. Our technology, expertise and more than 20 different thermoplastics modified by reinforcement, wear and friction reducing additives and colour pigments were essential for many successful applications and case studies for medical equipment, control engineering, the aircraft industry, electronics, and engineering.

Format for large-scale assignments

Pressureless custom casting has proven a particularly successful method for the production of bulky thick-walled components. Polyamide finished parts and stock shapes manufactured at the Cham location comply with extreme loading, reliability and safety requirements even under the most extreme conditions.

The TECARIM casting process permits sophisticated custom castings with different wall thicknesses. The stress-relieved semi-finished product TECAST offers excellent machining properties. Heavy-duty applications such as pulleys, sliding elements and support plates for elevators, cable cars and cranes benefit from the particular strengths of these materials: Abrasion resistance, light weight and corrosion resistance.

Withstanding high levels of stress

The high-temperature polyamides of the TECASINT range are the ideal materials to cope with tough application conditions. The broad temperature application spectrum of these sintered materials ranges from –270 °C to 300 °C. The materials will not melt, even if exposed to temperatures of 350 °C for short periods. Strength, dimensional stability and creep strength remain high under mechanical stress even during long-term usage.

These pressed or machined finished parts and semi-finished products offer a high modulus and exceptional long-term thermal stability. Other benefits of our polyimides include a high level of purity and low outgassing, as well as excellent tribological properties even in dry running applications.

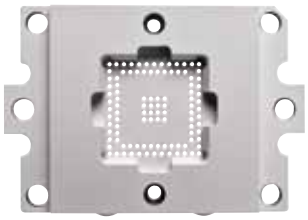
Christian Rückerl,
plant and machine operator,
Cast Nylon division

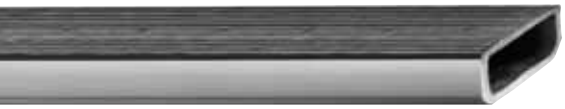
Pioneering solutions

Over the years, Ensinger has gradually opened up exciting new fields of application for engineering plastics which were formerly reserved to metals and ceramics. Our products are now used not only in car clutches, gearboxes and engine block covers: Many of the bearings, bushes, levers and gears used in modern machine engineering are also made from high-performance plastics. Materials from Ensinger also help to enhance the speed and safety of food production and packaging. Even in medical and dental technology, polymers are encroaching on many of the applications formerly performed by metals. Lightweight instrument handles made of sterilizable plastics are only one example of many surgical applications which now make use of Ensinger products.

In addition, plastics are proving highly successful for use in X-ray machines, computer and NMR tomography, blood analysis equipment and other imaging techniques due to their transparency and resistance to electromagnetic waves.

The use of renewable energy sources is also not possible without innovative materials. High-performance plastics are gaining increasingly in significance in applications to improve the efficiency of existing solutions. In the field of energy saving, probably the most important means of saving precious resources, Ensinger has for decades made a vital contribution through the development and manufacture of thermal insulating profiles and spacers used in double glazing.





Thermix® TX.N® spacers

- Higher surface temperatures on room-side glass edge ("warm edge")
- Environmental protection: Lower heat losses mean reduced CO_2 emissions
- For all popular insulating glass products

insulbar® insulation profiles

- Comprehensive standard range
- High precision and narrow tolerances guarantee reliable handling during assembly
- Good thermal insulating properties

Mechanical engineering

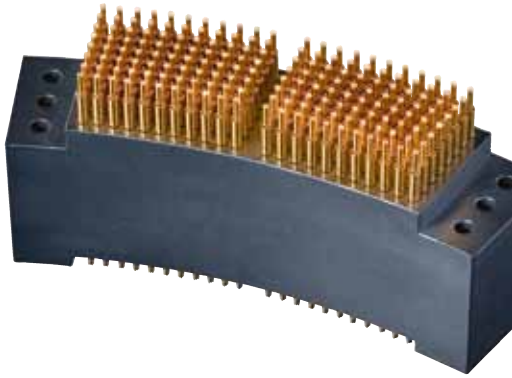
Thermal stability, resistance to chemicals and dimensional stability are only some of the properties which are vital to the field of mechanical and plant engineering. Ensinger offers a wide portfolio of tribologically optimized materials to address extreme wear resistance demands. These sliding friction-modified plastics are ideally suited for use in dry running applications under extreme conditions.

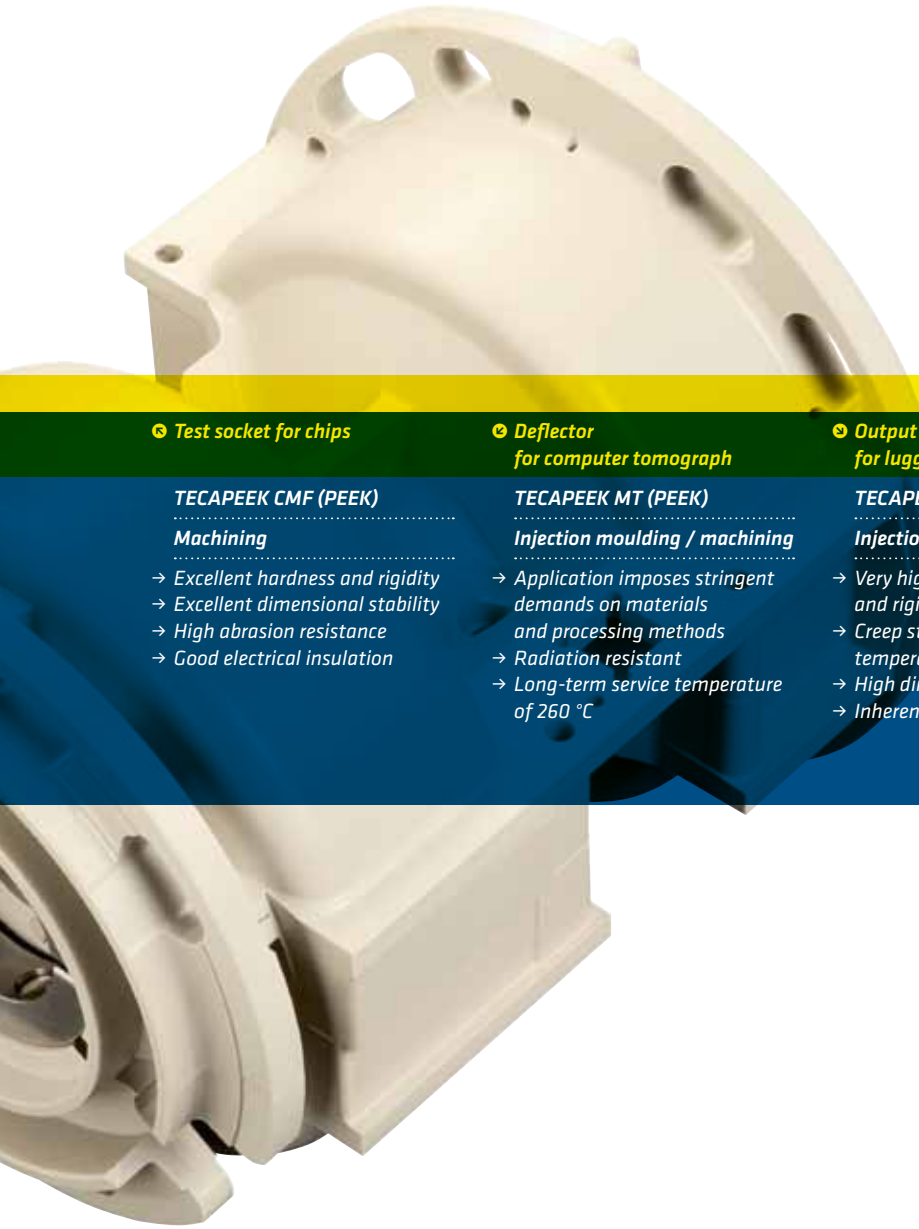
Construction industry

insulbar® thermal insulation profiles for metal windows, metal doors and facades ensure highly efficient insulation. Thermix® spacers sever the thermal bridge which occurs at the transition from glass to frame in windows and facades.

Medicine / pharmaceuticals

High-performance plastics from Ensinger are produced from raw materials conforming to stringent FDA requirements, and are additionally tested in their semi-finished state for biocompatibility to ISO 10993 at regular intervals. Plastics complying to the biocompatibility requirements of USP Class VI are also available. The demands made on quality, product documentation and product approvals are particularly stringent in the field of medical technology. Ensinger is certified in compliance with DIN EN ISO 13485. For our customers, using pre-tested materials simplifies the process of obtaining approvals for their own medical technology products. By ensuring consistent documentation of individual process steps, seamless product traceability is assured at Ensinger.





Test socket for chips

TECAPEEK CMF (PEEK)

Machining

- Excellent hardness and rigidity
- Excellent dimensional stability
- High abrasion resistance
- Good electrical insulation

Deflector for computer tomograph

TECAPEEK MT (PEEK)

Injection moulding / machining

- Application imposes stringent demands on materials and processing methods
- Radiation resistant
- Long-term service temperature of 260 °C

Output pulley for luggage compartment

TECAPEI GF 30 mod (PEI)

Injection moulding

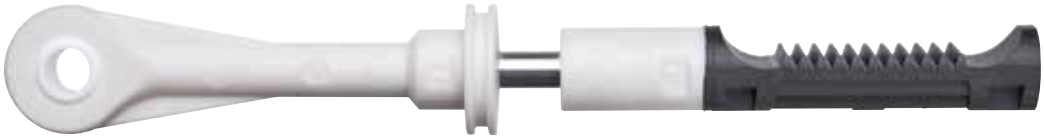
- Very high mechanical strength and rigidity
- Creep strength over a wide temperature range
- High dimensional stability
- Inherently flame resistant

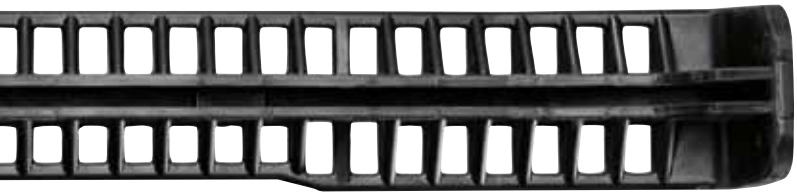
Snap contact (test adapter)

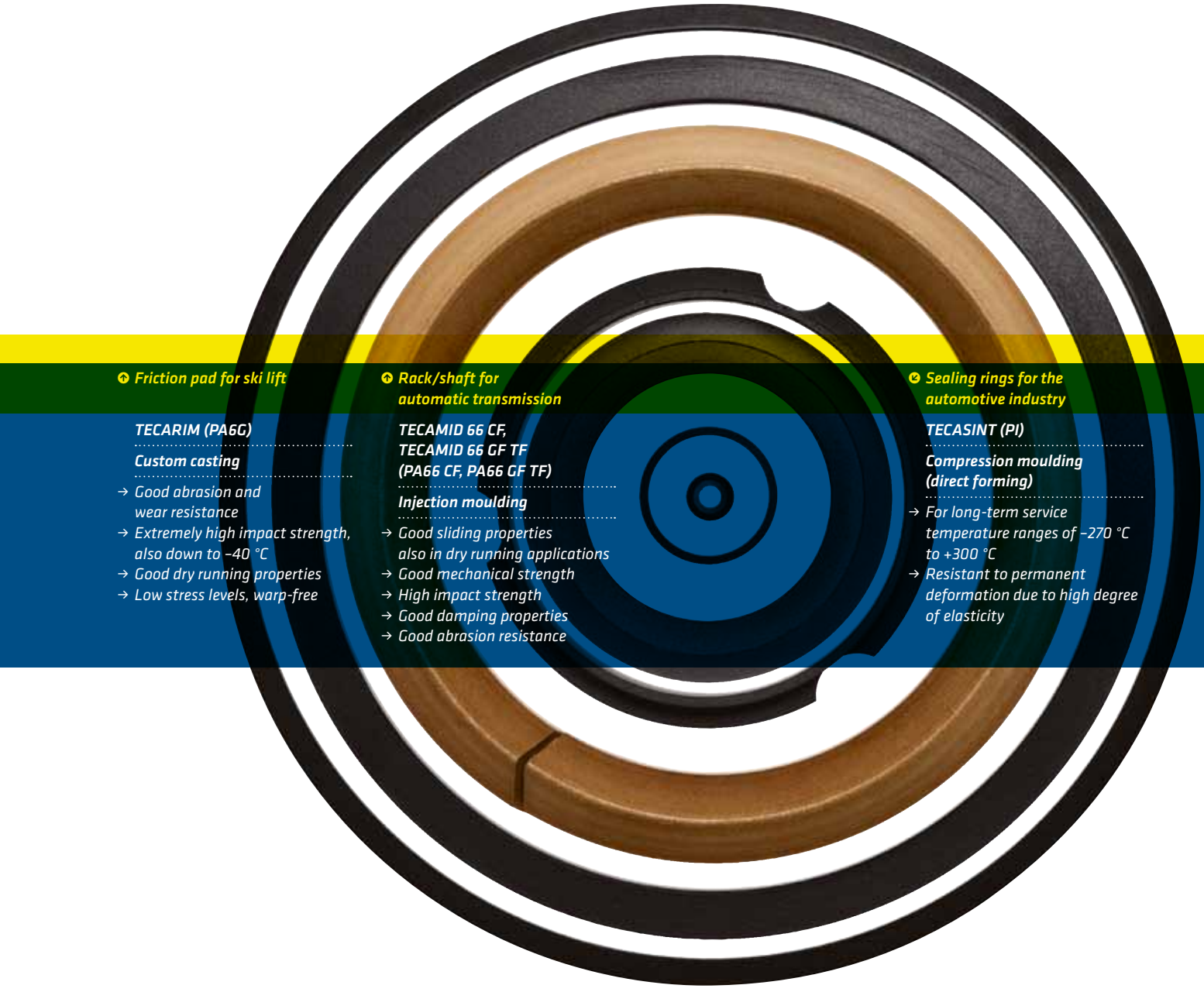
TECATRON GF 40 (PPS)

Machining

- Fibre-reinforced plastic
- 176 boreholes, narrow tolerances
- Excellent electrical properties
- Extremely abrasion resistant
- High chemical resistance







Friction pad for ski lift

TECARIM (PA6G)

Custom casting

- → *Good abrasion and wear resistance*
- → *Extremely high impact strength, also down to –40 °C*
- → *Good dry running properties*
- → *Low stress levels, warp-free*

Rack/shaft for automatic transmission

TECAMID 66 CF, TECAMID 66 GF TF (PA66 CF, PA66 GF TF)

Injection moulding

- → *Good sliding properties also in dry running applications*
- → *Good mechanical strength*
- → *High impact strength*
- → *Good damping properties*
- → *Good abrasion resistance*

Sealing rings for the automotive industry

TECASINT (PI)

Compression moulding (direct forming)

- → *For long-term service temperature ranges of –270 °C to +300 °C*
- → *Resistant to permanent deformation due to high degree of elasticity*

Automotive engineering

Ensinger offers low-wear plastics for use in the automotive engineering industry which are temperature, fuel and oil-resistant and also comply with the stringent production and volume requirements imposed by the industry in compliance with VDA standards.

Our core expertise includes the production of between just a few hundred to several million precision components using single or multiple component injection moulding. The production processes we use comply with automotive standard ISO / TS 16949 and in the majority of cases are fully automated.

Aerospace

Weight saving, high efficiency and no-compromise reliability: These are the decisive factors when it comes to plastics for the aerospace industry. Providing an ideal alternative to metals and glass, high-performance plastics from Ensinger have some impressive properties to offer: Minimal density coupled with high thermal and mechanical loading capacity, corrosion resistance and self-extinguishing properties.

Electronics

Whether high precision, extremes of temperature, electrical insulation, static proofing or defined electrical conductivity: Ensinger supplies the electronics industry with materials to comply with the most demanding applications, hand in hand with effective volume production methods such as injection moulding.

Semi-conductor technology

Many of the process steps involved in semiconductor production call for handling components made of qualified materials. Before any plastic can be approved for cleanroom production, it must comply with stringent demands within the framework of suitability tests. Vital to the successful application of our materials in this sector are their low weight, chemical resistance, good dimensional stability, minimal outgassing and high material purity.

Deflecting pulleys for lifts

TECAST mod. (PA6G)

Custom casting

- → *7× lighter than pulleys made from grey cast iron*
- → *Lower centrifugal mass reduces the inertia of the complete installation*
- → *Resistant to corrosion*
- → *Rope service life is increased due to low modulus of elasticity*

GPS transducer (position sensor)

TECATRON GF 40 (PPS)

Extrusion (industrial profile)

- → *Low coefficient of thermal expansion*
- → *Very high strength and rigidity*
- → *High thermal stability*
- → *Excellent electrical properties*
- → *Low water absorption*

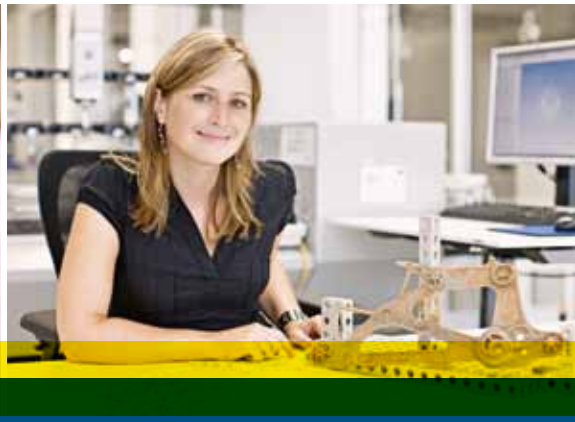
from left to right:

Hans-Martin König,
Project Management,
Injection Moulding

Nina Finkbeiner,
Product Management
(High-performance
plastics), Stock Shapes
and Stefan Maag,
Head of Internal Sales
Germany, Stock Shapes

Milena Müller,
Quality Assurance
(Series measurements),
Injection Moulding

Ask. Think. Succeed.



Technically sophisticated bespoke solutions are not something you can simply take off a shelf. It is only by gaining a thorough initial understanding of the terms of reference, the application conditions and the requirements imposed on a precision plastic component that it is possible to develop a suitable suggestion.

Tuned precisely to your complete requirement profile, our consultant engineers will find the most suitable material and the right production technology for your needs. The flexibility of these high grade materials is matched by the individual attention given by our specialists to the needs and preferences of our customers. Addressing their needs is both a commitment and a challenge. With our wide-ranging portfolio of products, production techniques, materials and services, it is a challenge we are ideally equipped to face.

We are also committed to providing comprehensive product compliance management. National and international statutory requirements create the framework for defining the physiological harmlessness and environmental compatibility of materials. Adherence to legal stipulations and material purity are of extreme importance when it comes to applications such as medical technology, food processing and drinking water contact. Our experts provide the information that customers need to ensure reliable approval of their end products.

Innovation born of continuity

We encourage our workforce to move away from well-trodden thought paths and to think outside the box. We welcome lateral thinkers, who often succeed in making the apparently impossible possible. Their independent initiative is an essential aspect of our ability to fulfil the wide-ranging demands of our customers.

But a sharp eye is essential to ensure the efficiency of internal procedures too. Here, we rely not only on the services of external auditors: Our own employees continuously monitor and optimize processes in the producing divisions and offices within the framework of the Ensinger continual improvement tool (EVI) for optimum productivity and quality assurance.

Impressive new developments are often an accumulation of countless minor improvements. But they certainly do not happen by chance. Behind every successfully implemented new development is a team of experts who can call on long years of experience combined with a lively sense of curiosity. We create the basis for this solid bedrock of expertise with our training program for the up-and-coming generation of young employees entering the company.

from left to right:

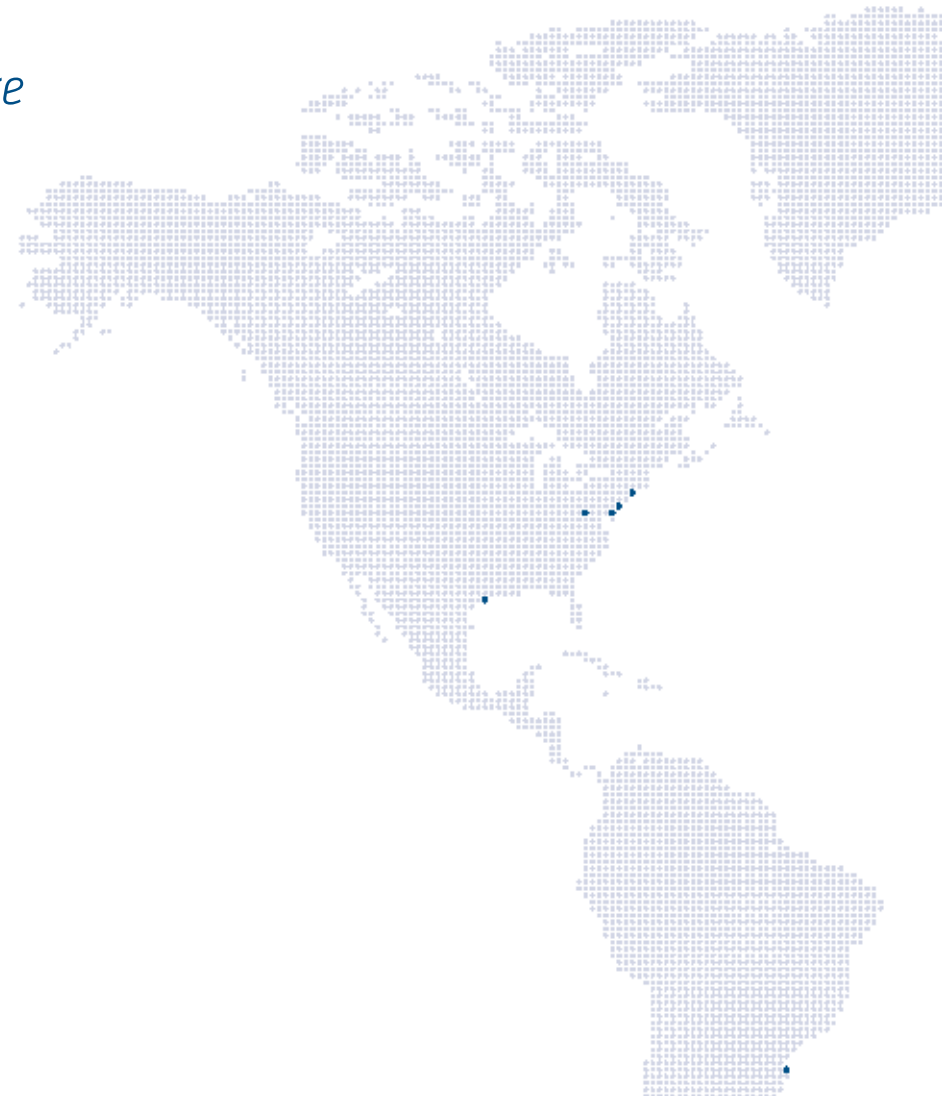
Klaus Pascher,
Sales Manager,
Machined Parts

Anika Harbord,
Development Engineer,
Compounds

Sven Pflumm,
Design Engineer,
Injection Moulding

Jürgen Haase,
Shift Leader, Extrusion
and Diogenis Vavulidis,
Extrusion Operator,
Stock Shapes

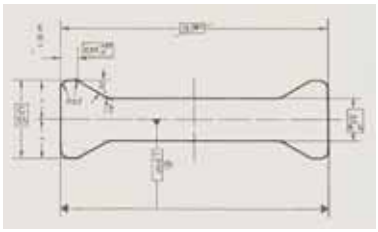
Born of tradition with an eye to the future



Wilfried Ensinger launches the production of quality semi-finished products in a garage near Böblingen.

1966

After three years of research and development, Ensinger produces its first thermal insulation profiles for window and facade construction.

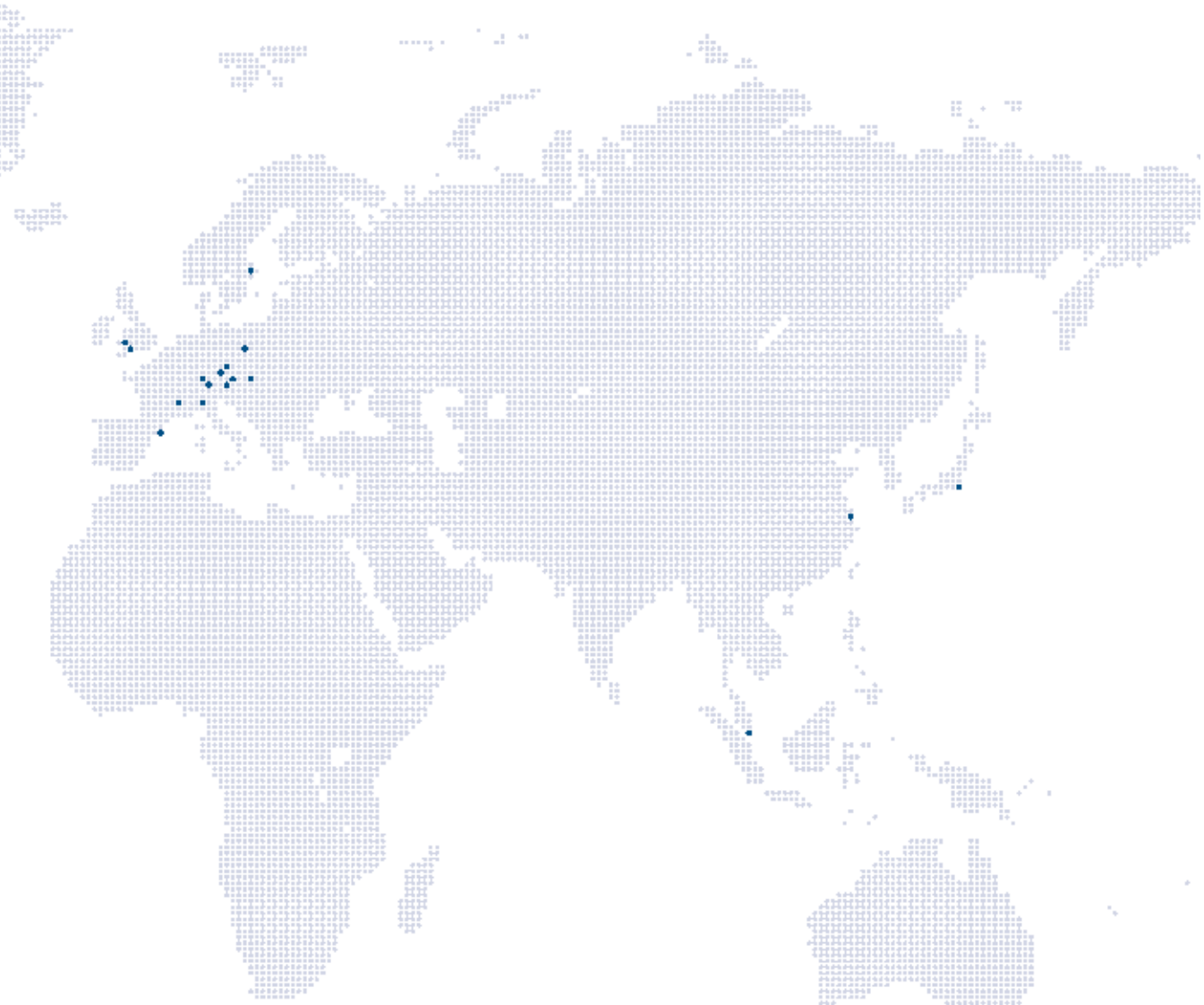


1977

A branch plant is opened in Cham. In 1986, Ensinger establishes its first foreign subsidiary in the USA (photo).

1980

The milestones which have marked the development of the Ensinger Group tell the story of a family firm which has never been content to rest on its laurels. The continuous further development of products and production processes and the encouragement of employee potential have been essential aspects of our corporate mission since the very early days.



The company makes available machined materials for the growing Asian market from its base in Shanghai.

2007

Ensinger establishes a new injection moulding factory in Rottenburg-Ergenzingen.

2009

Another new building in Nufringen extends the company's production and storage capacity.

1987

Europe-wide expansion of semi-finished product sales is launched with the formation of Ensinger Limited in Wales.

2008

A new profile factory is constructed in Cham with added production space and a high-bay warehouse.

Klaus Ensinger leads the company in the second generation. Since 2002 in association with Dr. Roland Reber.