FRANÇAIS ENGLISH

cea leti

PEL® 4.0

An innovative, connected cylindrical bushing for predictive maintenance in construction vehicles

What is PEL® 4.0?

The joints in construction machines are equipped with metal sliding bushings that are subject to wear. If the deterioration is too great, the bushings have to be replaced and the machine is immobilized for several hours or days.

This innovative sliding bushing solution includes multi-level wear sensors, an RFID tag and an antenna. The RFID tag enables users to track wear and facilitates predictive maintenance. This innovation is designed to withstand the harsh conditions of construction sites: grease, abrasive environments, vibrations, shock, extreme temperatures, etc.

Applications

- Public works equipment
- Lifting equipment
- Agricultural machinery
- Mining equipment
- Any type of machine with oscillating pivot links that are equipped with metal friction bushings which are difficult to access and/or difficult to see.

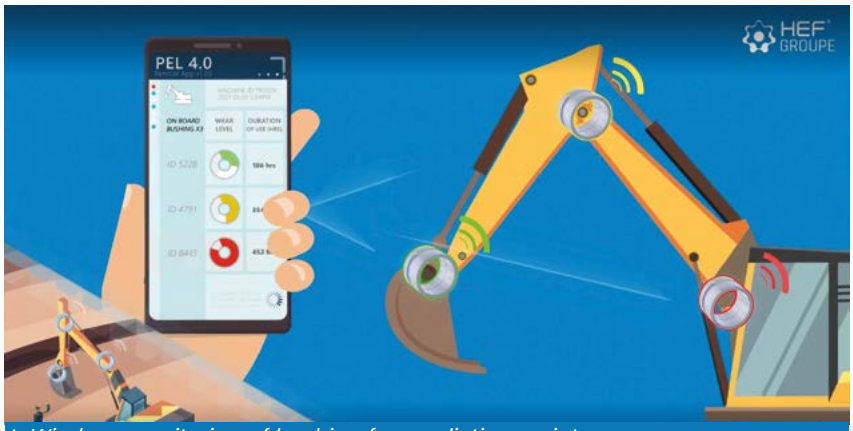
The sensor indicates three levels of wear which make it easier to plan the replacement of bushings and avoid breakdowns. The shift from preventive to predictive maintenance reduces costs and downtime.

Work performed in the frame of the IRT Nanoelec consortium.

NANOELEC.

What's new?

- Battery-free technology, remotely powered by RFID interfacing
- Specific miniature RFID antenna: small size, matches the bushing, optimized for a highly metallic environment (exploits cavity leakage effect)
- Adaptable antenna size according to the type of equipment
- 3 levels of wear for precise monitoring of the bushing's condition
- Can operate in extreme temperatures, from -196°C to +80°C



▲ *Wireless monitoring of bushing for predictive maintenance*

What's next?

The technological maturity of this innovation is improving as CEA-Leti continues to collaborate with HEF. Notable advances include:

- A proven ability to read the sensor and it associated RFID tag in complex, highly metallic environments.
- A 3-tier wear tracking system is under development and will be integrated to the sensor and RFID tag.
- Technology transfer to HEF is expected for 2024.

Other industrial wear sensors for complex environments can be developed based on these technological building blocks. A project is currently underway to monitor the wear of large industrial rubber sieves.

Key facts

- Technology under development with HEF, a French sliding bushing manufacturer
- 1 product patent has been filed for the complete bushing design

▲ *Instrumented ring with RFID chip, antenna and wear sensors*

Interested in this technology?

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