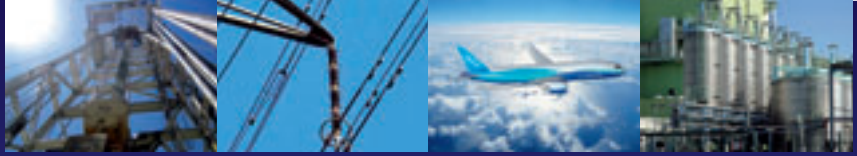
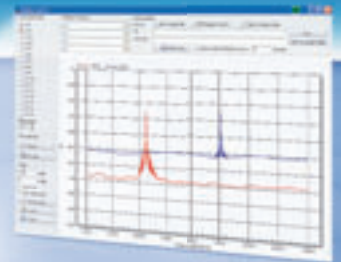


New technology. Proven reliability.



New horizons for your measurements



The optical measurement chain from HBM

Determine stress in your components safely and reliably.
Ideal for difficult environments and materials.



Measuring with light: A whole bundle of benefits ...

Gain from the many new possibilities provided by optical sensor technology – and HBM's proven reliability.

Determine stress in components and in environments where conventional technologies have reached their limits. Your solution... the optical measurement chain from HBM: Optical strain gages, electronics, and software from a single source.

Reliably and safely test innovative materials with high levels of strain or high numbers of load cycles, high electromagnetic stress or in highly explosive environments.

Reduce your installation costs – because a single fiber can handle multiple measurements.

With optical strain gages from HBM you benefit from reduced wiring requirements. Several optical strain gages can be used on a single fiber. The optical measurement chain is individually adapted to suit your requirements.

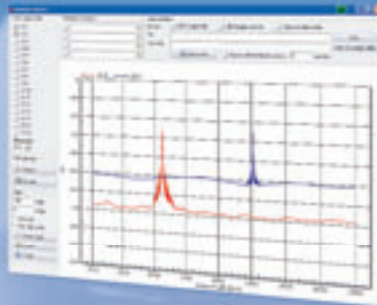
Get high-precision test results – even in difficult environments and materials.

Optical strain gages enable you to test the fatigue strength of your components. Stress testing can be conducted even in materials with high levels of strain, and with high numbers of load cycles. You get consistent and accurate test results even in adverse ambient conditions, for example, in high-voltage systems.

Acquire reliable data – whatever the distance between your optical strain gages and the measurement system.

The effects of distance and cable length on the test result can be neglected with optical strain gages. Even if your data acquisition system is located many hundred meters from the measuring points, the use of optical sensor technology will not negatively affect the quality of your test results.

...new horizons for your measurements



Best of both worlds

The optical measurement chain from HBM includes:

- ___ Optical strain gages
- ___ Interrogator (opto-electric measurement instrument)
- ___ Data acquisition and analysis software.

HBM's measurement technology enables the simultaneous acquisition of data using both electrical and optical strain gages. The EasyOptics module in HBM's catman®AP software enables you to jointly acquire and analyze data from different types of sensors.

... for your application

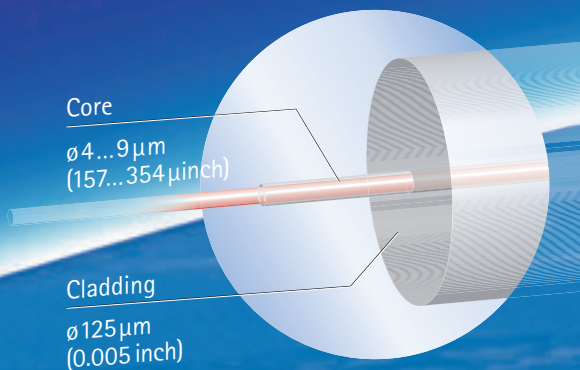
For more details on the optical measurement chain from HBM visit www.hbm.com/optical

Experimental stress analysis with optical strain Measurement using light

HBM's optical strain gages are made from fibers of glass with a very small core diameter of no more than 4 to 9 micrometers (157 to 354 μ inch).

In comparison, the diameter of human hair ranges from 60 to 80 micrometers (0.002 to 0.003 inch).

The fiber core is surrounded by a cladding layer from purest glass with a diameter of 125 micrometers (0.005 inch).



The fiber Bragg grating

Measuring grids are formed by inscribing a grid-like pattern into the fiber core to produce the fiber Bragg grating.

The grating comprises many thousands of grid lines. The inscribed Bragg gratings reflect particular wavelengths of light and therefore play a fundamental role in optical measurement.

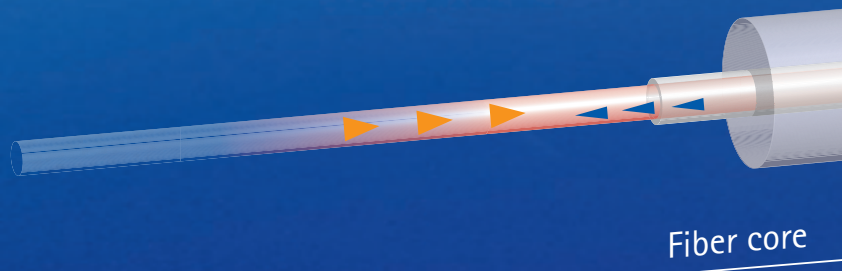
HBM patented optical strain gages utilize proven technology, and are easy to work with.

HBM's optical strain gages make measurement with fiber glass as easy as with traditional methods. The patented design protects the fiber and makes configuring your test setup quick and convenient.



Additional advantages:

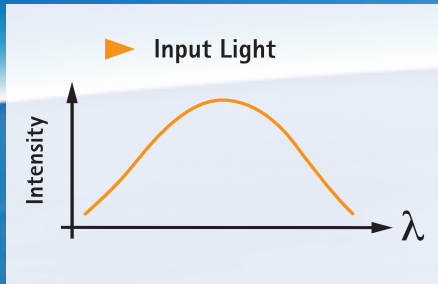
- Benefit from both optical sensor technology and the wide range of accessories for electrical strain gages
- Optical strain gages are as easy to handle as electrical strain gages (e.g. bonding and installation).



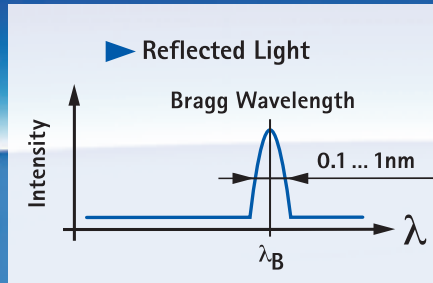
gages

Strain measurement with optical sensor technology

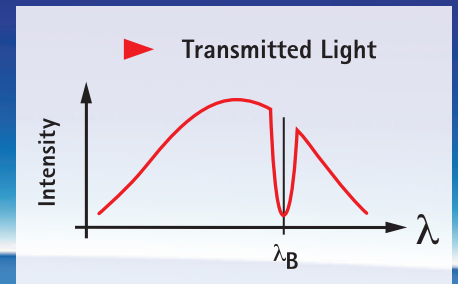
When the test piece is stressed, the strain is transmitted through the measuring body to the optical sensor. Straining the fiber in a positive or negative direction also changes the wavelengths of the light reflected by the fiber Bragg gratings. These changes enable the strains to be determined.



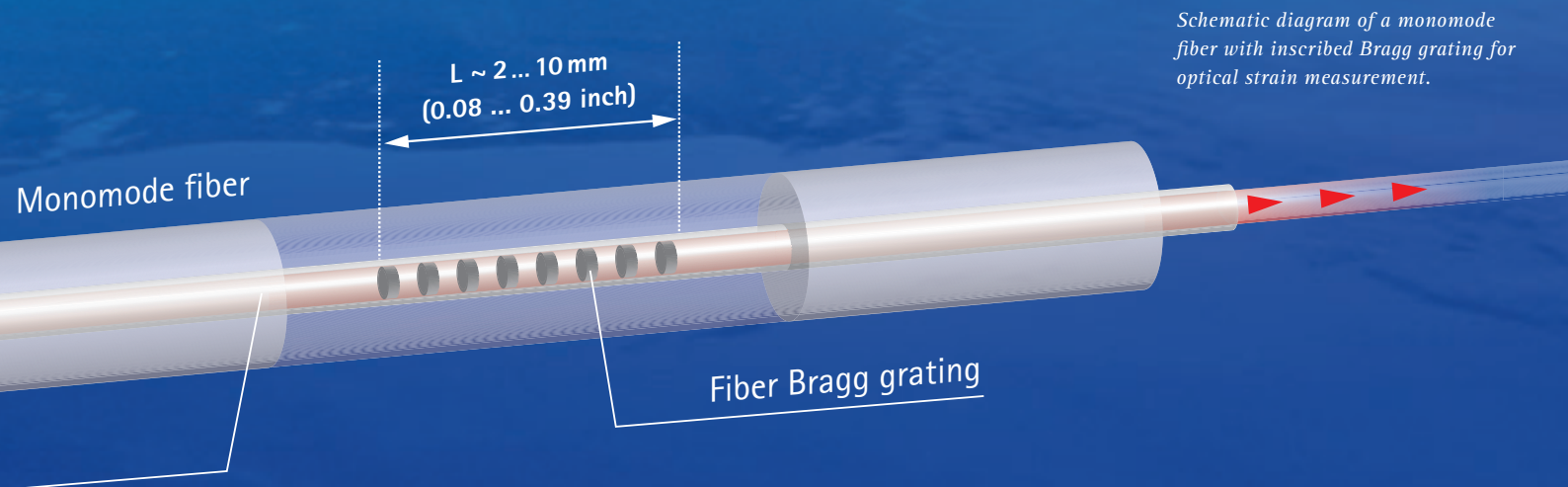
A laser transmits light of a particular wavelength range into the fiber, for example, in the range of 1510 nm to 1590 nm.



The inscribed Bragg gratings reflect particular wavelengths of light (the so-called „Bragg wavelength“). This fraction of light is transmitted to the interrogator.



Light that has not been reflected by a Bragg grating leaves the fiber at the other end.



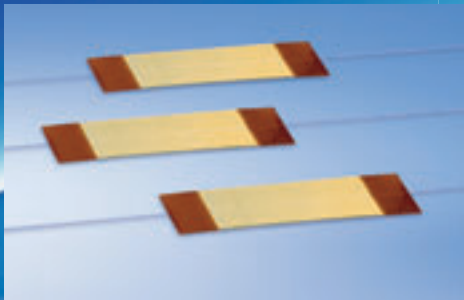
Schematic diagram of a monomode fiber with inscribed Bragg grating for optical strain measurement.

For more details on the optical measurement chain from HBM visit www.hbm.com/optical

The optical measurement chain from HBM From sensor to software ...

The complete solution from a single source

Now you can also benefit from perfectly matched measurement chains – made by HBM – when using optical strain gages. Gain time and increase safety by utilizing the complete solution from a single source – from optical strain gages through electronics and software.



HBM optical strain gages

Benefit from the many new advantages of measuring with light – without having to abandon the ruggedness and convenience of the classical strain gage. There is no difference in the handling of optical or traditional (electrical) types of strain gages.

You don't have to learn new skills: Bonding, covering, connecting, etc. are all identical.



HBM multiplexers

Recording of up to 320 measuring points

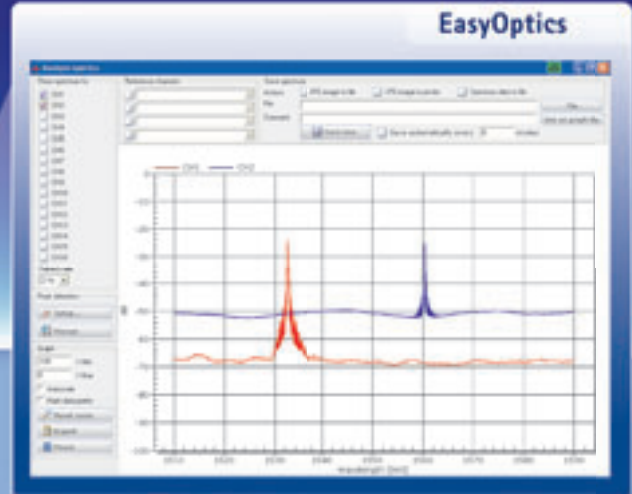
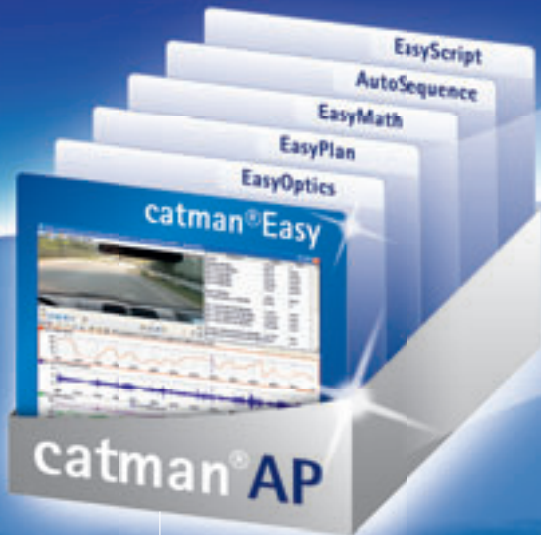
- ___ Upgrade of 4-channel interrogators to 8 or 16 channels
- ___ Real-time data acquisition
- ___ No external excitation voltage required.



HBM interrogators

Acquisition of optical signal data

- ___ Series SI interrogators for statically acquiring data from one to four channels, at 1 to 10 measurements per second
- ___ Series DI interrogators for dynamically acquiring data from one to four channels, at 100 to 1000 measurements per second.



catman®AP by HBM

Professional data acquisition and analysis with catman®AP

catman®AP is the new generation of data acquisition and analysis software. catman®AP comprises a powerful suite of easy-to-use modules. The EasyOptics module in catman®AP enables you to accomplish professional data acquisition using optical strain gages.

EasyOptics module ...

... for integrating the SI and DI interrogators with catman®AP

- ___ Parallel recording of data from the interrogator and from conventional strain gage amplifiers (MGCplus, Spider8)
- ___ Comfortable configuration of the interrogator
- ___ Conversion into strain values
- ___ Real-time temperature compensation
- ___ Graphical display and analysis of measurement values
- ___ Data export into different formats (e.g. Excel or ASCII).
- ___ Display of spectrum.

New technology. Proven reliability.

Choose HBM as your partner for optical sensing to secure all the advantages of this innovative technology – and at the same time benefit from reliable test results. We have almost 60 years of experience and know-how in the field of stress analysis and strain measurement – especially with regard to the complete measurement chain.



For more details on the optical measurement chain from HBM visit www.hbm.com/optical

Learn more about the optical measurement chain from HBM at

www.hbm.com/optical

- ___ Data sheets and operating manuals for downloading free-of-charge
- ___ HBM's free white paper: "Strain Measurement with Fiber Bragg Grating Sensors"
- ___ Our popular stress-analysis newsletter with up-to-date application reports and exclusive offers.

Services...

The optical measurement chain from HBM also includes a wide range of professional services. We offer a range of service options and training programs designed to give you optimal support and maximum security:

- ___ On-site installation
- ___ Technical support and individual consultation
- ___ Seminars and workshops of the HBM Academy.



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measure and predict with confidence

