
Prysmian
Group
NSW Submarine
Telecom Systems
Turnkey Solutions for the future, delivered today
NSW
A brand of Prysmian Group

Linking the Future

As the worldwide leader in the cable industry, Prysmian Group believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities. With this in mind, we provide major global organisations in many industries with **best-in-class cable solutions**, **based on state-of-the-art technology.** Through threerenowned commercial brands – Prysmian, Draka and General Cable- based in almost 100 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures, and achieve sustainable, profitable growth.

In our energy business, we **design**, **produce**, **distribute** and **install** cables and systems for the transmission and distribution of power at low, medium, high and extra-high voltage.

In telecoms, the Group is a leading manufacturer of all types of copper and fibre cables, systems and accessories – covering voice, video and data transmission. Drawing on almost 140 years' experience and continuously investing in R&D, we apply excellence, understanding and integrity to everything we do, meeting and exceeding the precise needs of our customers across all continents, at the same time shaping the evolutionof our industry.

Norddeutsche Seekabelwerke GmbH (NSW), the submarine telecom center of competence center within the Prysmian Group

NSW, became part of Prysmian Group following the General Cable acquisition in June 2018.

After NSW was founded in 1899 by Felten & Guilleaume and the Deutsch-Atlantische Telegraphengesellschaft, Siemens became one of its major shareholders in 1931, and acquired the remaining stock in 1995. In 2000, NSW became a subsidiary of Corning Cable Systems.

Experience, Innovation and Service

Norddeutsche Seekabelwerke GmbH (NSW) has been manufacturing underwater cables since 1899. NSW was already laying its first transatlantic submarine telecommunication cable in 1904, approximately 7,993 kilometers in length.

A century of experience in armored and non-armored cables for carrying power, signals, communications and fiber-optic applications has formed the foundation for a forward-looking organization committed to innovation and unrivalled customer service.

NSW's research-and-development and product-management teams work in close cooperation with Prysmian's experts and specialists from leading suppliers of electronic telecommunications transmission equipment to create state-of-the-art solutions for many of the world's leading network operators.

Applications

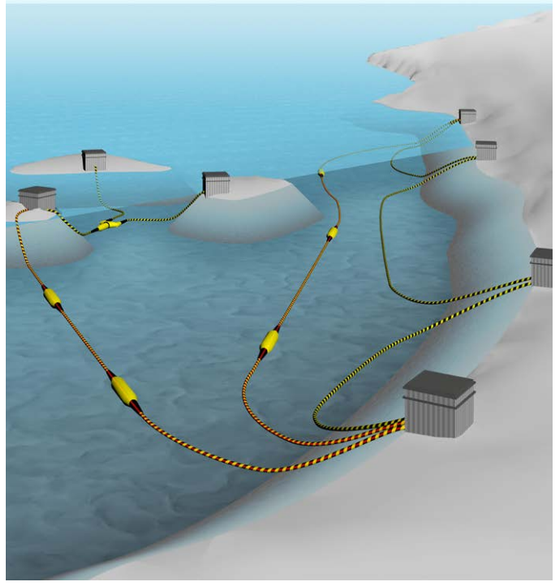
NSW® Submarine Cables for Telecommunication Networks

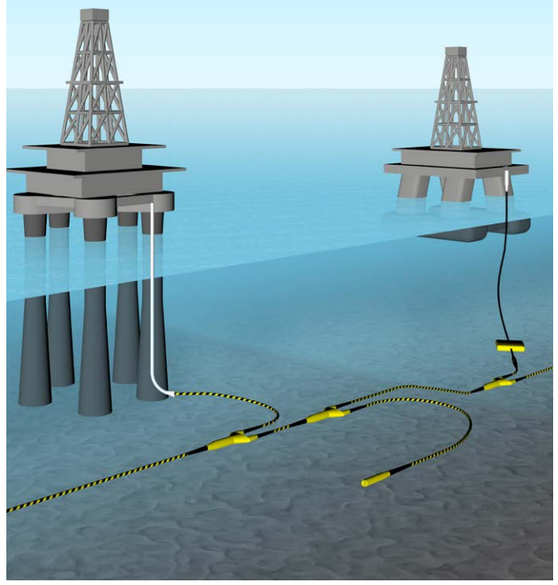
NSW has established itself as one of the **leading turnkey suppliers** for providing **state-of-the-art submarine cable systems worldwide**. NSW offers **fiber-optic submarine cables**, **accessories** and **associated turnkey services**. Investors and network operators are increasingly opting for the point-to-point or turnkey approach. By placing the entire project in the hands of a qualified expert, the risks that result from a lack of submarine project management experience are avoided, and time to market is brought down to a minimum.

NSW® Submarine Cables for the Offshore Oil and Gas Industry

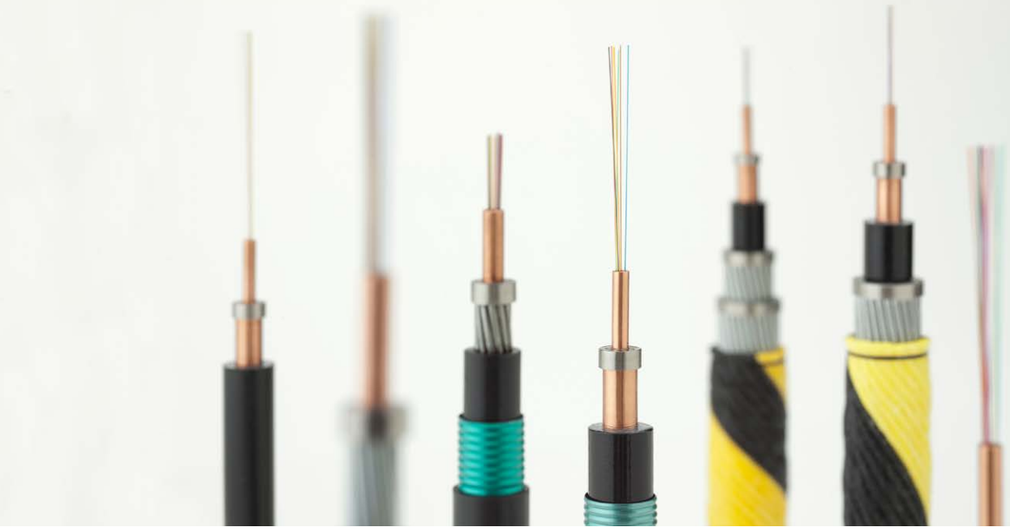
The increasing complexity of data transmission requirements (platform-to-platform, platform-to-subsea control system and platform-to-shore), challenging technologies like "free-floating" platforms or sub-sea exploration and the need for higher levels of system reliability resulted in the development of new telecommunication system solutions for the offshore industry.

Remote control, automation and other bandwidth demanding applications are obvious trends in the industry. Fiber-optic submarine networks can easily be adjusted to continuously changing business environments and can be incorporated into future engineering concepts.





Submarine Telecommunication Cables



NSW® MINISUB® is a rugged, lightweight fiber-optic submarine cable with unique features. Within the MINISUB® cable family, NSW offers **repeaterless** as well as **repeatered cable types** optimized for all network requirements.

Key design element of the NSW® MINISUB® is the central copper tube which ensures reliable protection of the fibers in the core against hydrogen ingress. Cables with a fiber loss of less than or equal to 0.185 dB/km for G.652 fibers and less than or equal to 0.160 dB/km for G.654 fibers have already been supplied to the market. NSW® Minisub fibers have excess longitudinal length and are not coupled to the cable's outer structure. This prevents fiber damage during cable handling and laying, and thus guarantees optimal fiber performance throughout the lifetime of a cable.

Both cable transport and cable laying are facilitated by the highly compact design of the cable. It provides less weight for more convenient, but also cost-effective transport arrangements. Innovative and efficient means of transporting Minisub cables can greatly enhance turnaround time. Containerized modular tanks enable NSW to transport the cable on standard container vessels, offering regular feeder services as well as fast and reliable turnaround. On reaching its destination and depending on the lay spread involved, the cable can either be laid directly from the tanks, or alternatively coiled into the tanks of the cable layer.

The the high specific gravity of the cable which results in optimal sinking speed to facilitate accurate laying exactly "on-route".

Both repeaterless and repeatered types are available as lightweight (LW), lightweight-protected (LWP), single-armored (SA) and double-armored (DA) cables.

Repeaterless MINISUB™ Submarine Cables

MINISUB™ repeaterless submarine cables can comprise **up to 36**, **48** or **144 fibers**. NSW® Minisub can be installed in **water depths of up to 5,000 m**. NSW branching units for the NSW® MINISUB™ submarine cable family provide flexible fiber management and routing features.

Repeatered NSW® MINISUB™ Submarine Cables

NSW MINISUB™ ® submarine cables systems, supporting **up to 32 fibers** and equipped with industry standard repeater technology, can be installed and recovered from **water depths down to 8,000 m**.

All NSW® submarine cables are Universal Joint qualified by the Univeral Joint Consortia.

Low resistance of 0.6 Ohms / km by using both a central copper tube and an outer copper layer above the strength members reduces the overall power feed voltage and therefore the power consumption of the wet plant.

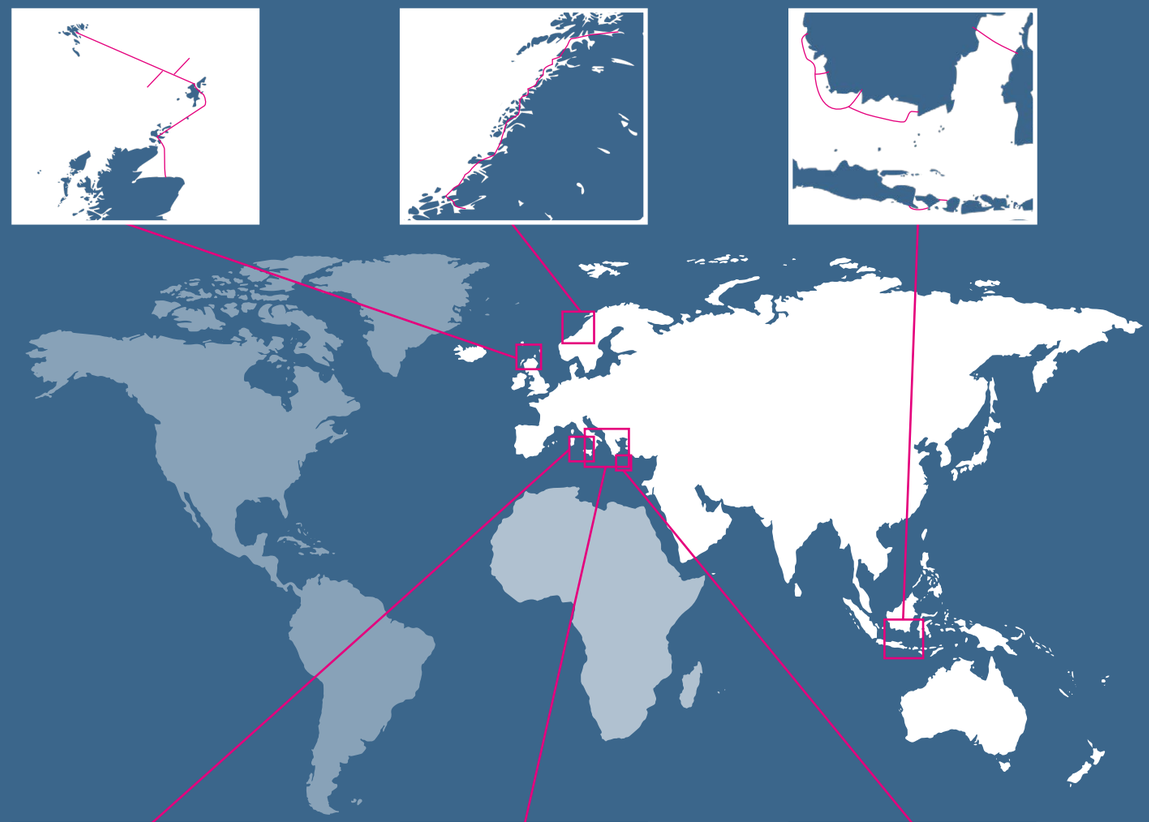
NSW supports its customers with cost-efficient system design, which also includes a careful look at route engineering, cable protection measures, transport logistics and wet plant installation.

Selected References

SHEFA-2
SHEFA-2 Project / Faroese Telecom / 960 km manufacturing and installation / 3 links / Scotland – Orkney – Shetland – Faroe

KystTele Polar Circle
KystTele Polar Circle Project / KystTele AS / 855 km manufacturing and installation / 23 links along the Norwegian coastline

JaKa2LaDeMa
JaKa2LaDeMa turnkey submarine cable project for PT Telkom / Indonesia 1,200 km repeatered system with 2 branching units on the south-west side of Borneo / 3 repeaterless links with approx. 500 km in total linking Java – Bali



Janna
Janna Project / Janna Consortia / 625 km / 2 links Sicily – Sardine – Italy

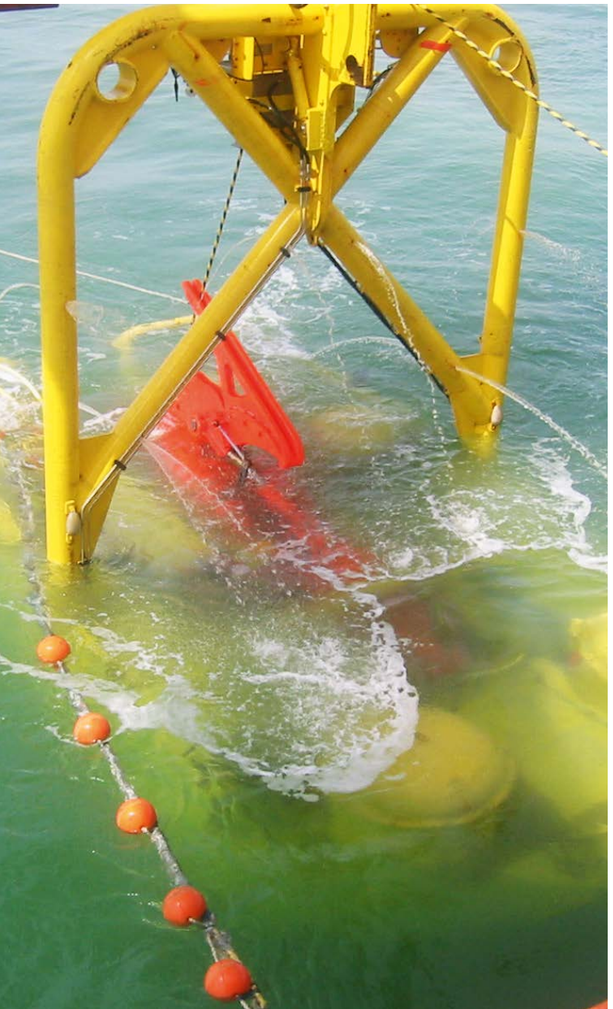
Hawk
3,500 km repeatered submarine cable supply to Fujitsu Ltd. for the Reliance Hawk project in the Mediterranean sea

OTE and Hellas Tellas Online
Manufacturing and installation of 1,000 km repeaterless MINISUB™ cables for OTE and Hellas Tellas Online connecting Geek islands with the main land of Greece

Project Implementation

Turnkey Project Management
NSW's customers benefit from a centuries experience in successful implementation of turnkey submarine cable projects. The faster a project can be implemented, the more economical financing becomes. NSW supports customers to achieve profitability through **efficient management** of their **turnkey projects**. An optimum trade-off is maintained between the cost and the technical measures to meet the customer's present and future objectives.

Business Case Development
The feasibility of adding new bandwidth supply depends on economic and technical characteristics of the systems already in place. Additional regional network rings can bring capacity to users in areas not immediately contiguous with landing points of transoceanic systems, and can also provide an economically attractive complement to existing terrestrial networks. In close cooperation with the customer, NSW reviews the feasibility of a proposed cable system, and supports the preparation of a **detailed business case** to satisfy the requirements of equity investors or lending institutions providing project financing.



Desktop Study
Once the frame parameters of a project have been defined, NSW prepares a desktop study in which all available **information on** the proposed **submarine cable route** is **collected** and **evaluated**, the system architecture is reviewed and the final technical **parameter of a system** are **defined**. Initial legal, commercial and contractual preparations for implementing the project are made hand-in hand with the customer to gathering all required approvals in time.

Marine Survey
NSW carries out a detailed seabed surveys along the proposed cable route through competent partners to align and up-date the database of the desktop study prior to the cable manufacturing phase. NSW's experts are on board the survey vessel to **monitor the work and data on the cable route**. Depending on the geophysical and environmental data collected, the cable type and protection measures (armouring, protection sleeves, burial depth etc.) as well as all necessary cable joints, housings and other system details are specified.

Project Implementation

Project communication
The key elements of NSW's project management is a small, **dedicated project team** with a direct communication path to the system owner. NSW's local project office allows **fast**, **effective** and **regular exchange of progress** in the same time zone, enabling short-notice ad-hoc meetings to address the challenges of the project in face-to-face consultation with the system owner. Delays arising from potential miscommunication spanning several different time zones and continents are eliminated.

Installation and Commissioning
NSW's laying and logistics concept allows **simultaneous cable manufacturing and installation**. To facilitate uninterrupted laying operations, laying vessels are supplied by feeder ships, making it unnecessary for the cable-laying vessels to return to the cable factory to load cable in the course of the project. Cable shore end operations can be effectively executed as direct landings from the main lay vessel, or even be planned by a pre-laid shore end by a small strategic spread utilizing local resources as a more effectively and flexibly than a fully equipped laying vessel. NSW's experiences cable laying crew will fully monitor the laying operations to ensure highest quality during the operation.

Commissioning comprises all required acceptance tests, training of customer's personnel, as well as a complete as-build-documentation package including all installation logs.

Quality

ISO 9001 & 14001
Out of conviction, NSW has implemented quality standards in its company processes and expanded them to an integrated management system according to **ISO 9001** and **ISO 14001**. As work safety is an essential part of NSW's philosophy, we are also certified according to **OHSAS 18001**. Consequently, the synergies created by a holistic system can be employed in the interests of our customers.

Independent companies use regularly occurring inspections to monitor compliance with the requirements of the standards. The certification documents from Lloyd's Register Quality Assurance GmbH attest that NSW uses an active and well-functioning quality and environmental management system. The criteria for production and environmental management systems contained in the ISO 9001/14001 standards apply throughout the world, and of course NSW cables and jointing technologies possess the full range of quality approvals (ITU-T, IEC, ISO Certificates).

Measuring and Testing at NSW
A **wide range** of measuring and **test equipment** and **trained staff** experienced in all the relevant measuring methods and test standards is available. NSW works to national and international test standards. In addition, NSW makes use of independent test bodies such as BAM, PTB, VDE, EPM, FHG/ILV as well as other certified laboratories.

In order to assure the quality of NSW products, **intensive and long-term investigations** are carried out on the product and materials, going far beyond the specified test requirements.

The continuous checking, monitoring and evaluation of the tests is just as much as a part of the investigations as the subsequent documentation of the results.

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