

Case Study

LNG Storage Tank Project

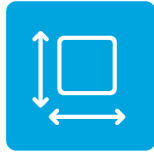




Industry
Energy and petrochemicals



Cargo
Four 225.4 MT LNG storage tanks



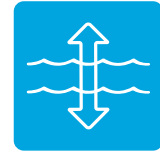
Cargo dimensions
Each 48.93 x 5.8 x 6 m long



Performance
On time, within budget and without any QHSES incidents



Challenges
Cargo movements through narrow streets of Decin's City center



Water level
Strongly fluctuating river water levels



Storage tank movement from the factory through Decin's city center to the Port of Rozbelesy, Decin

Case Study: LNG Storage Tank Project

In close collaboration between its offices in the USA, the Czech Republic and Germany, deugro moved four LNG storage tanks from the manufacturer's yard in Decin, Czech Republic via the Port of Hamburg, Germany to its final destination in the Caribbean Sea. Each of the four LNG tanks had a unit weight of 225.4 metric tons and impressive dimensions of 48.93 x 5.8 x 6 meters.

Due to the sensitivity of the cargo units, their weight and dimensions, detailed transportation and engineering studies were prepared to ensure a safe and smooth process to deliver the cargo on time through all crossing points. For this purpose, the teams of deugro Prague and dteq Transport Engineering Solutions, a company of the deugro group, conducted several personal site visits to identify sources of risk and to

develop appropriate solutions.

Because the units had to be moved from the factory through Decin's city center, special attention and additional precautions needed to be taken for the road transport to the Port of Rozbelesy in Decin, including traffic management arrangements and the required permits.

i

The challenges

- Unit weights of 225.4 metric tons and impressive dimensions of 48.93 x 5.8 x 6 meters
- The road transport of the oversized units through Decin's city center to the Port of Rozbelesy
- Transshipment was executed directly from the barges using the vessel's on-board cranes in tandem lift
- A constantly changing water level on the Elbe River



Loading operation at the Port of Rozbelesy, Decin

The biggest challenge was “mother nature”; the water levels along the Elbe River were a concern. While the overall transport had been planned and arranged for the third week in December, the carefully planned operations had to be put on hold until the river’s water level became favorable for safe marine transit. First the water level was too low for barge transportation, then significant river regions were covered by ice, and in early February the river reached flood levels.

To meet all the requirements, a flexible schedule for the crane and

barge arrangements was crucial to ensuring a smooth barge loading operation. Detailed planning was needed to manage the timing of the river barge arrivals in Hamburg to coincide with the arrival of the USA-flagged ocean-going vessel in Hamburg to avoid barge and or vessel detention.

A strong cooperation between deugro, dteq and the client at all stages of the project ensured the project was executed safely and within the budget.

Pre-carriage

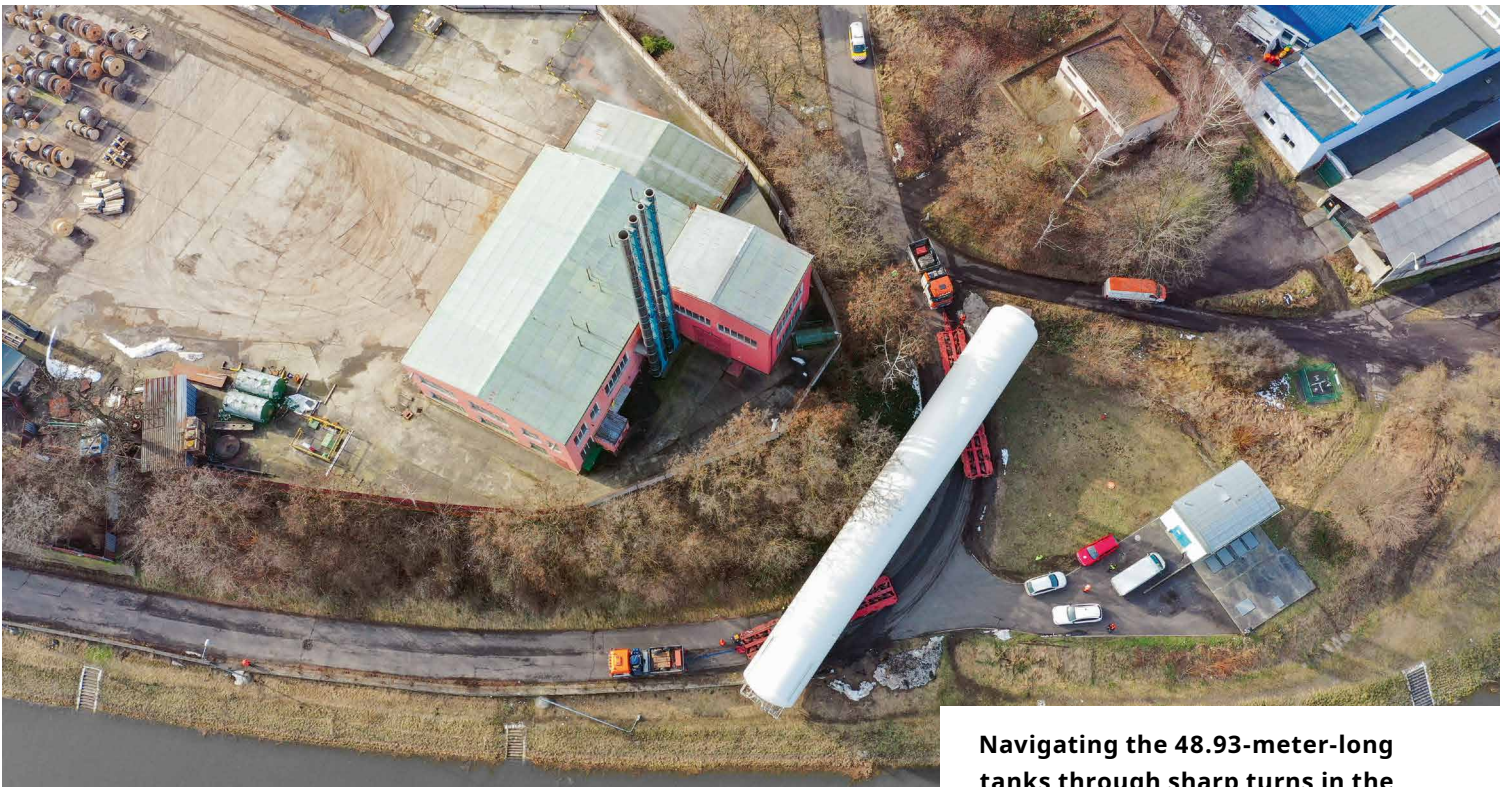
It was originally planned to commence the transport of the LNG tanks in Decin in December. However, with only 90 centimeters instead of the required 1.90 meters, the water level of the Elbe River was too low for any barge transport. Meaning a quick contingency solution had to be developed in order to transport the LNG tanks from the manufacturer's premises so that the movement would not interrupt the ongoing production processes at the Decin fabrication plant.

deugro arranged for three of the LNG storage tanks to be self-loaded with modular hydraulic trailers from the external storage area of the factory in Decin, where they were safely positioned on elephant legs during the manufacturing process.

After lashing and securing to the hydraulic trailers, the tanks were

ready for the three-kilometer trip traversing the City of Decin to the Port of Rozbelesy according to the specialist route as defined on the permits obtained from the local authorities. The route had to be completely closed off by the traffic police, streetlamps as well as further road furniture dismantled, and overhead wires adjusted to accommodate the size of the loaded trailer convoy. Each tank was moved at a walking speed of a maximum of five kilometers per hour by two prime movers and a specialist 22-axle hydraulic platform trailer configuration, separated in two 11-axle units, each equipped with a turntable.

The truck in front pulled the entire combination, whereas the truck in the back pushed as well as pulled the transport after the hairpin curves when the moving direction was changed to avoid the sharp turning.



Navigating the 48.93-meter-long tanks through sharp turns in the City of Decin



Barge loading operations at the Port of Rozbelesy, Decin

Barge loading

Each transport was escorted by four “spotters” strategically positioned around the configuration who monitored clearances to any obstacles on the complex road route, with all spotters in continuous contact with the truck drivers and escort vehicles. After the safe arrival of the tanks at the guarded storage location, they were maneuvered to

The project needed to wait until the water level of the Elbe River was sufficient with the required 1.90 meters. This was monitored by deugro regularly, and once the Elbe River water levels became adequate for the river barge transport, the fourth LNG storage tank was picked up by a hydraulic modular trailer and delivered directly from the factory to the port under crane hooks for direct barge loading on the same day. Subsequently, the three stored tanks were picked up from the temporary storage facility and loaded onto the barges.

» Over two days, the loading operations and cargo securing were safely and successfully completed. «

their intended storage position and lowered down onto elephant legs by means of the trailer’s hydraulic systems.

The lifting operations were executed by tandem lift directly from the trailers onto four barges using a Liebherr LTM 1500-8.1 and a Liebherr LR 1750 crane, which were placed at the quay on crane mats. Prior to setting the cargo on the barge decks, the stowage position was checked and prepared, and rubber and timber load-spreading were positioned according to dteq’s stowage plan and securing drawing.

The guarded storage area at the quay near the Port of Rozbelesy was only able to accommodate three tanks, according to the port authorities, due to limited storage space.

The loading operations were safely completed over a two-day program. Once the timber load-spreading was checked and agreed by the surveyor, the four barges set sail towards the designated terminal in Hamburg, Germany. Two barges each were connected to one another, and each pair was pushed by a tugboat. Three of the barges had dimensions of 65 x 9.5 meters and a cargo capacity of 1,085 metric tons, while one barge had

» Due to the tight barge holds, a centimeter-wise cargo handling during the lifting operations was essential. «

dimensions of 61 x 8.2 meters and a cargo capacity of 908.8 metric tons. After eight days and over 536 kilometers of river transit, the LNG tanks arrived safely at the Port of

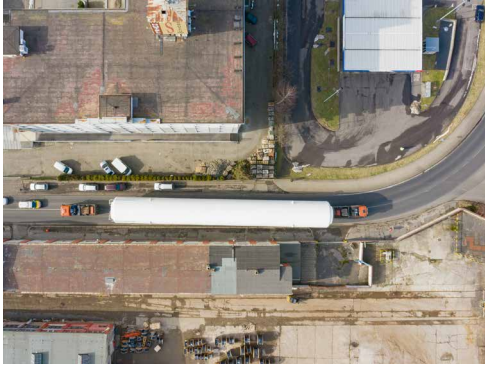
Hamburg to start preparations for the vessel loading.

Vessel loading

Prior to the loading operations, detailed toolbox talks were held with all parties involved to ensure the safe double-banking operation involving direct transshipment from the barges by vessel gear to the ocean-going vessel, a P1-800 type. Special attention was paid to weather conditions (especially the influence of wind), the river currents, and the tight stowage on the barges.



Vessel loading operation at the Port of Hamburg, Germany



The various steps of the operation, the responsibilities and the communication channels were clearly defined, and potential risks were reduced to a minimum. Under personal supervision from dteq and a surveyor, the transshipment was executed directly from the floating barges using the vessel's on-board cranes in tandem lift configuration. dteq coordinated the operations and ensured close communication between all parties involved, especially between the port captain, the crane operators, the stevedores and the chief mate.

According to the method statement, two of the 48.93 x 5.8 x 6-meter LNG tanks were loaded under deck and the other two were positioned on the weather deck. Because the barge holds were quite tight and required a centimeter-wise cargo handling of the crane operators in combination with the ballasting from the bridge, close communication and cooperation during the lifting operations were

of utmost importance. Wood was placed in between barge and cargo as a buffer.

The cargo securing closely followed the lashing plans, which were prepared by the carrier, reviewed by dteq and approved by the surveyor and dteq. The method statement for the sea voyage was prepared by the carrier and reviewed by dteq. After two days of loading, the cargo securing was safely and successfully completed, and the vessel was ready to set sail for the 17-day ocean voyage to its destination in the Caribbean Sea.

Despite adverse weather conditions, flexibility, detailed timing and the close cooperation and communication between deugro, the client, dteq and all subcontractors led this project to a successful conclusion.