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An automated system was used to carry out a visual inspection of the cables on a highway bridge in Switzerland

Routine inspection and testing of the cables on a bridge in Saint Maurice was carried out in half the time it would have taken with traditional methods. In addition the work, which took place this summer, enabled restrictions to traffic to be kept to a minimum.

Specialist firm Alpin Technik & Ingenieurservice was employed to carry out a comprehensive inspection of the cables on the cable-stayed highway bridge. The inspection was part of the routine maintenance work on the cable-stayed bridge, one of a pair which were built in 1986.

With the use of advanced technology, all ten stay cables were tested both in the free length and in the anchorage areas. The surface of the polyethylene coating, the grouted parallel wires and the anchors of the individual wires were tested using non-destructive methods and all found to be in good condition.

The work was carried out on the western bridge, which has a main span of 93m and side spans of 32m and 17.5m; its concrete towers rise to 26m height and it has a composite deck of 1.3m depth. It carries the A9 highway over the Rhône River.

To inspect the cable surface, an automated visual inspection was carried out. By using the Atis cable robot with a visual inspection unit for panorama imaging, the inspection was not only carried out more safely and precisely, but also much more effectively.

With a cruising speed of 300mm/s the Atis cable robot records the entire cable surface in high-resolution quality with just one pass.

The data obtained are recorded as a panorama image and presented in a high-resolution format, making it possible to shift the actual assessment process to a desk activity. Not only does this make it independent of weather and lighting conditions, inspectors can carry out the evaluation at their own speed and adapt it to suit their personal schedules and concentration levels. Any damage or irregularities can be commented on, measured, mapped and included in subsequent reports. There is also the option to directly compare results of future inspections directly with the current data, with impact on bridge traffic being significantly reduced.

Without any need for a full closure of the bridge, traffic jams and diversions were eliminated from the process and the bridge was able to operate with just a few minor restrictions. The work took place in the holiday season, hence the lack of restrictions eliminated inconvenience to motorists, and was completed one day earlier than originally planned.

Information about the condition of the wire anchors was obtained by ultrasonic inspection. In order to carry this out, the caps and other mounting parts of the anchors were removed so that the end of the wire, a protruding button head of the parallel wires, could be accessed. This specific non-destructive testing was carried out in partnership with specialist firm DMT.

Any potential internal damage to the parallel wire bundles can be visualised by magneto-inductive cable testing. This inspection device, developed in cooperation with the DMT and Swiss technology agency EMPA, enables reliable, complete cross-section measurement, even for cables with large diameters such as these, which are 250mm. For a reliable saturation of magnetisation, the electromagnetic-powered inspection head is placed in two parts around the cable and passed along the cable with an extra, high-speed fibre rope winch.

Light inspection systems which have lower magnetisation cannot always detect problems such as broken wires inside the cable, and there is the risk that some major repair measures that are necessary are not taken. This has happened in the past on other structures.

Areas where the cables penetrate through the structure also require special attention, since they are difficult to test. In the case of the Saint Maurice Bridge, a 6mm endoscope with a movable inspection head was used to examine the condition via the circular gap. These tests were carried out using rope access technology in a short time with the minimum of traffic restrictions.

As a maintenance measure, technicians applied Atis Cableskin at wear points of the transitions of the PE-coating. This material, which is based on butyl rubber, protects the cable from ultra-violet light and corrosion. It was developed specifically for cables and pipes and it has been awarded official European Approval.

With a tested lifetime of more than 60 years and made of 100% recyclable material, Atis Cableskin is very sustainable both for the environment and for resources. In common with Germany and Norway, Switzerland is also working to bring efficiency and sustainability to the maintenance of its cable-stayed bridges.

All work was carried out in just eight days – by traditional methods this would have taken an estimated 16 days – and only a temporary restriction of one lane was necessary ■