

A composite image showing an offshore oil rig deck. The top left shows a red ship hull. The top right shows two workers in orange safety gear on a yellow and white structure. The bottom half shows a large white and yellow mechanical structure being lowered into the blue ocean.

# Freyssinet Products and Services for Offshore Assets

New Build Solutions | Asset Life Extension  
Management of Movement | Sustainable Innovation  
Structural Health Inspection | Jacking and Lifting



**FREYSSINET**

# Freyssinet, the benchmark in structural engineering

Freyssinet brings together an unparalleled array of specialist structural engineering expertise. Covering the design of structures, the production of materials and equipment, and their implementation on site, Freyssinet offers integrated technical solutions in two major fields: new-build construction and structural repair.

**We have been at the forefront of structural and civil engineering technology for 80 years, providing solutions from conception to installation and continuing with whole life care. As a global expert in structural products and services, Freyssinet is renowned for developing innovative, cost-effective methods for extending the life of both new and existing structures.**

## Management of Movement

In the offshore sector our expertise is particularly important to the life and operation of structures that need to move or are exposed to fatigue. Our applications, which range from the movement of whole structures to the supply of special sliding bearings, focus primarily on the management of movement and locked in forces. Our prestressing systems, using strand and bar, have been used for decades to lighten gravity bases, improve fatigue resistance, and join structural elements.

## Collaboration

Freyssinet's in-house technical design capability allows us to provide alternative engineering solutions, temporary works design, examine alternative off-site construction methods, and streamline sequencing. Our project experience includes complex works on live structures, including oil rigs, railways and highways. To ensure the safe and efficient completion of works, we collaborate with clients as early as possible to develop a programme which minimises disruption to the structure, reducing down time as much as possible.

## Global knowledge, local expertise

Freyssinet has contributed to the durability of critical energy infrastructure in the most challenging environments all around the world. With comprehensive experience in post-tensioning, bearings for offshore topsides, seismic protection and heavy lifting, we work with asset owners to ensure the safety of personnel, protection of the environment, maintenance of operational continuity, compliance with regulations, management of risks, and preservation of the longevity and value of assets.



LOCATIONS IN OVER  
**70** COUNTRIES AROUND  
THE WORLD

2021 REVENUE:  
**€685 M**

OVER **7,300**  
EMPLOYEES



## 4D Vision:

Take a look at the bigger picture with us. Freyssinet's 4D service focuses on the proactive rehabilitation and safeguarding of structures.

Our comprehensive, customised solutions ensures performance, longevity and safety for new and existing offshore structures.

# New Build Services

Freyssinet has been prestressing offshore structures for decades: Ninian Central, Ekofisk, Frigg and Brent have given fine service for years. More recent examples include Harding, Hibernia and Hebron.

These days, it's more likely to be offshore wind farms that use gravity base structures but the principles of post-tensioned prestressed concrete are the same. By applying permanent compressive stresses in the concrete, induced by tensioning high-strength steel tendons, the structure is durable, safe and easy to maintain. The advantageous characteristics of prestressed concrete perfectly match the stringent requirements of offshore constructions:

- Excellent fatigue behaviour
- Good resistance to abrasion
- Limited crack propagation
- Slow chloride migration
- Watertight
- Good resistance in case of fire or ice

Freyssinet has its own prestressing bar system "Freyssibar" which has excellent fatigue resistance. This can be used to join structural elements, such as a steel turbine mast to a concrete foundation.

Freyssinet also has extensive experience of lifting structures vertically with pot ram jacks and moving them laterally with strand jacking systems.



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## Key services

- Prestressing strand systems for gravity bases
- Prestressing bar systems for wind turbines
- Heavy lifting and sliding in prefabrication yard
- Jacking and propping



## JACKING & PROPPING

23no propping frames, totalling 3000t of steel, on a viaduct in Glasgow. The jacking system comprises 300no. 200t hydraulic cylinders, simultaneously jacked in sets of up to 22no. cylinders by means of synchronous lifting system.



## HEBRON GRAVITY BASE PRESTRESSING

Newfoundland – 2,400 tonnes of strand prestressing, using 19C15 tendons, in this 120m tall by 130m diameter structure.

# HEBRON OIL FIELD NEWFOUNDLAND

## New Build

The Hebron gravity based structure consists of a reinforced and post-tensioned concrete construction designed to withstand sea ice, icebergs and meteorological and oceanographic conditions. Standing in 93m of water, it can store approximately 1.2 million barrels of crude oil.

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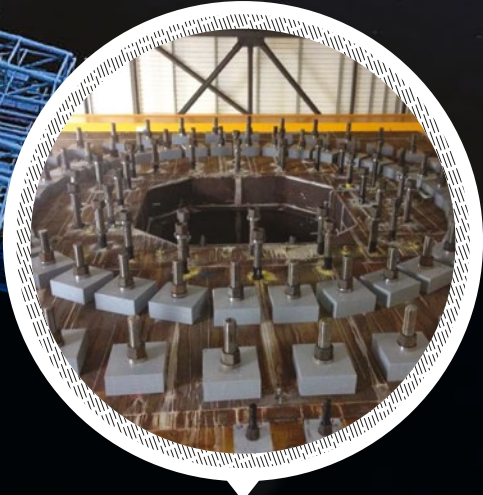


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### STRUCTURE SLIDING

HS2 Marston box, the world's longest box slide at 165m. This 12,000t bridge structure was built off-line and slid into place across the M42, Birmingham during Christmas 2022.



### PRESTRESSING BARS AT NAREC

Attached the adaptor rings to the 15m high concrete reaction block in the wind turbine blade testing hall. Freyssinet supplied and stressed 88 x 13m long 40mm diameter Freyssibars for the lower hub ring and 104 x 80mm diameter Freyssibar+ for the upper hub ring.



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# Asset Life Extension

Freyssinet's tagline "Sustainable Technology" is all about developing technology that can extend the life of structures, thereby reducing the environmental impact associated with replacing them.

## Repair: the Freyssinet way

Freyssinet has forged a reputation as a structural repair contractor with the ability to provide its customers with an end-to-end array of bespoke services and solutions, including cutting-edge technologies for protecting, repairing and strengthening different types of structures.

## Structure assessment

- Inspection and engineering assessment
- Preventative maintenance
- Residual life expectation
- Life extension optioneering
- Monitoring

## Bearing replacement

- Jacking and temporary works
- On site refurbishment

## Expansion Joint replacement

CFRP (Carbon fibre reinforced polymer) strengthening

## Bespoke engineering solutions

Cables, strengthening, anchoring



## INSPECTION & TESTING

Condition surveys, remaining life assessment, life extension options and monitoring.



## JACKING

For the reposition of elements or to allow topside and link bridge bearings to be replaced.

## DONG SIRI OFFSHORE PLATFORM DENMARK

### Repair

Anchored in the North Sea 220 km from the Danish coast, the Siri offshore platform operating since 2003 had been weakened by cracking. Freyssinet designed and supplied an innovative cable-based reinforcement system, adapting the H2000 cable to meet the project's pressure resistance, comprehensive waterproofing and corrosion protection requirements.

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### BESPOKE ENGINEERING SOLUTIONS

Such as the cross-bracing cables to Dong Siri platform. Freyssinet can develop handling and access solutions for hard-to reach and difficult-to-move situations.



### CFRP STRENGTHENING

Using pultruded sheets or free-form fabric. CFRP can increase the bending and shear resistance of various materials.

# Management of Movement

Freyssinet products, designed to support movement and loading in structures, are at the heart of our solutions, and together with our expertise in materials, fabrication, production, inspection and logistics, we deliver specialised products to our regional business units around the world.

To coordinate design, solutions, production processes and choice of materials, all Freyssinet bearings, expansion joints, anchorages and bars are designed and engineered in our in-house technical department, which customises them to fit the particular features of each project.

Our parts are carefully produced and inspected according to the most demanding standards before being given the Freyssinet quality label. These standards cover the rigorous selection of raw materials, optimised machinery fleet, regular in-depth training of operators, systematic metering and non-destructive testing.

## Bearings for topsides, flare booms and link bridges

- Special support bearings: high rotation and movement, uplift bearings, jackable bearings, bearings with load monitoring
- Elastomeric bearings and sliding pads
- Bodygarde® bearing protection system
- Aquagarde™ water collection system
- Isoglide® ultra long-life sliding material

## Pipeline bearings

## Dynamic protection devices

- Shock transmission units and dampers. To permit or control specific movements between modules.



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Isoglide info**



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## BODYGARDE®

The Bearing Bodygarde® is an encapsulation cover which protects the bearing from external elements. Custom-designed and made to suit all bearing types and sizes, the Bodygarde® will accommodate movement of the bearing without compromising its effectiveness. It protects the bearing from water, dust and salt, while its high-tech breathable material allows airflow, so the bearing is kept clean and dry but still accessible for inspections.



## DYNAMIC PROTECTION DEVICES

Shock transmission units can transmit sudden shock loading from one component to another, whilst allowing gradual movements, such as thermal, to occur without restraint. Dampers can dissipate energy, such as vibration, as it's transmitted from one part of a structure to another. Dynamic isolation bearings offer horizontal flexibility and a high level of damping.



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## ARCTIC LNG TANK RUSSIA

### Products

The Arctic liquefied natural gas (LNG) 2 project in the Gydan Peninsula in the northern part of Siberia, Russia. Freyssinet provided custom-made spherical bearings to support topsides during towing to the final position of floating installation in arctic conditions. The bearings provided outstanding service in extreme temperatures and satisfied stringent weight and dimensional requirements.

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### LAMINATED ELASTOMERIC BEARING

Can be fitted with a sliding surface comprising a PTFE sheet dipped in the elastomer of the bearing or notched in the top thick outer plate and a sliding plate with an austenitic steel sheet for decks requiring significant movement.



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### JACK BEARINGS

In-built piston can adjust bearing to exactly balance loads between supports.



## ARCTIC LNG TANK RUSSIA

### Products

Freyssinet designed and supplied 396 spherical bearings for the 3 GBS and the interconnecting structures on the project. The bearings are part of the Tetron SB Isoglide range, designed for vertical loads up to 55,000 kN and horizontal loads up to 2,700 kN at ULS.

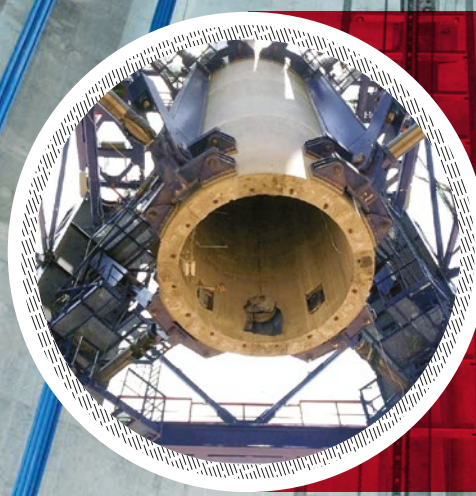
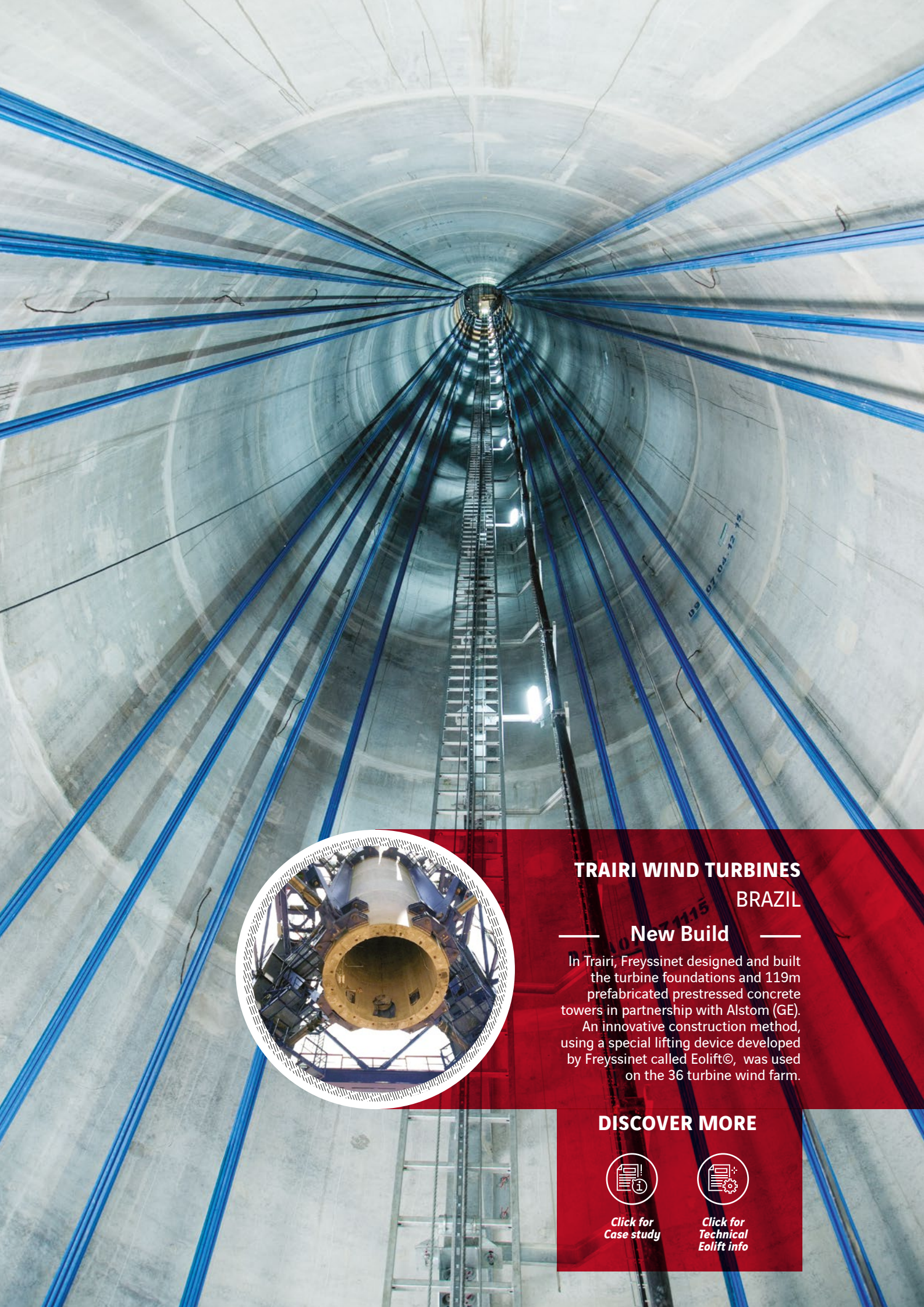
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## TRAIRI WIND TURBINES BRAZIL

### New Build

In Trairi, Freyssinet designed and built the turbine foundations and 119m prefabricated prestressed concrete towers in partnership with Alstom (GE). An innovative construction method, using a special lifting device developed by Freyssinet called Eolift®, was used on the 36 turbine wind farm.

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