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## Vale inaugurates pilot plant that allows for more sustainable mining

*Developed by New Steel, which was purchased by Vale in 2018, the technology enables dry magnetic concentration of low-grade ore*

Vale inaugurated yesterday (14th June), in Minas Gerais state, a pilot plant for magnetic concentration of low-grade ore without using water. The Brazilian technology, known as FDMS (Fines Dry Magnetic Separation), is unique and has been developed by New Steel - a company acquired in late 2018. The pilot plant, which cost US\$3 million, is the first step towards the construction of an industrial plant that will have a production capacity of 1.5 million metric tons per year. The investment in this project is near US\$100 million, and the commercial plant start-up is scheduled for 2022.

Vale estimates that, in 2024, 1% of all the company's production will use this technology, whose patent is already recognized in 59 countries. "NS-03 is a semi-industrial plant to carry out tests on a pilot scale with different types of ore, allowing the definition of operational parameters for commercial-scale projects," explains the president of New Steel, Ivan Montenegro.

Installed at Vale's Ferrous Technology Center (CTF), in Nova Lima, (Minas Gerais), the pilot plant is the second to start operating. Between 2015 and 2017, a unit operated at the Fábrica's mine also in Minas Gerais. The good results were fundamental for Vale to see the potential of the FDMS. The unit will be able to concentrate 30 metric tons of ore per hour, using dry magnetic separation technology with rare earth magnets.

"New Steel puts Vale at the forefront of investments in ore processing technology. We will continue to seek solutions that increase the safety of our operations," comments executive director of Ferrous, Marcello Spinelli.

With New Steel, Vale estimates that, in 2024, 70% of production will come from dry or natural moisture processing, without adding water to the process and without using tailings dams. Today, the company produces 60% of iron ore using natural moisture processing. However, by 2024, from the production using wet processing (30%), 16% will have filtered and dry-stacked tailings. Only 14% will continue using the conventional method with wet concentration and tailings disposal in dams or deactivated extraction sites. Thus, Vale will invest US\$1.8 billion in filtering and dry stacking in the coming years. The first units to use the technique will be Vargem Grande complex (in Nova Lima), Pico mine (in Itabirito), Cauê and Conceição mines (in Itabira), and Brucutu mine (in São Gonçalo do Rio Abaixo).

New Steel can deliver a concentrate with iron content up to 68%, from poor ore with content up to 40%, depending on its chemical and mineralogical composition. Currently, this concentration is produced by the method known as flotation, which uses water. In flotation, the tailings are usually disposed of in dams. With the dry concentration technology developed by New Steel, the tailings will be stacked. The company is already studying methods to use them as input for the civil construction industry, in addition to other initiatives, such as co-products.



Pilot plant will have the capacity to concentrate 30 tons per hour of dry ore, using magnetic separation technology, made using rare earth magnets

## Dry Processing

Vagner Loyola, director of Ferrous Metals Value Chain, points out that Vale has been developing technology to increase dry processing for years. Over the last decade, the company invested almost US\$17,8 billion to deploy and expand the dry - or natural moisture - processing of the iron ore produced in Brazil. Over the next five years, we estimate to invest US\$3.1 billion in similar processing facilities to achieve the goal of 70% of dry production.

In Pará, almost 80% of production already uses this technology in the so-called North System. The main plant in Carajás, Plant 1, is being converted to use the natural moisture processing; from its 17 processing lines, 11 already use dry processing and the remaining six wet processing lines will be converted by 2023. The treatment plants at Serra Leste (in Curionópolis) and the S11D complex (in Canaã dos Carajás) do not use water to treat the ore. In Minas Gerais, dry processing was expanded from 20% in 2016 to 32% in 2019. Today, this type of processing is used by several units, such as Brucutu, Alegria, Fábrica Nova, Fazendão, Abóboras, Mutuca, and Pico.

The plants that use dry processing in Minas depend on the availability of high-grade ore - near 60% - that can be found in

some mines of the state. To achieve the required quality and be included in Vale's product portfolio, this ore must be blended with the ore from Carajás - this blending is carried out at Vale's Distribution Centers in China and Malaysia.

Dry processing is associated with the quality of the iron ore from the mine face. In Carajás, as the iron content is already high (above 65% iron), the material is only crushed and screened to be classified by size (granulometry). In some mines of Minas Gerais, the average content is 40% iron in rocks known as itabirite. To increase its grade, the ore is concentrated through processing with water, and the tailings are disposed of in dams. Then, the high-grade ore resulting from this process can be transformed into pellets at the pelletizing plants to increase the added value of the product.

### More information

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