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Optical sensors watch US infrastructure

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Civil structures will be monitored by new optical sensors using lasers from RIO.

The hundreds of discrete local strain or fracture sensors currently monitoring US bridges, waterways and pipelines could be replaced by optical fibre sensing cables, under a technology innovation programme set up by the US National Institute of Standards and Technology (NIST).

Technology being developed in the Distributed Sensor Technologies joint venture will employ sources from Redfern Integrated Optics (RIO), whose PLANEX sensors are already employed in some civil engineering applications.

"RIO is currently selling lasers in a variety of infrastructure monitoring applications, including civil," Radu Barsan of RIO told optics.org. "The focus of this new programme is to develop a breakthrough monitoring technology for civil structures, in co-operation with our project partners."

PLANEX employs an external cavity laser and incorporates a Bragg grating inscribed in a planar lightwave circuit (see Wider markets beckon for fibre-optic sensors previously on optics.org). This is said by RIO to reduce noise in the laser output, as well as allowing devices to be robust and insensitive to vibration. These will be essential characteristics for sensors intended to watch for large deformations and dynamic overloads in civil structures.

"The sensing technologies envisaged for the infrastructure monitoring programme will exercise and push all of the attributes of RIO's PLANEX technology," said Barsan. "This is an example of an application with extremely demanding needs."

The poor state of US public infrastructure is a cause for serious concern due to neglect over recent decades and the new initiative is a recognition of the scale of the problem. NIST envisages a network of distributed integrated sensor architectures to monitor roadways, dams, water structures and critical public infrastructure.

"The programme is a high-risk high-reward project," noted Barsan. "The biggest challenge will be to seamlessly integrate the multi-disciplinary developments made by the project partners, which range from advanced laser technology to civil engineering."

Those partners include Optiphase, which will develop precision detection instrumentation, and civil structural monitoring expertise from the University of Illinois at Chicago.



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