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Focused on safety and people, Vale starts operating autonomous trucks in its largest iron ore complex, in Brazil

The technology has already been introduced in another unit, where no accident was caused by trucks in three years of operation

Vale started operating six autonomous haul trucks in the Carajás iron ore complex, in the state of Pará, Brazil. By the end of the year, ten vehicles will be operating at the site. This initiative is part of a set of actions aimed at increasing employee safety, making the operation more environmentally sustainable and obtaining gains in competitiveness. The implementation is being accompanied by a human resources plan to train employees to work with new digital technologies.

Click here to watch a video about the autonomous trucks

Capable of moving 320 metric tons at a time, the autonomous trucks were being tested in an isolated area in Carajás since 2019. Last week they started the final testing phase at the N4E mine and yesterday, September 1st, they officially went live. In the entire Carajás Complex, four autonomous drills are already in operation and by the end of the year this number will get to seven drills.

Autonomous haul trucks parked in the mining area in Carajás. Photo: Michael Roger/ Vale

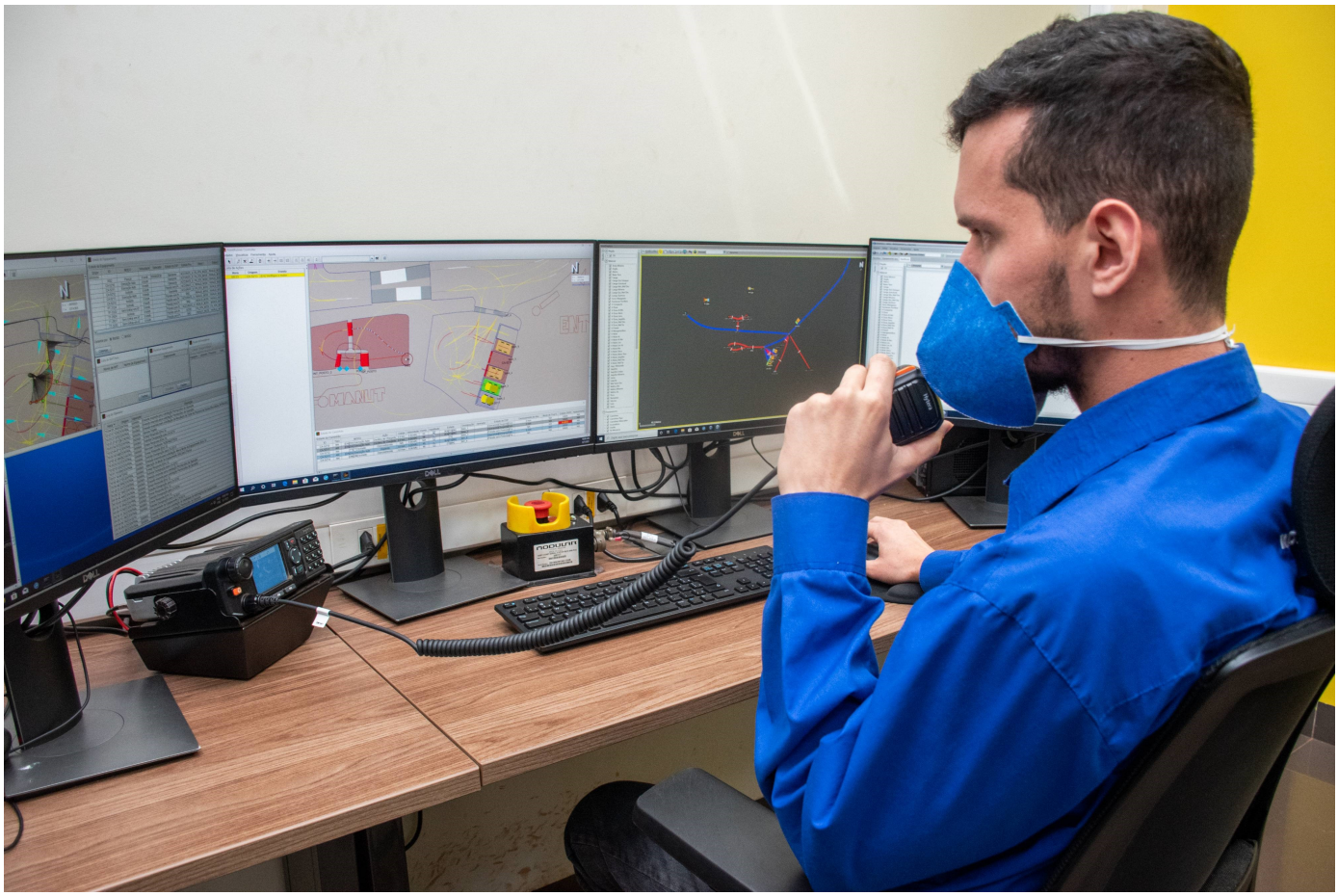
The autonomous operation began to be implemented by Vale at the Brucutu mine, in the state of Minas Gerais, Brazil, in 2016, and today it covers all 13 haul trucks at that unit. Since the implementation in Brucutu, no accident caused by trucks has been recorded.

The autonomous trucks are controlled by computer systems, GPS, radar and artificial intelligence, covering the route between the mining front and the unloading area. Upon detecting risks, the equipment stops its operations until the path is cleared again. The safety system's sensors are capable of detecting both larger objects such as large rocks and other trucks, as well as human beings in the vicinity of the road. Therefore, risky situations, such as tipping and collision, were eliminated.

“The introduction of autonomous trucks in Carajás is another step by Vale towards its ambition to become a reference in safety in mining and towards the goal of reducing carbon emissions by 33% until 2030”, says Antônio Padovezi, director of Vale's Northern Corridor . "Technology reduces the exposure of employees to the risks inherent to the activity and also brings environmental benefits, reinforcing our new pact with society ".

People at the center of decisions

In the autonomous truck there is no operator in the cabin. But people continue to play a relevant role in the operation. Other equipment circulating through the mine, such as motor graders and tractors, will continue to be manned. Therefore, the operators of these vehicles received training to interact with autonomous trucks. 32 operators have already been trained and by the end of the year this number will reach 120. There will be 208 hours of training for each operator, totaling almost 25,000 hours.



Operator in control room far from the mining site. Photo: Michael Roger/ Vale

Over the next 12 months, the operation will be assisted by the truck supplier. After this period, it is expected that Vale fully assumes the operation. When this occurs, new jobs will be created in control rooms, far from the mining front.

“The implementation of autonomous workers in the operation is being carried out with the concern of keeping people at the center of decisions”, explains the manager of the Autonomous Program, Pedro Bemfica. “The introduction of digital technology drives the evolution of employees' professional skills and makes them more prepared for the industry's digital transformation trend”.

Environment and competitiveness

Autonomous operation also brings relevant environmental benefits. The more constant performance of the trucks and the increase in their average speed will allow a reduction of about 5% in fuel consumption, which results in a lower volume of CO2 and particulate emissions. Based on market data, it is expected an increase in the useful life of the equipment of around 7%, reducing generation of waste such as parts and lubricants, and an increased in the life span of tires of approximately 25%, which will also lead to a lower waste generation of this item.

The project also shall lead to an increase in the competitiveness of Vale's operations. There will be greater efficiency, which will result in greater hourly productivity. Maintenance costs are expected to drop by 3%.

Expanding technology

Vale's autonomous program continues to expand, with a total investment of around US$34 million in 2021. By the end of the year, 23 trucks, 21 drills and four stocking yards (stackers and reclaimers) will be in operation throughout the company in four Brazilian states (Pará, Minas Gerais, Maranhão and Rio de Janeiro). Abroad, autonomous operation is already a reality in Canada, with drills and scoops, and in Malaysia, with stocking yard machines.

Innovation for safety

Innovation is key for Vale to improve people's lives and transform the future together with society. In its strategy, the company prioritizes safety, reliability, low carbon agenda and the contribution to society. Safety innovation initiatives have been grouped since 2021 in the Safety Transformation Program, which has three main objectives: create initiatives to ensure safe processes; accelerate the implementation of controls in the operation; and remove people from risky activities using technologies such as remote operations, autonomous and robotics. Within the scope of the program are projects for the implementation of autonomous vehicles, implementation of fatigue detection systems for operators and the use of augmented reality for inspections and maintenance.

More information

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