PRODUCT DATASHEET

IN-SIGHT — Diagnosis as a Service for legacy railway fleets

Executive summary: value proposition, target use cases in metropolitan and commuter rail networks, and estimated return on investment compared to corrective maintenance.

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Audience	Maintenance management, asset management, and operations departments

1. Value proposition

IN-SIGHT transforms fleets without telemetry into monitored fleets, without touching a single vehicle system. External sensor pods capture vibration, acoustics, temperature, and dynamics; the system's intelligence compares every moment of operation against the vehicle's calibrated health profile (Golden Run) and delivers alerts in clear language, with enough advance notice to plan workshop intervention instead of experiencing it on the line.

Indicator	Value
Typical cost per hour of unavailability on the line	€15,000
European fleet in the mid-life range of 15–30 years	40–50%
Modifications to certified vehicle systems	0
Installation time per vehicle (2 technicians)	< 8 hours

For whom	What it solves
Public transport operators with mid-life fleets (15–30 years), OEM warranty expired	First and only health data source for vehicles without TCMS. Full data sovereignty: the operator owns their telemetry.
Third-party maintainers winning contracts without access to train design data	Objective diagnostic tool independent of the OEM, essential for root cause analysis and warranty disputes.

For whom	What it solves
Leasing companies (ROSCOs)	Remote monitoring of the actual condition of the leased asset; quantified evidence for contract reviews and residual value.

2. Target use cases

The following scenarios illustrate the application of IN-SIGHT on two representative network profiles of the Spanish market. They are presented as target use cases, based on public operational parameters of metropolitan and commuter rail networks.

2.1 Metropolitan network — typical TMB profile (Barcelona Metro)

In a metro network, access doors are the most sensitive subsystem: with stops every 60–90 seconds and thousands of daily cycles per vehicle, a single blocked door holds the train at the station and causes cascading delays throughout the line. IN-SIGHT applies *cycle profiling* to each door cycle — the exact time versus pressure curve — and detects slow actuators or increasing friction **before** the door becomes blocked. The maintenance team receives the alert days in advance and schedules actuator replacement during overnight hours, without affecting service.

2.2 Commuter rail network — typical Renfe Cercanías profile

In commuter rail, with long routes at speeds of 90–120 km/h, the dominant risk shifts to the wheel-rail interface**: wheel flats and grease box bearing degradation. A bearing failure in service not only immobilizes the train; it can also damage the axle and the track. IN-SIGHT bogie pods capture the vibrational and thermal signature of each grease box and compare it against the vehicle's golden run adjusted for instantaneous speed and load. Characteristic defect frequencies (BPFO, BPFI, BSF) emerge in the residual signal weeks before functional failure, turning an in-service breakdown into a scheduled bearing replacement in the workshop.**

> **The train as a track probe**
> By geolocating each vibrational event (GNSS), IN-SIGHT also identifies infrastructure defects — degraded joints, track seats — that recur at the same coordinate across different vehicles. The same data serves the infrastructure manager for targeted track maintenance.

3. ROI compared to corrective maintenance

The return is built on three levers: avoidance of unplanned downtime, extension of component life (replacement by condition, not by schedule), and predictable OPEX. Conservative estimate for a typical fleet of 20 commuter vehicles:

Concept	Without IN-SIGHT (corrective)	With IN-SIGHT (predictive)
In-service failures per bogie/doors (year, fleet of 20 vehicles)	8–12 events	2–4 events (early rest of the events)
Average cost per online event (unavailability + rescue + penalties)	€15,000–€40,000	Scheduled replacement: €2,000–€6,000
Preventive replacements by schedule	Healthy components systematically replaced	Replacement based on actual condition
Fleet status visibility	Periodic manual inspection	Continuous, 24/7, with automatic monthly report

If the system anticipates **3–4 online events per year** in a fleet of 20 vehicles, the gross savings (€60,000–€160,000/year) exceed the annual cost of the full fleet subscription. Any additional savings — component life extension, reduction of spare parts inventory, data for negotiation with maintainers — represent direct margin for the operator. The initial deployment (kit + installation + Golden Run calibration) is typically amortized within the first year of operation.

4. Service model

Component	Description
Deployment and calibration (one-time payment)	Fleet architecture design, kit supply and installation, execution of the Golden Run protocol, and baseline validation with the operator's team.
IN-SIGHT subscription (annual, per vehicle)	24/7 access to the dashboard, real-time alerts, monthly fleet health report in PDF, platform support and updates.
Expert analysis (on demand)	For complex anomalies, Ingérop engineers perform in-depth root cause analysis and propose reengineering solutions.

Request a demo or a feasibility assessment for your fleet at **in3-insight.cloud**.