



**GROUND
ENGINEERING**

December 2020



RAIL BRIDGE RETROFIT

Piling for Mississippi rail
bridge rebuild continues



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Award for Digital Innovation

Winner: ETS for Miret

ETS is an engineering company with a background in the railway industry. Its Management and Identification of the Risk for Existing Tunnels (Miret) philosophy is an approach for the digitalisation and digital management of existing tunnels.

Operating on an infrastructure part of the main France-Italy railway links, Italian railway infrastructure manager RFI identified the need for a fast and reliable assessment of the lining conditions of tunnels. This would help with the design and planning of maintenance activities.

RFI approached ETS for inspection and planning activities along 25km of rail tunnels. Inspections had to be carried out on a live line with only short closures possible at night. RFI also needed objective data and evaluation to speed up discussion among the stakeholders – the owner, testers, designers and contractor.

ETS overcame the problem by using its Miret approach, which integrates innovative equipment, technical know-how and a digital approach.

The approach includes Archita, an ETS system for the multi-dimensional mobile mapping of tunnels that integrates a laser scanner, georadars, linear and thermal cameras.

These are mounted on a service train with a survey speed of between 15km/h and 30km/h. Archita moves the inspection phase from the field to the back office.

The digitalisation is performed from 3D point cloud to CAD and IFC, with a good level of information from the integration of high definition photographs, radargrams and thermal images.

ETS also implements artificial intelligence (AI) for the detection of defects from the high definition images from Archita linear cameras. The objectivity of the data is achieved by using the photographs and a digitalised as-built tunnel in a common data environment.



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The environment enables survey comparisons or the use of digitalised existing surveys to check the history of a tunnel and the effectiveness of the interventions. An activity previously performed only with technical drawings and reports based on subjective data has been automatised and digitalised.

Miret has already been used successfully for surveying, diagnostics and maintenance planning for tunnels on the Genova to Ventimiglia railway line in Italy. The Archita survey obtained the geometric digital twin of the tunnel and the high definition images for the defects detection in just two nights of line closures. This meant more data, integration and objectivity in less time.

The digital development of the Miret approach and the Archita technology has also helped improve safety and security for workers during surveys and provides users with objective, clear and repeatable outputs.

The judges believe the winner presented a practical application of technology, which enabled better inspection, better recording and improved productivity.

They said the solution reduces human error and removes a tedious activity allowing a competent person to look at the real issues.

“They showed integration of several technologies to provide image based and AI interpretation of these images – specific application was tunnel condition assessment methodology,” the judges added.

“Good supporting images highlighted the interpreted images. A consistent approach allows the state of the structures to be compared exactly and with certainty, thus ensuring an appropriate and proportionate maintenance regime.

“They showed good mitigation of safety, health and environmental risks, and it had many other possible applications.”