

Worldsensing launches smart tunnel lining concept

IoT remote monitoring leader announces solution where sensors are pre-embedded in the concrete segments used to line tunnels

COPENHAGEN, DENMARK, DENMARK, September 5, 2022 /EINPresswire.com/ -- Worldsensing, the global leader for monitoring critical and civil infrastructure through wireless IoT technology, has launched a novel tunnel monitoring solution to improve safety in tunneling.

The company's smart tunnel lining concept, unveiled at the World Tunnel Congress 2022 in Copenhagen, addresses a major safety challenge in the construction of tunnels and allows engineers to make data-driven

decisions from as early as the lining construction phase. Tunnels are inherently unstable structures that require careful monitoring during construction, particularly when tunnel boring machines (TBMs) are in use. As TBMs create tunnels, they place concrete linings behind them so the area can be accessed without a risk of rock falls.

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Matthieu Laville, Director of Global Sales at Worldsensing

Until now, the tunnel excavation process must be halted at regular intervals so monitoring equipment can be installed on the inner surface of the linings. Equipment installation can take hours at a time, adding to the cost and complexity of tunnel projects. Plus, it entails a degree of risk since engineers need to work on sections of the tunnel that do not have monitoring equipment in place.

Furthermore, the monitoring equipment installed during



Worldsensing Tunnel lining solution



Worldsensing company logo

construction must often be removed before the tunnel enters operation, so the ability to monitor tunnels after they are built is reduced. The innovation launched by Worldsensing addresses all these issues by embedding sensor equipment within the concrete segments installed by the TBM, thereby avoiding costly delays of equipment installation and de-installation.

The embedded sensors allow engineering teams to get real-time data on lining stability from before the tunnel linings are installed. The data is transmitted reliably throughout the lifespan of the lining and can be analyzed using any industry-standard visualization software, improving engineering teams' ability to make data-driven decisions relating to infrastructure safety and integrity.

The monitoring units include a robust Worldsensing [five-channel data logger](#), connected securely to vibrating wire sensors such as strain gauges or pressure cells. The data loggers are housed in a rugged polymer casing that can be embedded directly in concrete, with the casing sitting flush with the inner surface of the tunnel lining.

Tunnel monitoring

During construction, the data logger can send signals to a gateway installed up to 100 m away in the head of the TBM, providing an almost instantaneous, real-time view of tunnel stability from the moment the lining is laid down. All electronic device components are protected with insulating resin, with only the device's Universal Serial Bus (USB) connections left open for configuration purposes. The data logger is powered by batteries that can last up to a decade with no need for maintenance.

This data transmission distance is limited by interference from the TBM but once the boring machine has moved on communications can switch to tunnel-based gateways up to 3 km in a straight line or 800 m around curves. "This innovation represents a major step forward in tunnel boring safety and efficiency," said Matthieu Laville, Director of Global Sales at Worldsensing.

"We can now drastically reduce the delays involved in installing and configuring tunnel monitoring systems, saving time and costs. Because the technology is completely based on wireless there is no need for costly and time-consuming cabling and splicing work once the TBM has moved on."

Simplifying tunnel construction

Laville added: "Embedding monitoring equipment directly into the concrete lining in tunnels is a simple yet highly innovative idea that simplifies logistics during tunnel construction by minimizing the need for later installation work."

Worldsensing estimates the embedded monitoring solution could reduce the time and effort involved in tunnel construction by up to 25%. And the concept can be applied to other types of construction, such as building or installing shafts, concrete slabs, bridge pillars, segmental

bridges, diaphragm wells, precast foundations and columns and beams.

“This launch highlights our commitment to improving safety and efficiency within the construction industry,” said Andy Frost, Chief Product and Marketing Officer at Worldsensing. “We continue working with the sector on other ways to add value through monitoring.”

About Worldsensing

Worldsensing is a global IoT pioneer. Founded in 2008, the infrastructure monitoring expert serves customers in more than 70 countries, with a network of global partners to jointly drive safety in mining, construction, rail and structural health.

Worldsensing is headquartered in Barcelona and has a local presence in the UK, North and South America, Singapore, Australia and Poland. Investors include Cisco Systems, Mitsui & Co, McRock Capital, ETF, Kibo Ventures and JME Ventures.

Press contacts:

Jennifer Harth

Director of Marketing and Communications

+34 93 418 05 85

press@worldsensing.com

Jennifer Kranka Kirschniok

Worldsensing

+34 934 18 05 85

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