

IDOM Designs an Extensive Rail System that Will Connect Estonia, Latvia, and Lithuania to the Rest of Europe

Bentley Applications Streamlined Design by Connecting Teams in Numerous Countries and Incorporating Designs from Third-party Applications

CONNECTING COUNTRIES AND COMMUNITIES

Most of Europe benefits from an extensive, interconnected rail network that eases travel between countries. However, the modern European rail network originated in western Europe, and has taken time to build out to the east. Baltic countries Estonia, Latvia, and Lithuania lacked convenient rail access for decades. The Rail Baltica program will finally integrate these countries' rail systems into the rest of the continent. When complete in 2028, it will deliver seamless mobility for people, goods, and services in these countries, accelerating their social and economic development. "Rail Baltica will add the last missing piece to the European rail map, creating massive opportunities for value creation along its infrastructure. It will also shape new passenger habits and opportunities for private individuals," said Borja Manzano, a civil engineer with IDOM, one of the designers of the project.

The EUR 5.8 billion project will total 870 kilometers, with IDOM designing 389 kilometers in six sections, two in each of the three countries. The company's combined work includes 44 railway viaducts, 50 road viaducts, and 15 bridges, one of which, at 1.7 kilometers, will be the longest railway bridge in the Baltic states. In addition to complying with the technical standards for each country, the rail line also had to comply with the Technical Specifications for Interoperability that all integrated rail systems within Europe must follow.

NUMEROUS DISCIPLINES WITH INTERNATIONAL TEAMS

Designing such a large, international project requires the work of over 150 professionals throughout Spain, Poland, the United Kingdom, and other locations. The team must take on an array of civil disciplines beyond the railway itself, including roads, bridges,

structures, drainage, noise barriers, and utilities. Additionally, the project owners requested designs that provide a very high level of detail, including fabrication and assembly information that is accurate in terms of size, shape, location, and orientation. This level of detail would be used as a platform to guide construction.

The sheer size and scope of the project meant that IDOM could not rely on traditional development techniques. "To coordinate the amount of disciplines with their different designs perspectives is a big deal that cannot be possible with traditional 2D workflows," said Manzano. The team realized that they needed to employ 3D modeling to help all teams collaborate and make the complex idea a reality.

IMPROVING PRODUCTIVITY WITH INTEROPERABLE APPLICATIONS

IDOM realized that they could improve both collaboration and visualization on the project by using Bentley applications. They first used ProjectWise to establish a connected data environment, enabling all team members to instantly access the most up-to-date data and documents, no matter their location. With that system in place, teams then used Bentley's Open applications to manage project elements and incorporate content created by third-party applications. "OpenRail Designer has been the core for the development of our 3D railway models," said Manzano. "It is possible to use spreadsheets to enter and manipulate input from other software used by the different project disciplines, generating very productive workflows and carrying out design changes in a very short time."

With the help of the interoperability between Bentley and non-Bentley applications, IDOM created streamlined workflows that defined specific modeling

PROJECT SUMMARY ORGANIZATION

IDOM

SOLUTION

Rail and Transit

LOCATION

Estonia, Latvia, and Lithuania

PROJECT OBJECTIVES

- ◆ To help develop an extensive rail line that will incorporate the three Baltic states into the rest of Europe.
- ◆ To connect multidiscipline teams and incorporate familiar design applications.

PROJECT PLAYBOOK

Bentley Descartes™, Bentley LumenRT™, OpenBuildings®, OpenRail™, ProjectWise®

FAST FACTS

- ◆ IDOM designed 389 kilometers of the Rail Baltica project, including six sections in all three countries.
- ◆ Teams were required to deliver final designs with a high level of detail that would serve as a guide for construction.
- ◆ Bentley applications helped connect multidiscipline teams and provide intuitive visualizations to all stakeholders.

ROI

- ◆ The intuitive visualization had an accuracy of over 90%, preventing significant changes during the construction stage.
- ◆ The electrified line is looking to reduce air pollution by 18.3%, and the route was carefully designed to respect and protect undeveloped areas.



“We were able to guarantee to our clients that we could provide better design solutions that, when translated into the construction phase, have not suffered significant changes.”

– Borja Manzano, Civil Engineer, IDOM

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standards for all team members, helping designers coordinate their work. Their productivity was further enhanced via automatization features in OpenBuildings and OpenRail, allowing teams to focus on tasks that added value to the final design. Being able to accurately visualize the project helped IDOM detect and correct clashes, and images and videos created from Bentley Descartes and Bentley LumenRT helped all stakeholders understand the project and quickly make critical decisions.



Bentley applications helped connect multidiscipline teams and provide intuitive visualizations to all stakeholders.

IMPROVING ACCURACY AND PROTECTING THE ENVIRONMENT

By working within a collaborative environment, IDOM reviewed all aspects of the project simultaneously, leading to improved decisions early within the project. This method saved work hours, improved productivity, and reduced costs. ProjectWise also enabled the team to share documentation with stakeholders in all three countries for quick reviews and decision-making.

Not only did IDOM share accurate information about the project itself to stakeholders, they also incorporated surrounding buildings, nearby traffic, and local species of trees, making the shared information even more informative. The intuitive visualization had an accuracy of over 90%, preventing significant changes during the construction stage, and improved budget forecasts and the bidding process.

“Thanks to the BIM methodology and digital modeling OpenRail and OpenBuilding tools for design and construction, empowered with ProjectWise’s connected data environment and Bentley LumenRT for visualization goals, IDOM has been able to offer a solution that reaches a new level of quality and sustainability in infrastructures management,” Manzano said. IDOM’s design also delivers significant environmental benefits. According to data gathered for Rail Baltica cost-benefit analysis, the electrified line will reduce air pollution by 18.3%, and the route was carefully designed to respect and protect undeveloped areas. The teams included special passages for wildlife across the embankment to minimize the impact on natural habitats and migratory routes.



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