

Smart composite components for FRP bridge engineering



ES & 3DSensor: Case Study

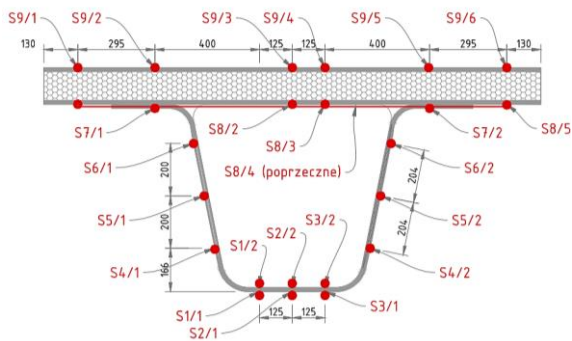
The innovative DFOS-based monitoring system was applied within the first Polish full composite bridge (composite girders + composite slabs). However, the in-situ installation was preceded by extensive research with analogous structural components under laboratory conditions. DFOS strain fibres were installed on the surface of both the girders and slabs. The system's design allowed us to utilise the idea of strain sensing by EpsilonSensor and displacement sensing by 3DSensor.



Benefits of application

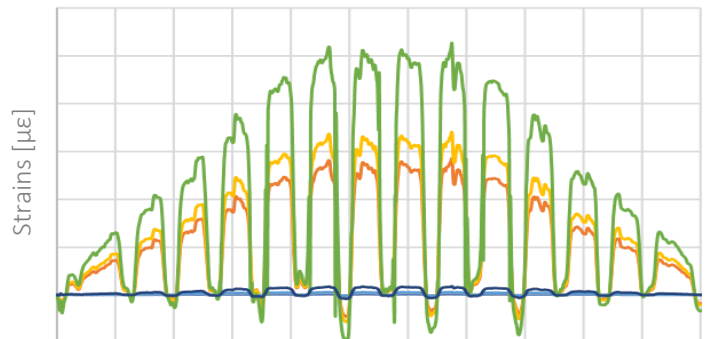
- Simultaneous measurements of **strains and displacements (shape changes)**
- **Thousands of measurements points** within a single element for self-diagnostics
- **Free and complex shapes** of measurement paths for FEA validation
- **New knowledge** on the behaviour of FRP structures (including connections)

Example results



The DFOS-based measurement system was used to verify the FRP components' (girder & slab) structural performance during mechanical load tests. Thanks to the negligible costs of the DFOS fibres, there was no need to limit their number. The figure below summarises example strain results from a sinusoid measurement path, which allowed for the simultaneous analysis of strains over different directions (both longitudinal and transverse).

- 🎯 **24 000** measurement points
- 📏 **240 m** of sensing path
- NERVE **24 x** DFOS strain sensors
- 🕒 **load tests & long-term**



project
partner:



RZESZOW UNIVERSITY
OF TECHNOLOGY

