

# Improving Reliability and Reducing Maintenance for ScotRail



## CHALLENGES

Improve reliability.

Reduce time spent in maintenance depots for the Class 334 fleet.

Monitor wheels and wheel bearing condition.

Increase expected lifespan of wheel bearings by at least 25 per cent.

## THE SOLUTION

Retrofit Hitachi's battery-free, wireless Remote Condition Monitoring system across the Class 334 fleet.

Abellio was awarded the ScotRail franchise in 2015. ScotRail provides over 94 million passenger journeys each year, with over 2,300 intercity, regional and suburban rail services a day. The ScotRail network is vital to Scotland's communities, and to the country's booming tourist industry, with more than 340 stations, and just under 800 trains serving Scotland's railway.

## UNNECESSARY MAINTENANCE

Maintenance regulations require the Class 334 electric trains to have all wheel bearings replaced on hard time maintenance schedules every 600,000 miles, whether they need the new parts or not. This means time out of service and sometimes unnecessary maintenance.

The addition of the UK-developed Hitachi system allows the continual monitoring of wheels, bearings and track and should deliver a 25 percent increase in bearing lifespans, due to timely fault identification and monitoring.

## REAL TIME ANALYSIS

Perpetuum wireless sensors use a patented 'energy-harvester' to provide readings to a centralised data concentrator. This information gives a real-time analysis of the wheel-rail interface showing if there's bearing/wheel wear or some damage to the track that could impact on overall safety.

There are already over 10,000 of these sensors deployed by rail operators in England, the USA and Australia which gives over 1.5 billion miles of 'service experience' to learn from. But the ScotRail fleet represents the first time Hitachi has been used in Scotland. Similar technology is already used in aviation for passenger aircraft where maintenance is 'condition-based' and its value in managing train fleets' reliability and repairs is now becoming apparent.

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## PINPOINTING CHANGE

The sensors are mounted onto the wheel bearing cover, where they capture data and transmit to a data concentrator. Algorithms calculate differences in the interface and this alerts the fleet manager when the train is ready for maintenance or of a potential fault developing.

Track officials can also see information which pinpoints changes in condition of the track, allowing prompt repair and subsequently lessening damage to the train wheels.

This hardware will enable *ScotRail* to push out the bearing mileage without compromising on safety. The lifespan of the bearings is expected to increase from 600,000 miles to 750,000 miles and the time the fleet spends in maintenance depots reduced.

Three Class 334 trains were used in the Hitachi pilot on the Scottish rail network, with the whole fleet fitted in 2017.

The *ScotRail Alliance's* fleet director Angus Thom said: "Keeping our trains out on the tracks, delivering a safe and efficient rail service, is essential to our operation. This technology helps our maintenance teams make informed and timely decisions around monitoring repairs and potential problems, so keeping our 334 fleet in optimal operating condition."

Hitachi's Commercial Director Justin Southcombe said: "If fleet managers know what condition a train is in they don't spend time and budget putting it through an unnecessary upkeep and repair programme. 'Condition-based' maintenance means that trains spend more time on the track and customer service is improved."

