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SIMEM S.p.A., 37046 Minerbe (VR) Italy

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When completed, the nearly 64 km (40 mi) long rail passage of the Brenner Base Tunnel (BBT) will enable all freight shipping, which passes through a gorgeous Alpine stretch in Italy and Austria, to get off the road and instead travel underground by rail. BBT will transform the region by relieving snarling traffic jams while significantly lessening thick air pollution. It will also accommodate high-speed passenger trains and bring greater economic development opportunities to the area.

With transnational commerce and Alpine tourism depending on an efficient train line, all eyes will be on Isocell Precompressi SpA as it helps create the Italian side of the tunnel. The Italian prefabrication company is producing the precast tunnel segments that serve as a critical physical framework: concrete structures which prevent the tunnel from collapsing.

Tunnels support massive amounts of weight, so the concrete that forms those liners must be of an exacting standard. The concrete also must arrive on time. Facing tight deadlines and needing substantial amounts of quality concrete, Isocell selected Simem SpA as its concrete batching plant partner. Isocell recognized that the concrete production equipment manufacturer would easily meet the demands of such a highpressure job. "We did a long selection process because a concrete production station was extremely important and we had identified in the beginning that we needed a professional partner that is used to working big projects," said Francesco Losciuto, owner and general manager of Isocell Precompressi SpA. "In the end, we recognized Simem SpA would be able to respect the timing and demands of the construction and be quickly on site, if needed."

Big project, large responsibilities

There's no denying the vast size of BBT. It will consist of two railway tunnels – northbound and southbound sides – that are each 8.1 meters (26.5 feet) in diameter. It will have six communication tunnels, two passing tracks and a single exploratory tunnel that enables engineers to constantly monitor the structural integrity of BBT. It's not just one tunnel; it's a massive series of connecting tunnels.

Because of the many challenges of an underground dig and construction project of this size, BBT must meet specific construction requirements and include time-tested materials. One such component is a precast tunnel liner, essentially a large concrete circle. It holds the earth around it in place, keeping groundwater in check and serving as the support



Over 400,000 tunnel segments will be produced to complete the Italian side of the Brenner Base Tunnel.



Six segments make up a complete ring with a final diameter of 8.1 meters to ensure safe railcar passage at speeds of 250 km/h (155 mph).

foundation for rail line installation. To place a tunnel liner, a Tunnel Boring Machine (TBM) installs a combination of precast concrete segments to form a ring, immediately after the machine excavates soil and rock. The continuous installation and connection of these segment rings create the tunnel liner. The precast liners needed for BBT will keep an extensive railway humming. An estimated 320 freight and 80 passenger trains will travel daily through the tunnel system, connecting goods and people between Germany, Austria and Italy. Safety is, without question, paramount. The construction standards for BBT - which will cost 8 billion Euros (\$8.9 billion in U.S. currency) to build - are perhaps higher than most any other public transportation project.

Isocell knows it is under a big microscope for its role in the project. "The quality of our job involves many aspects," Losciuto said. "The overall quality of the job is dependent on many items, but the primary item is the concrete strength. It is absolutely the most important part of job quality, especially for such a high-profile project."

Isocell had worked with another concrete batching plant provider on other projects, but the scope of BBT prompted the company to look for a new partner. "We didn't have problems on past jobs with this supplier, but we recognized it didn't have the structure for a project as important as the Brenner Base Tunnel," Losciuto said. "Simem was the wisest choice for us."

Increased quantity right on the job site

For prior projects, the other supplier provided Isocell with three concrete production plants. Those plants created, on average, 500 cubic meters of concrete daily. The BBT project requires at least three times as much concrete per day. "That shows you the dimension of the size and importance of this

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2,000-ton aggregate storage feeds Isocell's two twin mixer plants that are equipped with Xentrix planetary mixers.

project, and the immense production the batch plant had to achieve," Losciuto said.

Set up near the BBT construction site, two Simem concrete precast batch plants create between 800-1000 cubic meters of concrete daily for Isocell. Each batch plant is equipped with two mixers, providing Isocell with four mixers in total. The batch plants have the capacity to produce as much as 2,000 cubic meters and can discharge simultaneously into two delivery trucks. The speed and convenience of the batch plants enable Isocell's five trucks to quickly transport the wet concrete to where the tunnel segment molds await pouring.

"Thanks to Simem, we do not waste time," Losciuto said. "All the production lines are feeding the trucks in a timely and correct fashion. And if there ever was a problem with one mixer, the other three can support the quantity of concrete needed."

A partner that ensures success

Isocell didn't need just an increase in quantity. It also sought quality concrete. Simem has succeeded here, too, meeting Isocell's need to deliver the highest-caliber concrete.

"The quality in concrete is important on any project," Losciuto said. "What is different here is the total control and total traceability required for this particular job. For every concrete batch used on the Brenner Base Tunnel, we must document and demonstrate perfect compliance with project standards and regulations. With the Simem@tic 3.0 batch plant automation, in combination with a process management system, every single detail is under control and documented. This full traceability in the production process is better than any other project we've worked." It's imaginable that a project the size of BBT will have errors and cost overruns, but Isocell is confident the work will stay on time and within budget because of its ability to totally control the concrete batching process. Losciuto added: "With all the batching plants we are using, the Simem plants are for sure the best ones in terms of efficiency and control."

Expectations for BBT run high. Traffic congestion has choked the Alps for years and would show no sign of improving if not for the tunnel. Scheduled to fully open by 2026, the tunnel will drastically improve the flow of goods and train passengers. But that is the future. For now, the work continues at a hectic pace. The demands of the project - the need to install only the strongest tunnel precast liners - are not lost on Isocell.

"If we fail here, we fail as organization... and failure is not an option," Losciuto said. "Because of our partnership with Simem, we are confident we will not fail."

FURTHER INFORMATION



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- Tunnel segments for the Brenner, the Follo Line and the Metro Quito
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- Hydro Dam construction on five continents
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