Ensinger

High-Performance Plastic Solutions in the Hydrogen Industry

AR

Interactive Elements

This brochure contains content that is displayed using AR (Augmented Reality) and QR codes. In this guide we explain how to use the different functions.

If you have a printed version of our brochure, take your smartphone or tablet, open the camera and hold it over the QR code. The camera will scan the code and take you to more information on our website. In the digital version of our brochure, simply click on the QR code to go to the linked page.

This icon indicates the availability of a video. Click on the QR code to open the video on your device.

This icon indicates the availability of an augmented reality (AR) application. Use the adjacent QR code to experience the application in your environment!

About Ensinger

Ensinger GmbH stands for modern, innovative high-performance plastics. As a family-owned company with around 2,700 employees at 34 locations worldwide, we have been working on the continuous further development and improvement of our products and services in the field of high-performance plastics since 1966. These consistent efforts, new applications and strategic internationalization have secured us a place in the front rank of the plastics industry.

Business Segments

The spectrum of thermoplastic polymers processed ranges from engineering plastics to the class of particularly temperature-resistant high-performance plastics. The products are used in a wide range of industrial sectors, including mechanical engineering, the automotive and aerospace industries, medical technology, the food industry, and electrical and semiconductor technology.

Materials for Every Purpose

In our portfolio you will find standard, engineering and high-temperature plastics with suitable property profiles for a wide range of applications:

Standard Plastics

This category includes polyolefins such as PMP, PP and PE. These materials offer the right property profile for many standard requirements in the temperature range up to 100 °C.

Engineering Plastics

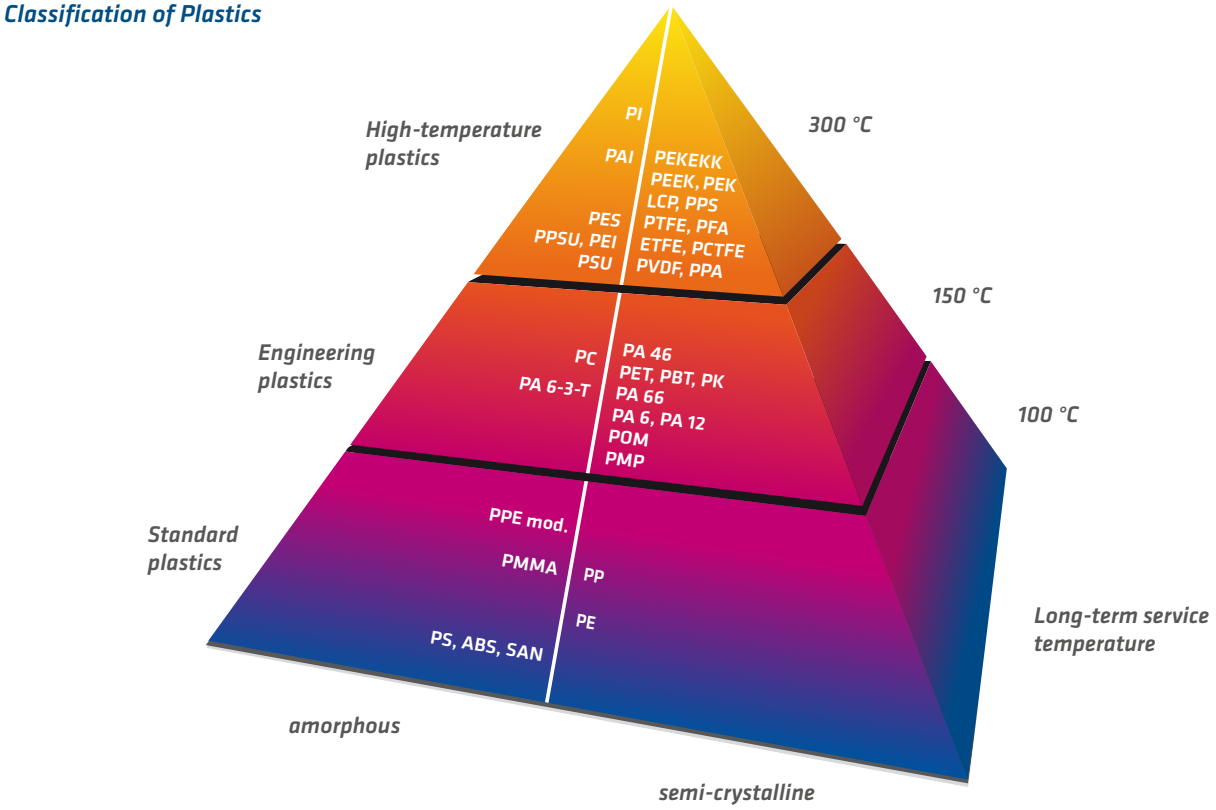
Engineering plastics can be used permanently at temperatures up to 100 °C or 150 °C. The polyamides (PA), polyacetals (POM) and polyesters (PET, PC) belonging to this product group are also known as engineering thermoplastics. The materials have good mechanical properties and high resistance to chemicals and wear. Through material combinations and modifications, the product characteristics can be optimized over a broad range for different applications. Engineering plastics thus cover a spectrum of properties.

As the class designation already indicates, engineering plastics, which can be machined without difficulty, are frequently used to construct technical parts for applications in the automotive, mechanical engineering, apparatus engineering, electronics and electrical engineering sectors, as well as in the food, transport or household appliance sectors.

High-Performance Plastics

The success of high-performance plastics is based on a combination of material advantages that are also effective at elevated temperatures: These include, above all, the good mechanical properties, which are complemented by high to very high chemical resistance. The continuous service temperatures of materials such as PEEK, PPS and PSU range from 160 °C to 260 °C – with polyimides even significantly higher. Radiation resistance, excellent fire behavior (self-extinguishing) and good electrical properties at low density are further important advantages. With special additives, heat resistance and stiffness can be further increased, tribology improved or electrical conductivity adjusted.

High-performance plastics are used wherever conventional plastics exceed their technical properties or where the aim is to substitute metals in order to reduce weight.



About the Hydrogen Industry

The hydrogen industry lies at the heart of a comprehensive transformation towards clean energy. Its potential spans across various sectors, including the plastics industry, which plays an important role in realizing a sustainable hydrogen economy. Hydrogen, touted as one of the most promising energy storage media of the future, offers an emission-free alternative to fossil fuels and significantly contributes to reducing global greenhouse gas emissions. This energy source is versatile and can be utilized for power generation, as well as in mobility and industry applications.

Hydrogen Plastic Solutions

At Ensinger, we continuously develop new materials and technologies to meet the specific demands of hydrogen technology.

The utilization of hydrogen as an energy carrier necessitates infrastructure for its production, transportation, storage and consumption. This is where high-performance plastics come into play, leveraging their diverse properties such as corrosion and chemical resistance, lightweight construction, and moldability.

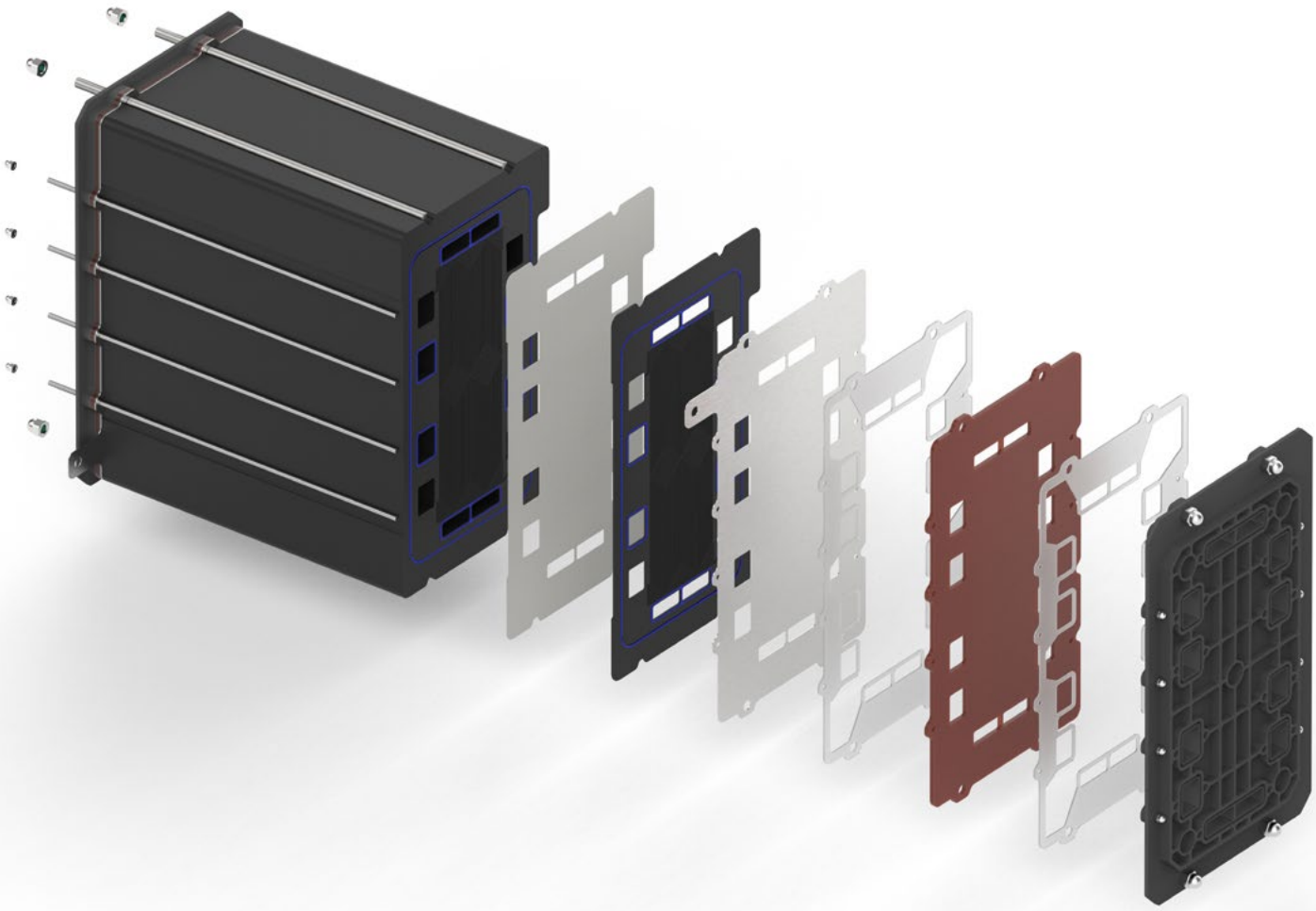
From fuel cells, which offer efficient and clean energy conversion, to electrolysis, a key process in the production of green hydrogen, our high-performance plastics play a leading role in shaping the landscape of clean energy generation and storage. As we delve into the intricate mechanisms of these technologies, we uncover the pivotal roles our materials play in driving forward the hydrogen economy. Together, let us embark on a journey to explore the vast potential of these innovations and pave the way towards a sustainable future.

Plastics in Application

Our high-performance plastics play a crucial role as materials and components in various important areas of hydrogen technology, paving the way for a sustainable and emission-free energy future. With applications spanning fuel cells, electrolysis and the so called balance of plant, our innovative high-performance plastics find diverse applications in the hydrogen economy. These technologies constitute the foundation of efficient and environmentally friendly energy generation and utilization.

Fuel Cell

The fuel cell is a promising technology that generates clean energy by converting hydrogen and oxygen in an electrochemical reaction. Unlike conventional combustion engines, a fuel cell generates electricity by combining hydrogen and oxygen, with water being the only emission.



The operation of a fuel cell is based on the principle of an electrochemical reaction, where hydrogen reacts at the anode and oxygen at the cathode to produce electrical energy. This energy can then be used to power vehicles, buildings, and other applications.

In the fuel cell, our high-performance plastics are used as bipolar plates, end plates, insulation plates, or as a media supply unit (MSU) to fulfill a variety of functions and optimize the performance and reliability of the system. Bipolar plates among other things serve for the distribution of the media, while end plates stabilize the structure of the cell. The insulation plate helps to electrically insulate the end plates from the inside of the fuel cell stack. The media supply unit (MSU) enables efficient supply of the cell with hydrogen, oxygen, and coolant, ensuring smooth and trouble-free operation.

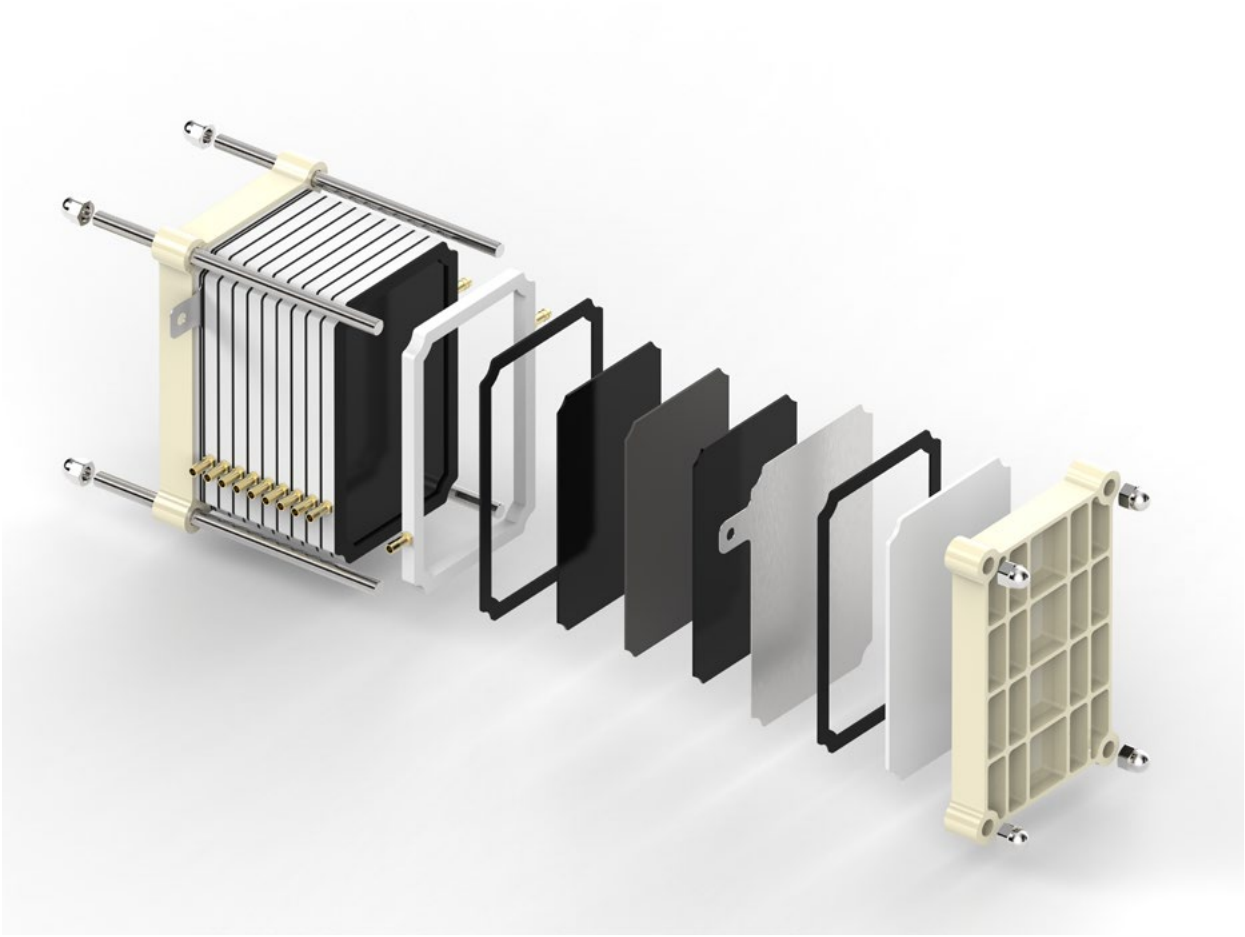
Electrolysis

In addition to fuel cells, our high-performance plastics are also utilized in electrolyzers, a central technology in the hydrogen economy. Electrolysis harnesses electrical energy to drive a chemical reaction that disassociates water molecules into hydrogen and oxygen components. This method serves as a critical means for producing green hydrogen, which holds immense promise for various applications ranging from energy storage to transportation.

Moreover, within the realm of electrolysis, we manufacture several key components essential for its operation. Alongside the cell frame, which serves as a foundational structural component, insulation plates are used to electrically and chemically insulate the end plates from the inside of the stack. These components play integral roles within electrolysis systems, providing structural support, facilitating efficient electrolyte and gas flow, and ensuring optimal performance throughout the electrolysis process.

Redox Flow Battery

The redox flow battery (RFB) is an innovative energy storage technology that is used to store grid-connected and renewable energy. It is based on redox reactions in which electrons are transferred between electrolyte solutions to store or release electrical energy.



Although some materials, such as our HTE compounds, have been specially developed for bipolar plates in fuel cells, they are also ideal for use in RFBs. As the RFB has a stack structure comparable to that of the fuel cell and electrolysis, other components such as end plates, cell frames, media supply units and insulation plates can also be found in the RFB. They ensure efficient energy storage, conductivity and structural integrity and increase the reliability and performance of the RFB technology.

Balance of Plant

Balance of plant (BOP) usually refers to additional components and subsystems that are required to operate a system. The BOP includes, for example, compressors, tanks and measurement technology for electrolysis as well as humidifiers and filters in fuel cells. The conditioning of the media, including piping and valve technology, is also part of the BOP.

Our materials and components are used in liquid hydrogen (LH_2) applications in the form of polyimide valve seats, in media distribution as pipes and in various plastic housings. These components play a critical role in maintaining the integrity and safety of the systems.

Applications

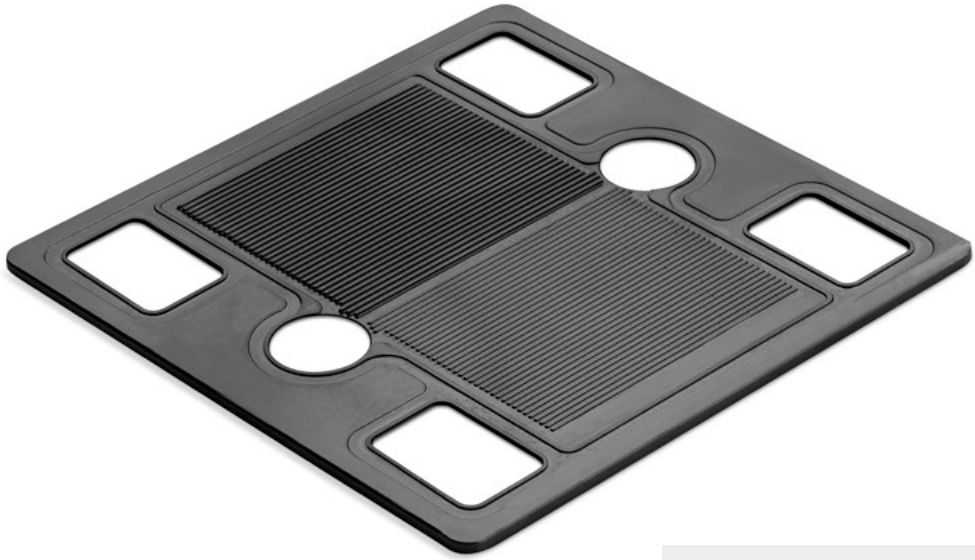
TECACOMP HTE Materials Graphitic Bipolar Plate

About

Fuel cells enable emission-free energy conversion and can be an innovative and sustainable alternative to combustion engines. Ensinger has been developing very highly filled thermoplastics for use in bipolar plates for fuel cell stacks for many years together with our partner, the Center for Fuel Cell Technology (ZBT) in Duisburg. The Ensinger formulation based on polypropylene (PP) is suitable, for example, for use in low-temperature fuel cells (PEMFC) or in redox flow batteries, the formulation based on polyphenylensulfide (PPS) is used in high-temperature PEM fuel cells or PAFC fuel cells as well as for plates for heat exchangers. The compounds are available in shape of powder.

The base polymer of the compounds is characterized by very good chemical resistance, low density, low creep properties and good stress crack resistance. The filler graphite enables the setting of a very high electrical and thermal conductivity.

The highly conductive materials that are particularly suitable for fuel cell bipolar plates. The special, electrically and thermally optimized formulations bring their advantages to the stationary as well as the mobile sector.



Application Areas

In addition to the **fuel cell**, which includes various types such as LT-PEM, HT-PEM, and DMFC, PAFC, the bipolar plate also plays a crucial role in **redox flow batteries**. This wide range of applications underscores the versatility and significance of the bipolar plate in hydrogen technology, highlighting its central role in the generation, storage and separation.

More Information

Benefits

- → Chemical and electrical resistance
- → Corrosion resistance
- → Excellent lifetime
- → Recyclability
- → Low hydrogen permeation ratio
- → High degree of design freedom thanks to independently designable front and rear sides
- → Ready to use
- → Existing team consisting of material scientists and development engineers specialized on the manufacturing of the compound and customized plates
- → Very homogeneous distribution of fillers

AR

More Information

End Plate

About

End plates are crucial components in fuel cells, serving both a mechanical function for compressing the cell stack and a role in media distribution.

The end plates serve various purposes. They can either serve purely mechanical purposes by compressing the stack or act as a combined component that also manages media distribution. Ensinger has extensive expertise in manufacturing end plates in dimensions of up to 500 x 700 mm (both machined and injection moulded parts). We offer comprehensive services such as fill simulations, FEM analyses, and other simulations for the design of injection moulded parts. The particular advantage lies in an excellent network and close collaboration with leading German institutes specializing in fuel cell technologies.

Ensinger demonstrates its full strength as a development partner for end plates in particular, from the first prototype through to large-scale production. The combination of extrusion and stocked semi-finished products and extremely precise machining for the production of prototypes and small series, while at the same time taking into account scaling to injection-moulded components, is second to none.

Application Areas

The end plate is typically used in **fuel cells**. In **electrolyzers** or **redox flow batteries**, the dimensions of the stack can be a limiting factor, as the plate dimensions of stock shapes are limited.

Benefits

- → Chemical, thermal, mechanical and electrical resistance
- → Corrosion resistance
- → Low hydrogen permeation ratio
- → Recyclability
- → Weigth reduction compared to metal end plates
- → Material and manufacturing expertise for reinforced high-performance thermoplastics and composites under one roof
- → We are your development partner for the entire lifecycle of your end plates. From prototype development to high-volume production.
- → Manufacturing and assembly of directly connected components such as valves, sensors or media supply units

Cell Frame

About

Cell frames stand as the backbone of electrolysis stacks, enduring extreme conditions while facilitating efficient electrolysis processes. At Ensinger, we recognize the pivotal role of cell frames and excel in meeting their demanding requirements.

Our customized cell frames are manufactured to withstand the rough environments of alkaline, AEM and PEM electrolyzers including critical media, elevated temperatures reaching up to 105 °C and pressures of up to 35 bar, all while enduring the rigorous pressure load inherent in stack compression. With years of experience in multiple manufacturing technologies, Ensinger specializes in the manufacture of cell frames up to a diameter of over 2000 mm to ensure compatibility with various electrolysis stack configurations.

To guarantee superior performance and durability, we employ cutting-edge technologies such as moldflow simulation and finite element method (FEM) analysis in our injection moulding design process. These simulations enable us to optimize designs for maximum efficiency and resilience under varied operational conditions.

Moreover, our strategic collaboration with leading German and European institutes dedicated to electrolyzer technologies enriches our knowledge base and fosters innovation. This advantageous network allows us to stay at the forefront of advancements in electrolysis technology, ensuring that our cell frames consistently meet the evolving needs of the industry.

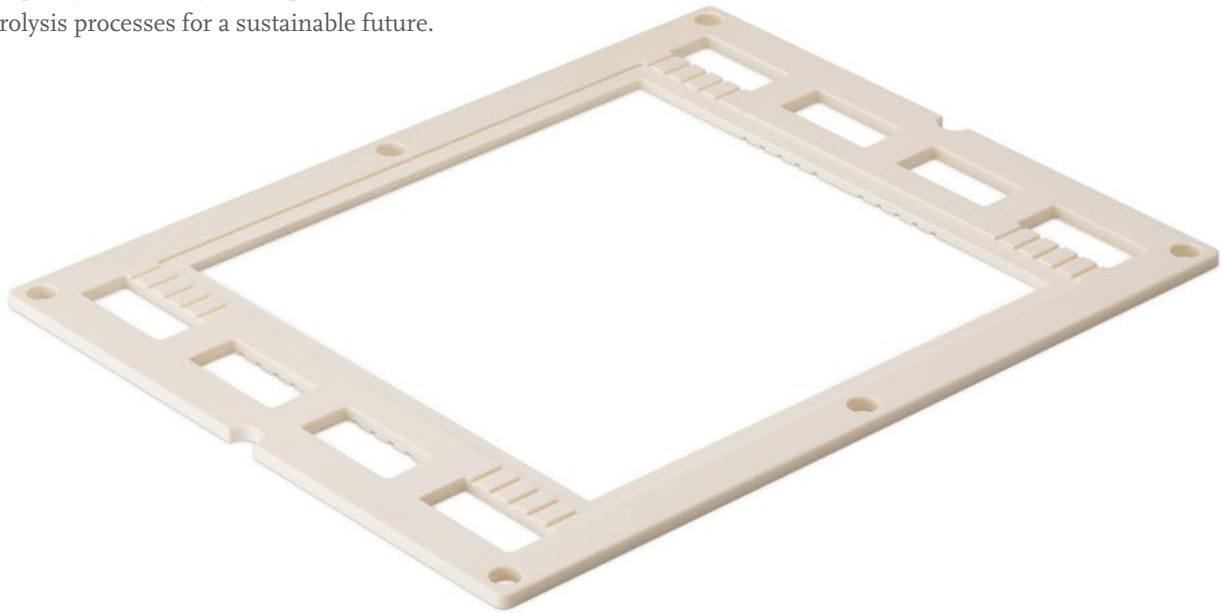
At Ensinger, we are committed to delivering cell frames of uncompromising quality, reliability, and performance, empowering electrolysis processes for a sustainable future.

Application Areas

The cell frame is utilized across various fields such as PEM, alkaline and AEM **electrolyzers** and **redox flow batteries**. It serves as the structural backbone for the electrolysis cells, enhancing stability and efficiency throughout the processes.

Benefits

- → Chemical, thermal, mechanical and electrical resistance
- → Corrosion resistance
- → Recyclability
- → Excellent flatness and plane parallelism
- → Comprehensive material and manufacturing expertise under one roof: Development partnership for the entire lifecycle of your frame, from prototyping to high-volume serial production.
- → We can combine a wide range of production technologies to achieve the best possible performance while taking into account the necessary capacities and investments



Media Supply Unit

About

The media supply unit (MSU) is a key component in the fuel cell that ensures reliable supply of media such as hydrogen, oxygen, and coolant to the fuel cell.

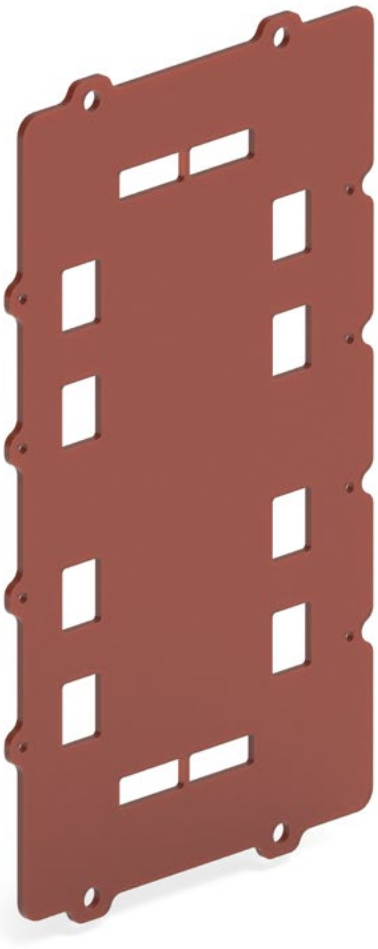
Ensinger has extensive experience in manufacturing media supply units in dimensions up to 500 x 700 mm, both in machined and injection moulded versions. We offer fill simulations, FEM analyses, and other simulations for the design of injection moulded parts to ensure optimal performance and reliability of the MSU. Our advantage lies in a beneficial network and close collaboration with leading European institutes specializing in fuel cell technologies. These partnerships enable us to stay at the forefront of technology and develop innovative solutions for the challenges in hydrogen technology.

Application Areas

The MSU is widely used in **fuel cell** and **redox flow battery** applications. It is mainly employed in mobile fuel cell systems, such as power plants for electricity generation, as well as in redox flow batteries for energy storage purposes.

Benefits

- → Chemical, thermal, mechanical and electrical resistance
- → Corrosion resistance
- → Recyclability
- → Weigth reduction compared to metal MSUs
- → Low hydrogen permeation ratio
- → We are your development partner for the entire lifecycle of your MSU, from prototype development to high-volume production
- → Manufacturing and assembly of directly connected components.



Insulation Plate

About

Insulation plates are supposedly simple components whose complexity is often underestimated. In addition to the immense pressure load caused by the compression of the stack, they have to withstand all the media required in the stack with simultaneous media pressure and increased temperatures. However, one of the main challenges often lies in the stack dimensions, which frequently exceed the sheet dimensions of common thermoplastics available on the market.

Depending on whether the insulation plate is considered a pressure-bearing component in the certification of the electrolyzer via the pressure equipment directive, a composite material can also be used.

Application Areas

The insulation plate is utilized in various areas, including **fuel cells**, **redox flow batteries**, and **electrolysis**. This component plays a crucial role in maintaining optimal operating temperatures and isolating electrical components within these systems.

Benefits

- → Chemical, thermal, mechanical and electrical resistance
- → Corrosion resistance
- → Recyclability
- → Special production for plates for non-standard dimensions and non-standard materials
- → Simple implementation of prototypes, small series and large series thanks to an extensive range of extrusion machinery

Designed and manufactured by James Walker Devol, Gourock, UK from Ensinger Materials for extreme performance in harsh environments

Valve Seats

About

Thermoplastic materials play an extremely important role in valve technology. For conditions, that do not require a metal-to-metal seal, plastic seats are generally used. Our product range extends from materials optimized for sliding and friction properties to extreme durable high-performance plastics like PEEK, a material often used for hydrogen valves.

The components have a low permeation of hydrogen, which prevents leaks and ensures the containment of hydrogen. Our polyimide components are engineered to meet stringent requirements, including pressureless conditions at -253 °C and withstanding pressures of up to 1300 bar. They are designed to accommodate various sizes, with maximum plate dimensions for semi-finished product reaching up to 300 mm x 1,000 mm and rods up to Ø 70 mm x 1,000 mm.

For smaller, simpler design parts, we offer the capability to produce “out-of-tool-parts” through direct formed parts, enabling efficient manufacturing of customized components. This versatility and precision in manufacturing contribute to the overall safety and performance of LH_2 and CGH_2 systems and components, further solidifying our commitment to advancing hydrogen technologies.

Application Areas

Thermoplastic materials, such as PEEK, are commonly used in **medium pressure hydrogen valves** up to 700 bar. Polyimide components are used in various **cryogenic** applications, including **sealings**, **spacers**, and **valves**. These components are integral to LH_2 tank technology, ensuring tight seals, proper spacing between components, and precise control over hydrogen flow within the tank. In addition, the components are used for **high-pressure hydrogen valves** where the pressure rates no longer permit the use of commonly used PEEK.

Benefits

- → Proven hydrogen compatibility
- → Years of experience in serial hydrogen valves
- → Outstanding results in H_2 permeation tests
- → Good chemical resistance
- → Polyimide has an excellent mechanical balance of stiffness and toughness under cryogenic conditions

Piston Rings

About

Our piston rings are designed for hydrogen compression systems, offering exceptional performance under demanding conditions. With a mechanical balance of stiffness and toughness, they provide thermal insulation even in cryogenic and high-pressure environments. Utilizing cost-effective manufacturing technologies like HCM/DF (Hot Compression Moulding / Direct Forming), we produce piston rings in various dimensions. Our capabilities include shaping, direct forming, and machining parts with precise tolerances.

With expertise in materials and manufacturing combined, we deliver high-quality piston rings that ensure reliability and efficiency in hydrogen compression applications.

Application Areas

The piston rings for hydrogen are used specifically within **hydrogen compressors**. These systems are essential for compressing hydrogen gas to high pressures, crucial for storage, transportation, and industrial applications.

Benefits

- → Mandatory requirements are pressureless at -253 °C and up to 800 bar at 100 °C
- → Low hydrogen permeation ratio
- → Maximum plate size for components up to 300 x 1.000 mm and rods up to Ø 70 x 1.000 mm
- → For small simple design parts we do have the possibility to produce “out-of-tool-parts” direct formed parts

Customized Tubes

About

When challenges, regulations and requirements increase, flexible and individual solutions are required. With over 50 years of experience in thermoplastic extrusion, we work with the highest precision to extrude the tubes our customers need. For individual solutions, we offer maximum flexibility in materials, dimensions, finishes and further processing for our custom tubes, rods and hoses. Each size is specifically designed to meet individual requirements, resulting in ready-to-use solutions. This allows us to offer products that are optimized for your application. Our experts will guide you through your project and provide you with advice and support.

Application Areas

Customized tubes find application across different sectors, including **fuel cells** (PEMFC and DMFC) for anode, cathode, and cooling circuits, as well as **electrolysis** for anode and cathode sides. These tubes play integral roles in facilitating efficient gas and fluid flow within these systems, contributing to their optimal performance and reliability.

Additionally, they are utilized in **H_2 test rigs** for various testing and validation processes, further emphasizing their versatility and importance in hydrogen technology.

Benefits

- → Chemical, mechanical and thermal resistance
- → Corrosion resistance
- → Low hydrogen permeation ratio
- → Customized dimensions from OD Ø 2 - 90 mm and wall thickness from 0.3 - 20 mm
- → High level of process expertise
- → Tailor-made materials
- → Processing options such as cutting, machining, coiling, ultrasonic welding, thermoforming, laser marking or assembly and packaging available

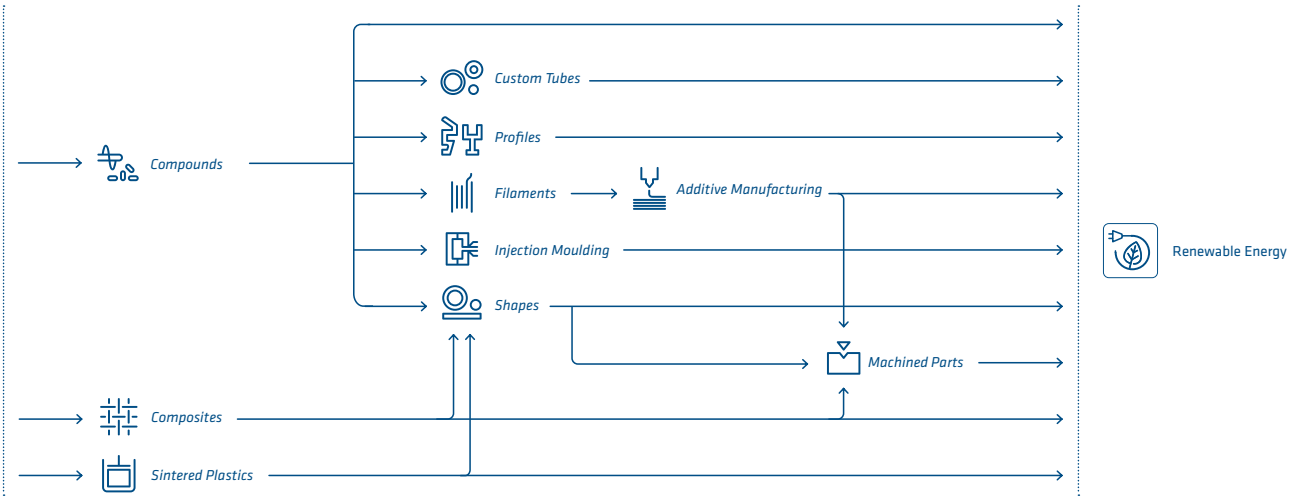
Your Development Partner

From Prototype to Large-Scale Production - One-Stop Shop

Our core disciplines, encompassing 3D printing services, machined parts, injection moulding, and material development, are fortified by an extensive array of manufacturing technologies seamlessly integrated under one roof.

We pride ourselves on guiding you through every facet of the product life cycle, from the meticulous development and selection of materials for your prototypes to the seamless transition into large-scale production. As your premier supplier of high-performance plastics in the hydrogen industry, we are committed to delivering unparalleled quality and expertise at every turn.

More Information



3D Print Service for High-Performance Plastic Parts!

About

Our service encompasses a wide range of offerings tailored to the needs of industrial 3D printing. With the largest and most diverse portfolio of high-temperature 3D printing materials available on the market, we specialised in applications for industrial settings. Our team of technical experts provides comprehensive support throughout your project journey, assisting with the selection of the most suitable material and guiding you through the process until the final 3D printed part is delivered.

We excel in providing efficient solutions for prototyping and low-volume production, even in challenging environments. Additive manufacturing emerges as a particularly cost-effective method for producing customized components, whether for customers or patients, in small batches starting from one unit or for rapid prototyping purposes.

Our additive manufacturing process ensures that components maintain similar strength and stiffness levels while offering a unique structure that enables significant weight, material, and cost savings. This combination of expertise and innovation makes our service an invaluable asset for those seeking high-quality, customized solutions in the realm of industrial 3D printing.

Benefits

- → Best 3D printed surface quality
- → Highest isotropic strength on 3D printed high-performance polymers
- → Airtight & pressure tight 3D printed parts
- → PEEK 3D printing in outstanding quality

More Information

Machined Parts

Know-How Transfer

We use the know-how transfer in the Ensinger Group network to find the optimum solution for each customer. Together with technicians and engineers, our sales department provides support in the selection of materials, component design and the structural design of the finished part. Thanks to flexible and fast cooperation across different stages of plastic processing, we have an exemplary range of technologies at our disposal to achieve the optimum result for you.

Extensive Portfolio of High-Performance Plastics

Ensinger not only offers machining and all the services around it – you also benefit from the concentrated expertise of the entire Ensinger Group. From compounds to stock shapes in the form of plates, rods and tubes, or even processed into injection moulded blanks, we supply your finished part from a single source.

More than 100 modifications of plastics are available to meet the most demanding requirements.

More Information

Injection Moulding

Demand in clean energy exploring the use of hydrogen fuel cells, largely as relates to automobiles but for other purposes as well is strongly increasing. The large scale production of these fuel cells is now an important issue. Efficient injection moulding technology plays a significant role to handle those large manufacturing demand.

IATF 16949

The quality management system (QMS) of Ensinger is based on recognized standards and includes important aspects such as statistical process control and a program for continuous improvement. Our QMS complies with the international standard for quality systems.

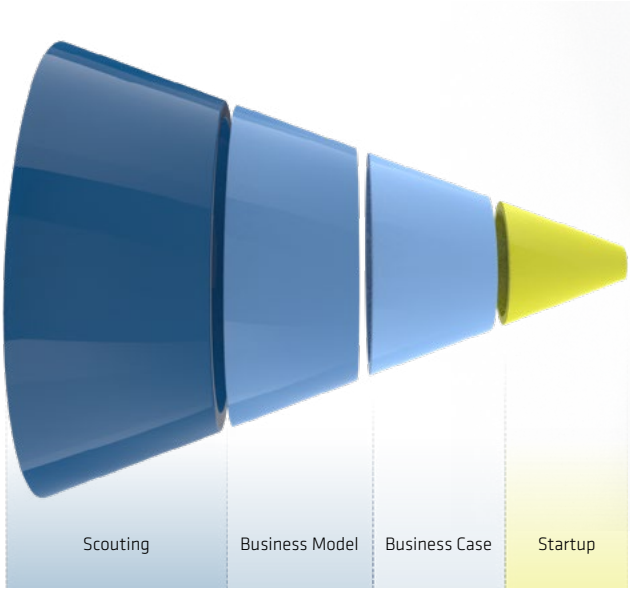
We confirm these standards through internal and external audits and continuously develop our work processes. All of our global injection moulding sites in Germany, the USA, Brazil and China are certified to ISO 9001:2015. In addition, the sites in Germany and China are certified in accordance with IATF 16949:2016, a quality management system that is essential for automotive suppliers. This certification plays an important role in our one-stop shop: for the hydrogen industry in general and mobile H_2 applications in particular.

We often accompany customer projects with small quantities during the prototype phase, while exponential increases in quantity are expected within a short period of time. It is advantageous to keep an eye on the corresponding quality requirements from the very first moment. Our project managers therefore accompany you in your development project and ensure a smooth process and consistently high quality throughout the entire product life cycle.

We are committed to the highest quality, safety and traceability of our injection moulded parts. Ensuring quality for our customers is a top priority in all areas of our business. Our injection moulding and plastics manufacturing processes deliver high quality parts and assemblies for your business through the use of state-of-the-art measuring and control equipment, a fully implemented quality management system and appropriate inspection services.

More Information

New Business Factory



Unlocking innovation: Ensinger Incubator Process

The New Business Factory serves as an innovation engine within the company: with our unique start up culture, which is fully embedded in the Ensinger organisation, we give new ideas space. In this way, we pave the way for new projects and products to create solutions for our customers.

From Idea to Innovation

At Ensinger, we believe in the power of innovation. Without the inventive spirit of our founder, Wilfried Ensinger, and the drive to continually improve, we and our customers would not be where we are today. That's why we have developed the Incubator. The Incubator represents 4 key milestones in the realisation of innovative ideas. The Incubator enables us to find, evaluate and implement new ideas in a structured way to achieve the best possible results for us and our customers.

The milestones of scouting, business model, business case and start-up are complemented and supported by selection processes, dedicated experts and specialised personnel. In this way, new ideas find a structural place in the New Business Factory and are implemented as start-ups after a successful scouting, model and case phase. This gives the idea provider the chance to realise his idea as a start-up leader.

Link to the Hydrogen Industry

As one of the most promising business cases, the New Business Factory is involved in the production of bipolar plates from our self-developed and produced HTE compound for high-temperature (HT-PEM) and low-temperature (LT-PEM) fuel cells. Due to the comparatively low technical readiness level (TRL) at which most systems in the hydrogen industry currently find themselves, target applications such as fuel cells and electrolysers are the perfect breeding ground for innovative developments. For this reason, further projects – especially for electrolysis – are already under development.

More Information

Material Development

The backbone of all our know-how is our material expertise. For this reason, we also have our own compounding department that specializes in the development and production of high-temperature compounds. Our expertise lies in our knowledge of the functions and interactions of various fillers and additives in the matrix of the different base polymers. Our aim is to provide our customers with optimized property profiles for specific applications. Metallic components still dominate in many areas of the hydrogen value chain. However, the advantages of high-performance plastics are becoming increasingly important. The optimum performance profile of plastics can be achieved through application-oriented material development. You will be supported by our experienced Ensinger development team in the creation and adaptation of compound formulations as well as process development in the pilot plant. If you already have a formulation that you have developed yourself, we can take over the scaling up and series production for you. Our experienced material experts are constantly working on designing new, future-proof property profiles for innovative applications and also develop formulations specially tailored to our customers' requirements. The best example of this is our HTE compounds, which have been specially developed for the production of bipolar plates for fuel cells.

More Information

Technical Appendix

Chemical properties

Chemical compatibility, chemical resistance and corrosion resistance are among the greatest advantages of plastics in comparision to metals. By choosing the right polymer family, the customer can create a resistance which withstands even the harshest environmental conditions.

Dimensionally stable plastics

Dimensional stability refers to the ability of polymers to maintain their size, even under varying environmental conditions. As a result, a dimensionally stable plastic shows low water absorption with low thermal expansion.

Electrically insulating plastics

With excellent electrical properties ranging from fully insulating to electrically conductive, plastics are an essential material in the electrical and electronics industries.

Plastics with good mechanical properties

In applications where plastic components are designed to withstand stress, the mechanical properties of polymers play a particularly important role.

General terms and conditions

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