

# Iron Ore Jetty for Vale

The client, mining corporation Vale, chose Lumut on Malaysia's west coast as its transshipment location for iron ore. The raw material is brought in from Brazil in gigantic 400,000 DWT bulk carriers some 360 metres in length. Conveyor belts transport the ore to shore where it is distributed to smaller ships for further transport to various countries in the region. The jetty is able to receive Valemax, the largest class bulk vessel in the world today. The construction of the export wharf was completed by the end of 2013.

## Main Client

Vale SA

## Client

JV BAM International, McConnel Dowell and SYS

## Type of Contract

Design & Construct

## Completion

December 2013

## Location

Perak, Lumut, Malaysia

## Consultancy Fees

Category 5 (see page 2)

## Construction

Euro 160 million

## Services

Study Environmental and Met-ocean Condition  
Berthing and Mooring Analysis  
Detailed Drainage Design  
Pile foundation Design  
Detailed Design of Major Import Wharf  
Detailed Design of Transfer Platform and Tug Berth Platform



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The Vale Jetty serves a maximum 90 million tonnes per annum of iron ore and functions as entry and exit points for all material including iron ore, sinter pellets, blast furnace pellets and pelletizing plant additives. The jetty is designed to bring in incoming iron ore from the largest bulk carrier of 400,000 DWT Valemax, and to export it with a maximum of 80,000 DWT panamax size vessel.

## Role Delta Marine Consultants

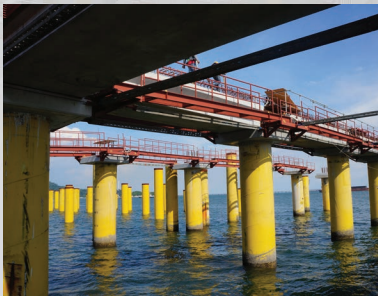
DMC was involved from tender stage throughout detailed design and execution of works. A total of 1.1 km of import and export wharf are connected with transfer platform to land site with 1.8 km of access trestle, using deck-on-pile structure system. Alternatives of design were made for optimization in the early stage. Semi precast systems for the deck and all vertical piles had been chosen to enhance the speed of construction. A high precision measurement of detailing utilizing 3D models had been brought from early stage and throughout the design process to ensure all the precast elements can fit smoothly on site during construction.

Coastal scope included a review of MetOcean Studies, a detailed Dynamic Mooring Analyses for all berths (including for the 400,000DWT Ore Carriers), wave and current load calculations, design of the drainage system, and ship-shore interface design.

DMC also carried out intensive technical assistance during process of construction, also when the wharf received 3 number of ship unloader with an individual weight of over 2,000 tonnes coming from transferring barge to the modified section on the wharf to fit the off-loading procedure. DMC was also closely involved when the Contractor had to deal with dynamic information from the top side supplier which required re-assessment of structures.

There were some interesting geotechnical challenges. Unforeseen soil conditions have led to a recalculation of pile lengths, but even with the engagement of additional resources the scheduled completion date was still achieved. The soil turned out to be relatively soft, making it necessary to drive piles 70 metres into the seabed. The piles were therefore at least 80 metres in length, with the longest measuring a full 120 metres. The longest single section pile pitched was 100 metres long, weighing approximately 98 tonnes. This was likely to be have been the longest single-length tubular foundation pile ever to have been driven from a floating crane barge worldwide.

A total of 901 piles, with varying diameters between one and almost two metres were driven. Two prefab yards were busy producing the 6,768 prefab elements – a total of 75,000 cubic metres of concrete. All elements weighing more than 45 tonnes were produced on a site in Lumut. The heaviest weighed some 120 tonnes. The lighter elements were brought in from the capital Kuala Lumpur. At peak, daily production reached 475 cubic metres of concrete and an output of 52 elements.



**Consultancy Fees:** 1: 50.000€ 2: 50 - 150.000€ 3: 150 - 300.000€ 4: 300 - 600.000€ 5: > 600.000€



Delta Marine  
Consultants