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"While dedicated oil tanker berths are typically dolphin berth structures with loading platforms on piles, the Port of Fujairah has decided to build continuous quay walls in OT1 and OT2. This allows flexible usage of the berths."

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Port of Fujairah putting itself on the map

Gert-Jan Roelevink, *maritime project manager, MUC Engineering, Fujairah, United Arab Emirates*

The Port of Fujairah was built in the early 1980s as part of the economic development of the United Arab Emirates. Fujairah is situated on the East Coast, just outside the Strait of Hormuz, and with its port being a secure portal to the Gulf; it has seen steady growth over the years. Due to its convenient location along one of the world's major shipping routes, the port has emerged into a major oil and logistic hub.

A mild wave climate, easy access due to its deep water relatively close to the shore, and the fact that Fujairah is piracy-free, have all contributed to the port's success. The mild wave climate allows open sea terminal operations and bunker trade in particular has played a key role in its growth; the port is now ranked alongside Singapore and Rotterdam in size.

Moreover, the importance of the port is increasingly recognised, with several national strategic projects being developed. One of these is the 1.5 million barrels per day (bpd) 'Fujairah Habshan Oil Pipeline', with its main oil terminal in Fujairah and the 250,000 bpd refinery which is planned for completion in 2016. Additionally, an LNG terminal is being constructed north of the Port of Fujairah.

To strengthen the private sector and support companies in the oil industry, a special zone for oil companies has been established in the area north of the port. This Fujairah oil industry zone (FOIZ) aims at developing the strategy for investment in the region and regulating the petroleum and hydrocarbon industries.

Fujairah oil tanker terminal

While the Port of Fujairah, being a multi-purpose port, offers a wide variety of services such as container handling, general cargo, break bulk, project and maritime logistical supply especially its oil tanker terminals have expanded rapidly in recent years. In 1996, the Van Ommeren tank terminal (currently Vopak Horizon Fujairah Ltd., VHFL) became operational with an onshore oil storage facility and offshore jetty operating independently. In 2004 a dedicated oil terminal (OT1) inside the Port of Fujairah was completed with three berths for handy size tankers and bunker barges. This facility mainly serves the Fujairah refinery just north of the port.

Forward projections of the increasing importance of Fujairah as a strategic oil hub, have resulted in the conception and planning of a second oil terminal (OT2), developed jointly with MUC Engineering. OT2 is being created around a new harbour basin, north of the existing port which is dredged to -18 metres. The new terminal is completely dedicated to handling oil tankers.

The first four berths of OT2 were commissioned in 2010 and currently accommodate tankers up to 200,000 deadweight tonnes (DWT). These berths have been realised as a 1,500 metre long quay wall. As a response to the increasing demand for more berths, the port has decided to continue the construction and is currently developing two further berths, which will be able to handle partly-loaded very large crude carriers (VLCC). These berths are planned to be finalised in early 2014. With these two new berths, the number of oil tanker berths in the Port of Fujairah totals nine, with six berths being able to handle tankers up to 180,000 DWT.

Additionally, in May 2013, the construction of the three-kilometre northern breakwater started. This breakwater shall enclose the northern harbour basin to protect OT2 against swells, and will serve as a causeway to a new VLCC berthing facility. This VLCC berth is planned to be built on the seaward end of the northern breakwater at a water depth of -26 metres and is scheduled to be operational in mid-2016. Furthermore, a number of dedicated berths for bunker barges and chemical tankers are at the drawing board.

Independent oil storage terminals

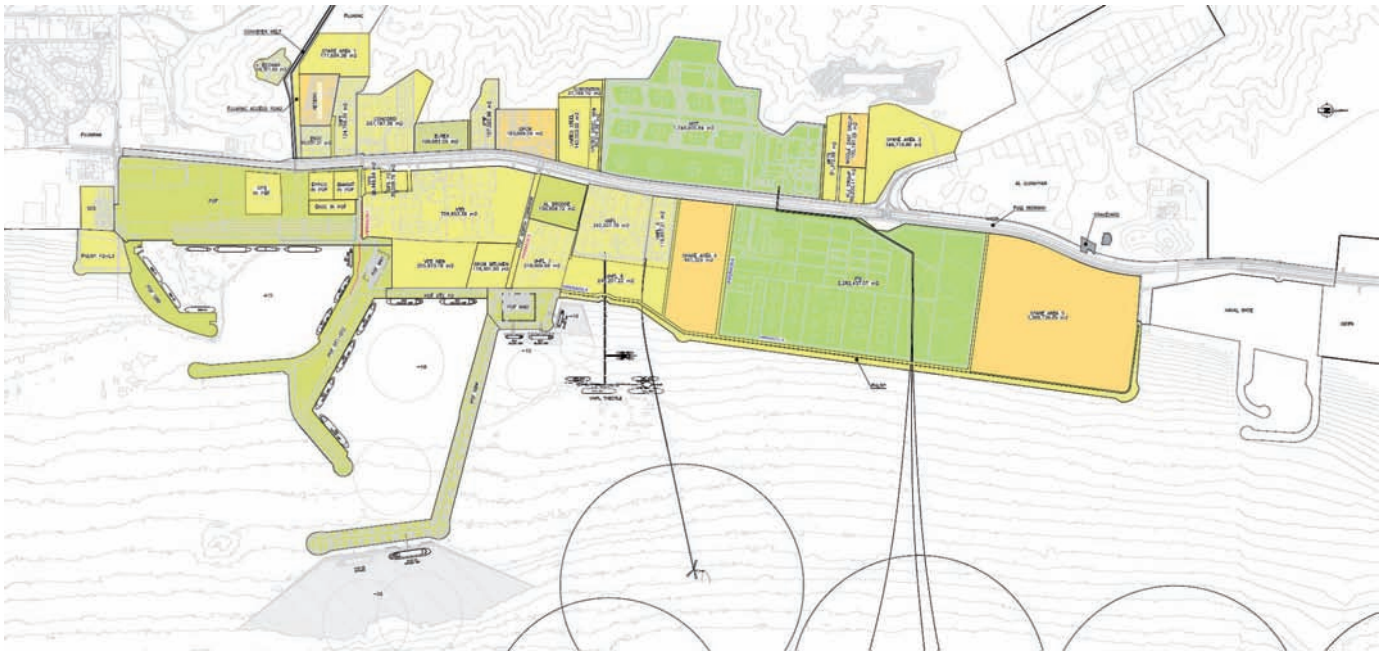
Only VHFL runs a self-owned jetty and all other commercial storage terminals in the FOIZ use the Port of Fujairah facilities for marine loading and unloading operations. Fujairah continues to attract new companies that commit to building storage tanks in Fujairah. In addition, existing tank farms all undertake new expansion projects to upgrade their

Main image: Fujairah's second oil terminal (OT2); Bottom right: Maiden call at OT2 in May 2010.

terminals. As a result, the total capacity of all commercial storage terminals is increasing and is expected to reach 8 million cubic metres by the end of 2014. Consequently, the anticipated throughput through the Fujairah oil tanker terminal could reach an annual 70 million tonnes at the end of 2014. This is exclusive of the crude which is being exported through the Abu Dhabi Crude Oil Pipeline (ADCOP). With the six berths on its jetty being fully occupied, VHFL has also started the construction of pipelines connecting its terminal to the Port of Fujairah, in order to use the berths in the Fujairah oil tanker terminal.

The flexible oil terminal

During the planning of the Fujairah oil tanker terminal, there has been an emphasis on flexible usage of berthing facilities in general and flexible connectivity in particular. Flexibility was considered to be an essential pre-condition for the success of the system as a whole. The port understood that dedicated berths for each terminal would result in a large number of jetties



The Fujairah oil industry zone.

that would quickly congest the available waterfront space. Hence a system was adopted where all tank terminals are connected to all berths through two large matrix manifolds. The berths and the matrix manifold are being operated by the Port of Fujairah.

Matrix manifold

The first matrix manifold (MM1) is fully integrated and connected to oil tanker berths two to nine. MM1 is able to receive 62 pipelines serving 10 to 11 oil storage terminals. A second matrix manifold (MM2) has been planned at the north side of OT2 and is able to receive an additional 60 pipelines from the storage terminals north of the port. MM1 and MM2 will be fully connected and integrated to enable connectivity between all tank terminals and all present and future oil tanker berths.

Flexible berth system

While dedicated oil tanker berths are typically dolphin berth structures with loading platforms on piles, the Port of Fujairah has decided to build continuous quay walls in OT1 and OT2. This allows flexible usage of the berths. Practically, it means that each berth can either be used for handling one big tanker with two central loading arms, or it can be used for handling two small tankers at the same time with two smaller loading arms. This system has proven to be convenient given the large number of small tankers which are used in the bunker trade. These small tankers can now be served two at a time if the berth is not occupied.

Future projections

Fujairah seems to be commonly recognised as an important strategic oil logistics hub and the number of companies that have an interest in establishing their business in Fujairah is increasing. With OT2, the Port of Fujairah has created the basic infrastructure for a marine oil terminal that has the potential to be expanded beyond 24 berths for large tankers up to VLCC class. The Port of Fujairah has shown dedication in providing the required marine loading and unloading capacity of terminals in Fujairah and has the capacity to accommodate more growth in the future.

About the author

Gert-Jan Roelevink is maritime project manager at MUC Engineering. He has a background in hydraulic engineering, where he specialises in the design of coastal protection and port infrastructure and port master planning. As maritime project manager his responsibilities are the management of port infrastructure design projects. He is also a key part of the design and engineering division at MUC, which consists of around 30 structural, geotechnical and hydraulic engineers, master planners and project managers.

About the organisation

MUC Engineering is an independent advisory engineering and consultancy company based in the Middle East. MUC Engineering has supported the Port of Fujairah with the development of the Fujairah OT2 master plan and has carried out the design and project supervision for the OT2 infrastructure. Furthermore, MUC acts as project management consultant for a number of the commercial oil storage terminals in the FOIZ.

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