The 42 bearings are being installed using 12 high-tonnage hydraulic cylinders and a PLC system

SLOW AND STEADY

A staged synchronous lifting method is being used to increase the seismic resilience of a nearly 2km-long viaduct in Italy, writes **José María Sánchez de Muniáin**

Dozens of existing bearings on the Savio Viaduct are in the process of being replaced, with works taking place at varying heights and in confined spaces.

Located between km 168 and km 222 of the E45 highway in the region of Emilia-Romagna, approximately 25km south of the city of Cesena, Savio Viaduct spans a narrow, winding valley above the Savio riverbed. The 1,890m-long bridge comprises 20 spans, each ranging from 85m to 110m in length and supported on 19 piers which vary in height from 7m up to 60m. It follows a reverse-curve horizontal alignment (S-shape) together with a longitudinal alignment defined by a continuous gradient along its length.

The viaduct is undergoing a major intervention to replace all existing bearings and introduce modern seismic-isolation capability. The existing bridge bearings – 42 units in total – are being removed and replaced with a combination of unidirectional, multidirectional, and friction-pendulum seismic isolators. Works are being delivered by Mavi for ANAS, Italy's national roads authority.

The bearing and isolator replacement programme began in July 2025 and is being executed pier by pier. Each pier must be temporarily relieved of load at its deck ends so the old supports can be removed and the new isolators installed.

The retrofit involves the installation of several bearing types, with each abutment housing one unidirectional and one multidirectional bearing, each rated 12,000kN. At Piers 1 and 19 there will be four multidirectional bearings per pier, each 25,000kN, while the remaining 17 piers will each carry four 25,000kN friction pendulum isolators.

Contractor Mavi designed, produced, and supplied 10 bearings – the two abutment bearings and eight multidirectional bearings – and the remaining friction pendulum isolators were supplied by FIP MEC.

To lift the deck, Mavi is operating 12 high-tonnage hydraulic cylinders with 600t capacity, controlled through the Enerpac EVO multi-point synchronous system. Typical loads at the end of each span vary considerably across the structure, reaching 1,224-6,300 tonnes at Piers 17 and 18, and approximately 6,600t at Pier 6.

The EVO system enables synchronous lifting of both span ends supported on a pier. It regulates cylinder pressure, reads stroke sensors, and controls deck movement within 10-12mm, allowing the deck to be raised, held, and lowered in a controlled sequence without inducing undesirable torsion or flexure. The synchronous lifting method was selected to handle the viaduct's high, asymmetric reactions and to ensure precise, coordinated movement at each pier.

The operations are challenged by a highly constricted workspace on top of the piers, which comprise hollow caps only 95cm in height that limit access and manoeuvrability for heavy hydraulic cylinders and equipment.

Another challenge regards the transportation of the hydraulic cylinders between piers. Although 12 cylinders are required for each lift, the intermediate scaffold platforms cannot support all cylinders at once. As a result, Mavi developed a staged equipment-transfer method: after deployment at the abutment, an electric trolley with a 1t capacity transports two cylinders – each weighing 500kg – between piers without exceeding the scaffold's capacity.

At the time of writing (*December*), both shoulders and one pier had been successfully lifted, had their bearings removed, and had new isolators installed. No unexpected issues have been encountered during the lifting operations to date, and the methodology is being replicated progressively along the structure ■

Crawler cranes advance Juneau Creek Bridge

Two Liebherr LR 1300.1 SX crawler cranes are playing a central role in the construction of Alaska's 290m-span Juneau Creek Bridge, the signature structure of the Sterling Highway upgrade between Anchorage and the Kenai Peninsula. Working from opposite sides of the deep Juneau Creek Canyon, the cranes are being used to lift and position the heavy steel girders that form the bridge's superstructure.

The Juneau Creek Bridge is being delivered by the Alaska Department of Transportation & Public Facilities, with bridge design completed in-house by DOT&PF and construction by the QAP-Traylor Joint Venture.

The girders are assembled on one side and then pushed across the canyon using a hydraulic launching system, avoiding the need for scaffolding in the rugged, inaccessible terrain.

The LR 1300.1 SX's Gradient Travel Aid, which continuously calculates the crane's centre of gravity and provides real-time slope data, has proven key for safe travel across the uneven site, where operators face steep slopes, challenging access and wind gusts reaching 64km/h during picks.

Construction of the Juneau Creek Bridge is scheduled to finish in 2027.