

Mooring systems



MACGREGOR

Designed to perform with the sea



Passion for performance – united by the sea

MacGregor is a family of innovators. By engineering solutions that make the sea more accessible, safe and reliable, we support you whose livelihood depends on the changing conditions of the sea. To enable that we have a variety of strong product brands and committed experts with a passion for solving challenges – and the power of the sea is sure to provide those.

Our founders braved new frontiers in different times and places. Those origins merge at today's MacGregor, inspiring us to continue the stories, and create new ones. The spirit of our founders lives on in the pride we have for what we do, and our determination to find new solutions for the people we work with. Together with you we will write the next chapters.

We are a global team of professionals, who create value for you; the shipbuilders, owners and operators,

in the offshore and marine industries. Understanding your business and way of life is key to our work. It is the foundation to addressing your needs with tailored solutions for load handling, cargo handling, mooring or essential auxiliary equipment. Your productivity, sustainability, and equipment lifetime benefit from our combination of expertise and technology. As innovators, we work together with you to set benchmarks in innovative solutions and value creation. Our deep respect for and experience of the sea lays the foundation for adapting to its challenging conditions. Wherever we work around the world, we work together with a passion for performance and a love of challenges – united by the sea. Our shared values - integrity, quality and safety - propel us forward, and are an important factor in our ability to continue to deliver what our customers need to succeed; solutions that are *designed to perform with the sea*.



MACGREGOR

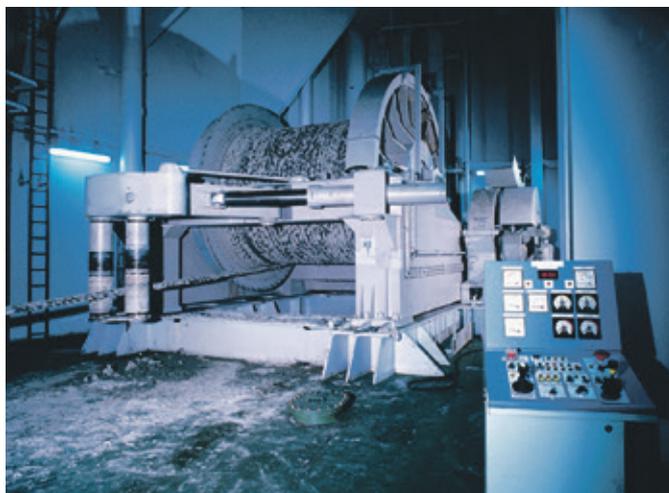
Designed to perform with the sea

Mooring winches

MacGregor mooring winches have evolved from steam-driven ship winches back in the late 1800s to the state-of-the-art electric and high-pressure hydraulic winches of today. Our offshore product range comprises anchor windlasses, chain jacks, traction winches, combination winches and rope/wire winches. Custom control and monitoring systems provide precise handling and management of a single winch or an integrated system of winches.



MacGregor anchor windlass for a 145mm chain on board the *Snorre B* production platform in the North Sea. The windlass consists of four cable lifters with a single electric drive/gearbox and two fail-safe band brakes per cable lifter. Brakes can be released using stored energy (accumulator) in an emergency situation.



MacGregor wire winch on the crane barge *Saipem 7000*. This is the largest mooring winch drum MacGregor has designed and manufactured to date. The drum can accommodate 3000m of 96mm wire.



The MacGregor Dual Chain RamWinch handles two chain sizes. This is advantageous where operators use smaller chain sizes during installation to bring the larger diameter top chain up to the same chain jack for final tensioning. The design allows the transition links to be pulled through without the use of inserts, thereby ensuring a fast and smooth installation of the floating unit.



MacGregor Roller RamWinches on board Shells's *Perdido Host Spar*. The nine chain jacks are arranged in three equal groups along the top circumference of the hull. Stalling capacity of each chain jack is 725 tonnes.



The movable windlass is a concept designed to operate multiple mooring lines within the same area. Normally, one windlass skids along a special foundation to operate one mooring line at a time.



The latest generation of MacGregor mooring winches for the MODU segment is based upon our extensive experience from delivery to more than 50 projects. This experience ensures that safe operation and durability in all climate conditions is reflected in the design. We strive to meet the industry requirement for high stalling power, low equipment weight and low lifecycle cost.

Fairleads and chain stoppers

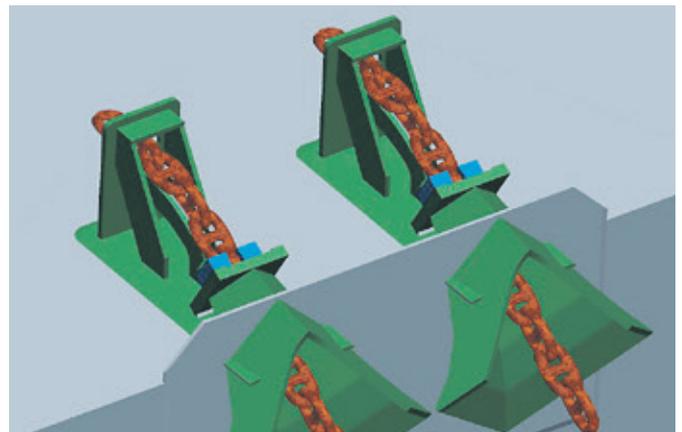
MacGregor has an excellent reputation for supplying high-quality long-life fairleads and chain stoppers. They are designed for operation in all climate conditions and for the harsh environments both above and under water.

Our latest fairlead designs include attachments that allow for the removal and re-installation of fairleads underwater, at the vessel's offshore location. We have also designed the special tools needed for this operation.

In recent years, a popular choice for offshore production mooring has been the innovative fairlead chain stopper. This unique fairlead combines the flexibility of a flag-type fairlead with the holding ability of a chain stopper.



MacGregor fairlead chain stopper installed on the *Goliat* FPSO. These fairlead chain stoppers are installed on a number of FPSOs and semisubmersibles. The compact design, low weight and hull-mounted location contribute to lower topside deck weight. This unique design allows for chain locking in a long pivoting stopper arm on the side of a vessel's hull, below the waterline. This constrains maximum loads to a limited area. Additionally, chain wear, static and fatigue stresses are greatly reduced.



The MacGregor bellmouth chain stopper provides a simple means of chain holding in benign areas where the mooring line can run straight off the deck. The stopper is designed for the full breaking load of the chain. In addition, a mobile tensioning device has been designed to move from stopper to stopper. A portable hydraulic power unit can be delivered to power the tensioning device.



MacGregor chain stoppers come in various types and sizes. Photo displays a version delivered to the FPSO P58.

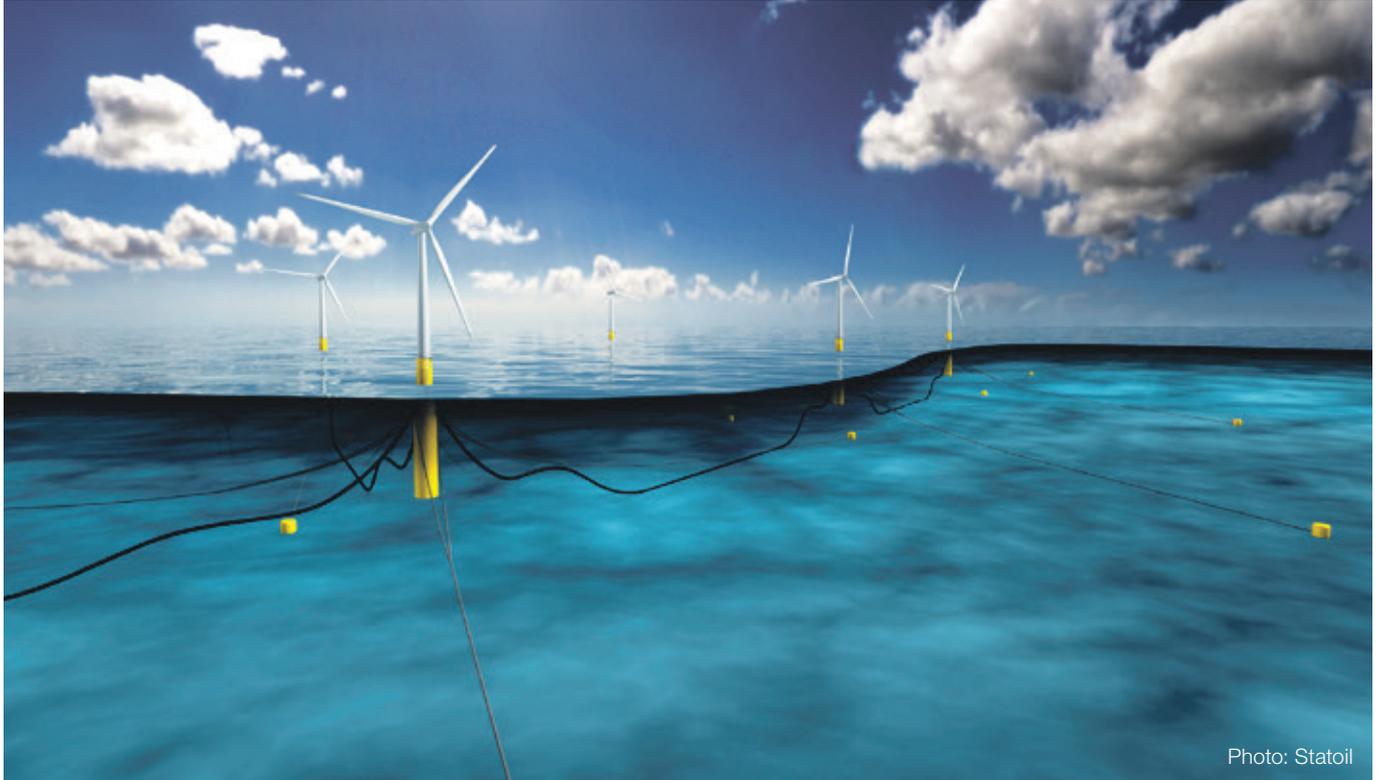


Photo: Statoil

Proven technology applied to a pioneering project for floating offshore windfarm. MacGregor delivers the substructure mooring connection system to the world's first floating offshore wind farm in Statoil's Hywind pilot park in Scotland. MacGregor was chosen for the project thanks to its long history of providing reliable mooring solutions for the harsh conditions in the North Sea.



MacGregor eccentric chain fairlead. Fairleads are known for their robustness and they are virtually maintenance-free. Recent designs allow for installation/replacement without the use of a diver. The eccentric chain fairlead has become the preferred choice for both drilling and production vessels. These can also be designed for wire or chain/wire combination. Photo from *Visund* production platform.



MacGregor eccentric chain fairleads mounted on the hull of BP's Greater *Plutonio* FPSO. The FPSO was installed off the coast of Angola in 2007. This type of fairlead has also been a popular choice for the many spar platforms found in the Gulf of Mexico.

Pull-in winches and equipment

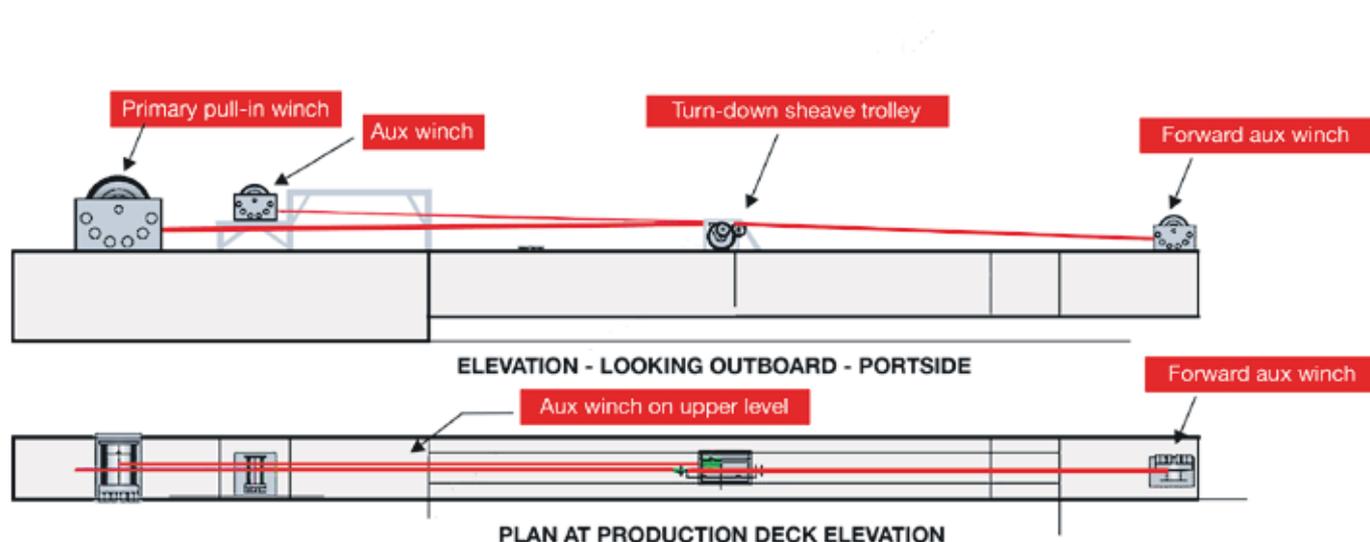
Pull-in winch is a general term used to describe the various types of winches involved in pull-in operations, such as the riser pull-in and mooring line pull-in. Various ancillary equipment, for instance trolleys and turndown sheaves are often involved in operations such as the riser pull-in.



A 200 tonne lateral pull-in winch on board Total's Greater *Plutonio* FPSO off the coast of West Africa.



A 100 tonne lateral pull-in winch on board Chevron's *Blind Faith* semi-submersible in the Gulf of Mexico.



A typical riser pull-in arrangement on board an FPSO.

Safe and secure

MacGregor has supplied offshore systems since 1968 and is recognised worldwide as an innovative designer and manufacturer of on-vessel mooring equipment for the offshore market. Different types of winches, fairleads and chain stoppers have been developed over the years.

MacGregor believes that commitment to continued research, studies and development has strengthened our position as a leading international company on a worldwide basis. Exploration and production in harsh climate areas require innovative thinking. Together with our proven technology we meet new challenges and provide equipment designed for safe and secure operation under the most demanding scenarios.

MacGregor mooring systems on board vessels in hurricane affected areas, such as the Gulf of Mexico, have on several occasions sustained the brutal forces these severe weather conditions can deliver.

Innovative and proven technologies at competitive prices, as well as proximity to the market are both important factors for ensuring future competitiveness.



MacGregor RamWinches on the *Devil's Tower* spar platform in the Gulf of Mexico at a depth of 1720m.



Blind Faith semisubmersible being transported to the Gulf of Mexico where it was installed in 2008. MacGregor RamWinches and chain fairleads for 127mm R4S chain were installed at the yard in Norway before sail-away.

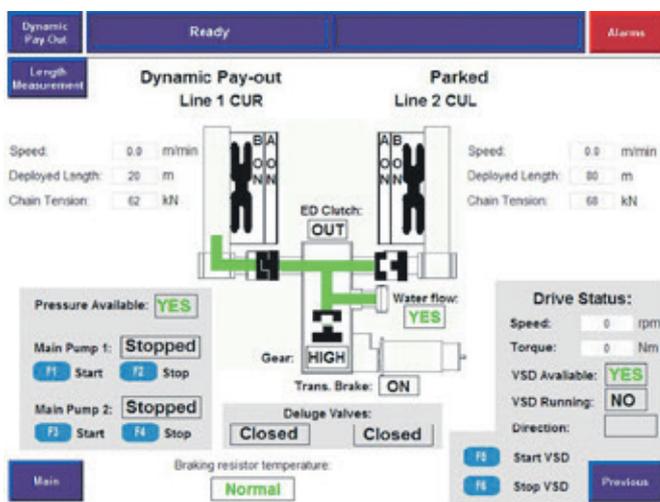


Photo: Anadarko

MacGregor RamWinches installed onboard the *Lucius* spar platform. The winches are designed to endure submerged conditions prior to upending.

Power supply and control systems

Both high-pressure hydraulic and AC/DC electric power can be used to drive the various types of offshore mooring winches.



Graphic display built into an operation panel for MacGregor Windlasses installed on the *Aker Barents* drilling rig. Each windlass is driven by a 450kW electric AC motor.

The hydraulic power units (HPU) are of a state-of-the-art design that provides a dependable source of power and performance in harsh and varying offshore environments. High-pressure hydraulics in a “ring main” system enables use of smaller pipe diameters and shorter pipe lengths.

MacGregor offshore winches are normally controlled by modern programmable logical controllers (PLC) in separate cabinets, where all status/alarm messages can be transferred to a designated control room. Graphic terminals with clear color displays act as an interface between operator and equipment.



A typical high-pressure hydraulic power unit with three pumps. The cooling of hydraulic oil can be done via seawater, freshwater, or an air system.



Local control console for operating MacGregor RamWinches on board the *Blind Faith* semi.

Worldwide presence and local service

Our customer-driven engineering and service solutions support customers in their onboard, port and offshore operations worldwide. Today, half of the world's oceangoing ships are fitted with MacGregor equipment. Turn to us when you want a reliable partner to keep that equipment up and running throughout your ship's lifetime.

Genuine marine spare parts - solution for reliable performance

We are able to source genuine spare parts and components (hydraulic, electronic and mechanical), even when it comes to obtaining original spare parts that are no longer stocked. Our logistic centres arrange original MacGregor spare parts to any destination worldwide.

MacGregor offers you lifecycle support for ships, ports, terminals and offshore vessels. We complement our products with original spare parts and support services.

Maintenance and damage repairs

For any minor or major repair work, conversion or modernisation of your cargo handling equipment, contact us. Our work starts with consultancy where we undertake a thorough inspection of your equipment. Through our lifetime analysis, we can determine whether the equipment is to be repaired, converted or modified, thus extending its productivity.

We supply repair services on a planned schedule, on demand or on an emergency basis.

Product experts

Tight and continuous collaboration between our field services network, product competence centres and new sales units ensure precise, quick and efficient support to our customers.

We operate in approximately 50 countries and we are constantly strengthening our local presence to meet changing market needs. MacGregor's service network consists of more than 60 service centres in major ports around the globe, staffed by specialists.

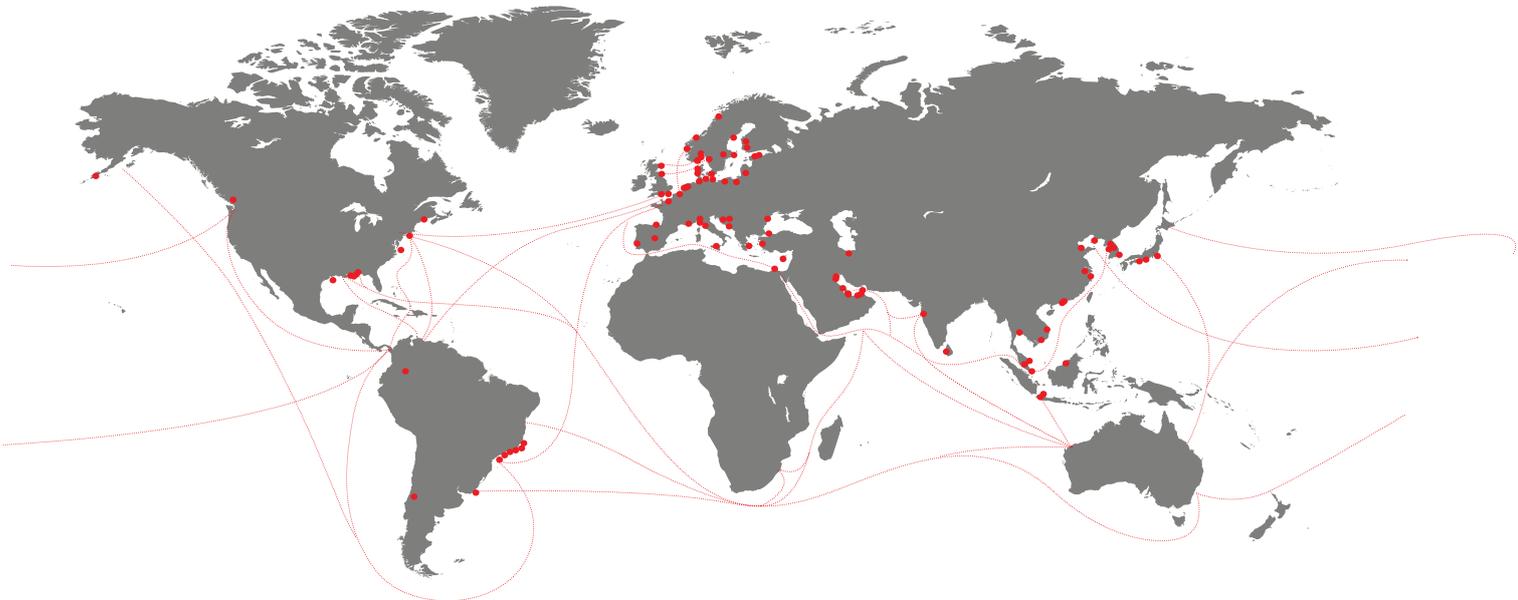
Global presence, 24/7

Armed with our world class expertise in cargo and load handling, we can provide service to our customers all over the world. Our global service network with its trained engineers, spare part coordinators and service personnel is at your service 24 hours a day, throughout the year and across the globe.



Wherever needed, you can rely on our support.
We serve our brands globally:

- Ankerlökken Marine
- Allset
- ASCA
- Becker
- BMH
- Conver-OSR
- Grampian Hydraulics
- Flintstone
- Greer Marine
- Hamworthy
- Hatlapa
- Hydramarine
- Hägglunds
- Interschalt
- KGW
- KYB - ASCA
- KYB - Kayaba Industries / Navire Cargo Gear
- Luezhoe
- MacGregor
- MacGregor-Conver
- MacGregor-Hägglunds
- MacGregor-Kayaba
- MacGregor-Navire
- Navire Cargo Gear
- NMF
- Nordströms
- Ozean Service & Reparatur
- Platform Crane Services (PCS)
- Plimsoll
- Pusnes
- Porsgrunn
- Rapp
- Triplex
- TTS
- Vestnorsk Hydraulikkservice (VNH)



MacGregor is a leader in sustainable maritime cargo and load handling with a strong portfolio of products, services and solutions, all *designed to perform with the sea*.

Shipbuilders, shipowners and operators are able to optimise the lifetime profitability, safety, reliability and environmental sustainability of their operations by working in close cooperation with MacGregor.

MacGregor is part of Cargotec (Nasdaq Helsinki: CGCBV).

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