

ICC – 5TH INTERNATIONAL COMPOSITES CONFERENCE

**„PROCESS INTEGRATION OF FIBER-BRAGG-GRATING-SENSORS INTO FILAMENT-
WINDING FOR PERMANENT MONITORING OF FIBER COMPOSITE COMPONENTS”
(FBG-WINDING)**



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Content

- KVB – the company
- Motivation
- Objective of the research project
- Methods of strain measurement
- Sensor integration
- Outlook

Areas of activity:

- Provider for research and development tasks
- Technology and product development for components made of fibre reinforced plastics and hybrid construction
- Material and component qualification
- Design and production of components (carbon-, glass-, aramid-, basalt fibre reinforced plastics, thermoset and thermoplastic matrices)

Company location: Am Fuchsloch 10,
04720 Döbeln
Germany



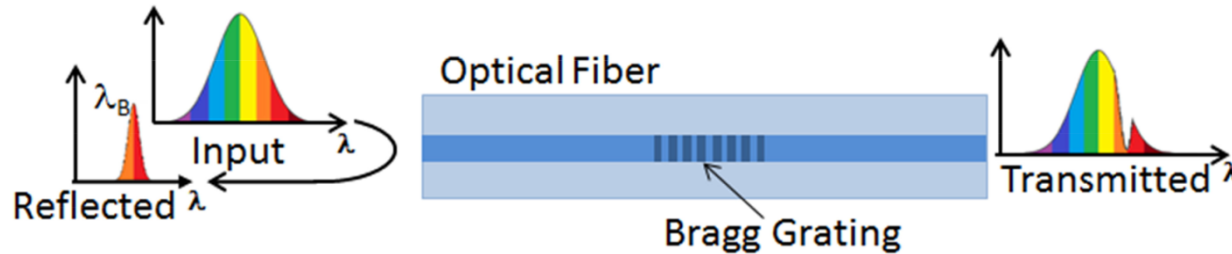
- Detection of defects inside fibre reinforced plastic structures difficult
 - Necessity of regular, cost-intensive maintenance intervals **or**
 - Use of disproportionately high factors of safety



[Quelle: Fakultät für Mechanik, Werkstoffkunde und Ingenieurwesen, Technische Universität Wrocław]

- Possibility for structural health monitoring (SHM) of FRP-components
- Automated and reproducible integration of sensor measuring technology in rotationally symmetric structures
- fibre optic cable placed automatically in analogy to a classic winding process
- Needs-based positioning of sensor fibre
 - Cost reduction
 - Minimal effect of mechanical properties

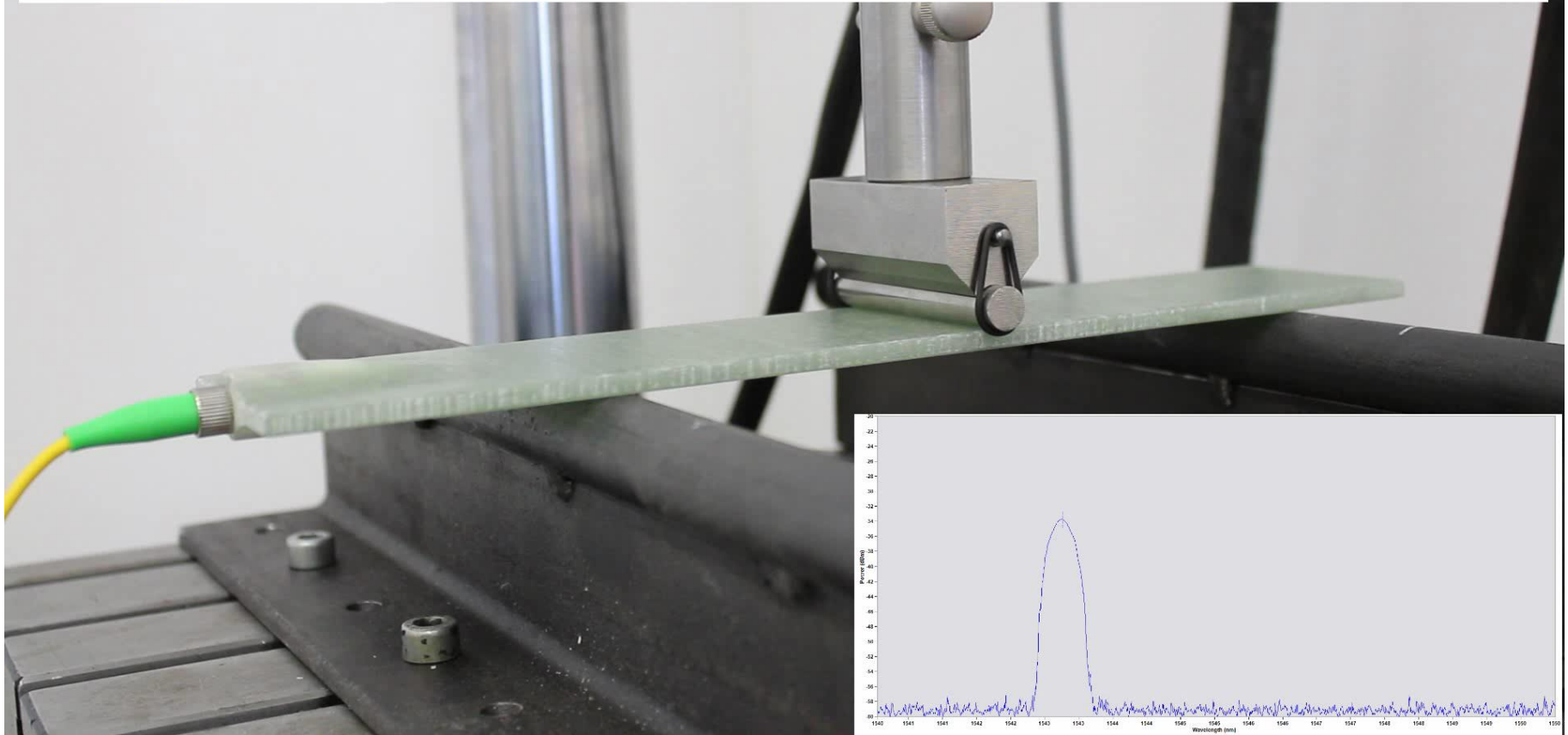
- Measuring principle: reflection of wideband light depending on grating distance



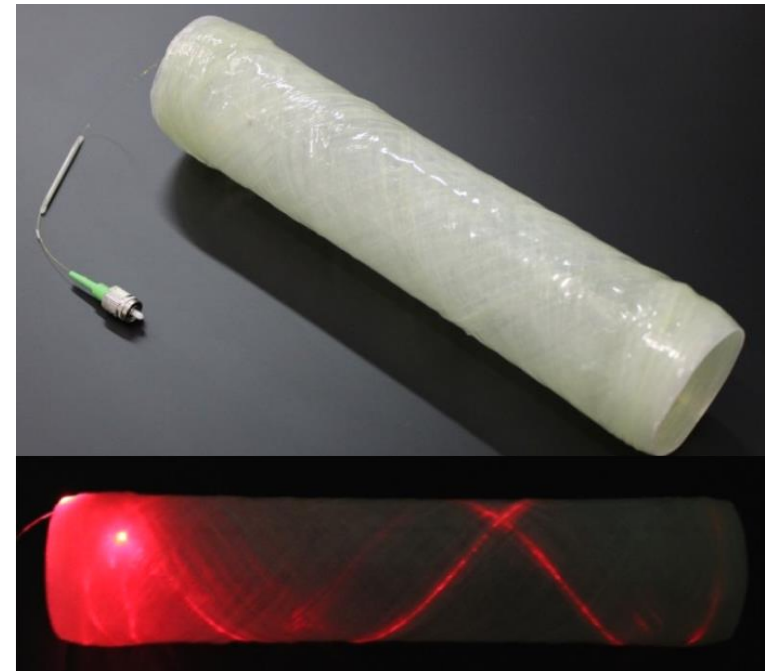
[SmartFiber: First Technology white paper]

- Measured quantities
 - Strain
 - Temperature
- Advantages
 - Multiplexing (up to 30 sensors/fibre)
 - Small design space
 - Small mass

Integration von FBG-Sensoren in FVK



- Automated placement in analogy to a classic winding process
 - precise positioning
 - Suitable for series production
- technical solutions for the in- and egress point of optical waveguide



Potential applications

- Pressure tank
- Hydraulic cylinder
- Drive shaft
- Further ideas?



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