



Fibron
Cable

Offshore Energy

IWOCS | SSIV | PLEM to Buoy
Short Length PCU |
Special Umbilicals and Cables



Offshore Energy

Fibron provides a wide variety of custom designed and bespoke product solutions for a diverse range of end user applications.

We are all explorers with the spirit of adventure at heart. For some it's about pushing the boundaries of human endeavour. While for others it's about overcoming the everyday challenges.

We believe passionately in the power of change. Together let's go deeper and further, changing attitudes and shaping the future of our industry.

Design, manufacture, testing and termination are completed in-house, maintaining technical integrity and reliability at all times. We offer an industry leading selection of subsea cables and umbilicals.

What can we do for you?

Whatever your particular challenge Fibron welcomes the opportunity to solve it. Our goal is to engage with you, our customer, at an early stage to allow the Fibron engineers to collaboratively work with your engineering, technical, operations and procurement teams.

In this way we can work together to complete the project on time and within the agreed budget. This early phase teamwork allows us to address the functional and safety aspects of the design. Our service doesn't end with product delivery, we continue to follow the product through its life cycle with our dedicated after sales services.

Applications

- IWOCS
- SSIV
- PLEM to Buoy
- Short Length PCU
- Special Umbilicals and Cables

Umbilical and Cable Specialists



Subsea umbilicals and cables

Cost-effective solutions offering operational longevity and end-use compatibility to recognised industry standards.

Subsea umbilicals and cables are expected to function in demanding subsea conditions. To ensure we fully understand all our client's operational requirements and expectations we like to get involved early in the design phase of projects. This allows us to offer tailored purpose built solutions. The list below represents typical key factors to be considered.

Special consideration checklist

- ISO, API, NORSOK
- Pressure
- Flow
- Temperature
- Chemical compatibility
- Collapse resistance
- Electrical (signal, power, fibre optics)
- Terminations (hose ends, mechanical and others)
- Ballast / buoyancy
- Weight and space constraints
- Loading
- In / out of riser
- Self-support / aided support
- Robustness
- Flexibility
- Design and service life expectancy

Umbilical and cable specialists

IWOCS

Intervention Work Over Control System (IWOCS) umbilicals utilise a high strength fibre reinforcement to maximise flexibility and minimise weight, ideal for applications where vessel or rig footprints and weight restrictions require special winch or reeler handling systems with certain safe working loads, handling sheaves and heave compensation.

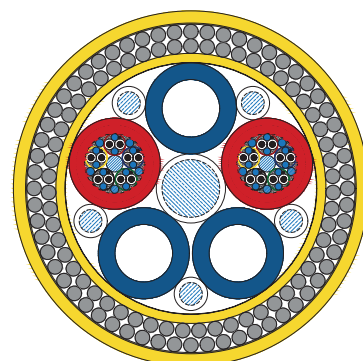
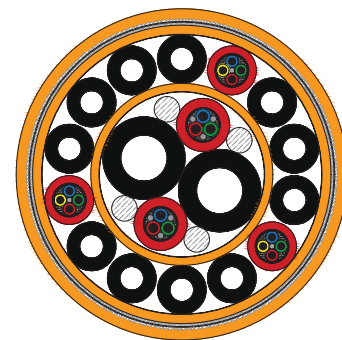
IWOCS umbilicals can be terminated to subsea stabplates to enable hook up to the subsea equipment during well intervention activities.

Fibron can also offer integration to IWOCs reelers at our dedicated production facility.

SSIV

Subsea Isolation Valve (SSIV) umbilicals provide a critical link from the topside platform to the pipeline isolation valves on the seabed.

Our SSIV umbilicals are designed for mechanical protection, stability, tensile strength and durability.



PLEM to Buoy

Fibron produce a range of Pipe Line End Manifold (PLEM) to Buoy umbilicals specifically designed and manufactured with bespoke Topside and Subsea Umbilical Termination Units (TUTU and SUTU). These umbilicals are used to activate the power and control systems during the transfer of fluids to or from the subsea pipeline and the tanker.

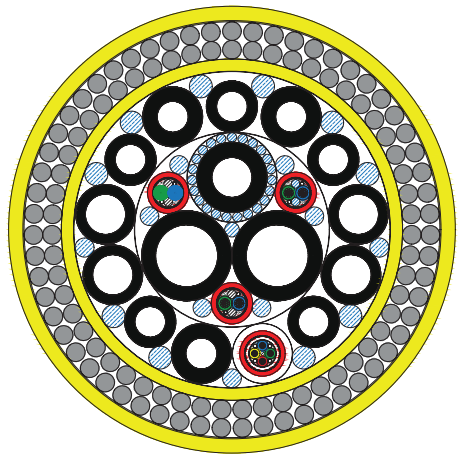
Production Control Umbilical

Our knowledge of Production Control Umbilical (PCU) designs enable us to offer a range of short to medium length custom built systems for installation at varying water depths. A diverse range of terminations can be offered.

Our products are used to tieback subsea trees to fixed platforms, FPSOs (Floating Production Storage and Offloading platform) and land based facilities.

An important part of the package is to supply jumpers and flying leads to complement other products and complete our offering.

We manufacture these with appropriate terminations to interface with subsea and or topside equipment.



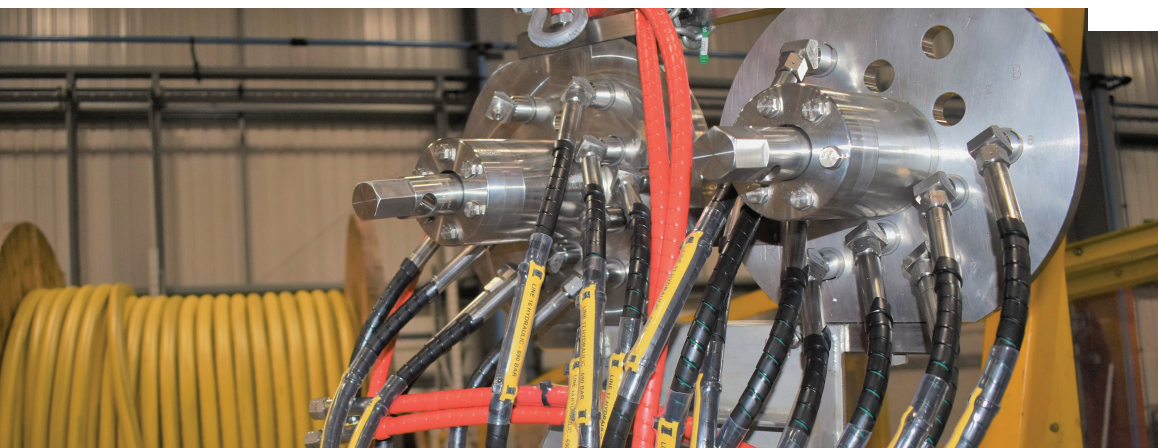
Other special umbilicals and cables

The offshore oil & gas market requires a diverse range of products which do not always fall into recognised categories.

The list below captures some of these other special products and many of these require dynamic performance and capability. This is a particularly harsh and demanding environment and Fibron have a wealth of expertise and experience to provide reliable and cost effective solutions to the challenges our customers present.

Other special umbilicals and cables:

- Chemical and gas injection umbilicals
- ILUC (Internal Line Up Clamp) umbilicals
- HCR (High Collapse Resistant) hoses
- Static and dynamic umbilicals and cables
- Subsea tooling umbilicals and cables
- Piggy back cables
- Pile driving umbilicals
- Power, signal and optical fibre cables
- Blow Out Preventer (BOP) umbilicals
- MUX cables
- ICCP cables (Impressed Current Cathodic Protection)
- Hydraulic Flying Leads (HFL)
- Electrical Flying Leads (EFL)
- Jumper umbilicals



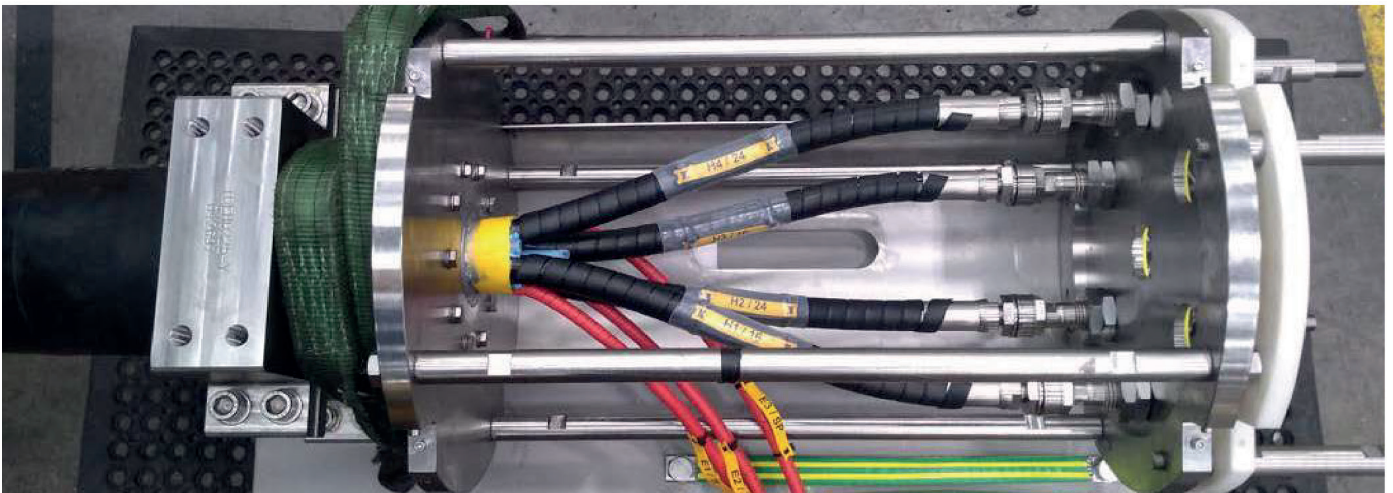
Supporting termination and ancillaries

A crucial element of the umbilicals and cables we produce are the terminations and ancillary equipment. Most of the mechanical terminations are designed in-house and manufactured locally.

We also rely upon an important number of suppliers to complete our scope of supply. Since we began trading in 1986, we have established strong relationships with these suppliers, and therefore we have full confidence in all of these products.

Umbilical ancillaries include:

- Armour body, sleeves, integration plates
- Bend stiffeners (moulded, bolt-on, screw-on)
- Vertebrae, segmented bend restrictors
- Pull-In heads, hang-off collars, isolation kits
- Termination assemblies (UTA, SUTU, TUTU, SDU)
- Junction boxes, housings (hydraulic, electrical and optic)
- Mounting frames
- MQC plates, stab-plates, cobra heads
- J-Tube seals
- Buoyancy and ballast modules
- Umbilical impact protection
- Hose end fittings
- Hydraulic couplers
- Electrical connectors
- Test kits
- Flushing hoses
- Cathodic protection
- Abandonment kits
- Installation reels, cradles, lifting beams, sling sets
- Handling systems (HPUs, reelers)



Product testing and qualification

The aim of qualification is to verify whether our product meets or exceeds the reliability and quality requirements for it to withstand the harsh and challenging conditions faced subsea.

Product testing and qualification plays a vital role in this industry, and is implemented to demonstrate product capability, reliability and consistency of supply. For this product range we defer to the ISO-13628-5 /API 17E standard, which identifies a number of qualification tests. It remains the clients decision to specify their requirement for ISO-13628-5/API 17E qualified product. Fibron has a wide range of in-house test equipment to support this need.

Tests include:

Reeling/Unreeling test – to assess the fatigue resistance of the umbilical to the reverse bending experienced during umbilical deployment and retrieval.

Fatigue test – to assess the fatigue resistance of the umbilical to repeated cycling of relatively small amplitude. Such a scenario can occur when an umbilical is deployed over a sheave with the winch in heave compensation mode or when the umbilical is deployed with a deck storm loop.

Tensile test – to certify the ultimate breaking load of the cable or umbilical to prove the mechanical termination design.

Crush/Clamp test – to determine the correct clamping force or the allowable crush load for over boarding operations.

Bend stiffness test – used as an input for product dynamic analysis or clashing analysis.

In addition to standard factory acceptance testing Fibron can offer additional verification and test services using our in-house test facilities.



Design philosophy

Fibron offer both dynamic and static cables and umbilicals designed and manufactured to operate in the very demanding subsea environment.

We actively engage with our customers during the design phase, to determine the optimum strength members, polymers, mechanical terminations and components to suit their specific application. During the design phase we draw upon over 100 years combined experience in designing products for these arduous applications. We

work with the appropriate certification bodies, when required, to ensure that the manufactured products meet their requirements and that of the operators. Typically the guiding document will be the ISO13628-5/API 17E subsea umbilical standard with additional inputs from the client's procurement specifications.



During the project execution phase our designers work closely with our project, quality and operation teams to ensure that the product is manufactured to the required specification, on time and to budget.

and constructive input. On completion of the more demanding projects we encourage our customers to participate in a 'lessons learnt' meeting to allow the Fibron team to continuously improve our product and service offering.

Our design team participate in the initial and subsequent customer/project meetings to ensure productive



Project management

Fibron has accumulated considerable experience in managing major oil & gas umbilical projects and will assign one of our experienced team as a single point of contact for all large or complex contracts.

This service offers personalised communication lines and reporting including the following:

Project planning including detailed Gantt charts giving information on all key stages in the execution of the contract:

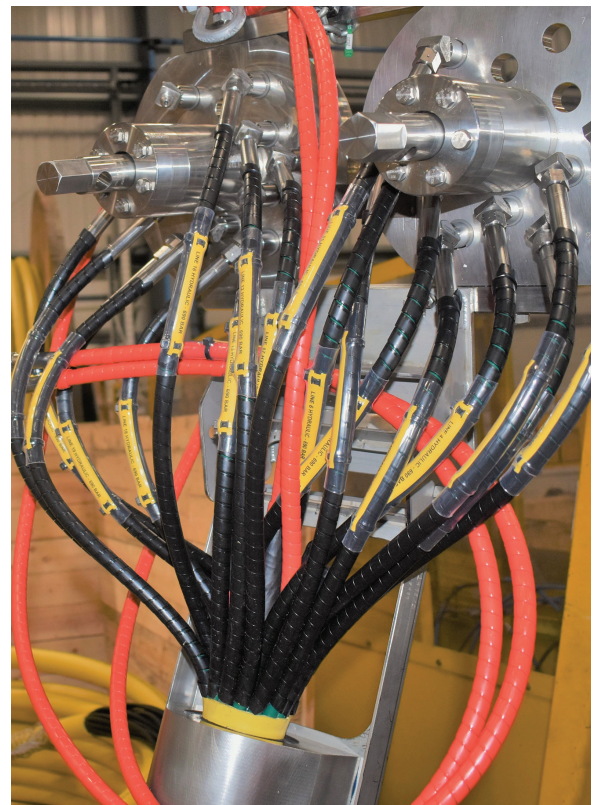
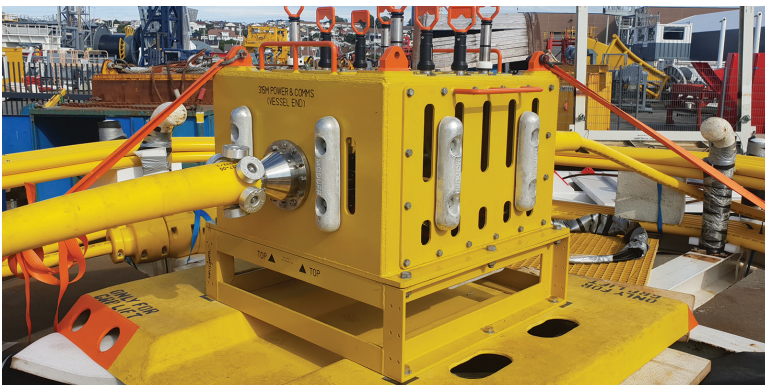
- Internal and customer kick-off meetings
- Contract review
- Design review
- Procurement
- Manufacture
- Inspection & test
- Packing
- Delivery

Project reporting in accordance with customer's specific requirements and at agreed intervals including:

- HSSE status
- Project status (completed in last period, planned for next period)
- Quality status (NCRs, reports, notice of inspection)
- Updated project plan
- KPI status

Project specific documentation including:

- Supplier master document list
- Project execution plan
- Work breakdown structure
- Inspection & test plan
- Quality plan
- HSE plan
- Project specific test procedures (FAT and qualification)
- Manufacturing record books



After sales

Fibron offers a full after sales service including technical support, qualified offshore technicians, re-termination and repairs and product installation support.

This ensures that our clients are fully supported from order date through to installation and operation of our products.

In the very demanding offshore oil & gas environment Fibron understands the critical nature of product performance and the implications of downtime on our end user. In these situations it is vital that our clients can rely on a fast and responsive service to quickly recognise the issues, and where possible put in place a plan of action to recover the product. In certain circumstances, due to severe product damage, it may not be possible to make a full repair, but where possible Fibron look to find solutions that will allow the product to perform safely until a permanent solution can be installed.

Services to support Fibron's products on a global basis both onshore and offshore include:

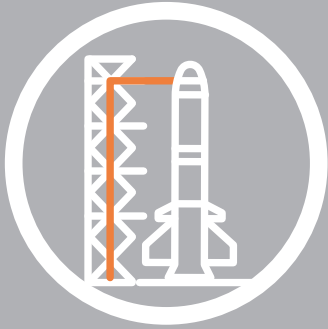
- Product testing of hose, electrical and fibre optic cable
- Product repair, maintenance and re-termination
- Supply of project specific spares and repair kit
- Product integration, product handling advice and trouble shooting
- Assistance in sourcing 3rd party associated products

Our track record demonstrates major projects where Fibron product has been installed globally in key offshore locations. We continue to fully support these products and our after sales services team is available to support our clients at these critical moments.



We are specialists in the design, testing and manufacture of bespoke cables and umbilicals for use in some of the planet's harshest, most demanding environments.

Our products have applications across many different market sectors, and our experienced team are always on hand to help develop a solution for almost any project.



AEROSPACE



AQUA CULTURE



DEFENCE



DIVING



HULL CLEANING



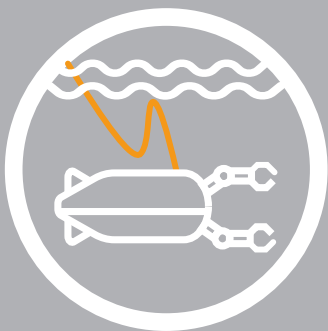
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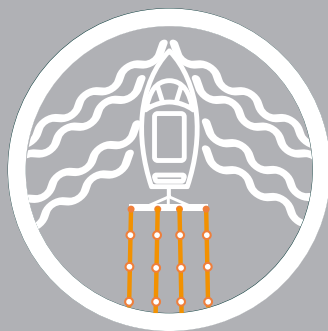
OFFSHORE
RENEWABLES



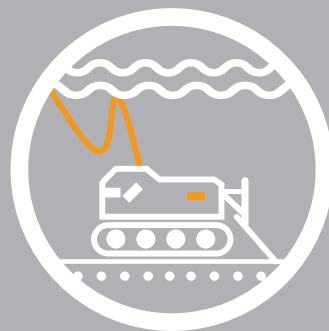
OFFSHORE WIND



ROV



SEISMIC



SUBSEA MINING



OTHER



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