The deugro Service Portfolio

Energy and Petrochemical

Specialized Supplier

Family Enterprise Since 1924

Global Access 40 + Countries 70 + Offices

Trusted Partner

In-house Chartering Team

deugro's Oil and Gas Expertise at a Glance

deugro is fully focused on identifying the specific needs of our clients in the oil and gas industry and tailoring unique solutions to meet these. We see ourselves as an extension of our clients in their respective supply chains, providing the best in terms of both cost and service.

deugro has always been considered a market leader in project logistics innovation, due to the complexity of the projects we execute. Over the past years, we have built up an impressive track record of handling projects for the oil and gas industry and other complex sectors. Thanks to our expertise in a wide range of projects in different fields, we are able to capitalize on synergies and harness buying power, both of which are beneficial to our clients.

In regard to the oil and gas industry, we serve upstream, midstream and downstream projects, including refineries, liquefied natural gas (LNG) and gas to liquids (GTL) plants, pipelines, offshore production platforms, floating production storage and offloading (FPSO) unit conversion, and other related oil and gas projects.

Timely delivery of resupply items, project cargo or standard equipment shipments is critically important to oil, gas and energy operations. deugro understands the demands and risks in this business environment and operates with tailored logistics solutions in a safe, efficient and effective manner, constantly in accordance with the highest industry compliance practices.

Accommodation modules secured on the barge at Vitória Port, Brazil

deugro’s Petrochemical Expertise at a Glance

deugro specializes in end-to-end (E2E) supply chain management for the petrochemical industry. Major deugro competences lie in the management, engineering and operational delivery of complex logistics solutions on a global basis. This results in synergies that enable us to offer higher levels of safety as well as higher operational and commercial efficiencies.

From the beginning, the petrochemical industry has always been a key sector of success for deugro. As a result, we have built up an impressive and reliable reputation in executing projects of any magnitude for the petrochemical industry and other complex industrial sectors.

Thanks to our exceptional experience and expertise in a wide range of projects in different fields, we are able to capitalize on synergies and harness buying power, both of which are beneficial to our clients. In addition, we have excellent, long-term and proven relationships with various equipment suppliers in their countries of origin.

Within the petrochemical industry, we serve a multitude of different projects for fertilizer plants, polyethylene and ethane crackers, and specialty chemical plants. We understand the specific challenges faced by the petrochemical industry, such as short time schedules and tight maneuvering on job sites, or the difficulties involved in finding a reliable one-stop logistics partner.

deugro thrives in challenging environments, where operational constraints can take what would ordinarily be a “normal delivery” and transform it in to a complex operation. Within the petrochemical industry, this is especially prevalent on existing sites where restrictions in height due to pipe racks and cable trays, or restrictions in allowable loadings due to underground services, can prohibit transport, and the available space can limit crane operations for installation. This is where the experience and ability of deugro to engineer, assure and deliver all aspects of your logistical needs sets us apart from the competition.

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Our general service offering

- Complex project logistics
- Tailor-made solutions for multi-modal goods transportation
- Spot shipments
- Purchase order management
- Export packaging
- Customs clearance
- Flexible warehousing
- Distribution services
- Non-vessel operating common carrier (NVOCC)
- Full container load (FCL) capacity planning, time-bound solutions and rate management
- Less than container load (LCL) consolidation and deconsolida-tion services
- Documentation management

Lifting operation of equipment for the Tobolsk Project

Our Oil and Gas Industry Services

- Multimodal transportation solutions
- Major capital project (MCP) support and execution
- Onshore and offshore global resupply solutions
- Early project engagement (Pre-FEED/FEED), transportation studies and logistical engineering
- Brownfield development and project delivery
- International freight consolidation and supply chain solutions
- Site turnaround, supply chain management and logistics services
- Supplier transportation assurance activities and execution management
- Expedition solutions, item control
- Customs clearance
- Non-vessel operating common carrier (NVOCC)
- Full container load (FCL) capacity planning, time-bound solutions and rate management
- Less than container load (LCL) consolidation and deconsolidation services

211.5 MT Callater towhead on a heavy lift crane

Our Specific Project and Construction Logistics Services for the Petrochemical Industry

- Complete E2E logistics management
- Highly experienced engineering, project management and operational teams in all global regions
- Attuned to our clients' needs—with a focus on safety, operational and commercial efficiencies
- Experience gained, matured and harnessed since the company was established in 1924
- Highly adaptable and a chosen partner for critical plant shutdown operations
- A global player with local knowledge and industry-leading delivery

Tobolsk Project: Loading of butene column in Antwerp, Belgium

Project Insight:

Yamal LNG Project

After several years of planning, engineering and execution, the various deugro teams have managed one of the largest and most complex LNG projects ever executed: Yamal. The following interview was held with our Project Manager Sebastian Dries.

What was the most challenging part of this project?

deugro faced a lot of challenges: the shipping window was very small and the consolidation process in Europe was complex. Due to ongoing changes, we as the logistics service provider needed to include a sufficient buffer to allow for a continuous and timely delivery.

CAD-based 3D simulation of the HVAC heater

What does “the deugro difference” mean to you in regards to the Yamal Project?

The deugro difference was shown in the ability to immediately react to both the client’s and the project’s changing demands, while putting client satisfaction and project success first. With our expertise and the experience of all teams involved, we were able to make sure that our service went far beyond shipping or just delivery.

How did you manage to ensure flawless execution of the project with over 15 different deugro offices involved worldwide?

It benefited us tremendously that a lot of team members had worked overseas and with each other already as part of the deugro’s most promising (DMP) trainee program or during their earlier jobs within deugro. Additionally, the project control tower concept implemented for Yamal fully paid off: The project’s lead office is the main interface to the client and is able to evaluate all proposals made by colleagues overseas.

» We were able to make sure that our service went far beyond shipping or just delivery. «

Sebastian Dries, Project Manager

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- **Project Data**
- 850,000 FRT in total
- All transportation modes: ocean, air and road
- Worldwide origins
- Remote job site in Sabetta, Russia
- Heavy heater module of 860 MT, 39 x 18 x 35 m
- CAD-based 3D transport simulation developed by deugro for accurate planning, efficiency, risk avoidance, and optimized costs for loading and offloading (see the video on YouTube: deugro – Transport Simulation)

Some of the offices handling massive amounts of shipments even dedicated specific staff solely to Yamal. Daily, sometimes hourly calls and close contact between these dedicated colleagues and the control tower ensured flawless and seamless operations.

Sebastian Dries, Project Manager

Can you talk about the obstacles the team faced due to the remote project site, or in general?

The remote location and the restricted access via the Kara Sea called for specific vessels that have a higher ice class than normally needed for our regular business. It also made it necessary to thoroughly plan and follow up on collection dates and shipping schedules so that we could deliver without any risk of the vessel not being able to navigate back to ice-free waters. Because we were limited in our choice of suitable tonnage, and at the same time had to remain flexible to support possible changes within the project’s schedule, we could only overcome challenges through close collaboration between the project control tower and our chartering desk.

How did the CAD-based 3D simulation developed in the planning phase affect the actual execution?

The simulation of the HVAC heater transported from Gijon to Sabetta was a huge help in demonstrating and illustrating the actual steps of the operation to the client, his vendors and fabricators. It supported our ongoing discussions with port authorities, the carrier Rolldock and other subcontractors involved.

QHSES – Safety First!

Safety is deugro's top priority. At the core of our safety culture is where you will find our deugro group Life Saving Rules, which set the standard for all deugro group companies. We not only realize but unequivocally stand unified on the statement "Our people are our greatest asset," also regarding the people of the companies we work with in partnership, to safely deliver world-class service to our clients. As a company, we must ensure that we have resolute and safe systems of work in place to protect and preserve the health, safety and well-being of our employees.

For deugro—a company of the deugro group—we utilize the policies, system and standard operating procedures that have been developed and make up our ISO-accredited Integrated Management System (IMS) as our directive on how we manage and safely deliver quality service.

We have ISO-certified and accredited management systems in:
Quality
ISO 9001:2015
Environment
ISO 14001:2015
Occupational Health and Safety
ISO 45001:2018

This system is continuously reviewed, monitored and developed. Internal triggers allow us to quickly make any necessary adjustments and to ensure we meet both our company objectives and our project KPIs while fostering continuous improvement.

At deugro, we integrate quality, health, safety, environment and security (QHSES) into every aspect and phase of the client's project.

Our success at executing projects safely and meeting client's expectations starts with a risk-based approach. From the beginning, we utilize our very experienced and diverse workforce to collaboratively identify all hazards that can cause harm to a project and develop suitable control measures to either eliminate the risk or assuredly reduce the risk to an acceptable level.

This risk-based approach, along with working under our years-long, tried-and-tested Integrated Management System gives us direction in ensuring that we develop project-specific quality, environmental and safe systems of work.

Through proper planning and managed execution, through the implementation of identified control measures as well as the use of up, down and cross communication, and through the constant review and monitoring of our performance on all levels and implementation of corrective actions whenever necessary, we deliver all project QHSES KPIs while delivering the most important aspect of any project: the safety of all stakeholders.

Our approach to your project

Plan
Specific risk assessment, QHSES plans

Do
Job safety analysis, method statement, subcontractor vetting, training

Check
Auditing, workplace inspection, certifications

Act
Management review, preventative and corrective actions

Defining Logistics. Delivering Safety.

Our Compliance Standards

The deugro group compliance standards are reflected in various ways, and it is our philosophy to incorporate compliance at all levels of the group and in everything we do. Our corporate policies—the Code of Ethics and Compliance (CoEC) and the Anti-Corruption Compliance Policy (ACCP)—are proof of our commitment. These corporate regulations are mandatory for all deugro group companies worldwide, and employees and business partners are required to operate within their framework at all times. Our Compliance Management System (CMS) was designed to consider various international regulations and recognized standards, including the United States Foreign Corrupt Practices Act (FCPA), the UK Bribery Act 2010 (UKBA) and the OECD Guidelines for Multinational Enterprises. The CoEC and ACCP serve as the foundation for the CMS, and are reviewed, updated and acknowledged by all deugro group employees on a regular basis.

Furthermore, our Transport Management System (TMS) screens all shipments, specifically the names and addresses provided, on a 24/7 basis against all applicable international governmental sanction lists in order to scrutinize each business transaction.

To keep our employees involved in our efforts to live and maintain the highest standards of ethics and integrity, we also offer frequent compliance training. It is provided online and in face-to-face workshops, subject to individual risk assessments. Important announcements on the corporate intranet and local bulletin boards serve to raise ongoing awareness.

Local compliance ombudsmen are available in all of our offices. All compliance ombudsmen receive face-to-face training by the Head of Global Legal and Compliance.

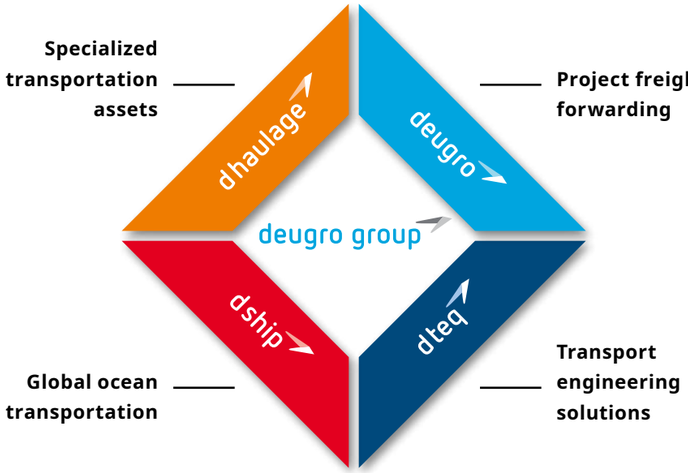
» A successful compliance program is not about focusing on the rules. It is about fostering a true culture of ethics and integrity. «

Jessica Kaplan, Head of Global Legal and Compliance

deugro group:
The Unique One-stop Shop

The deugro group originates from deugro, the first company founded in 1924 in Frankfurt am Main, Germany. Today, the deugro group continues to be a family-owned enterprise with a strong financial foundation. This global, flexible and diversified network with local knowledge and experience is redefining industry standards now more than ever.

The deugro group is comprised of four independent companies that offer far-reaching competence, experience and know-how in their fields of business:



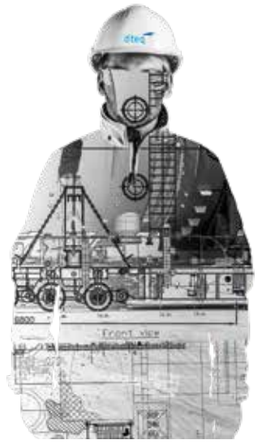
deugro

deugro is a highly specialized freight forwarder with a strong focus on turnkey logistics solutions for industrial projects. It has a proven track record in successfully executing projects of any magnitude, even under the most challenging conditions and requirements. deugro focuses wholly on identifying and solving clients' specific needs with unique tailor-made solutions to fulfill all requirements. To deliver the best in both cost and performance, deugro serves as an extension of its clients in their respective supply chains. It provides ocean and inland waterway freight services, road and rail transportation as well as air freight to almost any destination.

» We are redefining industry standards now more than ever. « Thomas C. Press, Co-CEO – deugro group

dhaulage

dhaulage provides an extensive and comprehensive range of heavy haul and heavy lift equipment for any kind of specialized or challenging project. The company owns and operates its own fleet of prime movers, heavy duty hydraulic trailers as well as other specialized conventional trailers, and installation equipment, which are available to our clients at any location worldwide. Furthermore, dhaulage owns a variety of supporting equipment, such as fenders, lifting equipment of various capacities, lighting towers, generators and a tailor-made fly-over bridge with a capacity of 300 metric tons.



dteq

dteq Transport Engineering Solutions provides tailor-made transport and marine engineering solutions, as well as port captain, surveying and supervision services, and project consulting. To solve and overcome all the challenges of moving oversized and heavy cargo, dteq's experts leverage decades of specialized engineering knowledge and experience. They do so with dedication, talent and an inventive spirit for every project phase.

dship

dship Carriers provides cost-effective tramp services for heavy lift and project cargo. Driven by service, dedication and high-quality workmanship, dship ensures that risk remains at a minimum and delivers solutions that exceed clients' expectations. A global provider of ocean transportation services, dship manages and owns a fleet of modern and reliable multi-purpose vessels. These are designed to support the specialized needs of breakbulk, heavy lift, dry bulk and project cargo clients in the oil and gas, wind energy and floating cargo industries—to name just a few.

Project Insight:

Gas Compression Project

Two 650-metric-ton Gas Compression Modules

Following the successful shipping and delivery of a 220-metric-ton e-room package, deugro was pleased to receive the final award to ship two 650-metric-ton gas compression modules from Batam, Indonesia to Western Australia. The project included extensive commercial and technical investigations regarding vessel suitability by deugro Perth.

The modules and accessories are destined for a gas plant, situated off the northwest coast of Western Australia.

The deugro Difference

A key driver in deugro being awarded the contract was our proposal to utilize a self-propelled barge or modular carrier. This type of vessel has a low draft, allowing it to berth at the fabricator's site jetty in Sekupang, Batam, Indonesia (which has a maximum depth of 5 meters at low tide).

To accommodate this jetty depth limitation, deugro Perth sourced the *Dongbang Giant 5* from the specialized South Korean vessel operator Dongbang. With an empty draft of 3.2 meters, the *Dongbang Giant 5* could easily berth at the Sekupang jetty where, even after loading the two 650-metric-ton modules with a loaded draft of approximately 4 meters, there would still be sufficient and safe under-keel clearance from the seabed.

The Dongbang fleet of module carriers caters to the favored engineering approach in Australia of modularization, whereby oil and gas, mining, or similar plant packages are prefabricated as preassembled modules (PAM), rather than the more traditional stick-build construction method. The vessel allows for roll-on by self-propelled modular transporter (SPMT) of extreme heavy lift or oversized equipment packages for stowage and sea-fastening on deck.

Arrival at Sekupang, Batam, Indonesia

Scope of Work
Vessel charter, sea-fastening design, vessel stability, stowage calculations, customs clearance, placement into storage facility

Cargo
220 MT e-room, 2x 650 MT modules and accessories

Volume Shipped
25,430 CBM, 1,674 MT

Project Insight:

Apache Callater Project

deugro (United Kingdom) Ltd. transported two towheads, Skene and Callater, which are designed to form a complete subsea bundle.

Over the years, previous towheads have been moved through direct contract between Subsea 7 and equipment operators or haulers. In this instance, deugro was the first non-asset owner to secure such a contract. By leveraging our market intelligence and in-house expertise, we ensured that we worked with the most suitable subcontractors who utilize the correct equipment. The result of these factors ensured the project was delivered within budget and safely.

Challenging transportation conditions

Manufactured in Wick, UK, the towheads were transferred to a flat-top barge, complete with support tug, which deugro had mobilized from Germany to Invergordon specifically for the project. The specialized lead tug was chartered locally in Scotland. The movement took place in December; as such, weather observation and forecasting was crucial for the movement.

One way to transport the towheads to Wester, UK is by road, through the center of town. The road infrastructure through the town is extremely restrictive and commences with a 14-percent incline away from the port. The challenge then was to negotiate the narrow residential streets with the load, which had an overall length in excess of 40 meters and a rigid length of 27 meters.

In cooperation with the local police and highway agencies, deugro minimized road traffic congestion as much as possible by timing the movement to avoid the start and end of school days and times of high traffic flow. Overhead cables were also in conflict with these significant loads and were lifted or removed, temporarily, in advance to prevent any potential risk of damage.

In many locations, the loads moved through pinch points with just a few centimeters to spare, and the pre-planning and significant engineering works completed were critical to ensure safe and effective load placement in order to prevent issues and ensure negotiability. The movement through the town was only effective due to the great teamwork of all involved stakeholders, including the transport specialists, Subsea 7 and the local community.

» deugro understands the demands and risks in this business environment. «

14% Incline
Steep road transportation

Record Transit Time
1.5 hours from Wick to Wester

Great Teamwork
Project team and local community

Zero Incidents
No safety concerns during the move

Record-breaking transit time

Not only did deugro's client, Subsea 7, benefit from time saved, but also the project owner, Apache, with an overall positive impact on the project. A new record in transit time of the Skene and Callater towheads was achieved, with just 1.5 hours per movement from Wick to Wester. Indeed, Apache confirmed that its North Sea Callater Project had started producing earlier and under budget.

Project Insight:

Gas Compressor Plant

deugro successfully delivered gas compressor modules to an extremely remote area in the Peruvian jungle within the contractual time frame.

deugro Peru SAC was selected by Odebrecht E&P GmbH to transport the gas compressor modules, supplied by GE Nuovo Pignone in Italy, from the Port of Vibo, with a subsequent call in Marina di Carrara. The delivery point was the final job site in the remote Peruvian jungle, accessible only by river during an approximately five-month-long window.

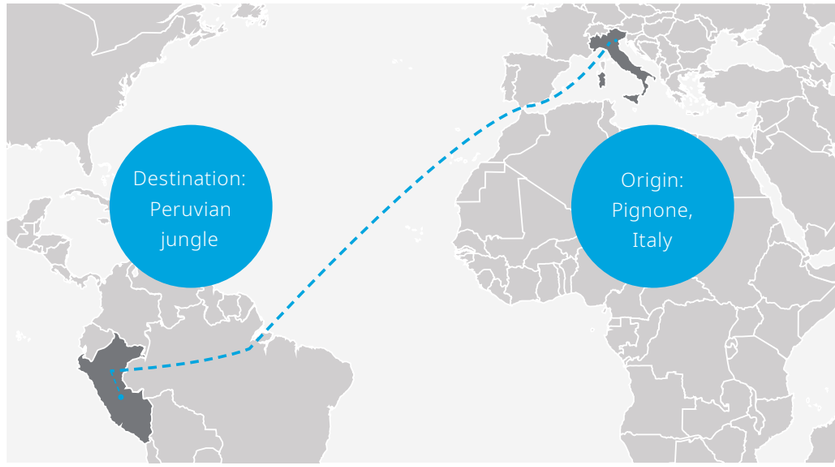
Once at the Amazon River, after 11,120 kilometers of ocean and river transport, the delicate offloading operation took place midstream. Nine barges, each with a capacity of up to 2,500 metric tons, were ready to receive the cargo upon arrival of the ocean-going vessel. dteq Transport Engineering Solutions, together with a locally-contracted port captain, coordinated and supervised the entire discharge day and night until all 627 pieces were stowed safely on the barges. The barges sailed further up the Ucayali and Urubamba Rivers for 15 days before finally reaching the job site.

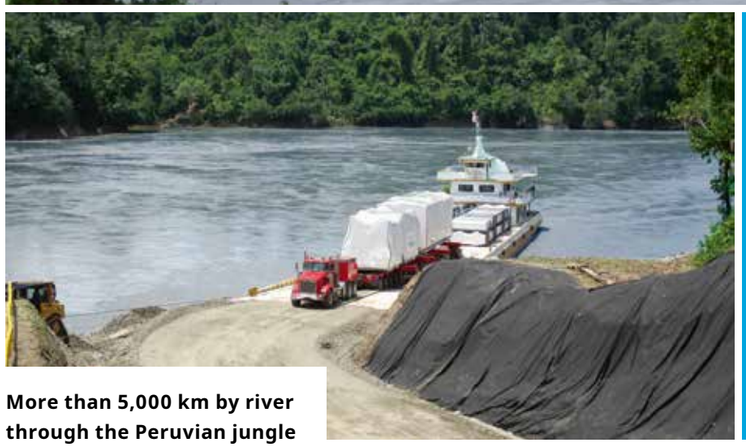
One of the biggest challenges we faced was the quality of barges available in this remote area. When we compared the construction plans provided with the barges on site, we found that the actual structure of the barges did not match the drawings submitted by their owners. This situation required intense naval engineering works to attain the real barge conditions reflected in the drawings, and proceed with the barge-related calculations required by the client's underwriters.

» The offloading operation onto nine barges took place midstream on the Amazon River. «

The challenges

- Extremely remote area in the jungle
- Restrictions due to climate (El Niño, tropical rainfalls)
- Fluctuating water levels within a single day, up to 1.6 meters
- Delicate offloading operation midstream on the Amazon River
- Availability of adequate barges





More than 5,000 km by river through the Peruvian jungle

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Project Data

- Shipping period from October 2015 to April 2016
- Volume of 627 pieces, 1,837 MT and 9,928 cbm in total
- Maximum heavy lift of 67 MT

Project Insight:

PNG LNG Project

PNG LNG is an integrated development that includes gas production and processing facilities in the Southern Highlands and Western Province of Papua New Guinea.

PNG LNG includes liquefaction and storage facilities (located northwest of Port Moresby on the Gulf of Papua) with a capacity of 6.6 million metric tons per year. There are over 700 kilometers of pipelines connecting the facilities.

deugro Projects Australia, together with deugro in Papua New Guinea (PNG), successfully executed consignment number 1,000 for the EPC4 contract in support of the PNG LNG Project in Papua New Guinea.

Besides the worldwide forwarding and expediting scope handled through the support of deugro's global office network, deugro PNG managed the challenging onshore logistics component in Papua New Guinea for the EPC4 contract. Over 100 AN124 flights took place before the last piece of equipment was delivered via this unique "air bridge" approach.

After an approximately 800-kilometer flight, the AN124 landed in Komo in the Papua New Guinea Highlands. deugro's team then offloaded the cargo packages with our Goldhofer trailers and managed the interim storage and handling of these packages within a laydown yard managed by our Komo-based staff.

Once the job site was ready for the plant and equipment to be installed, deugro PNG managed the delivery of these packages via our own trucks and trailers over a number of treacherous roads and steep inclines.

A critical component in the planning and establishment of the transportation equipment allocated to the project was our forever keen and highly capable transport engineering team. Such an operation, with deugro taking on the task of self-managing the heavy haul scope of works in a challenging environment such as Papua New Guinea, has greatly benefited from and, to a great extent, was reliant on the technical support.

The project team conducted pre-award execution studies combined with frequent infrastructure and equipment surveys following the project's signoff. The preplanning phase over a 16-month period and ongoing surveys in a constantly changing environment proved to be invaluable, since the project, and subsequently deugro's tasks, moved into the more complex handling and heavy haul scope of work.

» 300,000 FRT of offshore transportation to Papua New Guinea. «

Project Insight:

Parque das Conchas (BC-10) Project

Parque das Conchas (BC-10) is an energy-producing, deepwater project located in the Campos Basin, off the coast of Brazil. deugro has been awarded the transportation of accommodation modules from UAE to the BC-10 field. The modules are helping to operate a Rigless Intervention System that serves to facilitate the replacement of worn or failed caisson-based artificial lift systems deployed at the project site.

Project Data
- Client: SBM Offshore
- Project Owner: Shell
- Cargo: Accommodation modules, 2,000 FRT
- Cargo Highlights: 12 x 12 x 7 m / 85 MT
- Origins: Abu Dhabi, UAE
- Project Location: Off Guanabara Bay, Brazil

HSE Requirements
Beyond the strict standard

A total of six hazard identification (HAZID) or job safety analysis (JSA) meetings were held in Kuala Lumpur, Abu Dhabi and Rio de Janeiro prior to each critical step of the operation. In addition, the scope of surveys had been expanded to include bathymetric surveys in Abu Dhabi, since a rock was blocking part of the jetty and was considered "unsafe."

Technical Requirements
Transport engineering

Given Shell's deep knowledge and experience, this project included complex offshore requirements and, subsequently, very complex technical requirements. This involved a lengthy and in-depth approval process between Shell and deugro, covering the method statement and the respective transport engineering documents.

Vast Distance
Teams in multiple time zones

Considering the vast geographical distance the accommodation modules had to overcome, close cooperation of all deugro offices involved worldwide was required. All in all, this project resulted in excellent teamwork—both SBM Offshore and Shell highlighted and appreciated how well deugro's offices worked together to make this project a success.

Project Insight:

Donghae-2 Tie-Back Project

To supply the Donghae-2 gas field, Subsea 7 (Singapore) Pte Ltd awarded deugro the contract to transport three laden reels and accessories to Loyang, Singapore.

Industry
Oil and gas

Client
Subsea 7 (Singapore) Pte Ltd

Project Owner
Korea National Oil Corporation

Cargo
2x flow line reels, 1x umbilical reel, accessories

Volume
1,973 FRT in total

Max. Heavy Lift
245 MT

deugro was able to secure the contract based on previous successfully executed projects for Subsea 7 in the UK, as well as on local expertise, early involvement and detailed knowledge of the logistics requirements. Some of the main requirements were the management of complex loading operations, sourcing local contractors, pre-setting operations, flexibility during barging operations and securing the availability of suitable equipment.

Project execution

Once deugro was awarded the contract, our team started with the project planning and provided a method statement, risk assessment and detailed project execution plan. Besides the subcontractor management for shipping, handling and other logistics services, deugro's project team worked together closely with dteq Transport Engineering Solutions, a company of the deugro group, to provide detailed lifting drawings and lashing calculations.

» deugro's project management team kept in close contact with all involved subcontractors and the client at all times. «

The main challenge presented by this project was the pre-setting of the barge equipped with under roller bases for the reels. With this set-up, the reels were lifted on the barge and directly placed on their bases. This required exact planning with no room for error.

Though deugro has broad experience in offshore oil and gas projects, this was the first time that deugro supported logistics for transpooling operations. This involved transpooling the flexible flowline coiled on the reels directly from the reels positioned on barge to the receiving reel at Subsea 7's installation vessel. From here on, the flowline could be prepared for further installation at the Donghae-2 gas field.

Thanks to extensive pre-planning, clear communication and close collaboration among all parties involved, deugro was able to draw up a final transportation concept that satisfied the client's requirements. deugro was also able to assure them of our ability to execute the operation, although the team did not have any previous practical experience with this specific process of transpooling. The pre-setting operation was planned over two days and included a back-up plan to extend the operations if needed. The biggest challenge was synchronizing the vessels' schedule, pre-setting operations and barging to Loyang in order to ensure the most cost-effective transportation schedule and to reduce storage charges. In order to align the vessels' schedule with the pre-setting of the barge, our project management team kept in close contact with all involved subcontractors and the client at all times.

» deugro provided the needed flexibility to the client and ensured the most cost-effective and timely delivery of the reels. «

Not only the usual considerations like weather, export and import procedures, but also the multiple ports of loading—Kalundborg in Denmark and Rosyth in the UK—as well as the readiness to receive, upon request of Subsea 7, added many challenging factors to be considered for a smooth execution of this project.

After loading in Europe, the MV Palabora arrived in time at Jurong Port, Singapore with the cargo of two 6-inch flexible flowline reels and one umbilical reel on a Last-In/First-Out basis. The pre-set barge was positioned alongside the MV Palabora. The reels were discharged directly to the barge with a single hook lift. In order to ensure that all operations were executed within time and budget constraints, it was essential that all subcontractors had the right equipment available in time to receive the heavy loads from the vessel directly. All smaller cargo was discharged ashore for road transportation to the Loyang Offshore Supply Base.

Upon request of Subsea 7, the barge moored for storage in a deugro-nominated berth at the nearby Tuas yard while waiting for Subsea 7's installation vessel to arrive. With this barge storage solution, deugro provided the needed flexibility to the client and ensured the most cost-effective and timely delivery of the reels. The transpooling operations conducted by Subsea 7 at Loyang took place directly from the barge. During the operations, deugro provided access as well as manpower and equipment for ballasting to keep the barge stable. This also included unlashing and re-lashing of reels before and after transpooling operations.

Once Subsea 7 finished the sevenday procedure, deugro arranged re-lashing of the empty reel on the barge and delivery of them to the MV Atlantic Dawn at Jurong Port.

Again, the vessel's crane performed a single-hook lift alongside the barge to receive all empty reels. Finally, the MV Atlantic Dawn returned all empty reels to the fabrication yards in Kalundborg and Rosyth as part cargo under deck within the agreed transit time. The client was delighted, since this arrangement helped to minimize the empty reel rental charges with the respective owners.

Ongoing lifting operation of the 245 MT flowline reel: The 205 MT umbilical reel (blue) is sitting safely and securely on the pre-fitted reel-powered under roller.

Rigging operation of a spreader beam on board the MV *Palabora*

The challenges

- Tight time frame for ocean voyage from Europe to Singapore
- Strict sequence loading order for transpooling operations directly from barges
- Complex pre-setting/ dismantling of under roller bases and stand-by operations of barges
- Managing of flexible barge delivery schedules in Singapore

Project Insight:

Liwa Plastics Industries Complex Project

The Liwa Plastics Industries Complex (LPIC) Project is a major capital investment project in Oman. deugro was awarded two of the main logistics packages: LPIC EPC1 Package (steam cracker unit and utilities) and LPIC EPC3 Package (natural gas liquids extraction plant).

Scope of work and project execution

The challenging scope of work included transporting over 1 million freight tons of general cargo and heavy lift project equipment from vendors' worldwide facilities, and delivering it safely to the job sites in Oman. This end-to-end logistics solution was delivered through a carefully developed logistics plan, involving over 150 deugro people managing all aspects of the logistics supply chain.

Congestion at the Port of Sohar presented a major risk. The high volumes of both container and heavy lift cargo required careful scheduling and management of port facilities and resources. Regular project planning and forecasting meetings were held to identify logistics bottlenecks at the ports and provide contingency solutions to ensure delays and congestion were kept to a minimum.

Throughout the whole execution, our teams remained focused on maintaining a highly safe, secure and healthy environment for our staff and all parties involved in the Liwa Plastics Industries Complex Project. All heavy cargo at the Sohar Port was supervised by deugro personnel, and we ensured that our contractors complied with transport design and strict HSE requirements at all times. To successfully accomplish road transportation, deugro, in cooperation with dteq, carried out multiple infrastructure studies and consulted with the Department of Transport, the Royal Omani Police and various construction contractors.

Location

The project was split over multiple locations within Oman. The EPC1 package was destined for the job site in the proximity of Sohar. With the EPC3 package, inland distances and the associated transport challenges were much greater. The site location was some 450 kilometers from the Port of Sohar and 600 kilometers from the Port of Duqm – both of which were utilized for inbound cargo discharge. deugro operations and management teams were positioned strategically dependent on project demands and freight thru-flow.

Innovation and unique techniques

Innovation and unique techniques Throughout the delivery of the project, deugro collaborated with the clients in identifying innovative cost saving initiatives and changing procurement terms in their global sourcing. One example was the unbundling of three 330-metrictonne time-critical boiler modules. deugro worked together with the client to safely provide precarriage, loading and lashing on board the vessel in Italy. This reduced costs by 60 percent and improved permit times, while increasing control and assurance for this technically challenging heavy lift operation. This same principal was leveraged in numerous other circumstances and proved to be highly successful throughout the project.

Max. Heavy Lift
535 MT, length up to 53 m

650+ Heavy Transportation Loads
to project sites

Zero LTIs and Exemplary QHSES Performance

Project Insight:

NKNK03 Olefin Project

In close collaboration, the deugro Hanau and deugro Moscow teams executed the NKNK03 Olefin Project on behalf of Linde Engineering. After intensive planning and engineering, deugro moved nearly 90,000 freight tons of heavy lift and oversized cargo from various origins in the Far East and Europe to a remote job site in Nizhnekamsk, Republic of Tatarstan, Russia.

The cargo consisted of more than 300 heavy and oversized units of valuable refining and processing equipment, including a 724-metric-ton primary fractionator measuring 78 x 9.8 x 9 meters and a C3 splitter weighing 525 metric tons and measuring 96 x 7 x 6.9 meters. deugro developed a tailormade transport solution for this challenging petrochemical project.

The solution considered the complex logistics schedule with short navigational periods and the challenging passing of the winding Don River and Volga-Don Canal to reach the remote location of the Naphta Cracker in Nizhnekamsk.

Ocean transportation

deugro chartered and coordinated a total of nine full-charter vessels for the ocean transportation. The heavy lifts and overdimensional cargo items were shipped from various international ports in South Korea, Turkey, Germany, Italy and China to Nizhnekamsk (dry dock and Transkama Port) in the Russian Federation.

Strategic transshipment in Romania

After the cargo arrived at the Port of Constanta, Romania the biggest and heaviest units were unloaded from the oceangoing vessels directly onto a total of 11 barges. All of the cargo units were positioned onto stools on the deck. This resulted in the cargo being elevated, enabling the Self-Propelled Modular Transporters (SPMTs) to drive underneath the cargo for load-in at the dry dock. deugro engineered, designed, procured and delivered over 200 of such stools, 100 of which were fabricated especially for this project in Germany and transported to Constanta.

After stowage of the cargo, the barges and sea river vessels departed the Port of Constanta.

Last-mile transport

After arrival of the barges in Nizhnekamsk, they were positioned at the dry dock with tugboats. Following the closure of the dry dock, the water level inside the dock was increased until the necessary level was reached for roll-off; then the cargo was unsecured by the welders. The SPMTs were moved under the cargo to jack it up from the stools using a hydraulic system. Together, the SPMTs and cargo measured over 10 meters in height.

A challenging 21-kilometer journey to the job site commenced. A year before the project execution started, infrastructure work was undertaken due to its several obstacles.

Project Insight:

Irkutsk Polymer Plant (IPP) Project

In cooperation between the offices in Japan, Russia and South Korea, deugro transported 35,541 freight tons of cargo simultaneously on two fully chartered heavy lift vessels for an ethylene and polypropylene plant from Masan, South Korea via Tiksi in the Arctic Ocean to Ust-Kut, Russia. The vessels were accompanied by the nuclear ice breaker Yamal for the Northern Sea Route (NSR) passage to ensure a safe delivery at the Port of Tiksi. The total distance from Masan to Tiksi and the subsequent barge transport across the Lena River to Ust-Kut was over 6,450 nautical miles.

The cargo contained 45 oversized and heavy lift (OSHL) pieces, including a 597-metric-ton reactor and an 81.93-meter-long, 357-metric-ton ethylene fractionator. Due to the transport via the NSR and critical draft conditions of the Lena River, the navigation period was limited to a maximum of three months and required precise timing and coordination.

Loading in Masan, South Korea

According to the sea voyage via the NSR, two vessels with ice class 1A were chartered and motion response analyses were conducted to determine the effects of any accelerations on the cargo during the voyage.

To avoid any unnecessary double-handling of the cargo and to save costs, 17 OSHL units from China and Japan were loaded onto the same heavy lift vessel to Masan, which had already been chartered. Stowage plans and loading sequences were decided well in advance according to the barge stowage and discharging sequence onto the barges at Tiksi.

Transloading in Tiksi, Russia

After 4,500 nautical miles, both heavy lift vessels arrived punctually at the anchorage points in Tiksi. Due to the shallow draft in the port of Tiksi, the transfer from the ships to nine separate barges was executed within six days outside the port area.

The sensitive cargo units were discharged simultaneously from the heavy lift vessels by using on-board cranes with a combined lifting capacity of up to 800 metric tons.

River transportation

After arrival at the Ust-Kut jetty, which was designed in accordance with deugro's technical solutions and constructed by the project owner, the discharge operations started.

All units with a length of over 40 meters or a weight of over 220 metric tons were unloaded in tandem lift by two crawler cranes with a combined lifting capacity of up to 1,500 metric tons.

Barges on their river voyage to the Ust-Kut jetty and cargo unloading operation

On-carriage to the job site

Once the loading of the vehicles was completed, daily convoys from one to three road trains started their journey early in the morning during daylight, accompanied by escort cars and cars of the traffic police.

The distance up to the job site was about nine kilometers, including about two kilometers on the Viluy federal highway. The rest of the distance was covered on a separate road especially built for this purpose in accordance with the technical requirements and under the control of deugro.

To ensure smooth road transportation, the road was prepared according to the requirements of the cargo, based on the extraordinary dimensions and weights of the 81.93-meter-long ethylene fractionator and the 597-metric-ton reactor.

Once the convoy arrived at the construction site, the unloading of the SPMTs was performed by jack-down of the cargo onto elephant legs without using cranes, and the unloading of the THPs and semi-trailers with the use of mobile cranes by the project owner.

Project challenges

- 45 OSHL pieces, including a 597 MT reactor and an 81.93 m, 357 MT ethylene fractionator
- The transport via the Northern Sea Route and the critical conditions of navigation on the Lena River, with a limited navigation period of max. three months, required precise timing.
- The high number of interfaces, barge voyages and overland trips required precise coordination.

Project Insight:

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.

Months prior to loading and in close cooperation with the client, deugro's project experts and the transport engineers from dteq, a company of the deugro group, prepared method statements to meet the requirements of the project and to ensure compliance with all industry safety standards.

Loading operation

The journey started at the Port of Ulsan, South Korea, where the overdimensional 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.

After all the 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 set sail to the Port of Houston.

Unloading operation

After 9,641 nautical miles, the 967 metric tons of industrial cargo arrived punctually at Houston City Docks. 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, ensuring 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 assisted 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 of all the various tasks and steps in the handling 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 a 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.

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.

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 project.

All the planning, attention to detail, and flexibility were key to managing this challenging and complex project move.

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

Project Insight:

Tobolsk Project

deugro was awarded two contracts from major EPCs to deliver equipment to a petrochemical complex in the remote location of Tobolsk, Russia.

Due to intense weather conditions, deliveries are very difficult to perform. Both scopes were successfully executed by the centralized project control tower in Hanau, Germany alongside deugro Moscow (onshore coordination office) for all local Russian coordination.

Transshipment onto barges in the remote area of Kirkenes, Norway

Project Data
Ethylene Cracker Plant
- Client: German EPC
- Cargo: Heavy lift and oversized equipment
- Cargo highlight: 2 C3 splitter units (106 x 8.5 x 9 m / 920 MT each)
- Navigational period: 2016 to 2017
- Total volume: 131,000 FRT

Ethylene cracker plant

Because of the short navigational time frame, the scope was divided into two movements of approximately 63,000 FRT in 2016 and 68,000 FRT in 2017. The scope included only heavy and oversized cargo that could not be transported by road, including extremely heavy items with lengths of up to 106 meters and weights of up to 920 metric tons per unit.

Highlights
The first shipment involved a full charter of MV *Happy Sky* carrying about 30,000 FRT in one single voyage. The reason for choosing this state-of-the-art heavy lift vessel, which is equipped with two x 900 SWL cranes, was due to the weight and complexity of the cargo originating from Ulsan, South Korea.

During the 2017 navigational period, a record number of 25 barge trips were executed on the Ob/Irtysh River between Sabetta and the Tobolsk jetty. Although the freight volume for 2017 was similar to the volume shipped in 2016, the quantity of items nearly doubled. In addition, the cargo was sourced from more vendors and loading ports.

» A record number of 25 barge trips were executed on the Ob/Irtysh River between Sabetta and the Tobolsk jetty. «

Discharge of overdimensional cargo at anchorage at Novy Port

Polyethylene processing plant

This contract included not only heavy lift and oversized cargo, but also general cargo, full container loads, trucking and multimodal movements from origins around the world to the Tobolsk job site in Russia. Among the most difficult tasks for the project team at deugro Hanau was the dispatch of more than 1,500 truckloads from free carrier (FCA) vendor premises all over Europe and Asia to the final job site.

Parallel to the ongoing general cargo shipments shipped by rail and truck, the navigational period in summer 2017 was also used to deliver the heavy and oversized plant equipment via the Northern Sea Route. To avoid the congestion at the Port of Sabetta, it was decided to conduct the transshipment operation (on anchorage) at the arctic area of Novy Port.

In total, deugro chartered three ocean-going vessels for this scope, with all of these discharged at Novy Port onto a total of 13 barges for the onward journey via the Ob/Irtysh River system to the Tobolsk jetty.

Highlights
The remote Novy Port is located approximately 300 nautical miles south of Sabetta within the Gulf of Ob and does not have any landside infrastructure. All cargo needed to be discharged on anchorage while facing the harsh local weather and hostile environment.

For more information, please visit: deugro.com/cases

Project Data
Polyethylene Processing Plant
- Client: French EPC
- Cargo: All equipment relating to a polyethylene plant
- Cargo highlight: 2 polymerization reactors, 340 MT each
- Navigational period: 2017, with general cargo shipped in 2016, 2017 and 2018
- Total volume: 130,000 FRT over all transportation modes

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