LUNA

ABOUT HKPU

Industry: Civil
Location: Hong Kong

The Department of Electrical Engineering at the Hong Kong Polytechnic University has been implementing field projects at MTR Corporation employing Fiber Bragg Grating (FBG) sensor arrays for temperature and strain measurements on rail tracks, train wagons and bogies. FBG sensors have been monitored using FBG interrogators developed and manufactured by Luna.

Hong Kong Railway

The Challenge

Luna's technology played an integral role in a project conducted by The Department of Electrical Engineering at the Hong Kong Polytechnic University. By incorporating an optical sensory nervous system into various parts of the railway networks, HKPU hopes that turning conventional railway systems into "smart railways" will improve the safety, reliability, and efficiency of conventional railway systems.

The Solution

The FBG sensors are used to monitor important railway subsystems, allowing for maxim network capacity and optimization of electricity utilization, as well as effective detection of potential operational hazards to enhance overall service safety and quality. All FBG sensors are connected to Micron Optics FBG interrogators. One such location is n the MTR depot at Ho Tun Lau. These interrogators provide information on axial counting and derailment prevention in addition to train identification and scheduling.

Axial Counting and Derailment Prevention

- Axial counting to ensure the same number of cars entering and leaving the tunnels.
- Wheel weighing system to flag unbalanced load which may cause train damage or even derailment.

Train Identification and Scheduling

- To identify different types of trains on the railway system by recognizing their unique signature classes.
- To monitor variations in the response of trains for maintenance scheduling.

The Results

The field measurement results together with the experiences gained from these projects demonstrated that distributed use of Fiber Bragg Grating Sensors represents an excellent solution for the realization of smart condition monitoring systems for the railway industry. Resultantly, rail track monitoring systems (for the detection of wheel/rail interface response) are now used by the railway industry. The Hong Kong Polytechnic University is sharing local experiences within Hong Kong as a reference to promote the Optical Monitoring Systems for broad deployment by railway operators/consultants in other parts of the world.

INSTRUMENTS USED

(2) Micron Optics sm130 Optical Sensing Interrogator, (14) Micron Optics si425 Optical Sensing Interrogator; FBG Strain Sensors, HKPU Design, FBG Temperature Sensors, HKPU Design.

FBG Strain Sensor installed on track

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