Monitoring to secure the Ile-de-Ré Viaduct, France

Stéphane JOYE

Sixense Monitoring, Nanterre, France

Marcel De Witt

Sixense Monitoring, Bruxelle, Belgium

Contact: stephane.joye@sixense-group.com

Abstract

The Ile de Ré viaduct is cantilever bridge made of 6 independent viaducts to link the Ré island to the city of La Rochelle in France. Built in 1988 its length reach 2926m.

Unfortunately the viaduct experienced in 2018 a failure of one of its external post tensioning tendon. The Department de la Charente, owner of the bridge asked Sixense and Freyssinet to secure the structure in order to enable the replacement of the broken tendon. This securing operation consisted in 3 phases: Ultrasonic inspection of the cables anchorage zone, installation of acoustic monitoring and finally strapping of the group of cables together.

The objective of the ultrasonic inspection is to qualify the current state of degradation of the anchorage. Indeed, the cause and location of cable failure was known to be a few meter behind the anchorage head because of corrosion due to poor injection of cement grout inside the cable duct.

Once the current state is qualified, the acoustic monitoring allowed to detect remotely any future failure of wire from the tendons. Any overpassing of the maximum allowed broken wire or any acceleration of failing wire would stop the progress of the cable replacement job.

Finally once the way was secured by ultrasonic inspection and equipped with acoustic monitoring, the external post tensioning cables were strapped by group in order to prevent any whipping effect that would hurt the operator in case of cables failure. The quantity, strength, and location of straps has been carefully calculated with dynamic load cases.

Thanks to this monitoring securing of 85 anchorages, the broken cable and three additional cables in poor state were replaced between 2019 and 2020 allowing the securing of the whole viaduct.

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