Orange Marine
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Introduction

The Submarine Cable Division of the Postal and Telecommunications Ministry, active since the middle of the 19th century, became a wholly owned subsidiary of the Orange Group in 1999.

In October 2010, Orange acquired a controlling interest in Elettra, a subsidiary of Telecom Italia. Its management was delegated to Orange Marine.

Orange Marine specializes in submarine telecommunications, from the design and engineering phase up to the installation of intercontinental links and the maintenance of existing cables.

Orange Marine designs, manufactures and operates submarine vehicles (ROVs and ploughs) through the SIMEC Department (based in Fuveau, South of France).

Supplementing its traditional activities of telecommunication cable laying and maintenance, Orange Marine offers services in high-growth markets such as the offshore and renewable energies markets. Its comprehensive offering draws on its experience and encompasses the design phase through to implementation and follow-up of operations.

With the commissioning of the Pierre de Fermat in November 2014, Orange Marine now operates six cable ships from its marine bases (the depots in Brest, La Seyne sur Mer and Catania) or from foreign ports.

Orange Marine’s fleet of cable ships represents 15% of the global fleet and is one of the most experienced in the world.

The legal structure includes a wholly owned subsidiary, Chamarel Marine Services, based in Mauritius.
Orange Marine installs submarine cables and repairs defective links. It has laid more than 180,000 kilometres of submarine optical fibre cables in every ocean.

In the past fifteen years, its ships have carried out more than 585 repairs on intercontinental links, some of them at depths of 5,500 meters.

Installation

Installation contracts are signed following calls for tenders from operator consortiums. Orange Marine provides full-scope services: preparation of the response to the calls for tenders, negotiations with the customer, project engineering, project management for bathymetric surveys, choice of routes, estimation of the necessary human resources, ship, cable length, etc., installation, and connections to land stations, and full reporting.

Maintenance

Orange Marine and Elettra provide high-quality long-term cable maintenance under agreements signed with operator groups:

- **ACMA** (Atlantic Cable Maintenance Agreement) for operation from the Atlantic Marine Base in Brest in the Atlantic and Northern European zone, the densest in terms of submarine cables;
- **MECMA** (Mediterranean Cable Maintenance Agreement) for operation from the Mediterranean Marine Base of La Seyne-sur-Mer in the Mediterranean zone, including the Black Sea and the Red Sea, which covers 71,000 kilometers of submarine cables;
- **2OCMA** (2 Oceans Cable Maintenance Agreement) for work from the Cape (use of the Telkom SA depot) in the southern Atlantic and Indian Oceans;
- **SEAICMA** for operation of Alpha 8: a remotely operated vehicle (ROV) on the Asean Explorer cable ship belonging to Asean Cableschip, an Asian operator.

On the maintenance ships, the crew is available 365 days per year, ready to sail in less than 24 hours to repair a cable. On land, the support services provide the necessary support and expertise for the successful completion of operations.

The Orange Marine and Elettra fleets carry out an average of fifty maintenance operations per year.

Cable storage

Orange Marine offers customers a storage service for their supplies of submarine cables and spare equipment, i.e. repeaters, Branching Units and jointing kits.

The supplies are stored in three depots: Brest (Brittany), La Seyne-sur-Mer (Brittany) and Catania (Italy). The depots also manage the customs aspects of the contracts. The depots’ operations are certified under ISO 9001 v. 2008, ISO 14001, ISM and ISPS.
Cable recovery
At the end of their service lives, systems may be removed and destroyed or reconditioned for reinstallation in a different location in the form of a new link.

Orange Marine offers a turnkey cable recovery service for the decommissioning of systems, including the recycling of various materials in accordance with environmental regulations.

Supplementary services
In addition to laying and burying submarine systems from its ships, Orange Marine offers a wide range of services to assist customers in their submarine projects:
- Installation engineering services: route engineering and mapping, cable route surveying and buriability tests, dredging to clear routes, conventional cable laying and laying with an underwater plough, verification inspection of cable laying, post-burial ROV (remotely operated vehicle);
- Desktop studies and exploratory development to assess the technical feasibility of cable laying and draw up the installation schedule;
- Bottom surveys to confirm the validity of routing choices and to correct them if necessary, or to assess the potential for cable burial along the chosen route;
- Mapping studies to define the cable route and provide maps and technical drawings;
- Clearing of the route to eliminate obstacles that might impede plough passage in the days preceding cable-laying operations;
- Coastal landing points for submarine cables.

Orange Marine has a wealth of experience from the management of more than 100 successful cable-laying projects.

New markets: renewable energies and offshore work
Supplementing its traditional activities of telecommunication cable laying and maintenance, Orange Marine offers services for the installation and maintenance of cables for energy and offshore work.

Renewable energies are experiencing strong growth today, particularly in the maritime field, where offshore wind and tidal energy resources are being harnessed. Orange Marine assists industries in this segment through its comprehensive offering for the installation of energy cables, the availability of an experienced fleet and its knowledge in offshore work.

Orange Marine has developed complex procedures for submarine work near oil platforms (safety zones). Among others, it offers an installation service to draw cables towards an offshore installation (J- Tube).

All of Orange Marine’s sites – head office, cable vessels and marine bases – are certified under ISO 9001 and 14001, which are quality management standards for services to customers and for environmental protection. Orange Marine and its ships also have International Safety Management certification (ISM).
Stages of submarine cable laying

1st stage: ocean floor surveys and loading of supplies

The installation of a submarine cable begins by securing country licenses. The development of detailed marine charts of the area through ocean floor surveys can then begin. Route engineering determines the type and quantity of cable needed. The cable and repeaters, which amplify the optical signal, are loaded aboard the cable ship.

2nd stage: cable connection to the departure Beach Man Hole

The cable ship plugs in at the station closest to the cable’s departure beach. A small craft is launched to pull the cable in to the coast. Buoys are installed along the cable to prevent it from sinking to the bottom before it has been positioned along the designated route. Once the cable has been connected to the land station, the ship makes way for the open sea, laying the cable with enough slack so that it conforms to the ocean bottom and remains in constant contact with the floor. Along with the cable, the ship lays repeaters at great depth; these are optical amplifiers spaced 80 kilometers apart. In fishing areas, the cables are buried in a trench to protect them. The submersed Branching Unit creates a branch connection for submarine optical fibre cables to connect intermediate regions.

3rd stage: cable connection to the end station

When the ship finishes installing the cable offshore, she once again takes up station near the coast. The small craft draws in the end of the cable, with the strain eased by floaters up to the beachhead. The cable is pulled from the Beach Man Hole, which is the network communications building for the destination country. The domestic network and the international network (optical fibre cable) are then connected. Henceforth, the two countries are linked via optical fibre. Throughout the cable installation period, the technicians on board perform tests to check the continuity of the optical fibres to make sure that there are no disconnects or defects, and verifies that the signal repeater amplifiers are working properly. The ship follows the route assisted by a dynamic positioning system (DP2).
Stages of submarine cable maintenance

1st stage: arrival in the area and cable recovery
In the event of a malfunction, the submarine cable owner sends a repair order to Orange Marine. The ship must sail in less than 24 hours with the necessary crews and repair equipment (i.e. cable and joining kits). Once she is in the vicinity of the theoretical position of the defect, as determined by her submarine cable database, the recovery phase can begin. A submarine robot – the remotely operated vehicle (ROV) – or a rope with a grapnel is used for recovery.

2nd stage: optical fibre cable repair – jointing
Once brought aboard, the cable is cut. The on-board technicians perform measurements to find the exact location of the fault. The end of the cable in good condition is tied to a buoy and returned to the bottom. The other end is recovered up to the level of the fault. This section of the cable is removed. A new cable segment is connected to the two ends with optical fibre joints. Joining involves melting the optical fibres one by one to weld them without affecting their transmissions capabilities. Extremely meticulous work is involved in this phase. A protective shell is then installed by moulding it around the junction box to protect the fibres. Optical tests are performed, then the telecommunication terminals, which work around the clock, are contacted to ensure the quality of the repair before re-immersing the cable.

3rd stage: re-immersion of the cable
The ship holds the cable while measurements are made between the different telecommunication terminals. Once the effectiveness of the repair has been confirmed, the cable is replaced on the ocean floor. In certain cases, the ROV is used to bury the repaired cable in a trench. Traffic, which has been rerouted to alternate paths during repairs (satellites, submarine and land-based networks) is re-established along its initial route.

Fleet of six cable ships
Orange Marine operates six cable ships out of its marine bases or foreign ports:
- Elettra’s René Descartes and Teliri ships carry out installation operations in every ocean of the planet.
- Sister ships, Léon Thévenin and Raymond Croze, and Elettra’s Antonio Meucci operate under maintenance contracts.
- New cable ship, Pierre de Fermat, handles cable-laying and repair operations for all types of cables, whether submarine telecommunications cables or energy cables.
Orange Marine’s crews

Orange Marine’s cable ship crews are known for their technical expertise

The crew and stand-by technical team are available 24 hours a day, 365 days a year, and can sail in less than 24 hours to repair a defective cable. On land, the support services provide the necessary support and expertise for the successful completion of operations.

Operations are carried out by a joint pair:
- the captain and his crew manage vessel operations and ship safety
- the Chief of Mission and his crew (telecom specialists, cable experts and submarine vehicle pilots) handle commercial operations and relations with the customer’s representative, who is on board for the duration of the mission.

Both crews work closely together to ensure optimum quality in the service provided to the customer.

Repairs last an average of 10 days, depending on the transit time to the work area. Installation can last several months. Each maintenance cable ship goes to sea an average of 15 times a year.
Orange Marine and the environment

ISO certification

Under its ISO 14001 certification, Orange Marine is committed to continuously reducing the environmental impacts of its operations. Those impacts must therefore be identified and means of controlling them incorporated into its work methods.

Aboard the cable ships, Orange Marine works to reduce its consumption of natural resources and its emissions of pollution such as greenhouse gases. This is done by reducing the ships’ transit speed to their areas of operation, by controlling sea releases completely, by sorting waste and having it processed by certified service providers, by replacing potential pollutants with biodegradable products, and by controlling the management of ballast water to prevent any incursion into an ecosystem by an allochthonous species. We have prevention and response plans to prevent releases and pollution in the event of an incident. Our personnel is trained in environmental protection as part of our operations. On a case-by-case basis, we conduct preliminary studies on cable placement in particularly sensitive environments, such as posidonia fields in the Mediterranean or coral beds in the Pacific, in order to protect them while connecting the local population to global communication networks.

C/S Pierre de Fermat, an eco-designed ship

One of the unique features of the Pierre de Fermat, a member of the Orange Marine fleet since the end of 2014, is that environmental aspects were factored into her design: hydrodynamic hull design, on-board treatment of ballast water to limit pollution and protect marine ecosystems, non-toxic anti-fouling paint (without biocides), and electrical equipment to connect the ship to ground current and thus avoid the consumption of fossil resources and the production of related pollution. This cable ship has a large waste storage capacity, avoiding sea releases, and uses low-sulphur fuels to limit releases of SOx, NOx and CO2 pollution.

With this design and equipment, the Pierre de Fermat is one of the world’s most modern and high-performance cable ships.

Protecting flora and fauna

A cable is specifically designed for installation in the marine environment. It does not deteriorate in seawater and causes no pollution. On the contrary, it appears to allow some species to settle and even survive in environments where they could not have done otherwise. This is the case for certain species of sea anemones and starfishes, which attach themselves to the cable. Experiments have even been conducted to create artificial reefs with submarine cables off the coasts of Maryland and New Jersey, for example. These artificial reefs were colonized by a number of species of algae, fish, invertebrates and others.

During the installation of the Scottish Highlands and Islands (SHI) system in Scotland in 2014, C/S René Descartes brought Marine Mammal Observers (MMO) on board to ensure the protection of the very large local population of seals during these operations. Orange Marine is also part of the REPCET network, a collaborative system created by the Souffleurs d’Ecume association for the protection of cetaceans. Thanks to REPCET, the association is able to track the location of cetaceans in real time, limiting the risk of collision with large vessels in sensitive areas essential for reproduction and the preservation of the mammal’s ecosystem. Impressed by the efficiency of the system, Orange Marine has already equipped a second cable ship with the REPCET software system in order to allow it to install and repair its submarine cables in a way that is respectful of underwater life.
Last major achievements

SKR1M (2016-2017)
C/S René Descartes has installed a cable in Malaysia, connecting the mainland and the Borneo Peninsula. This cable, with a length of 2,100 km, has been buried by the ship on 1,850 km, which represents a new record for Orange Marine.

SACS (2017-2018)
SACS is a great transatlantic project between Sangano in Angola and Fortaleza in Brazil, for C/S René Descartes. The loading of the 6,200 km of cable was long, as was the transit through 3 oceans, between Asia where the ship was and the African Atlantic side for the beginning of the installation. This trip lasted 33 days.

AAE-1 (2017)
The C/S René Descartes installed an underwater cable that connects Cambodia, Vietnam and Hong Kong, for a length of 2,000 km within 600 km were buried by the underwater plough Elodie, and 500 km at 3 meters depth.

KANAWA (2018)
Orange deployed on its own funds a new submarine fiber optic cable that connect Guyana, Martinique and Guadeloupe, along 1,900 km.

FOA (2019)
An ambitious project for the C/S René Descartes which is responsible for the complete installation of the FOA system that links Chile in 4 points. After loaded the 3000km long cable in China at the end of 2018, the C/S René Descartes, now Cap-Hornier, has managed to complete this exceptional mission in 5 months despite the extreme environmental conditions for the most southern submarine cable of the world.
Appendix: The Pierre de Fermat
A multi-purpose eco-designed cable ship on the cutting edge of technology

The Pierre de Fermat is the most recent addition to Orange Marine’s fleet.
This multi-purpose ship is used to lay and maintain cables in every ocean of the world, whether submarine optical fibre cables for telecommunications or cables to transport renewable ocean energies.
Since her commissioning in November 2014, she has been assigned to maintaining submarine cables for the ACMA zone (Atlantic Cable Maintenance Agreement).

On the cutting edge of technology
The Pierre de Fermat is equipped with a remotely operated vehicle robot (ROV) to detect, handle, recover and bury cable during installation or repairs. The robot is steered from a dedicated on-board control room specifically designed with ergonomics in mind. Operated by Orange Marine, this heavy submarine equipment was designed and manufactured by its subsidiary SIMEC.
The ship’s dynamic positioning (DP2) system controls multiple powerful high-performance thrusters for perfect seagoing characteristics.
The bridge has a panoramic 360° view to facilitate delicate manoeuvres during cable work.

Life on board
The Pierre de Fermat can lodge up to 80 people on board. Careful thought went into designing the vessel for comfort and well-being on board. Each crew member has an individual cabin with a shower, sink and toilet.
Each cabin and work area has natural lighting.

An eco-designed ship
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In 2018, the Pierre de Fermat carried out
17 maintenance operations in the English Channel, the North Sea, the Irish Sea, the southeastern Atlantic and the Strait of Gibraltar.
It spent
145 days at sea

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