

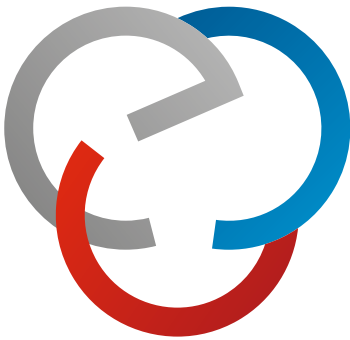


engionic
Fiber Optics

FIBER OPTIC LIGHT GUIDES AND SENSOR SOLUTIONS



Three decades of experience in fiber optics.
From prototyping to volume production.
Industry leading FBG sensor system solutions.



The engionic Fiber Optics GmbH

has been designing and manufacturing tailor-made fiber optic light guide solutions and fiber optic sensors since 1992.

The customer-specific products are used, among other things, in power plant monitoring, medical technology and industrial process monitoring.

The added value for our customers lies in the consistent support, starting with the development of the prototypes, to the start-up of the series production and then to the continuous optimization of the products and the manufacturing costs.

engionic Fiber Optics, thanks to its many years of experience, has been perfectly aligned to the needs of industrial customers who integrate the fiber optic components into their overall solutions. Product traceability, quality management and delivery reliability are part of the corporate DNA.

engionic Fiber Optics is part of the engionic Group.

PRODUCTS

engionic Fiber Optics offers a broad range of products and services in the assembly and manufacturing of fiber optic light guides and components, such as customer-specific light guide assemblies, cross-section converters, vacuum feedthroughs as well as transmission-, reflection- and medical probes.

Additionally, engionic Fiber Optics manufactures special fiber optic temperature and strain sensors based on fs-laser-written Fiber Bragg Gratings, that open up completely new sensing possibilities for a wide range of industrial and medical sensing applications, as well as individual sensor arrangements upon customer request. Based on our in-depth industry know-how, we also offer sensor system solutions and select the most suitable interrogator solution for our customers.

ADVANTAGES

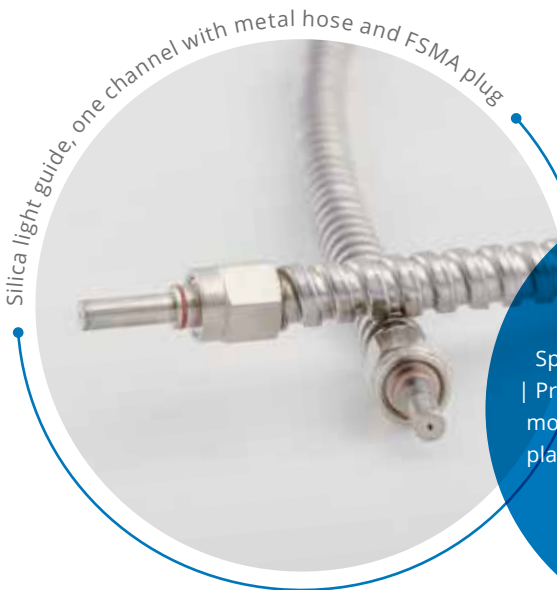
- ✓ Leading expertise in fiber optic light guides, probes and FBG sensors in the high temperature range
- ✓ Specialist for vacuum and pressure feedthroughs
- ✓ Development and production department with high implementation expertise
- ✓ Very high degree of customization in the implementation of individual solutions
- ✓ Small scale production without minimum quantity

GLASS FIBER PRODUCTS

LIGHT GUIDES

engionic Fiber Optics is developing light guides for various applications; from a simple light guide for lighting applications to complex analytic and sensing applications. Depending on the application, different fiber materials like glass, for UV- or IR-range optimized silica fibers or plastic fibers are used. In addition, we offer a wide range of fiber diameters, as well as the option of using single fibers or fiber bundles. To protect the fibers, engionic Fiber Optics offers complete assembly with different hose/tube materials such as PVC, silicone or steel depending on the requirement for flexibility and stability. For light guide connections we offer standard plugs such as DIN, SMA or FC as well as special adapters for high-temperature applications or angle geometries.

Additionally to our Multi Mode Assembly, we are offering Single Mode Assembly with FC/APC, FC/PC, LC/APC, optional E2000, SC/APC and DIN connection.



Application areas:

- Spectroscopy | Medical technology
- | Process control | Pyrometry | Flame monitoring
- | Fire protection | Power plant monitoring | Exhaust control
- | Engine monitoring
- | Colour measurement | Lighting

CROSS SECTION CONVERTERS

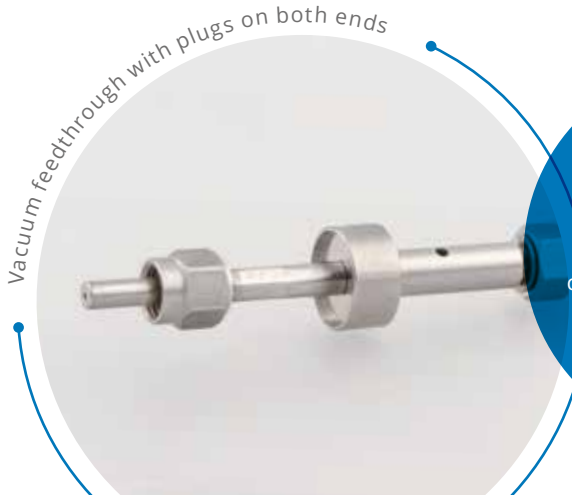
For the adaptation to special lighting or detection geometries, engionic Fiber Optics offers customer-specific cross-section converters. Wide linear arrangements for light beams and sensor applications can be produced as well as high-precision arrangements of individual fiber lines for exact spectrometer couplings. A special radially symmetric manufacturing geometry also allows the production of light guides for rotary couplers for signal transmission in robots and machines.



Application areas:
Spectroscopy | Medical technology | Process control

VACUUM FEEDTHROUGHS

To bring fiber optic solutions also into vacuum, engionic Fiber Optics offers customized solutions with pipe-couplings, KF-flanges for high vacuum requirements and CF-flanges for UHV requirements. engionic Fiber Optics has long-standing expertise in special adhesive technologies as well as soldering and welding processes. In addition, we are offering special light guides with vacuum compatible hoses and connectors.



Application areas:
Spectroscopy | Process control | Pyrometry | Power plant monitoring

FIBER OPTIC PROBES

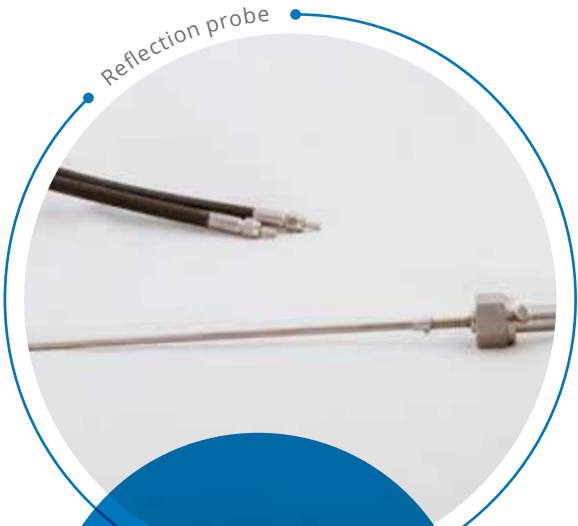
TRANSMISSION AND REFLECTION PROBES

engionic Fiber Optics manufactures application-specific reflection and transmission probes especially for industrial process control. Due to the high production depth with our own precision engineering workshop, we are able to quickly adapt the probes to specific application geometries and environments.

engionic Fiber Optics has outstanding skills in high temperature adhesives, special soldering processes and laser welding for applications at high temperatures, high pressure and dirty or humid environments.

MEDICAL PROBES

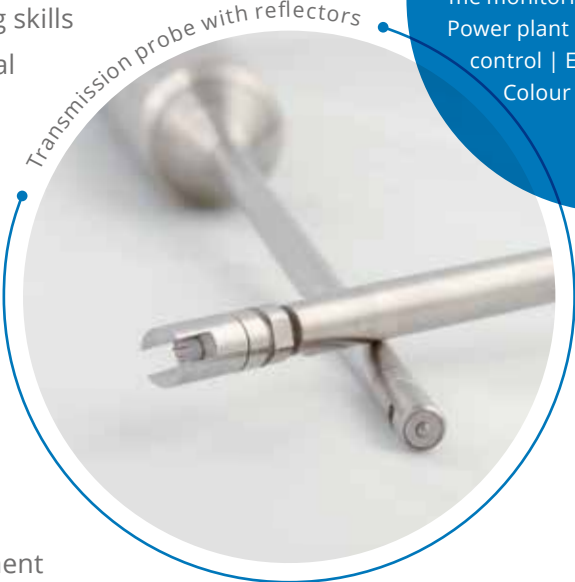
One of the predominate focus at engionic Fiber Optics is the development of special probes for medical technology applications. We manufacture, for example, NMR-compatible probes for different measuring applications. For external optode probes, we produce particularly compact and light angular heads, which are skin-friendly and easily portable. For the measurement of tissue during surgery, we also manufacture endoscopic adapters as well as arthroscopic probes.



Reflection probe

Application areas:

- Process control | Pyrometry | Flame monitoring | Fire protection | Power plant monitoring | Exhaust control | Engine monitoring | Colour measurement | Lighting



Transmission probe with reflectors



Optode measuring head

Application areas:

- Spectroscopy | Medical technology



Medical measuring probe

INDIVIDUAL DEVELOPMENTS

OEM DEVELOPMENTS

engionic Fiber Optics develops special solutions for optical measurement applications upon individual customer request or within the framework of research projects. These include, for example, arrangements such as lens systems, redirecting systems with prisms or mirrors as well as products for special environments such as pressure barriers or thermally insulated windows. With our in-house precision engineering, we have the opportunity to flexibly and quickly respond to individual customer requirements. Our special strength is the high-precision manufacturing of individual and very small turned parts such as individual plug and adapter solutions.

Pressure barrier



Lens attachment



Attachments for reflection probes



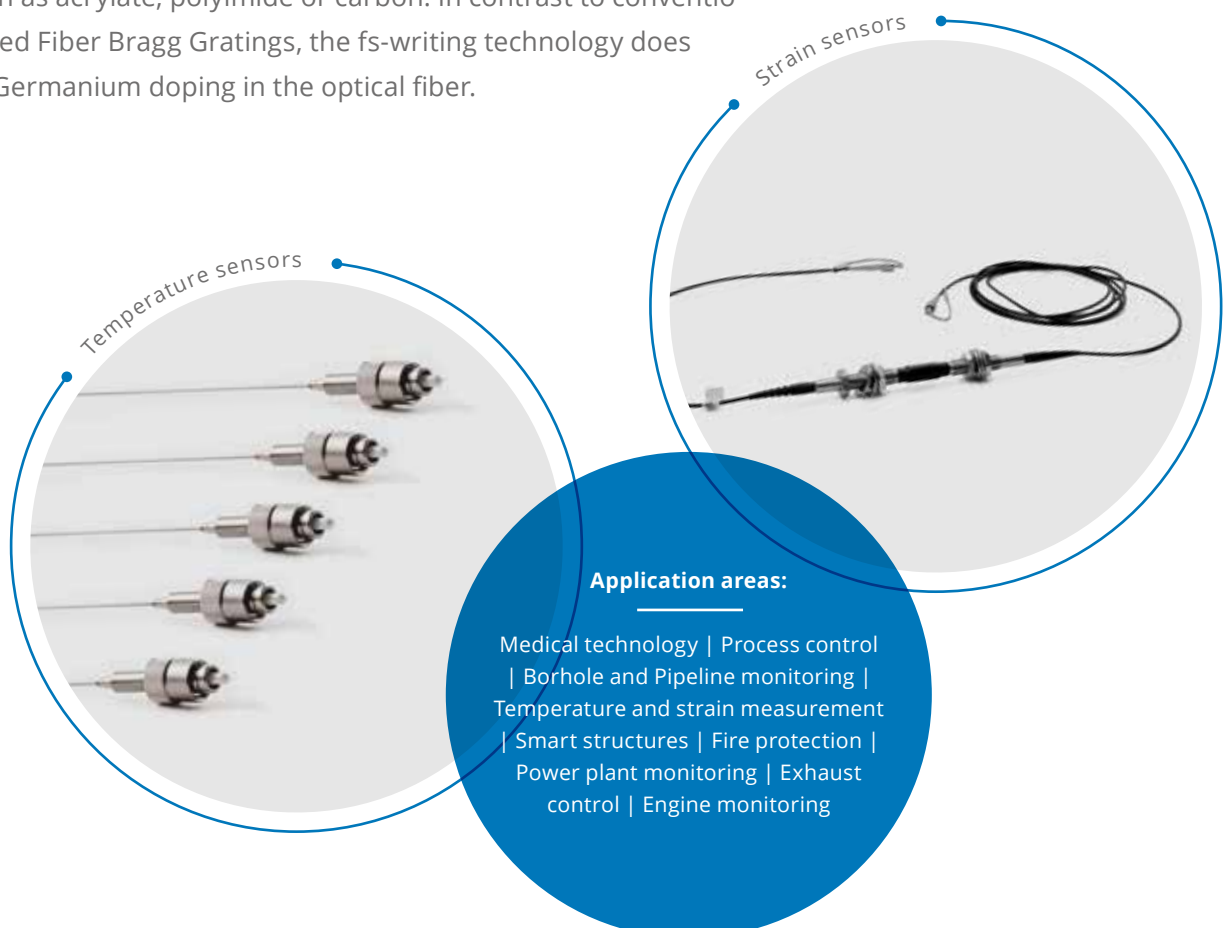
FIBER BRAGG SENSORS

TEMPERATURE AND STRAIN SENSORS

engionic Fiber Optics manufactures special fiber optic temperature and strain sensors based on fs-laser-written Fiber Bragg Gratings, as well as individual sensor arrangements upon customer request. The product portfolio includes standard FBG sensors, individual OEM sensor solutions, as well as sensor systems including interrogation unit.

Unique in the market is the fully integrated internal value chain within the engionic Group – from the production of Fiber Bragg Gratings and CNC parts up to the entire sensor assembly, calibration and housing.

The Fiber Bragg Gratings of our affiliate company engionic Femto Gratings GmbH form the basis for the fiber optic sensors. engionic Femto Gratings GmbH is the first commercial provider worldwide for femtosecond-laser-written Fiber Bragg Gratings. This technology makes it possible to write Fiber Bragg Gratings and light guides in virtually any kind of optically transparent material and through a variety of fiber coatings such as acrylate, polyimide or carbon. In contrast to conventionally produced Fiber Bragg Gratings, the fs-writing technology does not require Germanium doping in the optical fiber.



OEM SENSOR SOLUTIONS

Regarding OEM sensor solutions, engionic Fiber Optics is offering different co-operation packages.

Performance package 1 – Customer specific sensor development starting from the first idea and resulting in serial manufacturing. Profit from our extensive experience with regard to sensor assembly and volume production.

Performance package 2 – Customer specific adaptation of existing sensor concepts of engionic Fiber Optics, that have been developed over the past years. The sensors will be adapted to the customer-specific environmental and technical measuring requirements, will be tested as prototypes and thereafter manufactured in an efficient volume production process.

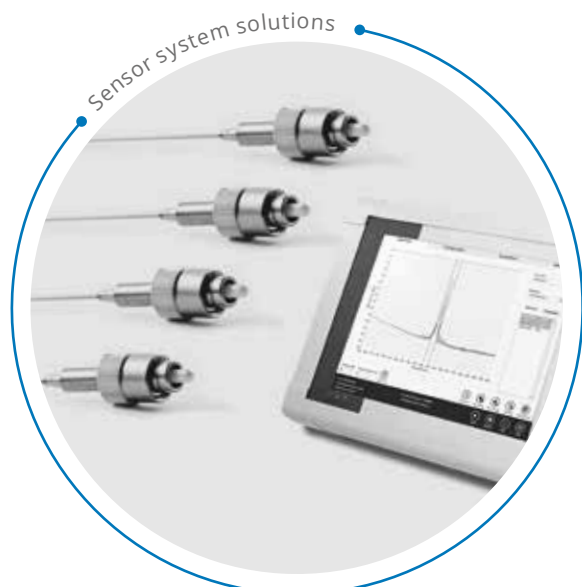
Performance packages 3 – Establishment of an efficient and cost effective volume production process for FBG sensors that already have been developed and tested by the customer and that shall be manufactured by engionic Fiber Optics as OEM supplier.

Selected developments we have realized are for example FBG Force Screw Sensors, FBG Vibration/ Acceleration Sensors, Hydrophone and Pantograph Systems.



SENSOR SYSTEMS INCLUDING INTERROGATION UNIT

Based on our in-depth industry know-how, we also offer sensor system solutions and additionally select the most suitable interrogator unit for our customers for temperature and strain measurement applications ranging from one to several thousand sensing points.



EXPERTISE

FIBER ASSEMBLY

- Processing of different fiber materials as a single fiber or fiber bundles (plastic, glass and silica glass)
- Assembly of single fibers and fiber bundles in cables up to approx. 100m length
- Single mode assembly with FC/APC and LC/APC connection
- Production of cross-section converters with slit width from 100µm
- Manufacturing of angular head arrangements in metal and plastic
- Production of concentric arrangements with multiple rings
- Processing of various protective hose materials (stainless steel with and without braiding, plastic, metal, plastic-coating)
- Processing of metal-coated fibers (Cu, Al, or Au)

JOINING PROCESSES

- Bonding, especially for high-temperature applications
- Crimping
- Laser welding
- Ovens for adhesive curing and testing

PRECISION MECHANICS

- In-house design
- In-house mechanical workshop with conventional and CNC-supported turning and milling technology
- Production of accessories for the light guide technology such as lens attachments, air-cooled lances, pressure barriers and probes with optical windows

FIBER-BRAGG-SENSORS

- Usage of worldwide leading fs-laser-written Fiber Bragg Gratings from the market leader and sister company engionic Femto Gratings GmbH
- High R&D competence for the development of customer specific sensor solutions
- Adaptation of existing standard sensor concepts to customer-specific environmental and technical requirements
- Cost efficient volume production from the FBG manufacturing to the ready-to-use sensor
- Housing of FBG sensors in a vast range of designs and materials
- In-house high precision mechanical workshop
- High precision temperature sensor calibration from -40°C to 700°C
- Calibration of strain sensors in various designs
- Connectorization for all common connector types
- Absolute residue free and highly stable packing of fibers according to customer requirements up to 2m length for high resolution temperature probes, standard configurations with stainless steel capillaries, ceramics and Quarz optional
- Annealing as well as cabling and jacketing options for long length
- Broad range of glueing, crimping and welding technologies available
- Combination of FBG sensors with vacuum feedthroughs

R&D

- Customer-specific development of optical solutions for technical measurement
- Participation in development and research projects on special light guide arrangements and sensor developments



APPLICATIONS

SPECIALIST FOR HIGH TEMPERATURES

Flame monitoring

Optical measuring technology is ideal for the monitoring of burning processes, e.g. in combustion or power plants. engionic Fiber Optics has developed special solutions for flame monitoring, which use protective windows as well as joining methods, such as laser welding, soldering and adhesive technologies for high-temperature applications.

Engine monitoring

The use of optical sensors with electric engines is extremely important since they are immune to electromagnetic interference fields. Due to their high temperature stability, our special sensors also offer monitoring possibilities for combustion engines with high operational temperatures that generate hot environmental conditions. Special optical windows make it possible to directly monitor the combustion process.

Power plant monitoring

In power plants, combustion processes take place under extreme conditions. Due to the high safety relevance, monitoring of the running combustion processes is extremely important. Also, compliance with limit values for the materials used with regard to temperature and pressure or strain must be monitored. engionic Fiber Optics has developed special solutions for monitoring, which take advantage of the protective window as well as special joining methods for high temperature applications.

Exhaust gas control

Exhaust gases must be controlled for limit values. Using spectroscopy methods, the combustion is easy to analyze inline. Due to the high temperature range, our fiber optic sensors are especially suited to the monitoring of hot gases.



FIBER OPTICS FOR STABLE PROCESSES AND SAFETY

Process control (industry 4.0)

The transmission and measurement of process parameters using optics has great advantages due to the immunity to electromagnetic interference compared with electrical sensors and data transmission. engionic Fiber Optics offers customized solutions for sensors using light for the monitoring of production lines. Through special rotary couplers, transmissions in machines with rotating elements are also possible. We also offer fiber optic sensors for the monitoring of process parameters such as pressure, temperature, vibration, strain, which enable intelligent control processes.

Borehole/Pipeline monitoring

Fiber optic sensors are particularly suitable for the monitoring of boreholes and pipelines in the oil and gas industry since they are ideal for the requirement of long extended measurement geometries. Several thousand sensors or scattering centres can be inserted in a fiber over a length of several kilometers.

Smart structures

Optimized, lightweight materials in aerospace as well as infrastructure areas such as bridges and buildings should keep up with more extreme environmental situations while being more energy efficient. In addition, life cycles of materials should be optimally exploited and ageing processes detected at an early stage. In order to assess the limits, engionic Fiber Optics offers intelligent fiber optic sensors. So, e.g. cable systems can report material fatigue or wind turbines icing hazards in a timely manner.

Fire protection

Especially in processes with flammable materials, optical methods are favored to avoid ignition by sparks. For the early detection of hot spots, engionic Fiber Optics has developed special light guide arrangements, which monitor highly sensitive processes even in very inaccessible areas.

APPLICATIONS



OPTIMAL RESULTS THROUGH FIBER OPTIC SOLUTIONS

Spectroscopy

Spectroscopy in the optical, UV as well as IR range is a widely used method for analysis and quality control. Due to the individual spectral characteristics of materials, product compositions and properties can be analyzed with the highest precision. Using light guides, this method can also be used in inaccessible places in production processes. In extreme environments such as high temperatures, dirt and humidity, light guides offer the possibility of placing sensitive analytical equipment far away from the measuring point in protected environments.

Pyrometry

Pyrometry is an important method for contact-free temperature measurement, especially with high temperature processes. Through light guide technology, it is possible to perform measurements in very inaccessible places. Using high temperature adapters with interchangeable protective windows, special pressure connections or even vacuum feed-throughs, use is possible in virtually every process environment. engionic Fiber Optics is particularly specialized in individualized solutions adapted to requirements of the respective technological process.

Color measurement

Using spectroscopic analysis, colors can be simply monitored in production processes. By means of light guides, this method can also be used in inaccessible places in production processes. Here too, in extreme environments such as high temperatures, dirt and humidity, light guides offer the possibility of placing sensitive analytical equipment far away from the measuring point in protected environments.

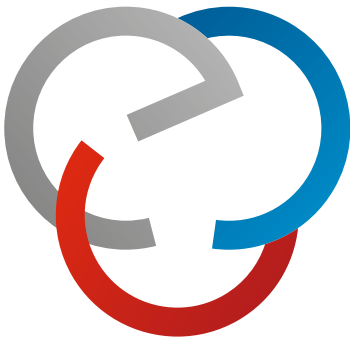


INNOVATIVE TECHNOLOGIES FOR MEDICAL

Medical technology

In medical technology, imaging techniques for analysis are often used where intricate lighting geometries can only be realized by specially adapted fiber solutions. Glass fibers are especially used for illumination and imaging in endoscopes where direct lighting is not possible. Spectroscopic diagnostic techniques are another field of application. Engionic Fiber Optics has developed special probes specifically for different fields of application. For example, with optodes, a very compact and lightweight design is desired while with arthroscopic probes, a sturdy and easy to be sterilized design has been developed. In addition, fiber-optic sensors in micro-invasive surgery enable the monitoring of parameters such as strain and pressure, as well as the 3-dimensional tracking of movements with catheters or endoscopes.

ABOUT ENGIONIC GROUP



The engionic group of companies focusses on the development and production of OEM specific products and components and covers the entire product life cycle, from prototyping to volume production. The group's technological focus lies on the design and production of fiber optic components and sensors, as well as the production of high quality precision CNC parts.

In 2022, we rebranded the engionic Group companies to create a joint brand identity. Loptek GmbH is now engionic Fiber Optics GmbH, FemtoFiberTec GmbH is now engionic Femto Gratings GmbH and KIESSIG CNC-Zerspanung GmbH is now engionic CNC GmbH.

Each company operates as an independent entity, while we maximize the synergies between the group companies to provide the best value proposition to our customers.

Within the group, engionic AG fulfills the function of a strategic investment holding company. All share holdings are bundled in this company. The main purpose of the holding company is the active further development of the business portfolio through organic growth and the selective acquisition of further businesses, as well as the identification of new technologies and products that are evolving on the market and can be scaled to industrial levels.



Members of engionic Group



engionic Fiber Optics GmbH has been designing and manufacturing tailor-made fiber optic light guide solutions and fiber optic sensors since 1992.



engionic Femto Gratings GmbH is the first commercial manufacturer of Fiber Bragg Gratings based on a complex and highly automated fs-laser inscription process.



engionic CNC GmbH looks back on more than 20 years of experience in the production of CNC components, made with an exceptionally high level of precision and quality.

Locations

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