Project Management Institute.
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Digital Insights:

MIPD Offshore Execution and Marine Traffic Control Center

By: Khalid M. Al-Muwalid, Abdullah M. Al-Yahya, Senthilkumar Ayyamperumal and Abdulrahman A Almalki

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ABSTRACT

Executing a major offshore construction project is a challenging task by itself. There are tremendous risks associated with the marine operations and installation work that must be mitigated every step of the way. The risks are much higher when the major offshore construction is taking place in an existing operational field.

Marjan Increment Projects Department (MIPD) and Tanajib Marine Operations Department (TMOD) have partnered to ensure the safety of Marjan Field by the introduction of an Offshore Marine Traffic Control Center (MTCC) to Marjan Field by mobilizing a standalone Jack-Up Barge (JUB) "Zamil LB-9" and establishing a standalone Installation and Hookup Unit (I&HU). The implementation of MTCC went through many reiterations, and eventually it was agreed to be onboard a jack-up barge in Marjan Field. This jack-up barge is serving as a multipurpose barge and acting as a mobile execution center along an offshore accommodation for Marjan increment program.

Furthermore, the installation phase of the newly built platforms, represents a major challenge to Marjan Increment program. Such a challenge is demonstrated with the presence of more than 300 offshore vessels and barges operating simultaneously in Marjan field; they are working in close proximity to operational offshore and subsea facilities, such as subsea pipelines, submarine cables, various platforms with different functionalities, and gas oil separation plants (GOSPs).

Additionally, they navigate near ongoing drilling operations and international marine channels and borders. Several challenges and risks have been identified in relation to this endeavor. This includes the potential of damage and disruptions to existing facilities, the risk of collisions and accidents between vessels and barges, and the possibility of commercial and cost escalation due to LSTK contractors' vessel standby, delays, or reassignments. Furthermore, security risks associated with working near international marine channels and borders are also a concern.

BUSINESS AND TECHNICAL DRIVERS

Saudi Aramco's Marjan Increment Project is considered one of the most ambitious programs worldwide. Marjan Increment program will boost the country's position as a leading figure in providing continuous and reliable energy to the world. The fact that Marjan Increment program is being executed in these very busy and congested mature offshore oil fields while maintaining normal hydrocarbon production is considered one of the most complex challenges ever taken on by Saudi Aramco in the offshore projects execution sector.

EVALUATION AND TECHNICAL OUTCOME

Marjan Increment overall offshore scope consists of the design, procurement, fabrication, installation, hook-up, and pre-commissioning of 21 jackets, 31 topside decks, 1350 kilometers of subsea pipeline, 475 kilometers of submarine cables, and 12 bridges, around 245,395 tons. Of structural steel and 8 Brownfield tie-in platforms upgrades.

A comprehensive technical team, led by Saudi Aramco Project Management Team (SAPMT), Marine Department, Operations and Inspection Team, was formed to perform an assessment focusing on increased vessel traffic services (TVS) levels, enhanced master training, enhanced vessel specifications, infield and field approach routing measures, support for offshore hook-up, pre-commissioning, and commissioning assistance.

The implemented measures ranged from administrative and contracting strategies to technical specifications and alternative ways of designing the facilities, including the benefits of renewable energy. In view of the above anticipated challenges, the following mitigations were considered and established to support the offshore execution activities:

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1) Mobilization of a dedicated Jack-Up Barge (JUB) to cover all offshore activities for the program.
2) Establishment of Offshore Marine Traffic Control Center (MTCC) and
3) Creation of installation and hookup unit (I&HU)

Saudi Aramco Marine has also proactively implemented several operational control measures to ease the movement and reduce the traffic in the busy offshore fields. The Marine increased the number of anchorage areas in the fields from two to four, providing safe designated areas for the vessels/barges to shelter during adverse or rough weather periods, and avoid the risk of damage to existing (or new) subsea and topside facilities.

Moreover, Marine team adapted and approved additional designated navigation channels for vessels to move between fields and back-and-forth from shore. These channels work like super highways and control the marine traffic through known, safe, and continuously monitored lanes, to avoid scattered traffic all over the oilfields in the Arabian Gulf.

COMMITMENT TO EXCELLENCE

Khalid Sulaim, Director of the Marjan Increment Projects Department, stated, Marjan Increment Program will be the largest offshore facility ever built by Saudi Aramco, aimed at increasing the production of the Marjan field to support the Kingdom in meeting the rising demand for energy. The deployment of Marine Traffic Control, Dedicated JUB and advanced technologies were crucial for the successful execution of this state-of-the-art project. Furthermore, the MIPD project team is dedicated to transferring the knowledge and experience gained from this initiative to future projects after thorough assessment.

MOBILIZATION OF DEDICATED JUB TO MARJAN OFFSHORE FIELD

MIPD partnered with Saudi Aramco Marine to mobilize a jack-up barge (Zamil LB-09) in order to support Marjan program's offshore installation, hook-up, pre-commissioning, offshore walkthrough, testing witness, and commissioning assistance activities. More than 150 MIPD, operations and different stakeholders' personnel were mobilized to lead the execution of the offshore campaigns at JUB LB-09 which serves as an offshore execution center and an accommodation hub that provides logistic point for accessing the various platforms in more flexibility. The LB-09 is a newly built vessel that was constructed in 2023, The JUB is 92 m in length and is boasting an impressive draft of 3.5 m, perfect for operating in Marjan Field. The deck of the JUB was also modified to hold 52 temporary living Quarters (TLQs). These TLQs contain over 80 high-end single-man bedrooms, office space, MTCC, and a world-class gym facility that covers 119 sqm.

LB 9 Jack-up barge

FROM PAPER TO PRACTICE

The following are the major benefits of mobilizing a dedicated accommodation JUB:

- Managing the increase of offshore marine traffic and avoid any potential accidents within Marjan Field by utilizing the MTCC.
- Accommodating over 150+ personnel to support executing all major offshore campaigns.
- Reducing the number of chopper flights required to manage and administer the offshore installations and execution activities.
- Enhancing the offshore execution by having the core team (SAPMT, Operations and other stakeholders) in one place, resulting in expediting the work activities and expedited resolutions of any identified conflicts within Marjan Field.
- Decreasing the likelihood of Marine Vessels clashes within the Field by utilizing the MTCC.

SIGNIFICANCE OF MARINE TRAFFIC CONTROL CENTER

The implementation of MTCC went through many considerations and brainstorming sessions and eventually it was agreed by Saudi Aramco marine that the MTCC shall be best situated onboard the Jack-Up Barge 'LB 9' located within Marjan Field for safe vessel traffic services.
Offshore MTCC is directly connected to the Vessels Tracking System (VTS) that was mandated on all marine vessels working on Saudi Aramco fields. The human-computer integrated staff deployed and continuous monitoring of all marine traffic have live-feed updates on the subsea construction/laying activities, heavy lifts, float-over installations and diving operations.

Marine Traffic Center at LB 9

MIPD progressive development in the field to insure an increase in production of oil and gas, with these developments efforts comes a lot of offshore traffic as more and more vessels are operating in the field to support the on-going activities, this increase in vessel activities also comes with an increase of likelihood of possible accidents in the field. Utilizing the VTS plays a major role in managing and mitigating navigation risks such as:

- One-way vessel transit in defined areas
- No passing/meeting of vessels in defined areas
- No overtaking in defined areas
- Use of escort tugs for large barges/vessel move
- Maximum speed limits
- Maximum draught requirement
- Daylight operations only
- Prohibited areas to be avoided
- Safety and exclusion zones
- Prohibited anchorages
- Restricted operations in certain weather conditions
- Time, distance and geographical separation of vessels
- Mandate routes to be followed and
- Traffic separation schemes/reporting schemes

ESTABLISHMENT OF A STANDALONE INSTALLATION AND HOOKUP UNIT

MIPD has also established an installation and hookup unit as another mitigation measure to administer the offshore logistics and lead all marine coordination for all Marjan Increment offshore campaigns.

The following are the two major objectives of the established installation and hookup unit:

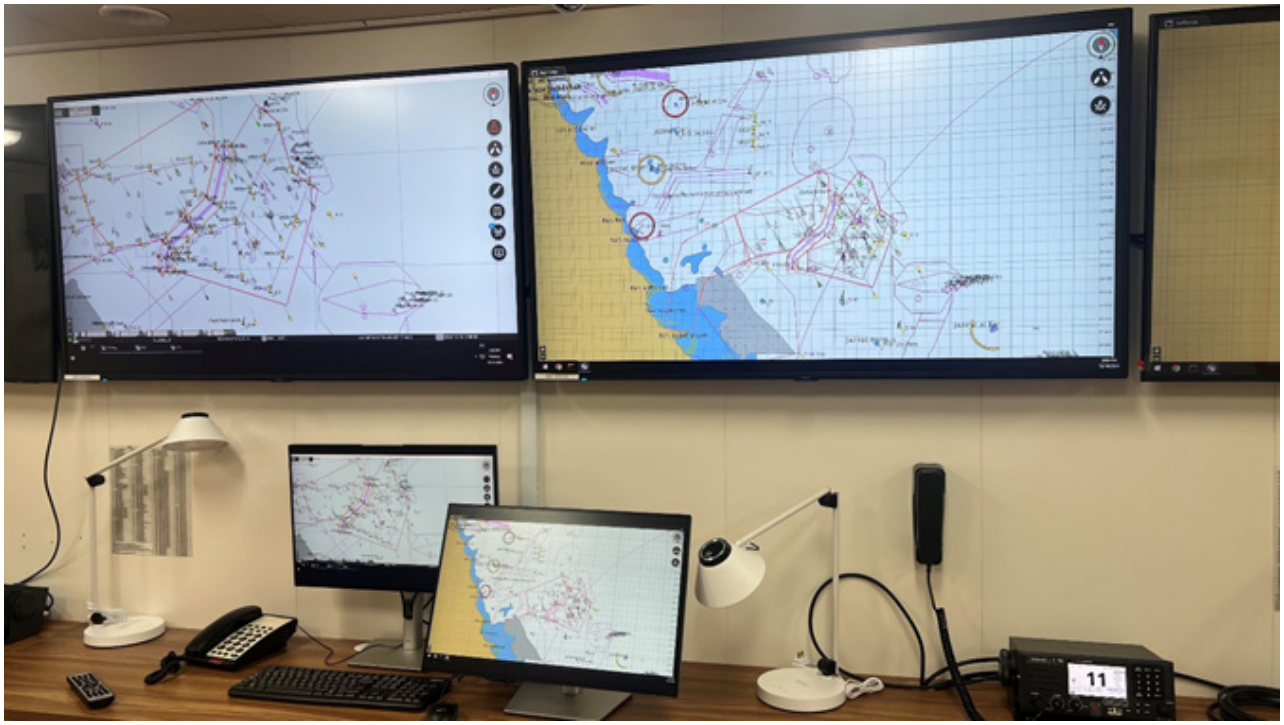
- Managing offshore construction to comply with utmost safety requirements and procedures, and coordinate with Operations and Company stakeholders to prioritize crucial offshore construction tasks.
- Resolving all the encountered offshore obstacles through assigning qualified on-barge construction superintendents to coordinate with Marine and Operations. This will minimize any work stoppage and potential standby time.

FINAL THOUGHT

Khalid M. Al-Muwalid, Manager of Marjan Offshore Oil Facilities Project, said, “by establishing the installation and hookup unit and mobilizing a dedicated accommodation Jack-Up Barge that is equipped with a Marine Traffic Control Center, the team has successfully managed to mitigate all identified major execution risks and anticipated challenges associated with Marjan offshore campaigns. The team was able to overcome all encountered challenges and apply an integrated approach to fully implement the necessary mitigation measures.”

Jack-up barge readiness and sea trails/testing

Jack-up barge mobilized to Marjan Offshore location



Marine Traffic Control Center at LB9