deugro

Case Study

Jawa-1 Power Plant Project

Industry
Power

Cargo
Gas turbines, GEN STAT and HRSG units

Highlight
Sophisticated barge unloading concept for OSHL cargo at the jetty

Origins and destination
From Asia, Europe and the USA to Indonesia

Total volume
Approx. 80,000 freight tons

Performance
On time, within budget and with zero QHSES incidents

438-metric-ton gas turbine discharged directly from the vessel to the barge at the Port of Tanjung Priok

Case Study: Jawa-1 Power Plant Project

As part of a 1,760-megawatt combined-cycle gas turbine power plant project in Indonesia, on behalf of GE, deugro moved approximately 80,000 freight tons of cargo, including two 435-metric-ton gas turbine 9HA.02 units, two 460-metric-ton generator stators (GEN STATs) units, and 52 heat recovery steam generators (HRSGs) with a length of 30 meters and weights of up to 240 metric tons.

The request was to find an economical concept that allowed all the cargo to be delivered safely and on time as per the given installation schedule, during various seasons with continuously changing weather conditions.

The challenges encompassed limitations at the site jetty in West Cilamaya, Java, which allowed only one barge to berth at a time, and on the road from the port to the construction site, which led through several, space-limited villages.

Furthermore, space limitations for the HRSG module storage at the Port of Tanjung Priok, as well as a limited feasibility to transfer the gas turbine and gas turbine generators, had to be taken into consideration. Based on a route survey, deugro Jakarta calculated the maximum transport dimensions and weight for the road freight and identified the cargo items that could not be delivered by road but had to be transported by barge.

For the oversized and heavy lift cargo, deugro Jakarta created a concept in which the entire barge cargo was discharged directly from the vessel onto the barges at the Port of Tanjung Priok. This led to significant cost and time savings, as well as risk mitigation, since double-handling, storage in the port and reloading onto barges were avoided.

In line with this concept and the jetty's limitation, a vessel arrival schedule was developed, matching the vessel sequence and arrival dates with barge and jetty availability to always have a barge ready upon vessel arrival and, at the same time, to avoid barge congestion at the site jetty.

This case study refers to one of the most challenging components to be moved: a 438-metric-ton gas turbine with a volume of 12.11 x 5.44 x 5.36 meters.

Arrival of the gas turbine at POD Tanjung Priok, Jakarta

After over 8,550 nautical miles from Antwerp, Belgium via the Suez Canal to Jakarta, Indonesia, the 438-metric-ton gas turbine was received by the barge at the Port of Tanjung Priok. Once the tug maneuvered the barge safely alongside the vessel, the cargo was discharged directly from the vessel to the barge using the vessel's on-board cranes in a double banking operation.

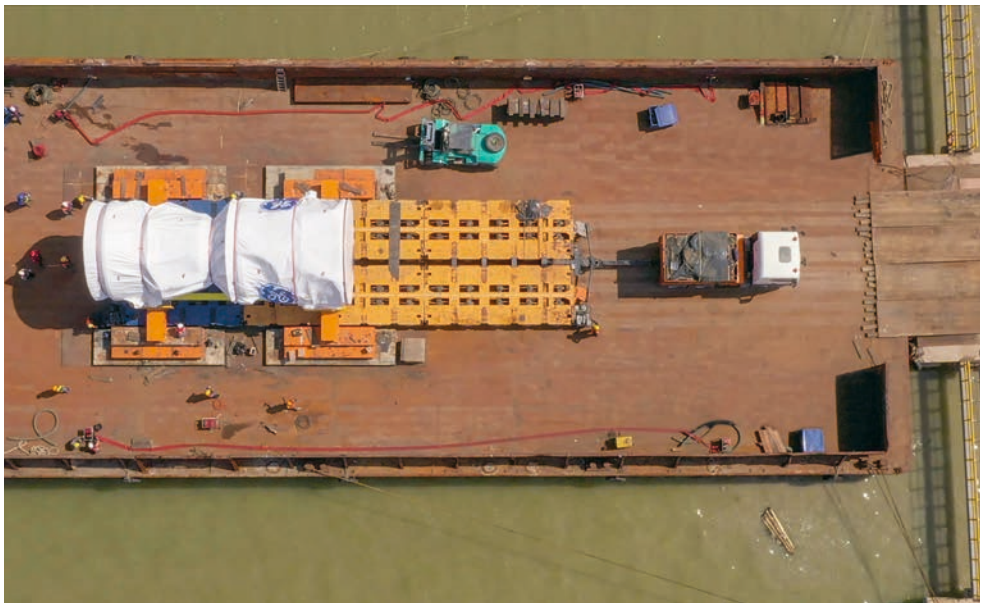
Prior to its arrival, the barge was prepared with all the necessary equipment to receive the cargo, including stools, beams, steel plates for load spreading, and notch wedges. Precise planning as well as barge- and cargo-specific designs of the load spreading were required to stay within the technical capacities of the locally available barges.

Based on the grillage arrangement and stowage plans provided by dteq engineers with the exact measurements for the final

» deugro's transport concept for the oversized and heavy lift cargo led to significant cost and time savings, as well as risk mitigation. «

positioning, the gas turbine was unhooked after it was placed in its final position on the prepared stools and beams. To distribute the loads to the strong points of the barge deck, load spreading was applied according to dteq's calculations to reduce the deck pressure and to meet the permissible uniform load of the barge.

dteq created the design for the seafastening on the accelerations derived from the stowage-specific motion analysis. The motions for the barge transport were calculated based on DNVGL-ST-N-001 considering the criteria of weather-restricted operations, whereby departure was limited to a maximum of Beaufort 5. In addition, for the voyage planning, the location of subsea pipelines had to be vetted. Once the seafastening was accepted, the mooring lines were released and the barge was pulled into the anchorage area in the harbor—ready to start its 100-nautical-mile voyage from the Port of Tanjung Priok to the job-site jetty in West Cilamaya.



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The challenges

- Limitations of the site jetty in West Cilamaya, allowing only one barge to berth at a time
- The road from the port to the construction site, leading through several space-limited villages
- Space limitations for the HRSG module storage at the Port of Tanjung Priok
- Various seasons with continuously changing weather conditions

Roll-off operation at the job-site jetty in West Cilamaya

After arrival at the job-site jetty, the tug was positioned on the bow of the barge in the pushing position to maneuver it towards the jetty using an access channel and to maintain its position until fully moored. In accordance with dteq's mooring calculations based on ABS Rules for Building and Classing Mobile Offshore Drilling Units 2012, the barge was moored, stern to the jetty, with four mooring lines and two lines as a backup. The ramp was placed on sandbags, which distributed the loads evenly on the ground.

Prior to the arrival of the barge, trailers were mobilized to the job-site jetty and the road was inspected for the trailer's maneuverability, for ground-bearing pressure and obstacles. After inspection of the heavy haul equipment and the ramp area, the load-in was executed during the falling tide when the ramp was level with the quay, using hydraulic axle lines provided by dhaulage, deugro group's equipment owner.

The trailer was positioned under the cargo according to the transport drawing and slowly raised to the loading height. Once the gas turbine was safely resting on the trailer, and the lashing and securing were applied in accordance with dteq's road transport lashing plan and industry standards, the trailer slowly rolled off the barge. Trim and heeling were closely monitored by dteq's engineers and controlled by ballasting, while the tugboat remained in a standby position to assist in pushing the barge if required. deugro Indonesia and dteq safely monitored all aspects of the operation.

Road transportation from the jetty to the job site

After successful roll-off, and supported by escorts, flagmen, spotters and traffic management as per site requirements, the convoy traversed seven kilometers on the purpose-built road to the construction site and the designated staging area using a Goldhofer THP multi-axle trailer.

To ensure safe maneuvering of the cargo on the challenging road infrastructure and the paths on the construction site, as well as successful delivery and on-site storage, dteq prepared detailed swept path analyses, including turning simulations. These determined safe and detailed transport paths and ensured that at each step there was sufficient space for the trailers to maneuver.

Because the road from the jetty to the job site had a ground-bearing capacity of 4.8 metric tons, dteq's transport engineers developed a transport solution that remained below this figure, while keeping the trailer configuration short enough to be able to navigate the purpose-built roadway.

Once the trailer was parked in its final position, the cargo was handed over to the receiving team, and deugro, in collaboration with dteq, executed another extraordinary project.

A mutual understanding, the ability to tackle various seasons and respond to continuously changing conditions, along with open communication and solution-oriented thinking, allowed deugro and its partners to complete this transport on time, on budget, successfully and safely.

Gas turbine traversing seven kilometers on the purpose-built roadway to the construction site