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MOVING FROM Singapore to the North Sea the largest jackup rig ever built was a remarkable feat that required detailed planning and painstakingly careful execution.

Final preparations for the long, unusual journey started in August, when the huge three-legged harsh environment jackup rig Galaxy I was delivered by Singapore-based Far East Levington Shipbuilding Ltd. (FELS) to its owner, Santa Fe Drilling Co. The rig, a Friede and Goldman Mod VI design (see sidebar) is by far the biggest jackup in the world.

In a nutshell, following delivery the rig was loaded onto the semi-submersible heavy lift ship Transshelf by means of the float-on method. Seafastening of the rig took 2 days, after which the ship departed for the North Sea.

Simple as this sounds, the operation was nevertheless unusual. Given the sheer size of the unit (transport weight of 24,000 metric tons with a leg length of 170 m), a traditional wet tow was not a realistic option. This would have required cutting the legs in order to reduce the dynamic loads in the guides. Moreover, transit time would have been in excess of 100 days and the risk during this long exposure was unacceptably high.

Dry transport of MODUs has in the past proven to be the fastest and safest method of transportation and, thus, this option was selected for the Galaxy I.

In May 1990, Wijsmuller Transport B.V. became involved in the transport feasibility studies. Use of the Mighty Servant 3 as well as the Wijsmuller-operated and Russian-owned Transshelf was studied and the following was concluded:

1. Transport of the Galaxy I with reduced leg length (140 m) would be feasible using either the Mighty Servant 3 or the Transshelf.
2. Transport of the Galaxy I with full leg length (170 m) would only be
construction and installation costs.

The sponson design evolved from 10 tanks, each measuring 20 x 30 x 5.5 m to 8 tanks, each measuring 20 x 3.5 x 5 m. Not only did this result in a weight savings of approximately 100 tons and a reduction of installation time and cost, but also the initial stability increased by 20%. A further increase of the width would have resulted in an effect too large for the ship's resistance rating.

The application of 20 m-long tanks resulted in:
1. Tanks that could easily be handled by cranes (each approximately 50 tons).
2. No stresses due to deflection of the ship hull in seaway.
3. Additional safety in case of damage/loss of tank.
4. Flexibility for future applications.

The gaps between the tanks were closed by means of channel profiles between which a wooden beam was inserted. This flexible connection allows for relative motion, while providing some streamlining. The forward and aft tanks were outfitted with tapered streamlining plates.

The tank depth was limited to 5 m so that they could be installed or removed with the Transshelf on its lightship draft.

The tanks are independent, with only the front and aft closing plates connected to the ship hull. The top plate was chain welded to the ship's rubrail. Ballasting/deballasting is accomplished through drain and vent valves, which can be operated from the top of each tank. Manholes are provided for access to the tanks. In order to have sufficient clearance over the tanks for valve operations, the top of the tanks are about 2 ft below main deck level.

The final sponson design was translated into a construction drawing which was submitted to the ship's classification society for approval.

The USSR Register of Shipping approved the construction and later surveyed the construction and installation. Construction bids were requested both in the Netherlands (as the Transshelf would call at Rotterdam before sailing to Singapore) and Singapore. The logistic advantages and a longer lead time associated with construction in the Far East, in combination with a competitive price, resulted in a contract award to FELS in May 1991. The sponsons were constructed and installed well ahead of schedule.

**Loading**

On August 29, the Galaxy I was
loaded onto the Transshelf at the Singapore Western anchorage. While the rig was towed from the shipyard to the loading location, the heavy-lift ship submerged to its loading draft.

The addition of sponsons to the Transshelf did require a modified ballasting/deballasting procedure. Ballasting of the vessel for loading was done with the sponsons in free flooding condition. That is, the flood valves and the vent valves were open and the sponsons were flooded during the submersion operation.

As soon as a sponson started to submerge, its flood valves and aft vent valve were closed. The forward vent valve remained open for pressure equalization. Once all sponsons were submerged and closed, ballasting continued until the loading draft was reached.

At 11:00 a.m., with the Galaxy I reaching the submerged ship, the tugger wires of the Transshelf were connected to the rig and the tugs were disconnected. The rig was then slowly maneuvered over deck towards the guideways.

Upon positioning of the rig, the Transshelf started to deballast. Once the rig was firm on its soft wooden cribbing, the trim was gradually increased to 5 m by stern.

Deballasting continued until the main deck emerged. During the minimum stability phase (from 12 to 10 m draft), stability was maintained by a small list of 1° to starboard, thus keeping one side of the rig in the water.

The trim was then reduced to zero and deballasting continued until the departure draft was reached at 8:00 p.m. At this point, the sponsons were still completely filled.

In sets of two (port and starboard simultaneously), the flood valves and the aft vent valves of the sponsons were opened and the sponsons were deballasted by gravity until the water level inside was equal to that outside the sponsons.

The sponsons were then completely closed (both flood valves and both vent valves) and the next two sponsons were opened. The remaining dead water was removed the following day using small submersible pumps.

Seafastening

The transport analysis, based on the route via the Suez Canal resulted in the following design criteria: significant wave height, 8.59 m; mean wave period, 8.2-11.4 sec.; mean wind speed, 53.5 knots; and 1-min. sustained wind speed, 65.0 knots.

The resulting motion responses and wind loads totaled the following forces to be counteracted by the seafastenings: Transversely, 5,300 tons; and longitudinally, 2,400 tons.

These forces included a reduction of 15% of the static weight of the rig because of friction between the rig bottom and the soft wooden cribbing. The rig was provided with special seafastening reeessses and matching seafastening boxes which were already prefabricated, needed to be installed.

At 6:00 p.m., with only the fore part of the main deck well out of the water, the local subcontractor arrived and started the preparations for seafastening of the Galaxy I. The steel boxes with rubber seafastening fenders were installed, jacked against the recess bulkheads and welded to the ship's deck. A total of 6 boxes were installed, a task that took a little over 2 days to complete.

On Sept. 1, at 3:00 p.m., the Transshelf heaved anchor and departed for Rotterdam, via the Suez Canal. The successful voyage took a total of 39 days, including the Suez transit. The rig was scheduled to re-delivered to Santa Fe Drilling on Oct. 10.