



LIVING UP TO THE LEGACY

Roll up of Heavy Offshore Frames without Lost Time Injury (LTI)

There has been a tremendous growth in the construction industry within the last decade. There is now an intense demand for projects to be completed in a shorter duration. This has increased the complexities in projects and pose serious threat to safety, quality and profits. The only way to effectively address these risks is to conduct detailed constructability studies, which help the engineer achieve project goals through an optimum usage of resources by moving in a meticulously-planned sequential order.

One such study was done for the PLQP project at MFF Kattupalli yard, where heavy offshore frames and jackets needed to be erected at higher elevations.

Working on the Edge

Heavy and large structures, ranging in weight from 50 MT to 650 MT, and in elevations from 3.5 m. to 10 m.

This was HCP's first offshore jacket fabrication job, where most of the structures were asymmetrical and therefore structurally unstable. Unlike traditional roll ups, they also had to be erected at an angle.

Most of the lifts used are unique and challenging in their own way, irrespective of the weight and installation location. Nevertheless, we will be looking at two major critical lifts for this study because of the effort and the time that was spent right from early planning stages of the project to on-site execution.



Roll up of PLQP Jacket Vertical Frame Row-1 and Row-2

These are twin lifts, weighing 650 MT each, standing at an elevation of 7 m. This was done for the first time in India where conventional jacket frame roll ups happen at a maximum elevation of 2-3 m.

Challenges

- The Centre of Gravity (COG) of the frames lay outside and there was a possibility of overturning, if the frames were not inserted properly before they were released from the cranes.
- The stability of the frames had to be properly studied since they were each being handled at multiple locations. (analysed between 0°-90°).
- A Ground Stability Analysis had to be carried out for the operation of the cranes since they had to be operated along two axes during the various stages of the roll up.

Interventions

- The structural stability of the frame was thoroughly analysed and based on crane capacities, feasible lifting points were provided.
- Additional strengthening points were provided for roll up supports to arrest the overturning moment.
- The members were to be welded to the vertical frame for the release of cranes were finalised. This was done since the final inclination of the frame was set to 89.2° to avoid overturning (due to COG frame offset).
- Six temporary supports for Row-1 and Row-2 frames were fabricated by modifying the previous (DDW1 WHP Project) designs. Not only did this help us finish faster, but it also resulted in a net saving of INR 31 Lakhs.

Erection of PLQP Mudmat Frame

Weighing at 340 MT and standing at 7m., this has been the heaviest offshore Mudmat erection in India till date. This was one of the most critical lifts of the project since even a slight change in orientation could make things go terribly wrong.

Challenges

- The final installed position of the Mudmat was set at an angle of 7.13° WRT the vertical. This increased the risk of overturning of the cranes as well as the temporary supports.
- Considering crane loads and frame structural stability, critical points for lifting and tailing had to be identified.
- The chances of frame members failing during Upending were very high.

Interventions

- A Structural Stability Analysis for the Mudmat was carried out for 0°-90° in intervals of 1°. The behaviour of the frame was predicted at different angles and additional strengthening was provided to arrest member failure.
- Once lifting points were identified with respect to crane capacities, unique lifting and tailing lugs were designed to maintain the structural stability of the frame.
- The temporary supports for placing and tilting the Mudmat frame were fabricated by modifying the existing supports used for the roll up of Row-2. This also resulted in substantial savings of both, cost and time.

OUTCOME

Product Stewardship



Most of the jackets erected are India's heaviest offshore jacket roll ups so far. They are also the largest in India (standing at an elevation of 7 m. viz. conventional roll ups of 2-3 m.)

Economic



Constructability studies helped us plan better, finish faster, and use our resources optimally. The roll-up of vertical frames Row-2 and Row-1 itself resulted in a net saving of INR 31 Lakh.

People



Given the complexities of the project, safety was of paramount importance. With the right interventions, 3,000 MT of offshore jackets were erected with approximately 62 pre-fabricated modules within five months **with zero LTI**.