



Fact sheet

SONIC SENSE – THE SMART SOLUTION TO RAILWAY CURVE SQUEAL

Automated Acoustic Detection and Intelligent Control of Corrective Actions for Tramway and Urban Rail Networks

Background

Railway curve squeal is a major source of noise pollution for residents living near urban guided transport systems, particularly in densely populated residential areas. Generated by wheel-rail interaction on tight curves, this phenomenon can reach 96 to 100 dB(A) at just 3.5 metres from the track, leading to recurring complaints and a significant impact on quality of life.

In the Lyon metropolitan area, a transport operator commissioned VIBRATEC and SITES to:

- Acoustically characterize the phenomenon on several critical curves.
- Assess the effectiveness of rail lubrication as a corrective measure.
- Develop an automated detection system. Combining the expertise of SITES and VIBRATEC, the Sonic Sense sensor is capable of automatically triggering corrective actions in real time.

This presentation will highlight the key findings of the measurement campaign, the limitations of conventional solutions, and how Sonic Sense provides an innovative, traceable and proactive approach.

Why Is Curve Squeal Such a Challenge?

- High noise levels: up to 100 dB(A)—equivalent to the sound of a chainsaw—in urban environments.
- High occurrence rate: up to 100% of train or tram passages may generate squeal on untreated curves.
- Weather dependency: strongly influenced by ambient humidity, with most events occurring during the morning.
- Limitations of existing solutions: manual rail lubrication can reduce noise by 15 to 20 dB, but its effectiveness is difficult to guarantee without supervision due to clogged lubricators or incorrect positioning.
- Extended applications: Sonic Sense can also be deployed for acoustic measurement campaigns and noise detection studies.

Sonic Sense: intelligent acoustic Detection

Developed by VIBRATEC, Sonic Sense is an intelligent acoustic sensor that:

- Detects 100% of curve squeal events while drastically reducing false positives through a proprietary spectral analysis algorithm based on characteristic frequency bands.
- Automatically activates rail lubricators when squeal is detected.
- Transmits events in real time to the network supervision system (SCADA compatible).
- Easily integrates into existing infrastructure with autonomous IoT, 12V, 24V or 220V versions.



WHY ATTEND?

- Understand the causes and impacts of railway curve squeal.
- Discover an innovative solution validated under real operating conditions.
- Exchange with VIBRATEC experts and end users.
- Learn how Sonic Sense can be integrated into your railway network.
- Anticipate future regulations related to urban environmental noise.

TARGET AUDIENCE

- Tramway and urban rail network operators (e.g. TCL, RATP, SNCF).
- Maintenance and acoustics managers from transport authorities and railway companies.
- Engineers and technicians specializing in acoustics, vibration and IoT technologies.
- Suppliers of rail lubrication and supervision systems (e.g. MOKLANSA).

Public authorities (cities, metropolitan authorities and regions) addressing urban noise pollution.