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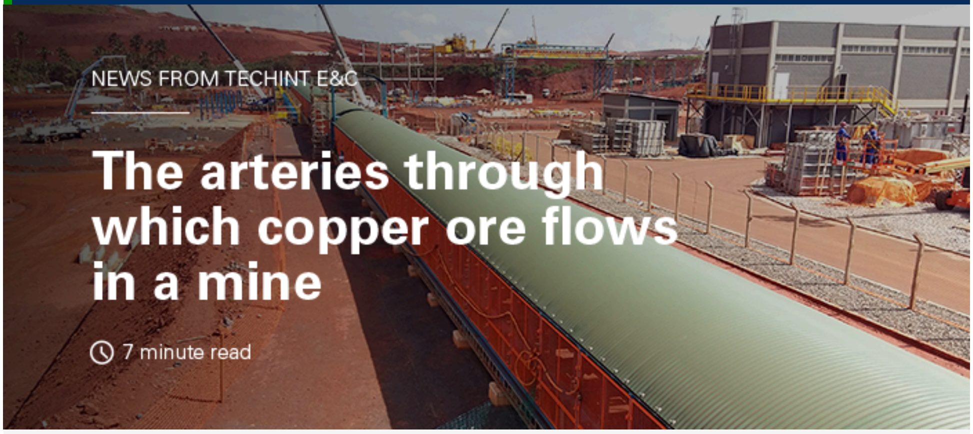

NEWS FROM TECHINT E&C

The arteries through which copper ore flows in a mine

7 minute read

The copper triangle formed by Argentina, Chile, and Peru is set to attract potential investments totaling USD 138 billion over the next 5 to 7 years, spread across 42 projects. What the aggregate figures do not show is the challenge that arises when several of these projects begin construction simultaneously.

In Chile, where the project pipeline consists mainly of brownfield projects, clients themselves are already assessing that risk. Discussions today are not about whether the projects will materialize, but rather about the actual capacity and resources needed to execute them simultaneously. In Argentina, the equation is even more complex, as the country lacks a developed mining industry, the projects are located in remote areas without adequate access, and, furthermore, they are competing for the same resources as the Vaca Muerta oil and gas sector.

All these projects respond to the growing global demand for copper, driven by economic growth, the energy transition, and AI. However, they face an additional challenge: declining ore grades in mature deposits (currently between 0.4% and 0.8%). This requires extracting and processing more material to obtain the same amount of copper, making the transportation system a key factor in the project's economics, from both a CAPEX and OPEX perspective.

In this context, it becomes crucial to determine how all the material will be transported between the different stages of processing, and this is where conveyor belt systems take center stage. Their design not only dictates the construction schedule and the required investment but also determines operating costs and production capacity for decades to come. For the client, this is one of the most critical factors.

The Challenges of Adapting to the Local Context

Those who have carried out projects on the scale currently planned for the region agree on three areas where plans often run into complications:

- **The route and the terrain.** Large-scale transportation systems operate under continuous vibration and extreme loads, and their economic viability depends on variables that are defined very early on: the topography of the route (how many changes in direction, what type of ground movement is required), the bearing capacity of the terrain supporting the conveyor belts, the crushing stations, and the transfer towers. In seismic zones—and much of the Andean pipeline network falls into this category—these variables become critical. Some projects were ultimately deemed unfeasible in their initial configuration because these parameters were not properly defined during the pre-feasibility and feasibility studies.

- **The trade-off between capacity and energy consumption.** At high altitudes, where energy costs are structurally higher, decisions regarding drive systems and conveyor belts impact the project's economics throughout its entire lifespan. Gearless drive systems offer significant advantages in high-power systems and over long distances; in other cases, conventional configurations may prove more cost-effective overall. The correct choice depends on an early analysis of the expected operation.
- **Lead times for critical equipment.** The market for high-capacity primary crushers for large-scale mining has few manufacturers, and delivery times are long. The design of the conveying system depends on the primary crushers, and if these are not specified in a timely manner, the engineering and procurement plan for the entire plant are affected by the critical nature of this equipment.

A concrete example helps illustrate what is at stake

The decision between transporting ore by truck or by conveyor belts is one of the most significant CAPEX/OPEX trade-offs in the early design of a mining operation. Trucks require maintenance infrastructure (truck shops), roads built to handle steep gradients, high fuel and tire consumption, and a large workforce of operators and mechanics. Conveyor belts, on the other hand, are better suited to complex topography, offer high mechanical reliability, require less human intervention—making them safer—and can be installed in tunnels with smaller diameters. Over longer distances, the economics tend to favor conveyor belts. Some operations even go so far as to build dedicated tunnels to shorten transport distances: the initial CAPEX increases, but the combined CAPEX+OPEX decreases, and the project's IRR improves.

Ricardo Juan, Mining Sr. Director at Techint E&C, sums it up this way: "Using conveyor belts reduces energy consumption—primarily from non-renewable sources—lowers maintenance costs, and increases operational safety; it provides a high level of mechanical availability and adds a high degree of automation to the process."

In addition to these challenges, there are design decisions whose effects are not apparent during construction but rather during operation:

- Systems with insufficient redundancy, where a single failure can bring the entire operation to a halt.
- Poorly designed transfer systems that lead to backlogs, accelerated wear and tear, and constant maintenance.
- Undersized equipment that causes permanent bottlenecks.
- Poorly integrated layouts that necessitate rework or early expansions.

In many cases, these mismatches result in additional investments after launch, or in operations that never reach their design capacity.

Success Stories in Latin America (and Around the World)

In greenfield projects, a well-thought-out design from the outset determines the mine's production capacity for decades. In brownfield projects, redesigning the operation with the right approach can extend its useful life and increase efficiency.

At S11D **Ferro-Carajás**, Brazil, we installed the Truckless system for the world's largest iron ore mining complex. The project included 10 sections of fixed conveyor belts and 2 mobile sections, 7 transfer towers, and 2 mobile tripper spreaders, totaling 31.3 km of conveyor belts, of which 9 km are overland sections, with a capacity of

16,500 t/h.

At **Petacalco**, Mexico, we built a coal import terminal with 14 km of conveyor belts and an annual capacity of 6 million metric tons.

At **Ruwais SHT2**, United Arab Emirates, we constructed the country's largest sulfur handling and export terminal under an EPC contract, with a capacity of 22,000 metric tons per day.

In Peru, we carried out the Feasibility Study for Antamina's W1 Mineral project under the ECI (Early Contractor Involvement) model. The project includes a primary crusher, conveyor belts and transfer towers.

The common pattern: key decisions were made in the early stages of engineering, in consultation with construction teams, operators, and technology suppliers for this type of equipment. That's what streamlines execution later on.

From the equipment manufacturer's perspective, Ignacio Fernández, Managing Director Chile & Peru at TAKRAF, puts it this way: "Mining conditions are becoming increasingly complex as ore grades decline and reserves are found at greater depths. This calls for integrated, efficient, and sustainable solutions to continue producing effectively."

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In a market with USD 138 billion in potential short-term investment and relatively inflexible schedules, the decision on where to deploy execution capacity depends less on available capital and more on who can sustain project development. A well-designed material handling system optimizes upfront CAPEX and defines OPEX for the decades that follow. If poorly designed, it is not solved during production: it is paid for through years of operational inefficiency or through additional adjustment costs that are unlikely to result in an optimal system.

The Latin American mining pipeline is already on the table. What defines each project's performance is what happens between the mine and processing.

Do you want to find out how you can apply this vision to your business?
Contact us for a chat.

See you soon!

The Techint Engineering & Construction Communications team

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