

CORROSION CAUSES RAIL ACCIDENT

Corrosion damage causes signal post to collapse

Company

A Railway Company

Region

United Kingdom

Intertek Solutions

Corrosion analysis – visual examination, microscopy, chemical and energy dispersive analysis of X-rays, causation analysis

A railway signal post corroded at the base, collapsed and fell obstructing one rail track and partially obstructing another. A train travelling at 110mph (177 km/h) struck the top of the collapsed signal on the partially obstructed track. The train car sustained exterior damage and did not derail. No human injuries were reported.

Intertek was commissioned to evaluate the cause of corrosion with the findings published in a report by the Rail Accident Investigation Board (RAIB).

You can have total confidence with Intertek’s corrosion analysis to help identify potential issues with aging equipment and prevent unexpected failures / incidences.



The Challenge

Intertek’s corrosion services were sought by the RAIB to ascertain which failure mechanism caused damage to the signal post, the rate of corrosion, the susceptibility of the post to corrosion and whether any coatings had been applied to it in the past.

The Solution

Intertek performed laboratory analyses on the relevant sections of the damaged post and submitted a report of its findings. Visual analysis, hardness testing, optical and scanning electron microscopy, energy dispersive analysis of X-rays and chemical analysis were all performed on the corroded post section.

The Result

Our findings consisted of several key points, which are included in the official RAIB report on page 18 to 21, paragraphs 43 to 51.

- Corrosion was focused at ground-level. Ballast and holding water concentrated around this area were likely to have affected the integrity of the coating system originally applied and increased the posts’ susceptibility to corrosion.
- Rainwater was able to seep through the open top of the post. As no drainage system was implemented, it was able to pool internally at the bottom.
- The bottom section of the post critically affected by corrosion was buried in ballast (seen below) and the visible section (above ground level) remained relatively unaffected. This may explain why the damage was not detected by routine visual examinations.



Hidden corrosion damage of the baseplate

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RAIB's Report Conclusions

Intertek's analyses were taken into account by RAIB and contributed to the conclusions made by the body as to the cause of the corrosion and the evaluation of the circumstances that occurred in the run-up to the incident.



Corrosion damage of the baseplate

The RAIB concluded that the signal collapsed because the base of the post had corroded. It also found that the corrosion was not detected by the routine examination regime, by additional inspections carried out during a resignalling project or during maintenance. The RAIB made several recommendations in its report to prevent a similar incident happening again in the future.



Corrosion damage at the base of the signal post

- The asset management strategy should be reviewed in order to improve examination and maintenance processes.
- A risk assessment process should be developed and implemented that specifically addresses partially buried hollow ancillary structures and their susceptibility to corrosion.
- Examination maintenance regimes for ancillary structures should be reviewed and an additional five key steps added. These were developed following this signal post collapse incident and were designed to consider aspects that may have been overlooked previously and enabled the corrosion of the hollow post to go undetected.
- Competence management processes for personnel involved in structure examinations should be reviewed and revised.

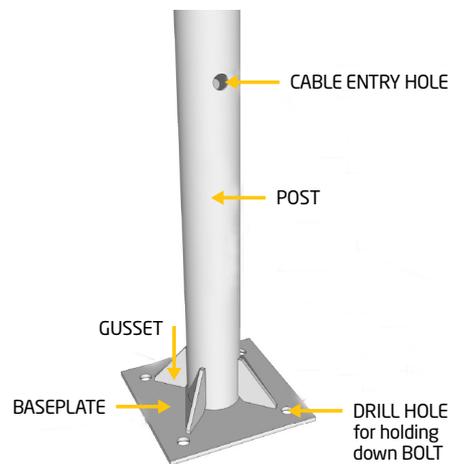
The Actions/Progress

Intertek was commissioned to understand the failure mechanism, the progression of corrosion in the signal post and the nature of the post material.

Since the incident, several actions have been taken to carry out structure examinations including:

- Ensure damage to signal posts is noticed during the inspection processes
- 1,700+ signal posts installed ballast boards to mitigate similar issues where necessary
- Commissioned a retrofit design to strengthen weakened assets
- New examination methodology and report form affecting ancillary assets with visual exams developed

Changes were also made to examining and reporting methods that require examiners to provide more detailed information in their reports, such as a greater number of images. They are also required to examine parts of the structures that were previously omitted from report forms.



Schematic of post and baseplate

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