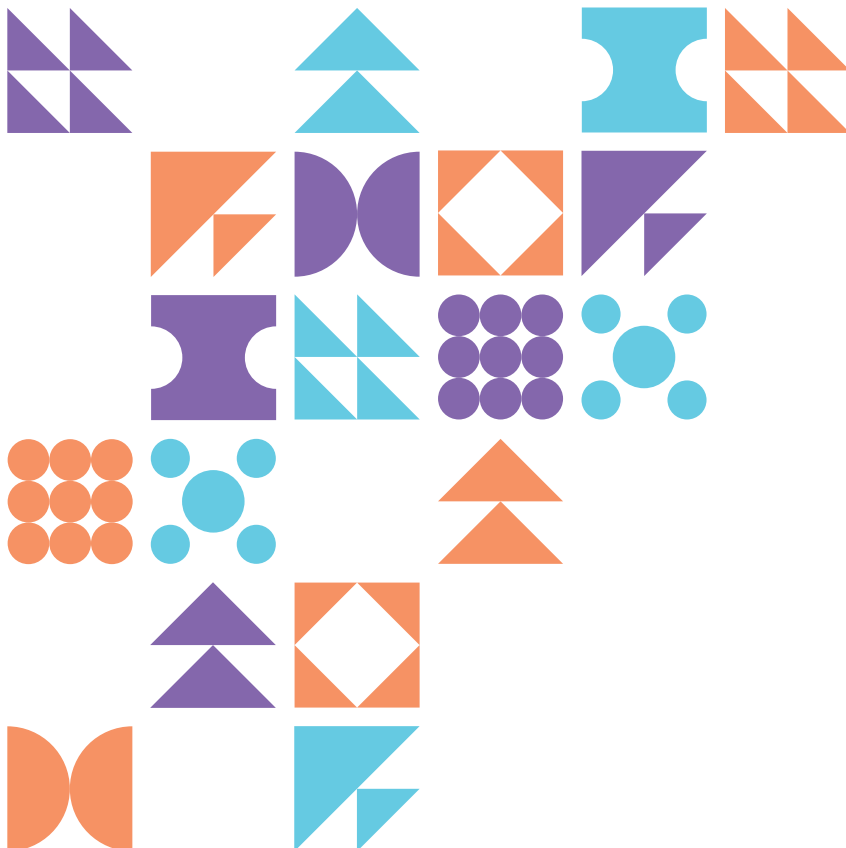


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# ***MIPD introduces smart fabrication methodology for serial production of offshore platforms***

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## Abstract

With the goal of reducing capital expenditure (CAPEX) and schedule risk to current and future Company projects, Marjan Offshore Oil Facilities (MOFOF) project team under Marjan Increment Projects Department (MIPD) had worked diligently with its main Lump Sum Turnkey (LSTK) Contractor to improve the utilization of resources, reduce project execution costs and schedule, and increase the safety of personnel during the fabrication of offshore oil production facilities in Sohar Yard, Oman. To boost efforts, the project team in collaboration with the LSTK Contractor introduced innovative fabrication processes by means of serial production of offshore Production Deck Modules (PDMs) under multiple gantry cranes. This allowed “assembly line” type manufacture, which removed the need for multiple mobile cranes and the associated inherent rental costs, and reduced man/machine interface risks.



*Installed gantry cranes at Sohar Fabrication Yard, Oman.*

Offshore project execution involves unique challenges that demand meticulous planning and cost-effective solutions. Considering the high costs associated with offshore projects and the necessity of completing the facilities with advanced technique along with precise quality, one of the most daunting challenges is completing the timely and high-quality installation of the facilities, particularly offshore wellhead platforms, subsea pipelines, risers, and subsea spools on platforms.

## Modular fabrication

Offshore production platforms are divided into topside Wellhead Platforms (WHP), which is above sea level, and Jackets (supporting sub-structure), which is submerged in seawater. These elements are fabricated separately and mostly in different time frames with well drilling occurring after jacket installation and prior to wellhead platform installation, hook up and commissioning, followed by the start-up of the facilities.

The modular approach to fabrication offers an efficient method of construction whereby a platform is divided into smaller sub-assemblies which contain the various equipment, piping, electrical, and instrumentation components. These sub-assemblies are completed to the greatest extent possible at a ground level forming several decks. Then, each deck is lifted and assembled (stacked) together to form the final shape of the platform.

The sub-assemblies are typically defined by deck level such as cellar, main, mezzanine, and helidecks which allow significant benefits over “stick-building” for safety, quality, and productivity.

The modular process of fabrication and assembly of WHPs results in minimal structural works at height and requires only the interconnection of cables, piping, instrumentation, and touch-up painting, as well as pre-commissioning activities to complete the production of a ready-to-install WHP.



*A serial production of Production Deck Modules (PDMs) pancake.*

## **Serial production initiative gantry crane**

The LSTK Contractor studied Saudi Aramco PMT's proposal and as a result developed the fabrication yard layout, and proposed adding 21 Nos new gantry cranes, each having a minimum of 10 MT lift capacity. These cranes, which are located in bays, have a span of 28 meters with a height of 20 meters. The dimension allows the gantries clearance over the top of the WHP while under construction. A total of four new production bays were developed and the existing two bays have been extended.

The net length of Gantry Bays is now 2 km with a coverage area of 49,000 sqm. Optimized size of the gantries was selected considering Saudi Aramco's standardized wellhead platform design.

All of the new overhead gantry cranes were fabricated in-house by the Contractor and, where possible, utilized off-cuts and surplus materials from old projects to lower the cost.

## **Benefits of utilizing gantry method**

The major benefits of utilizing Gantry Bays include the following:

- Increase throughput per square meter of available area reducing the area required for crane and material handling equipment access;
- Higher productivity as a result of the continuous availability of cranes on spot;
- Significant reduction in higher capacity crane requirement due to the complete coverage of the sub-assemblies by the gantry cranes. No need to reposition mobile cranes for access;
- Electrical powered cranes produce lower carbon footprint than diesel-powered mobile cranes;
- Easy to operate thereby eliminating the requirement of highly skilled crane operators; and,
- Cost optimization due to increased output; subsequently, this advantage will reduce the CAPEX unit cost.



*Utilizing gantry crane for wellhead PDMs assembly.*



## ***Operational excellence***

Khalid M. Al-Muwalid, Marjan Offshore Oil Facilities (MOfOF) Manager said, “The team has shown excellence in executing and managing this process of an innovatively improved fabrication solution, which has enhanced throughput by increasing Gantry coverage to fabricate and assemble modules.”

## ***Future applications***

Also, Mr. Khalid M. Al-Muwalid has added that in Marjan Increment Program, we explored creative ways of improving our business. Considering the effective solution and offered advantages, the innovative smart fabrication has been definitely a worthy consideration for all ongoing and future Company projects.

Mr. Khalid Z. Al-Sulaim, MIPD director, said “The initiatives by Marjan Program team members are very important and have contributed to key areas which include modularized fabrication process, enhanced fabrication/construction techniques, and commitment of the LSTK Contractor in further developing standardized modules that can lead to potential schedule optimization. These contributions will support not only our current project but also the future ones. And, as always, our goal in mind is to continuously offer more effective innovative solutions and open more doors to wider application in the future projects of Saudi Aramco.” ###

