

CASE HISTORY

Application: **Camera Inspection**

Technology: **Aries Industries BT 9000 series**

Location: **Glenfinnan Viaduct, Glenfinnan, Scotland**

The Glenfinnan Viaduct, famously featured in the Harry Potter movie series, was opened in 1901 after a four-year build using a then pioneering technique called “mass concrete”. This involved the use of concrete which was cast in-situ by means of shuttering and without internal reinforcement.

The bridge is 380m long and 30m high comprising 21 semi-circular spans which support a single-track rail line which runs from Fort William to Mallaig.

Requirement:

An inspection of key parts of the underside track bed was required. This involved drilling 10 x 102mm diameter boreholes horizontally into the top of the arch supports some 3m below the track level, through more than 1m of concrete. This revealed cavities which allowed visual access to the underside of the track bed. Several solutions to imaging the track bed were considered with Robertson Geo offering a camera system which could provide sufficient light to illuminate the internal structure. All borehole operations required the use of rope access from above, at night, the only time when the track was available.

Equipment:

The camera deployed was an Aries Industries BT 9000 series with a bottom and rotatable side facing camera, together with a powerful integrated light source. Due to the known access issues two different surface systems were mobilised for the operation to ensure success.



Management:

The responsibility for the bridge infrastructure lay with Network Rail Scotland and the train operator was ScotRail and together they form the ScotRail Alliance. For the project, these were responsible for track management while BAM Nuttall were responsible for project management and overall health and safety.

Operation:

For the first night, a portable system was deployed from a bogie on the rail track above. This involved moving all the surface equipment up a steep track where it was emplaced in a tent on the bogie (as rain was a possibility).

For the second night it was decided that the operation would be simplified if we utilised a system based on the logging vehicle being located on the ground. Some 250m of cable were hauled up to the track and secured, enabling access to all the boreholes with less equipment at the top.

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For each borehole the roping engineers would set up and drop over the side of the bridge positioning themselves ready for the camera. The camera was then lowered down on a rope and the engineers would insert it into the horizontal borehole. One Robertson Geo engineer managed the recording and the second engineer set up the camera at the borehole. Communication was maintained between the Robertson Geo engineers in order to instruct the roping engineers on where to position the camera. For the second night this was conducted by mobile phone.

Once inserted in the borehole recording was started and the camera was slowly pushed into the borehole until the side camera had emerged into the cavity. The camera was then held steady while the side camera was rotated giving an image of the underside of the track bed. When complete, the camera was withdrawn and hauled back to the rail track level. The roping engineers then climbed back up, rigged down and moved onto the next borehole.

Challenges and Solutions:

- Limited vehicular access in remote location - Two surface systems deployed to cover possibilities
- Horizontal boreholes 30m up - Coordination required with roping engineers
- Working at night - Head torches and portable lighting used
- Infamous Scottish midge swarms - Mosquito hats required
- Overall H & S - Risk assessments, inductions and liaison between all parties, full PPE worn
- Communications - Clear protocols including use of mobile phones
- Coronavirus crisis - Social distancing required throughout

Outcome:

This challenging project was extremely well managed with no H & S incidents throughout. The client was able to see the images in real time for QC purposes and the quality of the images was sufficient for the objectives to be met. All parties were very happy with the outcome given the number of potential problems that had to be managed. Though the work was hard it was a pleasure to work on a project with such a high degree of professionalism throughout.