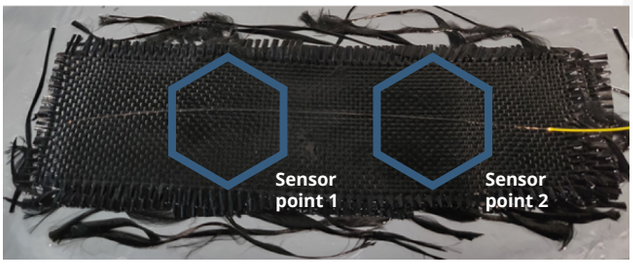
## SHUTE Sensing Solutions A/S was founded in 2015 at the Department of Photonics Engineering at the Technical University of Denmark (DTU).

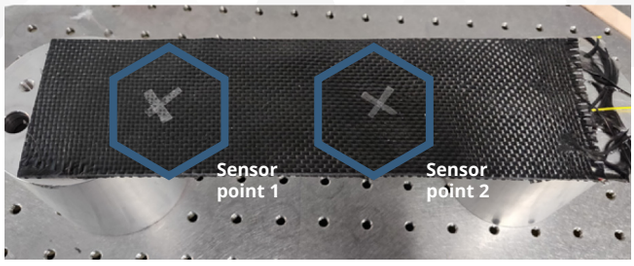
We have developed a novel and unique plastic (polymer) optical fiber sensor system, which enables real-time monitoring of strain/stress, humidity and temperature in points along a hair-thin optical fiber. Hence the name SHUTE.

### Like having "eyes" in the core of composite materials

SHUTE Sensing Solutions A/S has patented the world's first commercial plastic fiber sensor system, which can be placed inside composite elements to act as an internal strain monitor, without compromising the strength of the structure. The SHUTE sensor can measure internal strain during curing, adding more optimizable parameters to the production process. A fully embedded fiber can be used to detect small internal cracks in composite elements, while also being able to monitor the applied strain on the element during operation.

### From guessing to knowing with a SHUTE sensor in the core

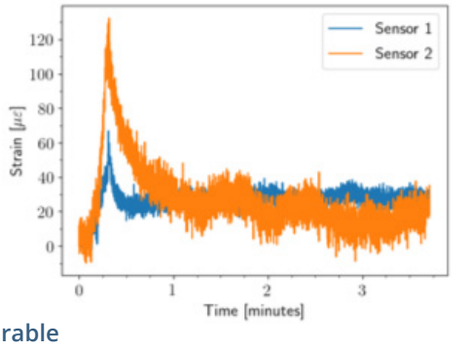



**SHUTE sensor with 2 sensor points in the process of being embedded in the composite material, and on the second picture, fully embedded in the core.**

One of the important disadvantages with composite materials is that internal damage to the core is difficult to detect. The material might have been stressed to 90% of its limit and in the process broken some of the fibers in the material, and even though it from the outside appears unaffected, its core might be heavily damaged and the next time the material will be exposed to strain/stress it will easily fail.

By measuring the internal strain continuously during the subject's operation, you can also use our sensor as a common strain monitor (Figure showing strain response of FBG sensors during manual bend test), which is placed internally in the subject. This can tell if the item has been close to its maximum load during operation.




## SHUTE Sensors

- Are light weight, non corrosive, non electrical conducting, flexible and durable
- Can be placed in the core of the element without weakening the structure
- Can monitor the curing process on several parameters
- Can be used in reference monitoring for identification of internal damage to the structure
- Can monitor real-time internal stress in the structure under operation, even in thick composite structures as the sensor becomes integrated with the surrounding material

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**For more information visit www.shute.dk or feel free to call us on +45 2338 6728 to discuss how SHUTE technology can assist you in optimizing your composite materials.**