



Project summary

Organization:
Italferr S.p.A.

Solution:
Bridges and tunnels

Location:
Serravalle, Alessandria, Italy

Project playbook:
Bentley LumenRT™, Blynscy®, iTwin®,
OpenRail™, OpenTunnel®, ProjectWise®

Project objectives

The 53-kilometer Tortona-Genoa railway under development will greatly reduce travel times and improve trade from Italy to Europe and Asia.

Rail developers wanted to improve asset monitoring of the seven-kilometer Serravalle Tunnel to ensure safe and reliable operations.

Italferr used Bentley applications to create a digital twin of the tunnel, enabling them to automatically detect wear while retaining their existing workflows.

ROI

While traditional methods would have required an estimated 1,664 hours to survey the tunnel over two years, Italferr's system cut the time required to 1,400 hours.

Italferr revolutionizes tunnel maintenance with a digital twin

Bentley applications help to identify tiny defects before they grow into larger issues

Improving trade with a new rail artery

As part of efforts to improve economic growth throughout Europe, the 53-kilometer Tortona-Genoa high-speed railway will connect Italy's Ligurian coast with the industrial regions of Piedmont and Lombardy. When completed, the EUR 6 billion railway will dramatically shorten the travel time between Milan and Genoa from one hour and 40 minutes to just 50 minutes, as trains will travel at 250 kilometers per hour. The completed railway will be part of the Trans-European Transport Network, boosting the distribution of goods and materials throughout the region by providing an alternative to sending freight through ports on the North Sea. It will strengthen trade between Italy, Europe, and Asia.

As most of the terrain along the path of the railway is mountainous, a majority of the rail—36 out of 53 kilometers—will be tunnels. This challenging environment significantly slowed development of the project, which was originally proposed in the 1990s. Construction finally began in April 2012, but progress was gradual. Finally, with the help of a boring machine, workers broke through all parts of the seven-kilometer Serravalle Tunnel, completing a critical connection. Though for the developers of the project, numerous challenges associated with the Serravalle tunnel remained.

Keeping a critical link safe

Tunnel maintenance is crucial for safe, reliable rail operations. No matter how well-designed and well-constructed a tunnel can be, time and use can

cause its structure to weaken. Regular maintenance is a must, as tiny cracks and leaks can grow into significant issues. In the worst-case scenario, tunnel repairs can become so technically complex that they run the risk of shutting down an entire section of railway for months, causing significant disruptions to commerce and quality of life. Though the railway had not yet opened, the operators looked ahead and wanted to make certain Serravalle Tunnel operated as safely and smoothly as possible.

They turned to Italferr, a company with over 30 years of experience in rail engineering and large infrastructure projects, for a pilot project to improve condition monitoring for Serravalle Tunnel. The objective was to research and implement an advanced digital system for monitoring tunnels that could automatically detect defects. "Through the use of laser scanners and artificial intelligence algorithms, [Italferr] is trying to make the automated detection of structural defects possible, with the aim of reducing inspection time and increasing the accuracy of analyses," explained Luca Dominici, head of BIM construction and field at Italferr.

However, to meet the goals of the project and ensure continued tunnel operations, Italferr needed the right tools to identify damage and distinguish it from dirt. Initial tests with other software became frustrating, as they operated in proprietary formats and could not manage large amounts of data efficiently, which slowed analysis and monitoring.

Connecting teams with a digital twin

To overcome previous limitations and work in an environment that could be easily integrated into the existing workflows of each discipline, Italferr turned to Bentley applications. They started with ProjectWise to establish a connected data environment and eliminate any difficulties with data management. By using iTwin, OpenRail, and OpenTunnel, they created a digital twin of the tunnel, providing a strong environment for accurate analysis. “Thanks to OpenRail and OpenTunnel, it was possible to model the tunnel project precisely, creating a digital twin that can support predictive maintenance and model the as-built tunnel to allow continuous monitoring of structural conditions,” elaborated Dominici.

With the digital environment in place, Italferr used iTwin Capture Manage & Extract to collect and process data from laser scanners and 360-degree images, allowing for smooth management of the tunnel’s point cloud. The team developed advanced algorithms to automatically recognize structural defects or other deviations from the original design that required corrective action. “Through artificial intelligence techniques, the system was able to identify defects and anomalies with greater accuracy than traditional methods and the human eye, significantly reducing

the time needed for inspections and improving the quality of the data collected,” said Dominici.

Comparing the design to the current state

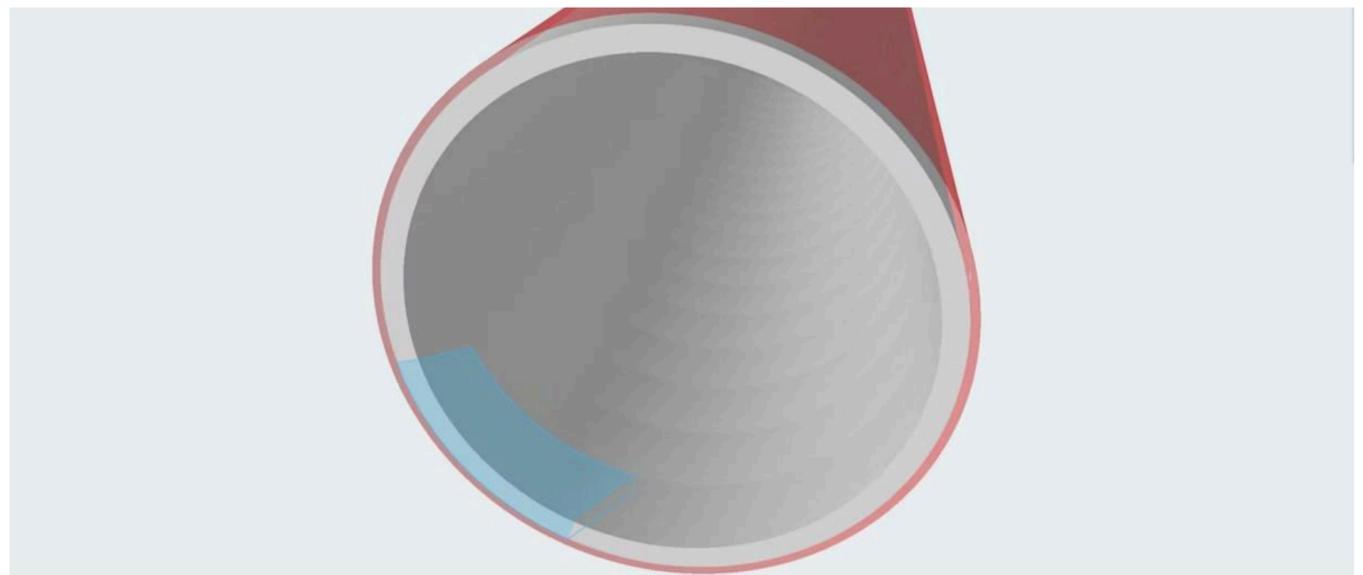
By creating two digital models—one in the design phase and one as-built—Italferr made it easy to create a detailed comparison between the design status and the actual state of the tunnel, identifying any changes and deterioration and helping to optimize intervention strategies. “The introduction of advanced digitization and 3D modeling has allowed [us] to make control activities more agile and reliable, significantly reducing the time normally required for field inspections,” revealed Dominici. While traditional methods would have required an estimated 1,664 hours to survey the tunnel over two years, Italferr’s system cut the time required to 1,400 hours.

In addition to reducing the amount of time needed to survey the tunnel, the process is expected to detect smaller issues faster, so workers can fix tiny issues before they grow into bigger, costly problems. By optimizing maintenance procedures, the railway operators can minimize the chances of problems within the Serravalle Tunnel and ensure that people and freight flow freely across the region.

“

The integration of Bentley software into the Serravalle Tunnel experimentation project represented a paradigm shift in infrastructure management. Thanks to advanced modeling and collaboration between the various digital tools, we have achieved finer control, reduced uptime, and an overall improvement in project quality.

— Rossella de Robertis, BIM Coordinator,
BIM Construction and Field, Italferr



The 53-kilometer Tortona-Genoa railway under development will greatly reduce travel times and improve trade from Italy to Europe and Asia.



Rail developers wanted to improve asset monitoring of the seven-kilometer Serravalle Tunnel to ensure safe and reliable operations.

Find out more at Bentley.com
1.800.BENTLEY (1.800.236.8539)
Outside the U.S.: +1.610.458.5000
Global office listings: [bentley.com/contact](https://www.bentley.com/contact)

© 2026 Bentley Systems, Incorporated. Bentley, the Bentley logo, Bentley LumenRT, Blynscy, iTwin, OpenRail, OpenTunnel, and ProjectWise are either registered or unregistered trademarks or service marks of Bentley Systems, Incorporated or one of its direct or indirect wholly owned subsidiaries. Other brands and product names are trademarks of their respective owners. CS-4064