

Rajant Kinetic Mesh® Wireless Network Chosen by SiTech Brazil for Simultaneous Teleoperation of Seventeen Heavy Construction Units



A mining company located in Brazil was dealing with the challenge of simultaneously managing multiple pieces of heavy machinery inside high-risk areas of a dam without any human operators onsite.

A long-standing and important mining company in Brazil has operations around the world. Its mission is to transform natural resources into prosperity and sustainable development. Its mining activity in Brazil centers around the extraction of iron ore.

SITECH Brazil, an experienced and long-term partner of the mining company and Rajant Corporation, designed and delivered a unique solution that met the customer’s needs. They are a worldwide distributor of technology products, and their mission is to promote increased productivity through innovative Trimble and Skydrones solutions.

The Challenge

The collapse of some dams in Brazil required direct and immediate action to address high-risk conditions. For a large iron ore producer in Brazil, reducing the number of people directly involved in the perilous process of dam maintenance and reconstruction was paramount.

SITECH Brazil developed a solution to carry out the entire construction process without any person in the risk area to increase safety.

Remotely covering the entire topography with the simultaneous management of multiple pieces of heavy machinery was a tremendous challenge. According to SITECH Brazil Technical Manager Tiago Barros, “Many times, the work to be done is to cities with a lot of interference. The elevation also varies between the backhaul and the equipment.”

The Dam

- Operating a variety of vehicles and equipment, including dozers, excavators, loaders, and trucks.

The Partners

- **Rajant:** Provides peer-to-peer radio communications enabling data, voice, video, and autonomous applications.
- **SITECH Brazil:** Their development engineering and telecommunications team developed multi-brand solutions and combined Rajant’s ability to achieve results.
- **NEVIL:** Provides a remote operation system able to carry out operations without operators’ involvement in hazardous areas.

Solution Components

- Rajant Kinetic Mesh® private wireless network consisting of LX5-2295C and ME4-2450R BreadCrumbs® placed on heavy machinery and LX5-2455D BreadCrumb on backhaul.
- The NEVIL remote operating cabin and portable transmitter to allow teleoperation of heavy machinery in the high-risk area.

Outcome & Impact

- Simultaneous teleoperation of seventeen (17) dozers, excavators, loaders, and trucks on a single network.
- Multiple tasks are done with no onsite human operators.
- Similar or greater production compared to the method with onboard people.
- Maintain the quality and durability of the technology without impacting the operation.

The Solution

SITECH Brazil successfully separated people for the risks inherent to the work area by dividing overall operations into two zones: Remote Operation Area and Operation Safe Zone.

The Remote Operation Area consisted of seventeen (17) dozers, excavators, loaders, and trucks. The Operation Safe Zone had command center shelters where simultaneous teleoperations and software monitoring were conducted among heavy-duty equipment. Connecting both zones was the Rajant industrial wireless network. The teleoperation software and controls were provided by NEVIL ELETRO MECANICA of Brazil leveraging SITECH Brazil's integration and engineering expertise.

Including the entire construction process without the involvement of people was unprecedented. Programmed drones did the topography survey process of primitive terrain data. Data was collected and worked remotely in software for project preparation. At the conclusion, this data was loaded on machines, such as dozer and motor graders, to perform the accesses in an automated way and at a distance - Operators were 23 kilometers away.

After all accesses were prepared, the excavator loading equipment entered the area to start extracting the material, while transport equipment entered to remove this material from within the area. During the process, drones carried out flights for monitoring and productive analysis of the operation. The Rajant network carried out all communication in the security area, and the entire operation took place without any person at risk.

"The simultaneous nature of operations between machines was and continues to be a feat of safety and productivity. Downtime and risk are eliminated through the machine learning applied to earthmoving equipment. Only a robust, reliable, and redundant wireless network can do this and do it without infrastructure as to go where the work is required," says Tiago Barros.

Far beyond being a specific solution, its technology can be scaled organically and adjusted to other projects seeking to ensure the integrity of human life.

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Rajant is the best communication solution for this operation. Installed in 2019, it continues to perform very well. Since March 2021, no network adjustment has been necessary. The equipment operates 20 hours/day from Monday to Saturday. The customer is very satisfied with the solution and today has plans for more.

— **Tiago Barros**

Technical Manager at SITECH Brazil

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The best part of installing the Rajant solution," Parker added, "is that it is practically one-touch commissioning. It worked as designed from the outset."

The Results

Almost one million cubic meters have already been moved with this equipment, and the work continues. All of this was made possible by a solution that relies on scalability from Rajant Kinetic Mesh® and Rajant's machine-to-machine BreadCrumbs® explicitly designed for mobility.

The fleet included trucks, loaders, dozers, and excavators. With numerous teleoperated equipment working across the Rajant Kinetic Mesh network, SITECH Brazil has 17 operating simultaneously.

As the work continues, SITECH has maintained a stable and productive operation without any people inside the heavy equipment and risk areas. Should any of the dams fail during the decommissioning process, the result is that no lives are lost. An equally significant impact occurs as SITECH is creating a trend that it is possible to carry out 100% automated construction operations without people in accident areas.