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Ponta da Madeira Maritime Terminal turns 30

Opened in 1986, the terminal is one of Brazil's most important port facilities, and it is preparing to become the largest port operating anywhere in the world

The leader in Brazil's cargo handling ranking, Ponta da Madeira Maritime Terminal (TMPM), operated by Vale in São Luís, in the state of Maranhão, in Northeastern Brazil, celebrated its 30th anniversary on January 6th, and it is preparing to become the world's largest port by 2018. TMPM's vast size surprises visitors: it occupies an area of 600,000 m², three and a half times bigger than Maracanã Stadium in Rio de Janeiro. Between January and September 2015, Ponta da Madeira shipped out 87.9 million metric tons of iron ore, up 13% from the same period of 2014.



TMPM is currently undergoing work to expand its capacity, in order to handle the increase in production arising from Vale's S11D project in Canaã dos Carajás, in the state of Pará, in Northern Brazil – the largest iron ore project being developed anywhere in the world. S11D will add 90 million metric tons to the output of Vale's North System, which encompasses the Carajás Complex's mines. At the moment, TMPM's annual embarkation capacity is 150 million metric tons, but by 2018 it will be 230 million metric tons. This level of throughput will be reached in stages, involving alignment between the capacity of Vale's mines, railway and port. The logistics part of the S11D project, of which the port's expansion is one element, also includes building a 101-km railway branch line and double tracking the Carajás Railway (EFC). Nearly 70% of the port expansion work has now been completed.

The work at TMPM includes onshore and offshore expansion, as well as enlargement of the railway terminal located inside the port. The project's offshore work includes construction of Pier IV's Northern Berth and the installation of two ship loaders, replicating the existing Southern Berth's design. Pier IV's advantage in relation to other Brazilian ports is its ability to accommodate large ships such as Valemaxes – the world's largest ore carriers, 362 metres long and 65 metres wide, and capable of transporting 400,000 metric tons of cargo.

Pier IV's mooring system is the only one of its kind in the world for ships able to carry 400,000 metric tons. Because of the strong tidal currents, the pier has land cables that help to moor ships to the berths. This system enables these giant vessels to operate without restrictions. Each berth has two quadrant ship loaders able to load 16,000 metric tons per hour – the largest of their category in the world. The work to complete Pier IV's Northern Berth and install the new dual quadrant ship loader is on schedule.

The onshore expansion work involves enlarging the port's logistics area, where four new iron ore stockyards, each able to store 600,000 metric tons, are being installed. They will join the port's 11 existing iron ore stockyards. The new stockyards will be equipped with two rotary car dumpers, one stacker, two reclaimers and two stacker-reclaimers. Finally, the construction work at Ponta da Madeira also entails expanding its railway terminal, composed of a locomotive inspection and refuelling station, and a railcar workshop, which includes a rolling stock replacement and maintenance centre.

Modern and safe

Ponta da Madeira Maritime Terminal's iron ore stockyards are equipped with the largest and most modern iron ore stacker-reclaimer machines in Latin America. In all, there are 13 items of equipment, most notably the world's largest stacker, called EP-313K-06, and two reclaimers featuring an automatic system that generates 3D images of the yard. In port operations, the stackers and reclaimers have the function, respectively, of organizing cargo in the stockyards and moving the products to be loaded onto ships.

Reclaimers are large machines capable of moving up to 8,000 metric tons of iron ore per hour. "They have an automatic operation module resource that ensures better operational safety and 11% superior performance compared with the operational modules of other machines," says the Executive MManager of TMPM's operations, Roberto Di Biase.

Reclaimers also possess a CCTV system featuring radars, sensors and software to assist with their control, guaranteeing operational excellence for the embarkation system.

The world's largest stacker moves 16,000 metric tons of iron ore per hour and one of its advantages is that it can simultaneously unload two rotary car dumpers. In addition to being more productive, the equipment's automatic functioning generates intangible benefits for the health and safety of operators at Ponta da Madeira. In terms of the project's capacity, the largest stacker is not so different from the other stackers already in place in the company's stockyards in Maranhão. Its advantage is that it increases the physical availability and usage of equipment, through improvements made to its design, resulting in a higher production capacity.

How TMPM operates:

Operational Control Centre

The efficiency and safety of operations originates in Ponta da Madeira's Operational Control Centre. In real time, this centre simultaneously monitors ship schedules and iron ore unloading, stacking and ship loading operations.

Rotary car dumpers

It is in the unloading area that TMPM's operations begin. Currently, six rotary car dumpers receive loads of iron ore and manganese transported by the Carajás Railway. Each car dumper can unload up to 8,000 metric tons per hour. The railcars are unloaded in the dumpers at a 180° angle. The cargo then goes onto a conveyor belt system, which takes it to the stockyards.

Iron ore stockyards

The storage area is composed of 11 iron ore stockyards covering a total area of 625,000 m², with the capacity to hold 10.5 million metric tons. The yards store iron ore and manganese, which is taken by conveyor belts to the ship loaders. The stockyards now have 13 machines: four stackers, four stacker-reclaimers and five reclaimers.

Interesting facts about TMPM:

- Ponta da Madeira Maritime Terminal is located in Itaqui Port Complex, on the east bank of São Marcos Bay, on São Luis Island, Maranhão. It ships out products such as iron ore and manganese.
- Ponta da Madeira has three piers with a total of four operating berths. The newest one, Pier IV, has a water depth of 25 metres, a 1.6 km access bridge and two berths – the Southern Berth, already operating, and the Northern Berth, under construction.
- In 1985, loading tests began with the Docepolo ship, involving 127,000 metric tons of ore. TMPM started operating regularly in January 1986. That first year, it shipped out 11.6 million metric tons of iron ore.
- Vale has developed a system that makes it possible to remotely operate the stacker and reclaimer machines used to transfer iron ore from the stockyards to ships. This system enables the remote control of machines from the port's Operational Control Centre.
- TMPM uses advanced mathematical models to simulate the mooring behaviour of ships at piers, predicting wind speeds, currents and water depths, among other factors. Vale maintains a scale model of the port terminal at the University of São Paulo, where simulations are made of ocean currents and tides, and their effects on manoeuvring or moored ships. This model is also used to simulate ship docking and undocking manoeuvres.
- The stockyard machinery's operators are trained using simulators that recreate these activities inside a fully customized cabin and a software program that simulates port operations. The technology uses monitors that show 3D animated images capable of simulating adverse situations, such as rainy days or night-time operations.

More information



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