



Fiber Optic Light Guides and Sensors

- Fiber Optic Light Guides
- Fiber Optic Probes
- Fiber Optic Sensors
- Precision Mechanics
- Individual Developments





Loptek stands for more than
20 years of experience and know how in the
realization of customer-specific solutions for all aspects
of light guides and fiber optic system components. Absolute
customer orientation, qualified production processes and experienced
staff are essential keys to success. Loptek also stands for extremely high
technological expertise and actively advises its clients in the design of fiber
optic systems, individual design services as well as completely
new developments.

In the area of fiber optic sensors, Loptek offers innovative,
fs-laser-written fiber Bragg sensors for temperature and strain
measurement, which due to their technological uniqueness,
satisfy the most demanding measurement
requirements.

PRODUCTS SERVICE

Loptek offers a wide range of fiber optic products. These include medical probes and fiber optic sensors for temperature and strain measurement in addition to fiber optical products such as light guides, cross-section converters and vacuum feedthroughs. In addition, Loptek has extensive experience in precision mechanics and the realization of customer individual development projects.

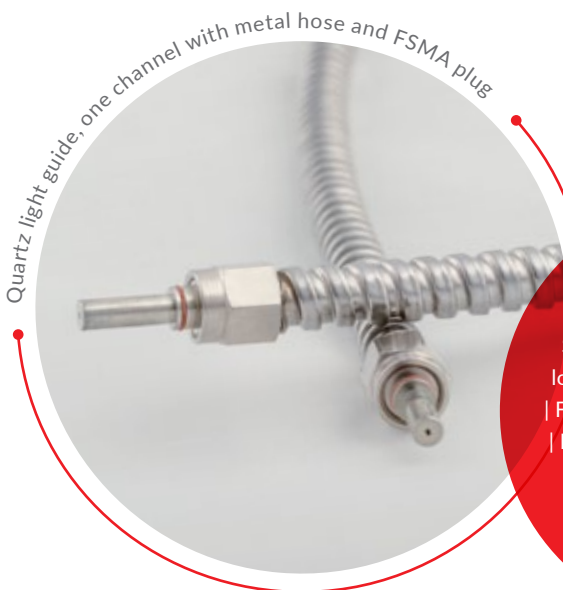
ADVANTAGES

- 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

Depending on the application, different fiber materials like glass, for UV- or IR-range optimized quartz fibers or plastic fibers are used. In addition, Loptek offers a wide range of fiber diameters, as well as the option of using single fibers or fiber bundles. To protect the fiber, Loptek 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, Loptek offers standard plugs such as DIN, SMA or FC as well as special adapters for high-temperature applications or angle geometries.



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

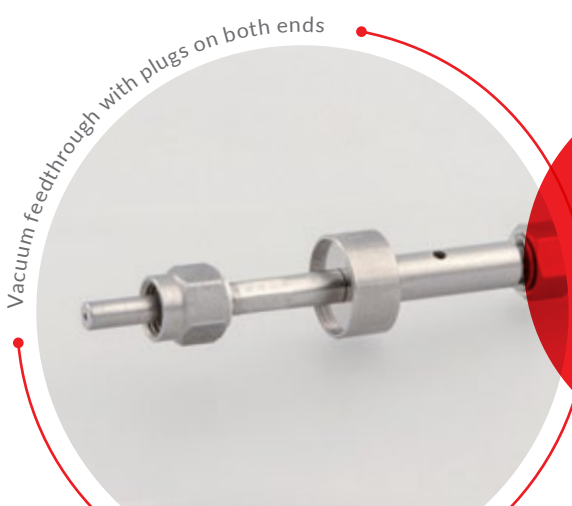
For the adaptation to special lighting or detection geometries, Loptek offers individual manufactured cross-section converters. Wide linear arrangements for light beams and sensor applications can be produced as well as high-precision arrangements of individual fiber lines for exact spectrometer couplings. 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, Loptek offers customized solutions with pipe-couplings, KF-flanges for high vacuum requirements and CF-flanges for UHV requirements. Loptek has long-standing expertise in special adhesive technologies as well as soldering and welding processes. In addition, Loptek offers special light guides with vacuum-compatible hoses and connectors.



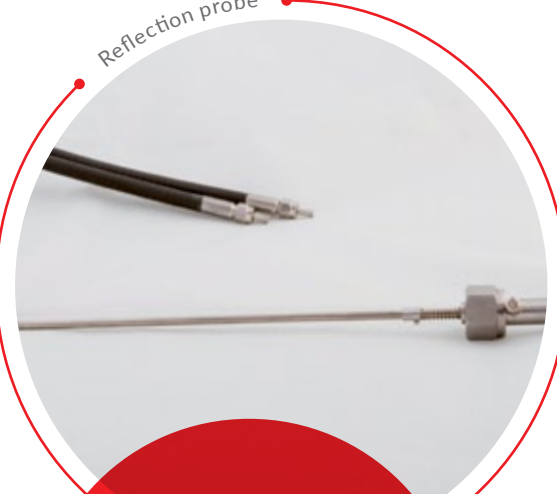
Application areas:
Spectroscopy |
Medical technology |
Process control | Pyrometry |
Power plant monitoring

FIBER OPTIC PROBES

TRANSMISSION AND REFLECTION PROBES

Loptek manufactures application-specific reflection and transmission probes especially for industrial process control. Due to the high production depth with the own precision engineering workshop, Loptek is able to quickly adapt the probes to individual application geometries and environments. Loptek 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.

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



MEDICAL PROBES

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

Optode measuring head



Application areas:

- Spectroscopy | Medical technology

Medical measuring probe

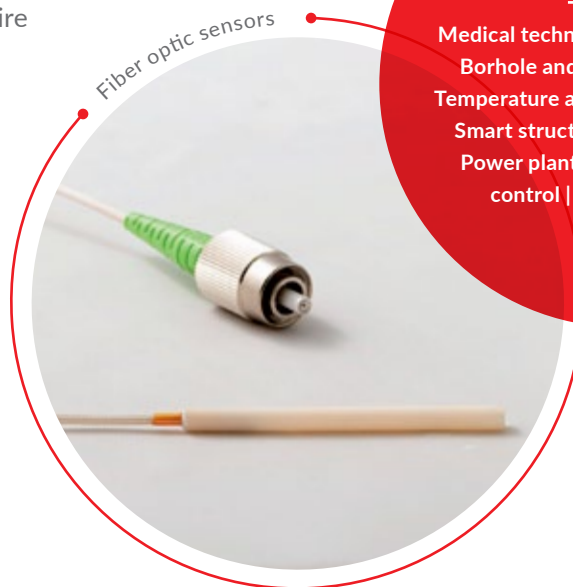


FIBER OPTIC SENSORS

Loptek manufactures special fiber optic strain and temperature sensors based on fiber Bragg gratings (FBG) as well as individual sensor arrangements upon customer request. The fs-written FBGs of our affiliate company FemtoFiberTec GmbH form the basis for the fiber optic sensors. FemtoFiberTec is the first commercial provider worldwide for femtosecond-written FBGs which are manufactured with an infrared fs-laser. This technology makes it possible to write FBGs and light guides in virtually any kind of optically transparent material and through a variety of fiber coatings such as acrylate, polyimides or carbon.

In contrast to conventionally produced FBGs, the fs-writing technology does not require Germanium doping in the optical fiber.

The fs-written FBGs are type II gratings and can be used in harsh environments for temperature and strain measurements up to 1,000 °C. In addition, the sensors based on pure core fiber are insensitive to radioactive radiation.



Application areas:

Medical technology | Process control |
Borhole and Pipeline monitoring |
Temperature and strain measurement |
Smart structures | Fire protection |
Power plant monitoring | Exhaust
control | Engine monitoring

PRECISION MECHANICS

PRECISION MECHANICS

With its own precision engineering, Loptek has the opportunity to flexibly and quickly respond to individual customer requirements. Loptek's special strength is the high-precision manufacturing of individual and very small turned parts. With this, Loptek can also manufacture individual plug and adapter solutions.

Flush sleeve of anodized aluminium for light guides



Flush sleeve of stainless steel for light guides



Application areas:
Medical technology |
Engine monitoring

Flush sleeve of anodized aluminium for light guides



INDIVIDUAL DEVELOPMENTS

Loptek 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.



FIBER ASSEMBLY

- Processing of different fiber materials as a single fiber or fiber bundles (plastic, glass and quartz glass)
- Assembly of single fibers and fiber bundles in cables up to approx. 100m length
- 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

FBG SENSORS

- Unique technology worldwide by our affiliate company FemtoFiberTec GmbH
- Femtosecond (fs)-written fiber Bragg gratings which are manufactured with an infrared fs-laser
- Technology makes it possible to write FBGs 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 FBGs, no Germanium-doping is necessary in the optical fiber
- Can be used in harsh environments for temperature and strain measurements up to 1,000°C
- Insensitive to radioactive radiation and humidity
- Suitable for the measurement of extended arrangements of several km in length in difficult environments such as high electromagnetic fields

DEVELOPMENT

- Custom-specific development of optical solutions for technical measurement
- Regularly participation in development and research projects on special light guide arrangements and sensor developments in medicine and industry



LOPTEK THE SPECIALIST FOR HOT AMBIENT TEMPERATURES

Flame monitoring

Optical measuring technology is ideal for the monitoring of burning processes, e.g. in combustion or power plants. Loptek has developed special solutions for monitoring, which use protective windows as well as joining methods, such as laser welding, soldering and adhesive technologies for high-temperature applications. Loptek additionally offers special coating solutions with cooling possibilities.

Engine monitoring

The use of optical sensors with electric engines is extremely important due to their immunity to electromagnetic interference fields. Due to their high temperature stability, Loptek special sensors also offer monitoring possibilities for engines that generate hot environmental conditions. Special optical windows make it possible to look directly at the running processes.

Power plant monitoring

In power plants, burning 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. Loptek 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 as well as temperature in the composition. Using spectroscopy methods, the composition is easy to analyze in-line. Due to the high temperature range, Loptek fiber optic sensors are especially suited to the monitoring of hot gases.

FIBER OPTICS FOR STABLE PROCESSES AND MORE 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 measurement and data transmission. Loptek 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. Loptek also offers fiber optic sensors for the monitoring of process parameters such as pressure, temperature, vibration, strain, etc. 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 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 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, Loptek 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, Loptek has developed special light guide arrangements, which monitor highly sensitive processes even in very inaccessible areas. In battery management, early detection of fire hazards from lithium ion-based batteries is an important field of development because in the context of the increased use of renewable energies, increased and in particular decentralized storage capacities are necessary.



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 feedthroughs, use is possible in virtually every process environment. Loptek is particularly specialized in individualized solutions adapted to requirements of the respective technological process.

Color measurement

Using spectroscopic analysis, colours 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 MEDICINE

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. Loptek 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.

CONTACT

Loptek Glasfasertechnik GmbH & Co. KG
Oberlandstraße 13-14
12099 Berlin
Germany

Phone: +49 (0) 30 62 88730
Fax: +49 (0) 30 62 88731
info@loptek.com
www.loptek.com

