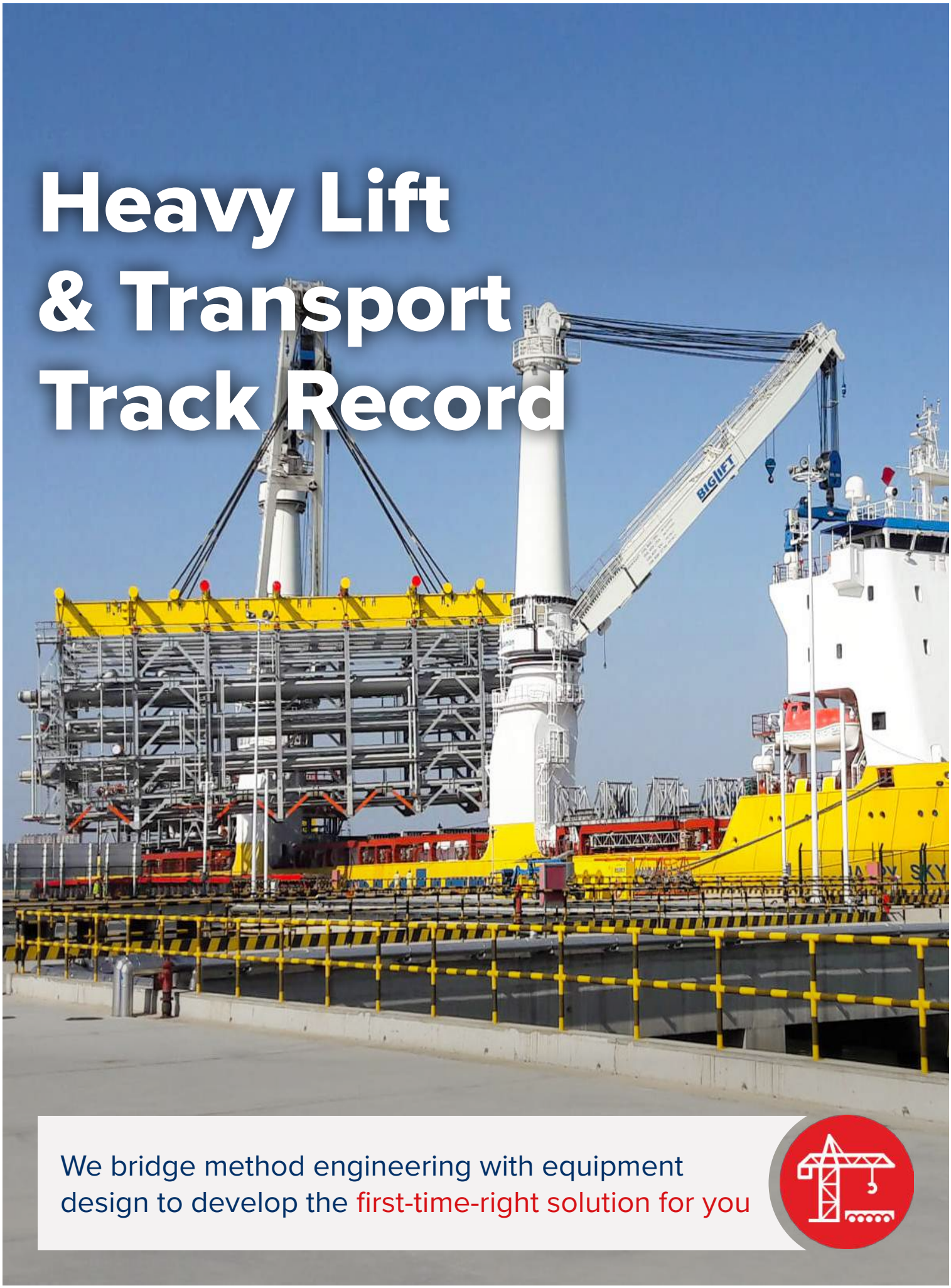
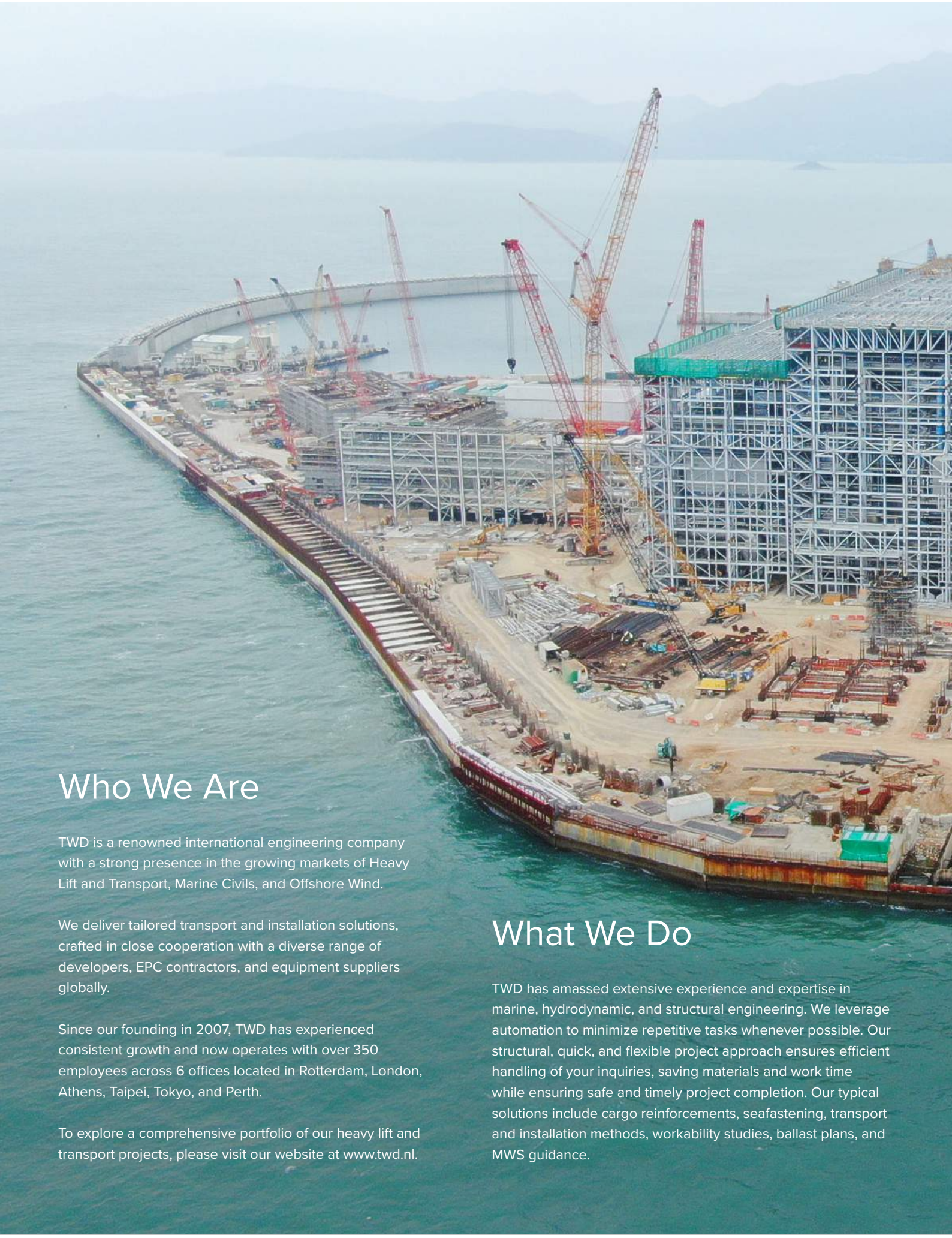
TWD

Heavy Lift & Transport Track Record



We bridge method engineering with equipment design to develop the first-time-right solution for you



Who We Are

TWD is a renowned international engineering company with a strong presence in the growing markets of Heavy Lift and Transport, Marine Civils, and Offshore Wind.

We deliver tailored transport and installation solutions, crafted in close cooperation with a diverse range of developers, EPC contractors, and equipment suppliers globally.

Since our founding in 2007, TWD has experienced consistent growth and now operates with over 350 employees across 6 offices located in Rotterdam, London, Athens, Taipei, Tokyo, and Perth.

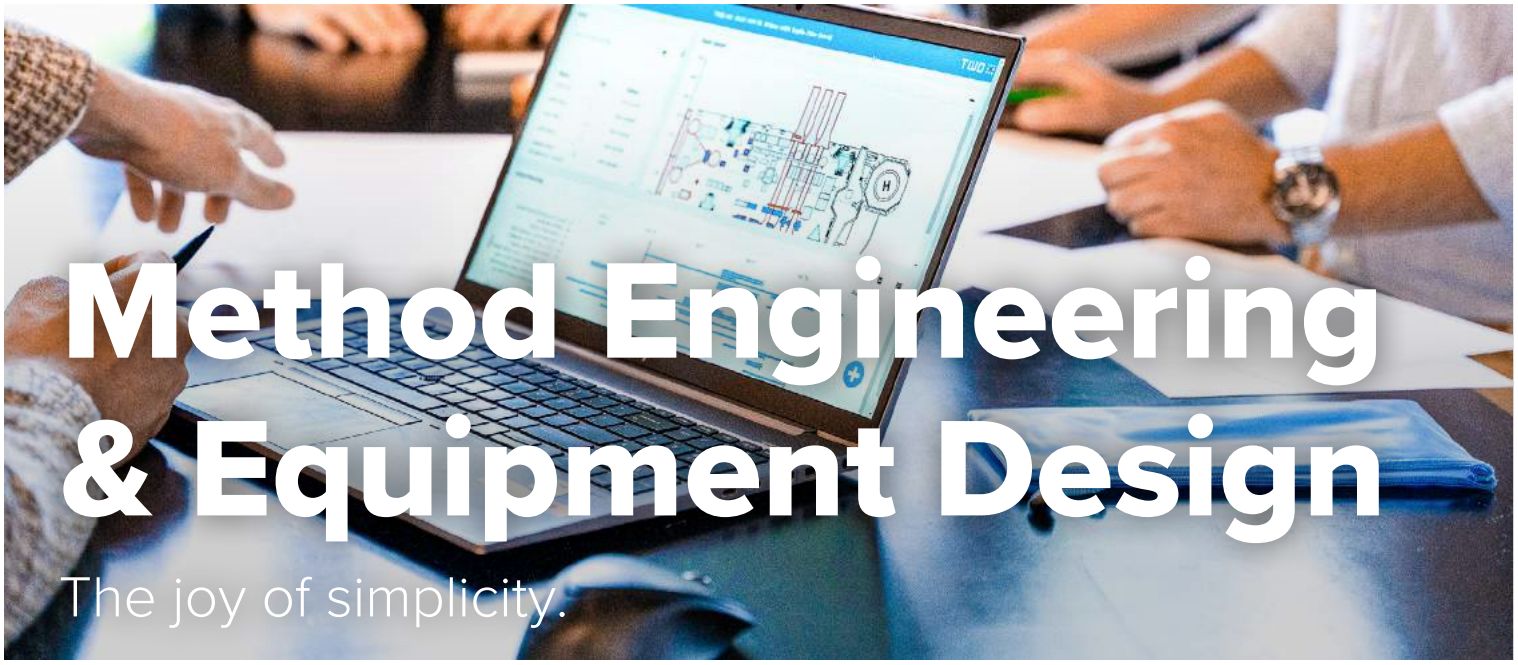
To explore a comprehensive portfolio of our heavy lift and transport projects, please visit our website at www.twd.nl.

What We Do

TWD has amassed extensive experience and expertise in marine, hydrodynamic, and structural engineering. We leverage automation to minimize repetitive tasks whenever possible. Our structural, quick, and flexible project approach ensures efficient handling of your inquiries, saving materials and work time while ensuring safe and timely project completion. Our typical solutions include cargo reinforcements, seafastening, transport and installation methods, workability studies, ballast plans, and MWS guidance.

Heavy Lift and Transport Track Record

Client	Vessel	Route	Year of Operation	Max Module Weight [t]	# Modules
Undisclosed	Undisclosed	Thailand to Belgium	2025	6500	7
Keppel Seghers	Boskalis - Giant 5	China to Hong Kong	2023	6000	17
Linde	Megaline - Mega Caravan II	India to Singapore	2022	3300	46
Technip	SAL - MV Lisa	China to The Netherlands	2022	530	14
Boskalis	Various	Asia to Australia	2015	5320	119
Cofely Fabricom	Sarens - Josef and Rosa	Hoboken to Antwerp	2014	460	3



Method Engineering & Equipment Design

The joy of simplicity.

Project steps

1 **Develop**
optimal construction / transport / installation method

2 **Specify**
required mission equipment / temporary works

3 **Create**
structural / mechanical design from concept to details

4 **Procurement**
assistance with broad supplier database

5 **Fabrication**
management & reporting

6 **On-site**
assistance & operator training

The challenge

Method Engineering

Equipment Design

Procurement & Fabrication Management

Field Engineering

Construction made easier

Our approach

Strategic
project planning & resourcing possible as construction method is defined up-front

Tailored
and smart construction methodology suitable for your project requirements

Transparent
and integrated working approach among our multi-disciplinary engineers and designers

Creative
and lean equipment design with cutting edge industrial knowledge and trends

Independent
design for fabrication that makes case-by-case fabricator selection possible

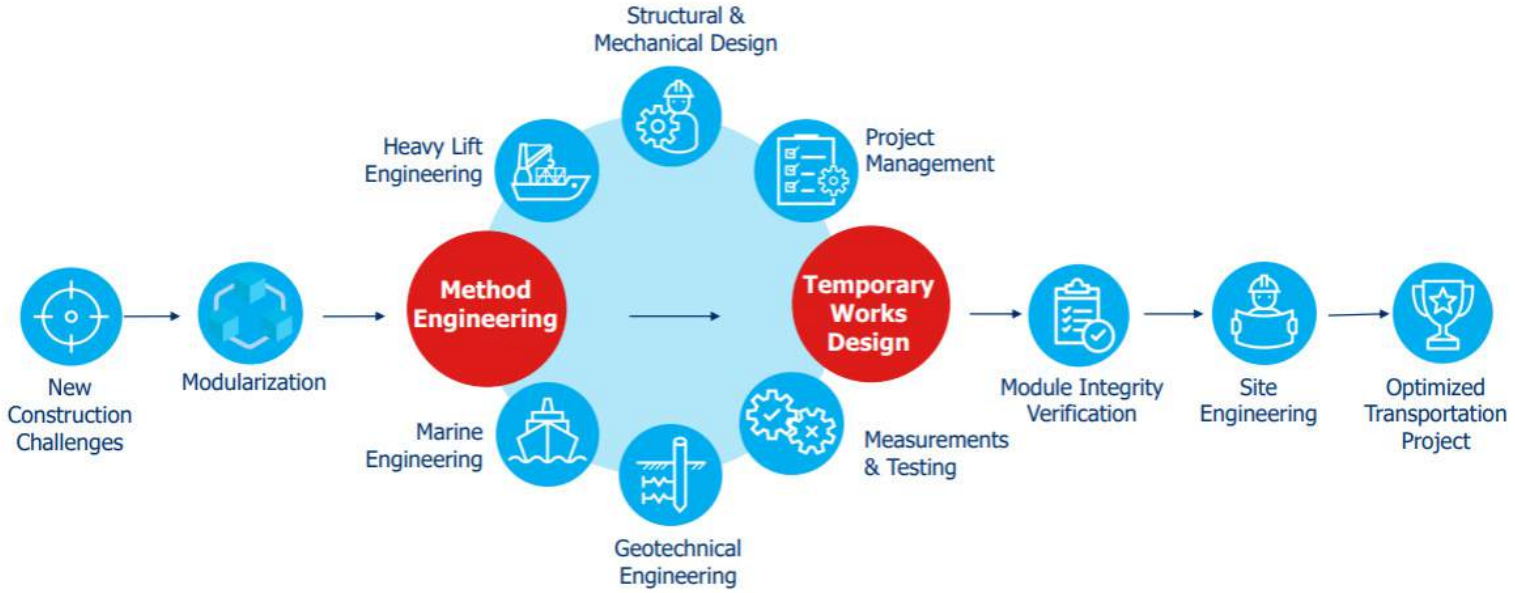
Assurance
in quality, lead time, and functionality through our fabrication management process

Experienced
in full project scope management from method engineering to mobilization assistance

Our Services

Our multidisciplinary engineering teams develop fit-for-purpose solutions for any construction, transportation, or installation challenge. Combining different fields of expertise in a single team allows us to take an integrated approach for your project, covering technical risks at all critical project interfaces.

Starting from a robust method, we design ingenious mission equipment and reliable temporary works to ensure your project is executed safely, on time, and within budget.



We facilitate the mitigation of interface risks among site surveys, marine logistics, and land logistics, ensuring seamless and efficient project operation through close monitoring.

Module Design & Transport - Keppel Seghers

Module Design & Transportation for 17 Modules

Keppel Seghers developed Hong Kong's first integrated waste management facility (HKIMWF1). To streamline the construction process, the plant was assembled using prefabricated units (modules).

These modules were fabricated in China and transported via sea to an artificial island near Shek Kwu Chau, in Hong Kong.

TWD designed 7 unique modules including temporary transport steel, with the heaviest module weighing 6000t.

Engineered for safe and robust transport for sea and land, the modules were also designed considering in-place and yard conditions, typhoons, and earthquakes.

It is the heaviest transport ever performed with a hanging boiler from the top of the module.

TWD scopes

- Module, seafastening and method design
- Workability assessment
- Marine analysis (motion, mooring, stability)
- Connection design
- Silo design
- Hanging boiler seafastening
- Welding table
- MWS approval guidance
- Fabrication assistance
- On site support

Module Transport for Gasification Plant - Linde

Sea Transport from India to Singapore, Monitored by TWD

In 2019, Linde engaged a contractor in India to fabricate 46 modules for a new gasification plant on Jurong Island, Singapore.

TWD's engineers reviewed all calculations and method statements, covering both SPMT transportation and the seafastening design. Additionally, we provided on-site assistance and gave the green light for each shipment when all international quality and safety standards were assured.

On top of these, to continuously improve our transport methods throughout each shipment, our marine engineers implemented a sensor on the vessel to measure vessel motions and accelerations.

TWD scopes

- 3rd party calculation review
- MWS services on-site
- Vessel motions monitoring

Ethylene Plant Module Transport - Technip Energies

Module Design & Transportation for 14 Modules

The Shell Skyline plant, in the Netherlands, underwent an upgrade with the replacement of its existing cracking furnaces, leading to a decrease in energy consumption and CO2 emissions.

The new cracking furnaces are modularized. A total of 14 modules, including cracking furnaces, stacks, and pipe racks, were fabricated in China and transported in two shipments to Moerdijk. The heaviest module weighed 530 tons.

TWD conducted fatigue and motion analysis, and thoroughly reviewed the sea transport calculations and deliverables from the shipping company. Additionally, we offered support throughout the MWS (Marine Warranty Surveyor) approval process.

Module Transport and Installation - Wheatstone

Smart Transport and Installation Design for 119 Modules

Dockwise enlisted TWD to aid in the transport and installation design for 119 processing train modules for the Wheatstone LNG Project, spanning from Asia to Australia.

To tackle this challenge, we developed various transport methods, including direct on deck, piggy-back, tug, and barge.

TWD scopes

- Intact and damage stability calculation for the unrestricted and coastal tow of the tug and barge
- Separate ballasting manuals for load-in and load-out
- Ballasting plans for tidal loadouts classes 1 and 2
- On-site ballasting support

Keromax Modules Transport

Structural Analysis for Keromax Modules

Cofely Fabricom fabricated three modules for the Exxon Keromax site located in the Antwerp harbour.

These modules – comprising the main module, pump skid and staircase – required transportation across the River Schelde from the production site in Hoboken.

TWD was requested to perform the structural analysis during transport and to develop a design for the seafastening.

TWD scopes

- RO/RO transport engineering
- Transport and installation engineering
- Ballasting plans
- Structural design/reinforcing
- Support frames on SPMTS
- Lifting and rigging plans

Jumbo Re-design FPSO Module Grillages MV Fairplayer

Seafastening Grillages for the Transportation of Modules

Jumbo Offshore BV required transportation of FPSO modules from Brazil to China using various Jumbo cargo vessels. A total of six shipments were arranged across three separated time periods.

The initial two shipments were planned for October and November 2015, utilizing the HLV Fairplayer and the HLV Fairmaster. Each vessel was tasked with transporting 3 to 4 FPSO modules, positioned on the vessel's top cover.

TWD designed the seafastening grillages for transporting the modules aboard the HLV Fairplayer during the first shipment.

TWD scopes

- Lifting plans
- Seafastening
- Skidding systems
- Site visit and survey Jumbo

NewWaves Hinkley Point C - HAF

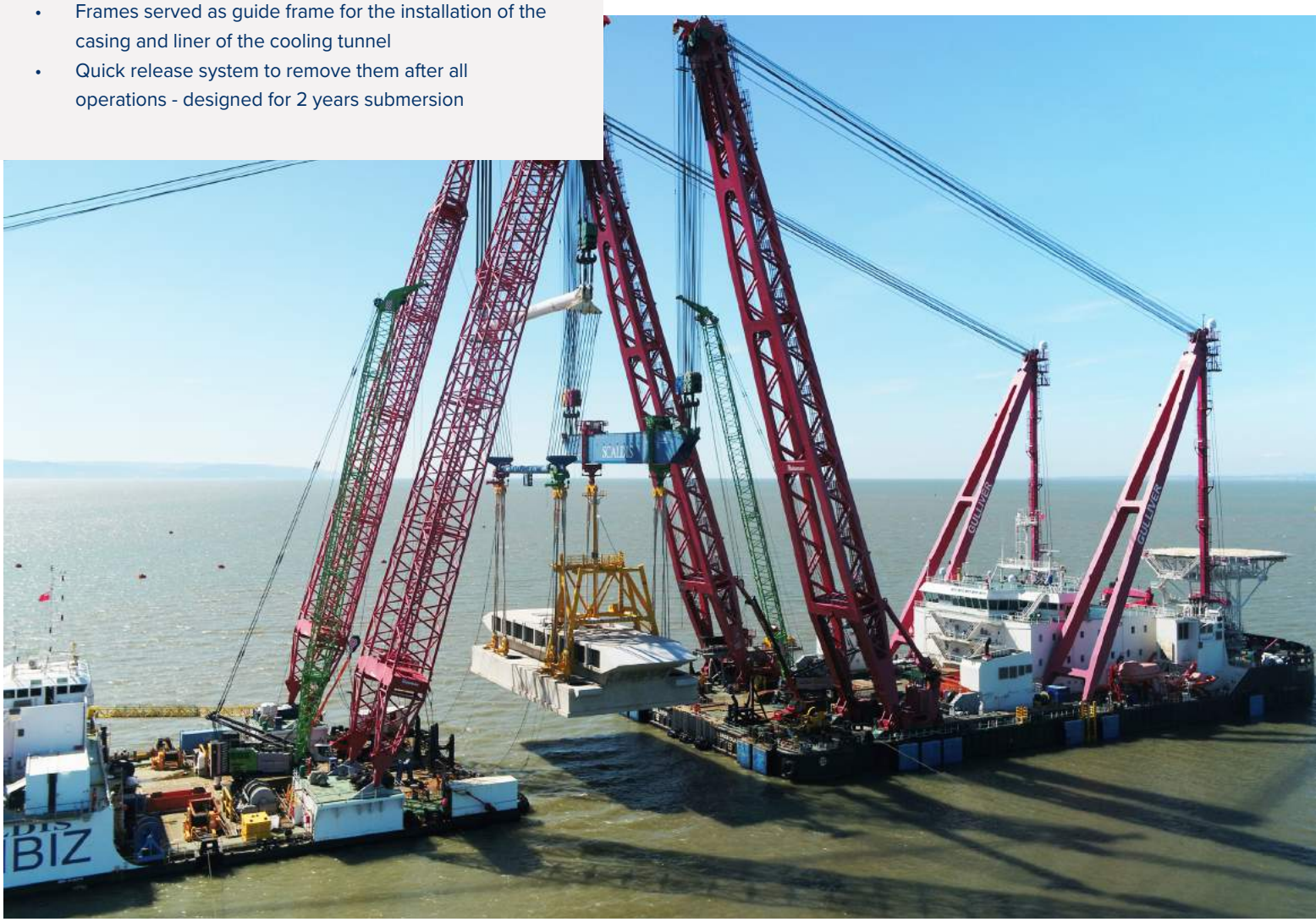
Six Unique Guiding and Lifting Frames

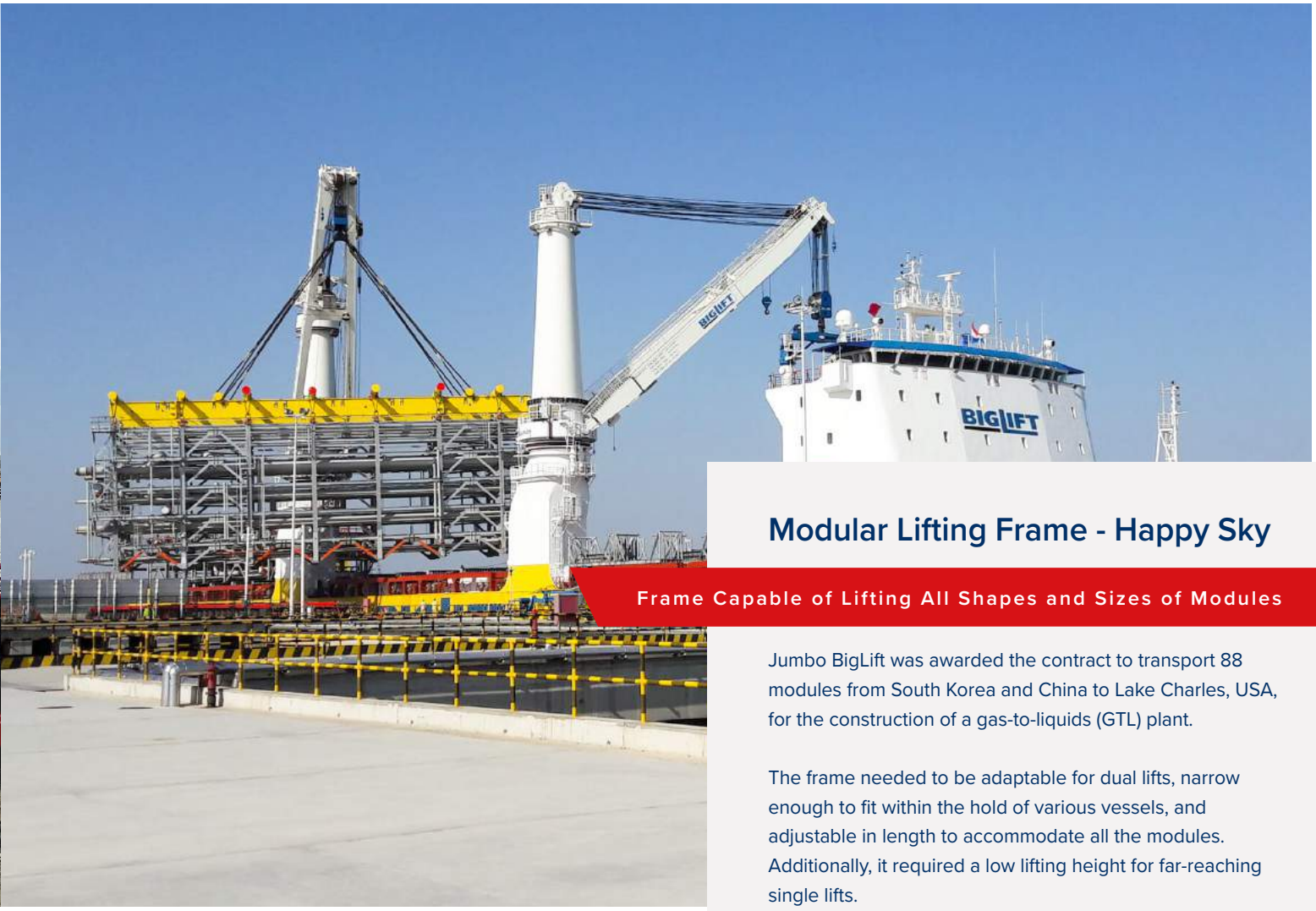
For a challenging subsea installation of 5.000t concrete structures as part of a cooling water inlet, TWD supported the marine contractor with the design of 6 unique guiding and lifting frames. These frames enable two floating cranes to accurately position the concrete structures on the seabed.

TWD's scope included the structural and mechanical design. In close collaboration with client, the best operational sequence and concept designs were determined with method engineering. We also provided fabrication assistance and technical support during the fabrication of the frames.

TWD scopes

- Tailored designs to match individual concrete structures
- On-site fabrication assistance to ensure all frames built according to TWD specifications
- Frames served as guide frame for the installation of the casing and liner of the cooling tunnel
- Quick release system to remove them after all operations - designed for 2 years submersion





Modular Lifting Frame - Happy Sky

Frame Capable of Lifting All Shapes and Sizes of Modules

Jumbo BigLift was awarded the contract to transport 88 modules from South Korea and China to Lake Charles, USA, for the construction of a gas-to-liquids (GTL) plant.

The frame needed to be adaptable for dual lifts, narrow enough to fit within the hold of various vessels, and adjustable in length to accommodate all the modules. Additionally, it required a low lifting height for far-reaching single lifts.

TWD scopes

- Six months to design, fabricate, test, and deliver the lifting frame
- Designed in a modular way to lift all 80 modules
- Fully assembled lifting frame weighed 215 tonnes
- The lifting frame can be adjusted in length, and to different positions and rows of lifting points

Duck Transport and Installation - Aghios Dimitrios Plant

Method & Structural Engineering for Duct T&I Project

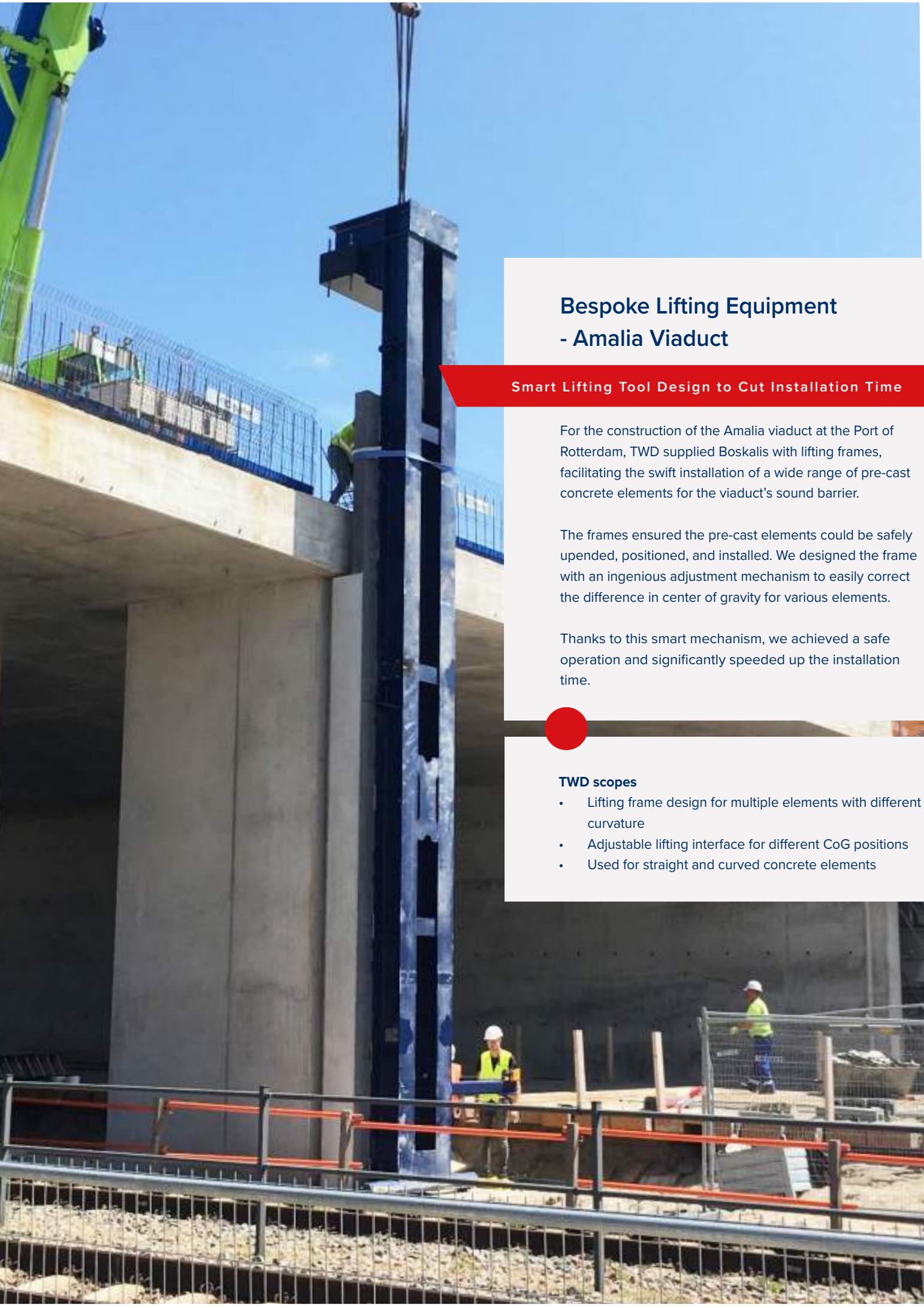
AVAX developed a desulphurization unit at the Aghios Dimitrios power plant on behalf of PPC. This unit bypasses the plant's exhaust gas through an absorber, releasing clean exhaust gas into the atmosphere.

TWD supported AVAX with the engineering required for transport and installation of heavy duct sections. Our contribution includes the design of transport cradles and lifting arrangements, along with the detailed design of a skidding and jacking system tailored for installing duct sections inside the cooling tower.

Our precise designs of the transport arrangements for the heavy modules ensured a safe and efficient operation.

TWD scopes

- Method engineering, transport plans and storage arrangements
- Skidding system to fit strict requirements for clearances
- Detailed design jack-up and jack-down operation
- Design of cradles, lifting pad-eyes, and spreader beams
- Enabled duct installation through an opening on the cooling tower cell, thus avoiding the use of a large crane



Bespoke Lifting Equipment - Amalia Viaduct

Smart Lifting Tool Design to Cut Installation Time

For the construction of the Amalia viaduct at the Port of Rotterdam, TWD supplied Boskalis with lifting frames, facilitating the swift installation of a wide range of pre-cast concrete elements for the viaduct's sound barrier.

The frames ensured the pre-cast elements could be safely upended, positioned, and installed. We designed the frame with an ingenious adjustment mechanism to easily correct the difference in center of gravity for various elements.

Thanks to this smart mechanism, we achieved a safe operation and significantly speeded up the installation time.

TWD scopes

- Lifting frame design for multiple elements with different curvature
- Adjustable lifting interface for different CoG positions
- Used for straight and curved concrete elements

Cradle Support - Oceanco Yachts

Tailor-made SPMT Support Cradles for Yachts

TWD designed support cradles for two large luxury yachts of Oceanco.

The cradles not only supported the hull throughout the construction process but also allowed for works on the outside of the hull, enabling transportation on self-propelled modular transporters (SPMTs).

To ensure the cradle perfectly fit the yachts, we performed 3D laser scanning. Additionally, for Y712, we designed a center cradle with hydraulics to ensure proper load distribution. Our smart cradle designs contributed to the safe transport and successful launch of both yachts.

TWD scopes

- TWD fabrication assistance and taking care of procurement, construction, and delivery process
- 3D laser scanning
- SPMT pickup

DHL Tower Lifting Tool

Lifting Frames for Concrete Elements

DHL is transporting wind turbine tower sections in Vietnam. The tower sections are roughly 28 to 29 meters long and weigh approximately 60-82 tons.

For the load out of the tower sections, DHL requires a spreader beam capable of accommodating them.

TWD scopes

- 30m long lifting beam
- 28-36m long tower sections
- 98t max lifted weight
- Beam can stand on deck and can be lifted by forklift
- Design report and safe use manual provided

TWD Offices

Rotterdam, NL (HQ)
+31 10 294 03 74
www.twd.nl
sales@twd.nl

Rotterdam Science Tower
Marconistraat 16
3029 AK Rotterdam
The Netherlands

London, UK
+44 2 038 083 703
www.twd-uk.com
info@twd-uk.com

310 Metropolitan Wharf
70 Wapping Wall
E1W 3SS London
United Kingdom

Athens, GR
+30 21 1199 0588
www.twd.gr
info@twd.gr

Agias Triados 1
Agia Paraskevi, Attiki
153 43 Athens
Greece

Taipei, TW
+886 02 7723 1365
www.twd.nl
troethof@twd.nl

5F, No. 48, Ren'ai Street
100, Taipei
Taiwan

Perth, AU
+61 403 305 184
www.twd.nl
ltenten@twd.nl

19 Essex Street
Fremantle WA
6160
Australia

Tokyo, JP
+81 3 3244 3721
www.twdjapan.co.jp
hirose.m@twdjapan.co.jp

Shin-Otemachi Bldg.
2 Chome-2-1, Otemachi
Tokyo 100-0004
Japan