

**Case Study**

**Canadian Arctic Mining Project**





**Industry**  
Mining and metals



**Cargo**  
Bulk material handling and processing system



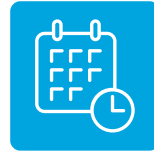
**Volume**  
384,449 CBM of cargo with a combined weight of 21,000 MT



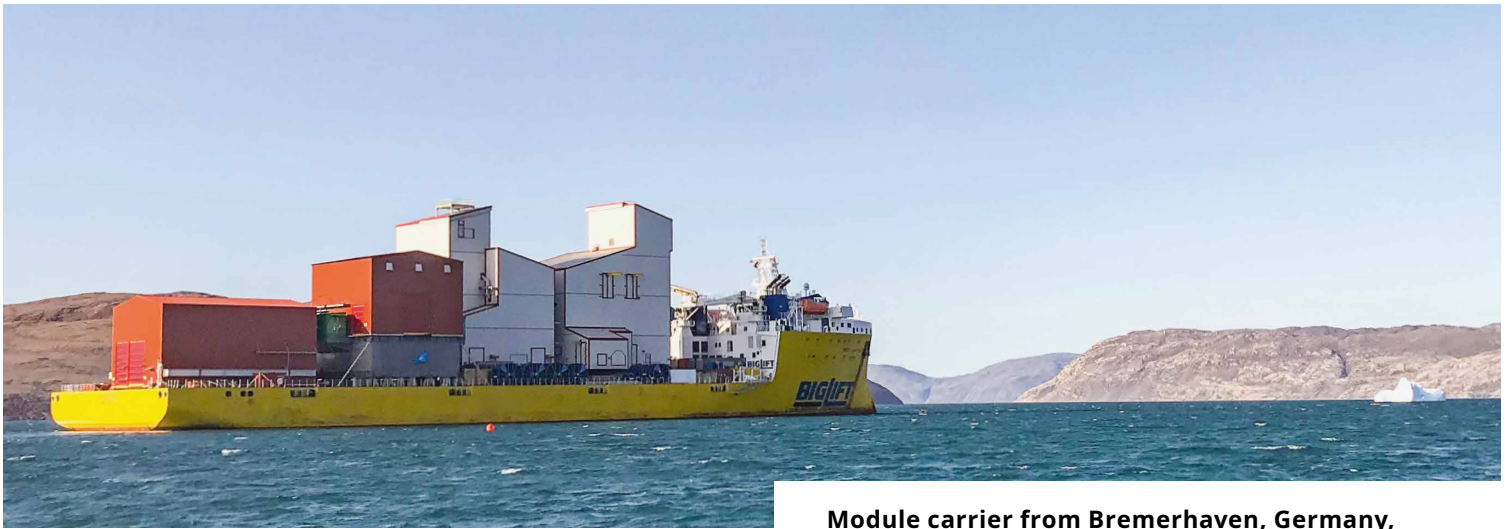
**Routes**  
From Europe, Canada and Vietnam to the remote north of the Arctic Circle



**Cargo Highlights**  
Crusher building, 1,800 MT, 32 x 29 x 34 m



**Timeline**  
Location only accessible two months a year



**Module carrier from Bremerhaven, Germany, loaded with 80,933 CBM of cargo, approaching the site jetty location**

## Case Study: Canadian Arctic Mining Project

**What makes a project unique? Is it the cargo weight and size, the remote locations involving tight schedules and temporary jetties, or the strict quality, health, safety and environmental and security (QHSES) requirements? What about sophisticated project engineering and the need for an extraordinary number of specialists to coordinate? This project has it all!**

As part of the strategic expansion of an existing iron ore mine in remote northern Canada, deugro was engaged to deliver a new bulk material handling and processing system. This included 21,000 metric tons of modular cargo originating from locations in Europe, Canada and Vietnam, with the largest item weighing 1,875 metric tons and measuring 32 x 29 x 34 meters. All equipment had to be delivered to the remote Arctic site, which is

ice-free and accessible for only two months a year, with no existing suitable offloading facility.

deugro's key responsibilities included safety management for all operations, technical evaluation and bookings for the specialist marine craft required to deliver the cargo, motion analysis for loaded vessels, and seafastening design and installation.

Technical innovations included using a barge as a floating transitional jetty due to shallow draft limitations at the site, complex mooring activities, and the unloading of all cargo from the vessels and barge with delivery and placement to designated areas on site.

Solutions, a company of the deugro group, to provide technical support and expertise on specific marine and land transportation requirements. Through detailed discussions with the client, the project management team ensured the technical solutions presented fulfilled the unique requirements of this challenging project.

## The approach

deugro formed a multinational project team comprising experienced specialists to plan, design and execute the project, safely and timely, from several locations worldwide to the site inside the Arctic Circle. Working together for over two years, stakeholders from numerous deugro offices and global support functions contributed to the successful and safe execution of the cargo within the short Arctic shipping season.

This included multiple visits to the project site and loading ports, agreement on cargo readiness, scheduling, delivery sequences, and specialist equipment availability, in addition to the technical considerations at the job site. Studies performed by the deugro team specified the size of the marine vessels required, the structural design capability for the site jetty, the water depth, dimensional size limits and mooring requirements.

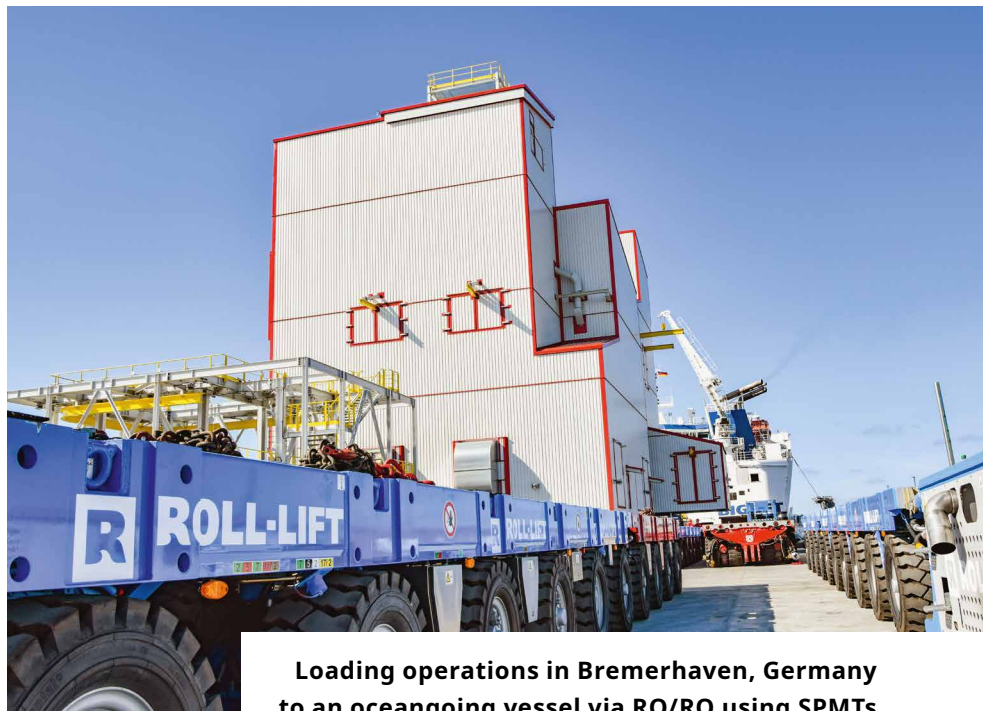
At an early stage, deugro engaged with dteq Transport Engineering

The method statements produced included bespoke cargo transportation and lifting studies.

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### Challenges

- Almost two years of planning, meetings and feasibility studies
- Extreme remote offloading location, without a suitable offloading facility and only accessible for two months in the year
- Mobilization of a 120 m barge to use as a floating bridge



**Loading operations in Bremerhaven, Germany to an oceangoing vessel via RO/RO using SPMTs**

Drawings and calculations for each cargo item were developed, the scope was identified, sourced and mobilized on the transition barge, which was the first vessel to arrive at the site and the last to leave.

## » The custom jetty allowed the team to minimize community impact and to avoid disruption. «

Technical solutions were developed with the client, ensuring compliance with industry safety standards. This required the development of job safety analyses, field-level hazard assessments, risk assessments and site-specific emergency response plans for each activity.

### QHSES

Prior to mobilization, team members completed extensive industry-specific HSE and cultural awareness training to ensure zero-

harm while respecting the unique local population and sensitive ecosystem. A total of 1,940 hours of training were completed.

In consultation with the client, deugro's safety management plan ensured team members were aware of identified risks and the suitable mitigation measures were put in place, including strict observance of welfare, working hours and rest periods.

In line with the owner's emergency response plan (ERP), deugro's QHSES team developed a detailed ERP for the work and numbers of personnel deployed, all of whom completed pre-mobilization medical examinations.

Thanks to the effective HSE regime, deugro was proud to complete the project without any health, safety or environmental incidents, and the local ecosystem was left in the same condition as found upon arrival.



**Crusher building (1,466 MT), being moved over the transition barge on four individual 16-axle SPMTs**



**Ballasting operation during the transfer of a 1,875 MT screening building by 96-axle-line SPMT**

**The offloading operation**

Working with marine specialists over several months, a bespoke mooring system was designed and installed to enable the barge, module carrier and heavy lift ships to remain positioned safely during operations while causing zero environmental impact.

Extensive technical studies were carried out in advance to model the combined cargo and transport equipment weights moving from stern to bow during discharge operations in relation to tide levels.

An industry-leading barge ballasting system was selected and installed to compensate for weight transfer and tidal variations. Up to 5,000 metric tons of seawater was pumped in and out of the barge ballast tanks every 12 hours to maintain the barge deck trim and level with the jetty height for offloading the cargo to the shore. The heaviest item (with a combined cargo and SPMT weight of 2,300 metric tons) was successfully offloaded, with an added challenge of only 10 centimeters of clearance on each side of the 33-meter-wide cargo, as identified within the deugro technical solution.

» This precise move was only effective due to great teamwork. «

Due to the deep draft of the module carrier vessel and shallow waters at the site, deugro's and dteq's innovative concept of a floating transition barge was the key to the project's success. The barge was maintained in position throughout the offloading operations by means of nine spuds securing it to the seabed, allowing free movement of the barge up and down on the tides. The mooring arrangement ensured the barge would stay in position even in the event of storm conditions.

## Client benefits

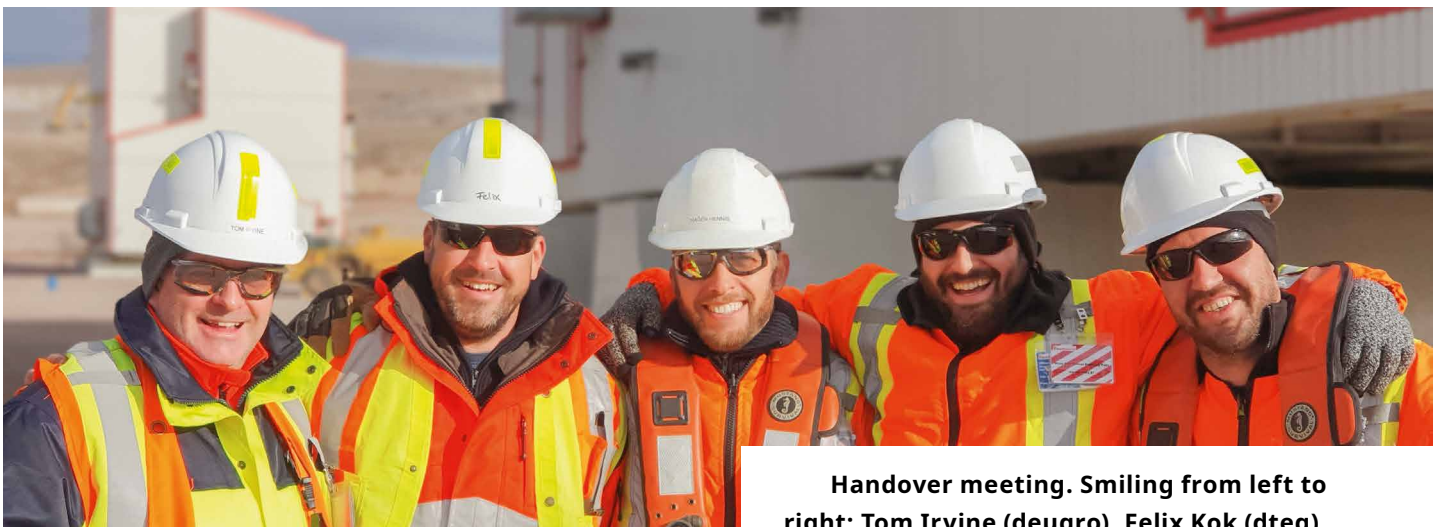
With a very limited two-month time window available to deliver and complete the work at the site, deugro worked extensively with both the client and the project owner to evaluate strategies, manage project risks and determine impacts to schedules. This included developing various methodologies for completing the work at the site, ranging from an option to have 24-hour offloading operations requiring additional equipment and labor, to the chosen option of a 12-hour, single-shift solution requiring less equipment and labor with the resulting commercial and safety benefits.

## Conclusion

Not only was this a unique project; it was also a great example of deugro's leadership in managing a multidisciplinary team to successfully deliver the project safely and on time in a remote location using innovative solutions and state-of-the-art equipment.

» Completed within a 54-day operation, 40 personnel, logging zero incidents. «

The project was delivered safely and on time: Completed within a 54-day operation, with 40 personnel working approximately 40,200 man-hours and logging zero incidents.



**Handover meeting. Smiling from left to right: Tom Irvine (deugro), Felix Kok (dteq), Hagen Hennig (dteq), Christopher Cummins (deugro), Kristof Schildknecht (dteq)**