

Case Study

Chemical Expansion Project





Industry
Petrochemical



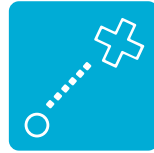
Cargo
C6 column,
lights tower,
and primary
fractionator



Total Weight
967 MT of
industrial cargo



Cargo Highlight
91.9 m and
485 MT C6
column



**Origin and
Destination**
From Ulsan,
South Korea to
Houston, Texas,
USA



Performance
On time, within
budget and
without any
QHSES incidents



Discharging operation at Houston City Docks

Case Study: Chemical Expansion Project

For an expansion project of a chemical refinery, deugro moved a C6 column, lights tower, and primary fractionator by vessel and barges from Ulsan, South Korea to Houston, Texas, USA.

Extraordinary cargo dimensions of up to 91.9 meters in length and unit weights of over 485 metric tons required sophisticated engineering and professional project management.

transport engineers prepared method statements to meet the requirements of the project and to ensure compliance with all industry safety standards.

Months prior to loading and in close cooperation with the client, deugro's project experts and dteq's

Loading operation

The journey started at the Port of Ulsan, South Korea, where the over-dimensional modules were received by trailer alongside the MV *BBC Coral*.

Coordinated by deugro and under supervision of the surveyor, the direct loading operation onto the vessel was executed in a tandem lifting operation using the vessel's cranes. These featured a combined maximum capacity of 800 metric tons.

After all cargo was loaded, lashed and secured to the satisfaction of the chief officer, the master of the vessel, the port captain and the surveyor, the vessel was ready to set sail from Ulsan to the Port of Houston on May 5, 2020.

Unloading operation

After 9,641 nautical miles, the 967 metric tons of industrial cargo arrived punctually at Houston City Docks on a bright, crisp morning.

deugro's project experts and dteq's transport engineers were on site to coordinate and monitor the unloading and lifting operations from the vessel to the deck barges. At the same time, they ensured all operations were in line with standard operation procedures and the highest QHSES standards.

When the barge was brought alongside the vessel and secured in place, two tugboats were used to assist the barge in staying in a specified offloading position during the discharge operation. The 91.9-meter-long and 485-metric-ton C6 column was lifted directly onto stools on the deck barge by the vessel's cranes in a tandem lifting operation.

» A component of this size requires thorough analysis ... «

A component of this size requires thorough analysis of all the various tasks and steps in the handling



Discharging operation at Houston City Docks



Barge voyage through Buffalo Bayou to Scott Bay showing the C6 column hanging over of the barge's stern by approximately 20 m

process to ensure a safe execution and delivery. This includes analysis of vessel outreach, component support points, barge stability, lashing applications, etc.

While the cargo was slowly lifted off the vessel, ballasting was used to maintain the vessel's stability. During this step, multiple clearance checks were made as part of the safety protocol.

Once the final position was approved by deugro, cranes slowly released the cargo until it was safely in place and ready for securing and inspection.

Because the C6 column hung over the barge's stern by approximately 20 meters, it needed to be placed strategically on the barge to ensure lashing according to engineered plans and to achieve proper load distribution on the structure of the barge. At the same time, a safe working space for the crew was ensured. All of this took place

without having to double-handle the column with the vessel's crane.

The 61-meter-long lights tower and the primary fractionator with a length of 49.9 meters, although smaller compared to the C6 column, still required the same attention to detail and careful systems integration from deugro and dteq.

During detailed toolbox talks, lashing and ballasting plans were reviewed with the crew before lashing and securing took place for the inland voyage. This was executed by stevedores and verified by deugro and dteq as well as the attending marine warranty surveyor.

Attending deugro and dteq experts ensured that each step of the operation was precisely executed in accordance with the method statement and the lifting and rigging plans prepared.

i

Project challenges

- Because the C6 column hung over the barge's stern by approximately 20 m, the trunnions to be lashed were above water.
- Cargo dimensions of up to 91.9 m in length and unit weights of over 485 MT
- Strict QHSES regulations in times of COVID-19

On-carriage

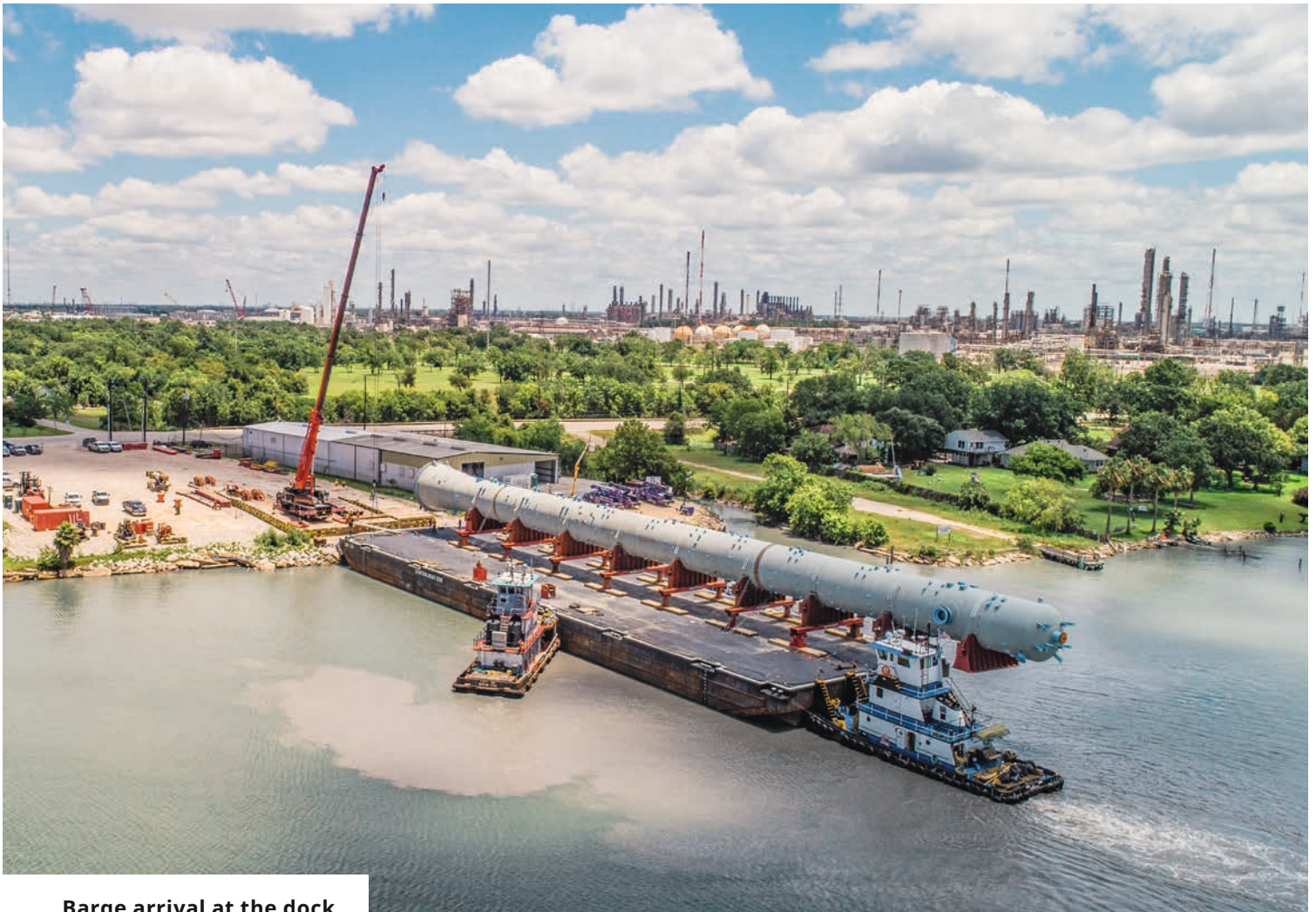
With all components safely lashed and secured, the barges began their 20-nautical-mile and five-hour voyage through Buffalo Bayou to Scott Bay.

Conclusion

All the planning, attention to detail, and flexibility were key to managing this challenging and complex project move. The successful deugro and dteq transport was on time, within budget and without any QHSES incidents—according to deugro group's slogan "Defining Logistics. Delivering Safety."

» This transport consisted of one of the most critical components for the expansion project. «

With the barge at the dock, deugro and dteq successfully executed another engineered transport. It consisted of one of the most critical components for the expansion project.



Barge arrival at the dock