



Submarine Cable Installation Contractors

CAPABILITY DOCUMENT





FOS CAPABILITY DOCUMENT

- 1.0 Introduction3
 - 1.1 Five Oceans Services GmbH 3
 - 1.2 General Information and Immediate Response Contacts..... 4
 - 1.2 Submarine Flexible Product Installation 5
 - 1.3 Submarine Cable Delivery 5
 - 1.4 Submarine Cable Burial and Protection 6
 - 1.5 Repair and Maintenance 6
 - 1.6 Equipment Design, Engineering and Manufacturing 6
 - 1.7 Engineering Studies 6
- 2.0 Capability Statement.....7
 - 2.1 Introduction..... 7
 - 2.2 Installation of Submarine Cables..... 7
 - 2.2.1 Pre-Trenching..... 7
 - 2.2.2 Surface Lay..... 7
 - 2.2.3 Simultaneous Lay and Burial 7
 - 2.2.4 Surface Lay and Post-lay Burial 8
 - 2.2.5 Shore Approach..... 8
 - 2.3 Protection of Submarine Cables..... 8
 - 2.4 Repair and Maintenance of Submarine Cables..... 9
 - 2.4.1 Repair and Maintenance..... 9
 - 2.4.2 Agreement Contracts..... 9
 - 2.5 Associated Activities 9
 - 2.5.1 Route Surveys 9
 - 2.5.2 Burial Assessment Surveys..... 9
 - 2.5.3 Route Clearance..... 10
 - 2.5.4 Pre- and Post Lay Surveys 10
 - 2.5.5 Integrated Navigation and Cable Management (INCAM) 10
 - 2.5.6 External Cable Protection Services 10
- 3.0 Organization and Human Resources 11
 - 3.1 FOS Company Structure 11
 - 3.2 Human Resources 11
 - 3.3 Company Resource Support 11
- 4.0 Equipment..... 12
- 5.0 Appendices 13

1.0 Introduction

1.1 Five Oceans Services GmbH

Five Oceans Services GmbH (FOS) is a German based registered Company having its head office in Leer, situated in the Northern part of Germany, where it also has its design team, manufacturing facilities and its operational support base. Furthermore FOS has several subsidiary and representative offices based in Egypt, United Arab Emirates, Iran and India.

FOS operates as an installation contractor in the Submarine Flexible Product Installation, Repair and Maintenance market on a worldwide basis but with a specific geographical focus on Egypt, Middle East and India.

FOS organization has a history of being active in coastal and inshore marine and civil construction operations since 1985 and operates various vessels together with a comprehensive array of marine construction equipment.

The marine spreads utilized by FOS varies from offshore lay barges to fully redundant DP II class installation vessels and from remote operated vehicles capable of performing operations at depths of up to 1,000 meters in addition to shallow draft trenching equipment able to work in surf zones and shore approaches up to 15 meters of water depth.

FOS has in place a long term charter (6 years) for the DP Class II MV Siem Carrier which is suitable to support FOS operations.

The projects Five Oceans Services performs involve complex operations. Tough environmental conditions, complex logistics, stringent design criteria and third party interfaces are amongst others challenges our project teams are confronted with. Challenges that are being dealt with under stringent time constraint of the overall field development and specific Client requirements. Five Oceans Services believe that these challenges can only be met by strong project management and close co-operation between client and contractor.

Our excellent performance during the various subsea installation projects are mainly based on flexibility and knowledge of our personnel forming the dedicated project teams.

Our project teams consist of highly capable and experienced personnel meeting the standards set in the offshore oil- and gas industry and dedicated to the project from pre engineering phase up to final acceptance.

1.2 General Information and Immediate Response Contacts

FOS immediate response contacts together with telephone and fax numbers for key personnel within FOS are given below:

| | |
|-----------------------|--|
| Company Name | : Five Oceans Services GmbH |
| Visiting Address | : Hafenstrasse 6a D-26789 Leer Germany |
| Directors | : Hans Huijskens Lars Muck Perry Balls |
| General Manager | : Perry Balls |
| Commercial Manager | : Hans Huijskens |
| Operations Manager | : Lars Muck |
| Telephone Number | : +49-(0) 491-91243-0 |
| Telefax Number | : +49-(0) 491-91243-29 |
| Email | : hans.huijskens@fiveoceansservices.com lars.muck@fiveoceansservices.com perry.balls@fiveoceansservices.com |
| Web | : www.fiveoceansservices.com |
| Tax Registration No. | : 60/202/00241 |
| VAT Registration No. | : DE230928217 |
| Customs No. | : 6110827 |
| Place of Registration | : Leer, Germany |
| Register Court | : District Court Aurich, Germany |
| Registration No. | : HR B 111347 |
| Chamber of Commerce | : Emden, Germany |

FOS appreciates the requirements of clients to have immediate contacts with a contractor. In the event that any of the above contacts are not immediately available the secretarial support staff will be pleased to locate alternative personnel to deal with the query or to locate the person required in order to provide a response as soon as possible.

1.2 Submarine Flexible Product Installation

Scope of Works

As a subsea flexible product engineering and installation contractor, FOS presently specializes in the following main activities and services linked with the installation and trenching of power- and telecommunications cables and flexible subsea power cables, flowlines and umbilicals.

Our expertise comprises a variety of services:

- cable installation
- cable protection and/or burial
- cable transportation
- J-tube installation
- Crossing preparation and installation
- Cable shore pull ins
- Cable platform pull ins
- Repair and maintenance of subsea cables
- Equipment design, engineering and manufacturing
- Engineering studies

Five Oceans Services core activity is the installation of power- and telecommunication cables in both shallow- and deep waters and difficult terrain. The installation and protection of cables in these environments is a challenge which requires innovative solutions. Five Oceans Services designs and manufactures project specific cable lay and burial equipment as a result.

- Installation of cable festooning and main lay systems;
- Installation of inshore, shore end, shallow and tidal water cable systems;
- Installation of cables for the offshore oil- and gas industry including J-tube pull-in at offshore platforms;
- Pre- and post lay cable route surveys.

1.3 Submarine Cable Delivery

Through various strategic alliances with European and Far East based cable manufacturers for both power- and fiber optic cables FOS is in a position to provide turn key solutions which includes the delivery of cable.

1.4 Submarine Cable Burial and Protection

- Cable trenching by jetting;
- Cable burial by ploughing;
- Cable protection by rock dumping and/or mattresses;
- Cable protection by manufactured cable ducts;
- Pre- and post lay inspection burial/protection surveys.

1.5 Repair and Maintenance

- Cable repair and maintenance equipment design and provision;
- Cable repair and maintenance under contract to the Operator/Owner/Client;
- Cable repair and maintenance procedures and training.

1.6 Equipment Design, Engineering and Manufacturing

- Cable storage equipment design and manufacturing/procurement;
- Cable handling equipment design and manufacturing;
- Cable tolerance and parameter measuring systems design and manufacturing;
- Cable burial tools or cable protection design and manufacturing/procurement;
- Cable lay and burial system design, manufacturing/procurement and fitting.

1.7 Engineering Studies

- Cable route feasibility studies;
- Cable lay equipment suitability studies;
- Cable burial and protection feasibility and equipment suitability studies;
- Cable maintenance and repair suitability studies;
- Cable installation, protection and maintenance cost estimates and cost analysis.

The above services are provided to cable network owners, cable manufacturers, offshore oil and gas operators, power supply corporations and other parties involved in the transmission and distribution of telecommunications or power transmission via submarine cables.

Individual items of activity can be carried out independently of the others on a stand-alone basis or as part of a complete submarine cable installation, from conception through subsea lay and burial to completion, or can be conducted as a turnkey operation.

FOS also provides services to the offshore oil and gas industry in the installation of flexible flowlines and umbilical with techniques and equipment specially adapted or manufactured to suit the specific needs of the field development or installation project.

2.0 Capability Statement

2.1 Introduction

This capability statement is a brief outline of the main phases of a typical submarine cable installation which can be undertaken by FOS and which have been, or are currently being, carried out by FOS utilizing various cable handling and storage equipment and the cable lay barge Coastal Spider and/or chartered vessels and support craft as appropriate.

The equipment and vessels used to handle and install a cable may vary from project to project depending upon Client requirements and the characteristics of the product to be installed, the geographical location and the seabed topography at the installation site and the possible requirement to protect the cable from damage during its operational life. The techniques of installing and protecting a cable are adapted to suit the demands of the project.

The experience record of FOS is included in Appendix 1. Furthermore the corporate structure is detailed in Appendix 2.

2.2 Installation of Submarine Cables

2.2.1 Pre-Trenching

FOS has the experience and capability to design the trench dimensions based upon soil conditions, cable parameters, environmental data and the requirements of the Client and can provide, or design and manufacture, the required excavation tools.

2.2.2 Surface Lay

The cable is laid directly onto the seabed from the cable lay vessel either from a static coil or a revolving turn carousel/turtable depending upon the characteristics of the product. The cable is led via a cable pick-up arrangement and an associated cable trackway through linear cable engines and is led over board through a cable chute/stinger usually mounted at the stern of the vessel.

FOS owns and operates its own cable handling and storage equipment and also operates a flat bottom cable lay barge with a carrying capacity of 1,600 tones. Furthermore a long term charter is in place for the DP Class II MV Siem Carrier which has a carrying capacity of 1,250 tones.

2.2.3 Simultaneous Lay and Burial

When the cable is required to be buried over a greater part of its route to provide protection and, if this can be achieved in one pass, it can be laid and simultaneously buried during the installation. Burial can be achieved either by towing a plough which effectively cuts a trench depositing the soil back onto the cable or by jetting or cutting which lowers the cable below the seabed.

In the case of using a trenching tool the opened trench will be backfilled by natural sediment movements within a short period of time.

FOS operates various burial devices for shallow water operations and through FOS has the capability to design and manufacture project specific (trenching) tools. FOS also has the in-house experience to advise on the best method of burial protection and to mobilize various types of trenching equipment for burial operations.

2.2.4 Surface Lay and Post-lay Burial

Where simultaneous lay and burial of the cable cannot be carried out in one combined operation, e.g. restricted soil conditions, restrictions by client/owner or restrictions as a result of cable characteristics, the cable can be laid on the sea bottom and be buried subsequently using ploughing, water jetting or soil cutting techniques later.

With the exception of shorter routes, the post burial option is usually a more expensive operation (subject to soil conditions) than simultaneous lay and burial as a second pass will be required over the cable, either by the cable lay vessel or another cable burial vessel. FOS has the experience and equipment to advise and conduct the best method of post burial.

2.2.5 Shore Approach

Shore pull of a submarine cable at landing locations requires specialized equipment and techniques to pull the cable through the shallow areas such as mud flats and tidal waters.

Similarly, landing a cable at an offshore platform requires special handling and the provision of specialized fittings and equipment to maintain the bending radius and integrity of the cable. Therefore specialized offshore trained personnel and equipment shall be made available for activities onboard offshore platforms always with respect to Client requirements.

FOS has gained vast experience in shallow water submarine cable operations over difficult terrain and owns and operates a variety of cable handling equipment and inshore vessels to cater for shore approaches and offshore platform landings.

Through the FOS Mechanical Engineering Division FOS has the capability to design and manufacture project specific equipment for a variety of shore landings.

2.3 Protection of Submarine Cables

In many cases submarine cables require protection against damage that may result of changes in the seabed, dropped debris, dragged ship's anchors or trawled fishing gear. To prevent damage to occur, certain options are available:

Burial of the cable (see section 2.2) or when this option cannot be used, protecting the cable using mattresses, rock dumping, articulated split pipes or added padding (e.g. Uraduct).

2.4 Repair and Maintenance of Submarine Cables

2.4.1 Repair and Maintenance

“Repair and Maintenance Agreements” cover the majority of telecommunications cables. However, some of the telecommunication systems may not have adequate repair and maintenance coverage within their "Agreement". FOS is able to advise on repair and maintenance requirements, to design and manufacture the key elements of the repair equipment and in addition can arrange for technology transfer to client's staff.

FOS is a fast reacting organization that can respond with equipment and personnel at short notice. Where repairs are required on a "one off" basis, mobilization can be reduced to a bare minimum through utilization of local offices worldwide to secure suitable local vessels. FOS repair equipment can be containerized and flown out to the repair site and mobilized within the minimum of downtime to the submarine cable operation. In addition FOS has available cable storage facilities situated in various deep-water ports.

2.4.2 Agreement Contracts

FOS with its vessels and equipment manufacturing capability and rapid response ability is an ideal and reliable partner in a maintenance agreement contract. FOS recognizes and values local input and the cost effectiveness of using local personnel and resources whenever possible.

2.5 Associated Activities

There are several other activities that are vital in the submarine cable installation process and a requirement to a successful and cost effective installation of a submarine cable.

These associated activities that FOS is capable of carrying out are:

2.5.1 Route Surveys

Route surveys are essential to determine the optimum route for the cable with respect to the integrity of the cable during its operational life, environmentally and politically it also determines whether a route is acceptable.

FOS can organize and mobilize a full survey spread, Remotely Operated Vehicles (ROV's), bathymetric equipment and soils sampling equipment to conduct these surveys and to report the most favorable cable route as part of the route engineering.

2.5.2 Burial Assessment Surveys

In order to more accurately determine whether a cable is capable of being buried along sections of the route, a burial assessment can be carried out using a burial assessment tool. Soil investigations can also be made sampling at discrete intervals along the route.

2.5.3 Route Clearance

Where the route crosses obsolete cables FOS can provide grapnels and cutting equipment to clear a corridor from these cables.

If there is extensive debris on the seabed such as old trawler nets, disposed wires or chains, FOS can provide clearance equipment to remove the debris.

2.5.4 Pre- and Post Lay Surveys

Where required FOS can perform a pre-lay survey as a final determination of the cable route and as a route clearance check by ROV either from the cable lay vessel or from a support vessel.

Following the cable lay a post lay survey can be carried out in a similar manner to the pre-lay survey to determine, if applicable, the condition of the cable on the seabed and to provide the "as laid" documentation.

2.5.5 Integrated Navigation and Cable Management (INCAM)

FOS uses an integrated navigation and cable management system to plan the route and to control the lay and burial of the cable within its required tolerances. Geographical positions and recorded cable tensions together with burial depths are presented in the form of an immediate display and are recorded throughout the installation to form part of the "as-laid" documentation.

2.5.6 External Cable Protection Services

FOS is capable to provide cable protection services in addition to trenching techniques. These services include rock dumping in both deep- and shallow water and the supply and installation of ductile iron articulated pipe.

3.0 Organization and Human Resources

3.1 FOS Company Structure

All sales, marketing, contracting, engineering and operations are conducted by in house personnel. FOS has a “flat” organization giving short lines of communication and clear responsibilities.

3.2 Human Resources

All personnel are allocated permanently to the different disciplines within the organization. All personnel are experienced and qualified in the discipline they represent. Curriculum Vitae of all personnel within FOS are held on record and are available on request.

FOS personnel are available on a consultancy basis to assist clients in the consideration or planning of potential submarine cable links.

When a project of whatever nature is undertaken by FOS specific personnel are allocated to it for its duration with clear reporting lines and allocation of responsibilities and duties.

3.3 Company Resource Support

FOS's personnel and equipment support can be made available and provided whenever necessary.

Specifically this support includes the provision of highly skilled and experienced surveyors and survey equipment, marine crew and marine construction, dredging crews and dredging equipment, cable lay operators and cable lay equipment, fabrication design and manufacturing facilities.

4.0 Equipment

FOS operates and partly owns a wide range of cable handling and storage equipment:

- cable drums and cable static coils;
- pick-up arms and loading booms with various bend radii;
- cable guiding/diverting systems and cable track ways;
- linear and bow cable engines combined or as single units;
- self contained power packs and generators;
- self contained power control rooms;
- cable trenching tools to 3.0 meters depth;
- trenching grapnels/route clearance tools;
- cable floaters and buoyancy aids;
- cable pull in winches;

FOS operates its cable lay barge Coastal Spider and the MV Siem Carrier which is long term charter to FOS, as well as 3rd party cable lay vessels and various support craft:

- CLB Coastal Spider
- CLV Siem Carrier
- shallow water/shallow draft pontoons;
- shallow draft support boats;
- shallow draft RIB's and workboats.

FOS provides an immediate design and fabrication facility and shallow water and inshore equipment:

- winches of varying capacity;
- installation rigging and support gear.



5.0 Appendices

- Appendix 1 FOS Experience Record
- Appendix 2 FOS Organigram & Responsibilities



Appendix: 1

FOS Experience Record

Projects in Progress and Backlog

| | |
|-------------------------|--|
| Client: | J. Ray McDermott Eastern Hemisphere (United Arab Emirates) |
| Location: | Pearl Project, Offshore Qatar, Persian Gulf |
| Length of Installation: | 136 km |
| Type of cables: | Fibre Optic cable |
| Specific details: | Installation of 2 shore to platform and 1 inter-platform cables incl. multiple cable and pipeline crossings and 4 J-tube pulls and 2 shore end installations including post lay stabilisation. |
| Client: | National Petroleum Construction Company (NPCC). |
| Location: | Northfield, Offshore Qatar, Persian Gulf |
| Length of Installation: | 58 km |
| Type of cables: | MVAC 94mm lead sheathed power cable with fibre optic component |
| Specific details: | Installation of 5 inter-platform cables including 15 cable and pipeline crossings and 4 J-tube pulls |
| Client: | IOEC |
| Location: | Salman Field, Offshore Iran, Persian Gulf |
| Length of Installation: | 12 km |
| Type of cables: | MVAC 84mm lead sheathed power cable with fibre optic component |
| Specific details: | Installation of 4 inter-platform cables incl. 28 cable and pipeline crossings and 8 J-tube pulls |
| Client: | J. Ray McDermott Eastern Hemisphere (United Arab Emirates) |
| Location: | Northfield, Offshore Qatar, Persian Gulf |
| Length of Installation: | 65 km |
| Type of cables: | MVAC 94mm lead sheathed power cable with fibre optic component |
| Specific details: | Installation of 2 inter-platform cables incl. 24 cable and pipeline crossings and 4 J-tube pulls |
| Client: | J. Ray McDermott Eastern Hemisphere (United Arab Emirates) |
| Location: | Northfield, Offshore Qatar, Persian Gulf |
| Length of Installation: | 135 km |
| Type of cables: | MVAC 94mm lead sheathed power cable with fibre optic component |
| Specific details: | Installation of 5 inter-platform cables incl. 12 cable and pipeline crossings and 6 J-tube pulls and 2 shore end installations including 2 x 750 meter long umbilicals |
| Client: | Naftogaz India Private Ltd |
| Location: | Bombay High, Offshore India |
| Length of Installation: | 115 km |
| Type of cables: | MVAC 94mm lead sheathed power cable with fibre optic component |
| Specific details: | Installation of 26 inter-platform cables incl. 380 cable and pipeline crossings and 52 J-tube pulls |

Year 2008

Client: Petroleum Marine Services (PMS) (Egypt)
Location: Khafji Joint Operations Field, Offshore Saudi Arabia, Persian Gulf
Length of Installation: 50.4 km
Type of cables: MVAC submarine power cable with fibre optic component
Specific details: Installation of 24 5kV MVAC cables with a total length of 29.4 km
Installation of 7 36kV MVAC cables with a total length of 21.0 km
Installation of 250 pipeline and cable crossings
Installation of 31 J-tubes
Installation of 62 cable hold-back arrangements
Execution: 1st quarter 2008 until 1st quarter 2009

Year 2007

Client: Gulf of Suez Petroleum Company (Gupco) (Egypt)
Location: East Nile Delta, Mediterranean Sea, Egypt
Length of Installation: 68.5 km
Type of cables: Electro-hydraulic umbilical, 104mm, incl. hydraulic, power and fibre optic components
Specific details: Installation of one 68.5 km shore-to-subsea wellhead umbilical incl. one shore pull and one subsea lay-down

Client: ABB Power Technologies (Sweden)
Location: Bahrain, Persian Gulf
Length of Installation: 9.75km
Type of cables: MVAC 150mm submarine power cable with fibre optic component
Specific details: Installation of 3 66kV 3.25km inter-shore submarine power cables across the Bahrain to Saudi Arabia Causeway incl. six shore ends

Client: Petroleum Marine Services (PMS) (Egypt)
Location: Gulf of Suez, Red Sea, Egypt
Length of Installation: 12.3 km
Type of cables: Electro-hydraulic umbilical, 102mm, incl. hydraulic, power and fibre optic components
Specific details: Installation of one 12.3 km shore-platform umbilical incl. one shore and one J-tube pull

Year 2006

Client: J. Ray McDermott Eastern Hemisphere (United Arab Emirates)
Location: Northfield, Offshore Qatar, Persian Gulf
Length of Installation: 74 km
Type of cables: MVAC 94mm lead sheathed power cable with fibre optic component
Specific details: Installation of each one 10 km + 28 km + 36 km inter-platform cables incl. 16 cable and pipeline crossings and 6 J-tube pulls



Client: McDermott Arabia Company Ltd. (Saudi Arabia)
Location: Khafji Joint Operations Field, Offshore Saudi Arabia, Persian Gulf
Length of Installation: 5.5 km
Type of cables: MVAC 123mm XLPE power cable with fibre optic component
Specific details: Installation of one 5.5 km shore-platform cable incl. 4 cable and pipeline crossings and one J-tube pull as well as installation

Year 2005

Client: LD TravOcean Middle East (United Arab Emirates)
Location: Persian Gulf incl. UAE, Qatar, Bahrain, Saudi Arabia and Iran
Length of Installation: N/A
Type of cables: N/A
Specific details: Charter of Cable Lay Barge Coastal Spider

Client: Clough Engineering (Australia)
Location: East Coast India
Length of Installation: 26 km
Type of cables: Electro-hydraulic Subsea Umbilical, 120mm
Specific details: Installation of one 25.5 km subsea umbilical
Installation of one 3.2 km terrestrial umbilical
Post lay trenching of shallow water umbilical
Post lay trenching of shallow water pipelines

Year 2004

Client: Al Nasr Irrigation & Contracting (United Arab Emirates)
Location: Abu Dhabi, United Arab Emirates
Length of Installation: 37km
Type of cables: MVAC 106mm sheathed power cable with fibre optic component
Specific details: Installation of 34 inter-island submarine cables
Installation of 68 shore end sections incl. rock-protection



Appendix: 2

FOS Organigram and Responsibilities



Five Oceans Services Capability Document

Ref. : Capability Document
Rev. : 09
Date : July 2009
Page : 18 of 18

