Halden:
- Offshore subsea cables/umbilicals
- XLPE land cables above 52 kV
- HV laboratory

Rognan:
- Special communication cables
- Limited production of copper cables

Langhus:
- Installation cables
- Nexans comfort cables
- Logistic center

Namsos:
- XLPE land cables 12-72 kV

Karmøy:
Aluminum conductor and line

Tokyo Bay:
High Voltage Subsea Cables
Since its foundation in 1915, Nexans Norway has been the main supplier of underground and submarine cables in Norway. We produce and install power cables and advanced umbilicals for the transmission of power, signals and fluids for the management and control of production wells on the seabed. Our product range also covers special purpose cables for direct heating of flowlines, seismic surveys and for the control of remotely operated vehicles (ROV).

Nexans Norway is part of the Nexans group, one of the world’s leading cable manufacturers with an industrial presence in 29 countries and commercial activities worldwide. Nexans is listed on the Paris stock exchange.
Nexans’ Halden Plant - a competence centre for subsea technology

The Halden Plant is Nexans’ competence centre for submarine power cables as well as interplatform cables and umbilicals for the offshore industry.
The Halden plant is the largest manufacturing facility of Nexans Norway. It is the competence centre for high-voltage submarine power cables and umbilicals within the Nexans Group. At this plant, research and development are carried out on a comprehensive range of submarine power cables and umbilicals.

Important R&D activities are:

- Dynamic and static umbilicals for deep waters.
- Insulation systems for HVDC and HVAC submarine cables, lapped and extruded.

The plant, located by the Oslofjord, was built in order to produce the 120 km 350 kV Skagerrak cables in the early 1970’s. Since its erection, it has continuously been enlarged and upgraded in order to accommodate developments in the field of paper insulated high-voltage AC and DC cables, high-voltage XLPE (crosslinked polyethylene)-insulated cables, composite cables, pipeline heating cables and umbilicals for the offshore industry.

In fact, it has supplied cables to a number of projects representing milestones in submarine cable technology, among them:

- the first 250 kV DC cables across the Skagerrak Sea;
- the first 525 kV AC cables between Vancouver Island and mainland British Columbia, Canada;
- the first 400 kV DC cables;
- the first steel tube umbilicals;
- the first 420 kV XLPE AC Submarine cable system for Ormen Lange;
- the first direct electrical heating systems for offshore pipelines;
- 400 kV AC cable at a maximum water depth of 830 m;
- the first Integrated Return Conductor (IRC) HVDC cable - between Scotland and Northern Ireland.

The factory is equipped with modern facilities for the manufacturing of steel tube umbilicals and composite cables for the offshore market, including two vertical lay-up machines able to accommodate a large number of drums and baskets. A special feature of the plant is the turntables used for the storage of semi-finished products between processes and the large turntables located outside the factory used for the storage of finished cables. From this selfpowered outdoor turntables – with diameters of 30 metres and a storage capacity of 7,000 tons – an entire cable length can be transferred directly to a laying vessel equipped with a similar turntable. From this factory we have supplied cables in continuous lengths of up to 145 km, at a weight of 6,300 tons.

Paper-insulated cables

The Halden plant has originally been designed for producing long paper-insulated and heavy submarine power cables, and is equipped especially for this purpose. The plant is currently able to produce cables with conductors up to 2,500 mm², for voltages up to 765 kV.

XLPE-insulated cables

In 1995, a new unit for the production of XLPE cables was put into operation. The technology applied was based upon experience accumulated since 1969, when the company introduced its first vertical production line for XLPE cables in Oslo.

The present extrusion line has been installed in a tower over 100 metres high. The extrusion of the conductor screen, insulation and insulation screen is performed in a single operation utilising three extruders connected to one extruder head. The super clean raw material is fed into the extruder through a completely closed system for submarine cables up to 420 kV.

In this tower Nexans is able to manufacture continuous lengths of XLPE cables of 1.5 km without factory joints. Applying controlled factory joints on the phases, the maximum length is only limited by the storage and laying vessel capacity.

Umbilicals

Nexans introduced the first steel tube umbilical in 1993, and the first dynamic steel tube umbilical in 1995. The company has supplied more than 1,800 km of umbilical altogether such as umbilicals for 2,300 m waterdepth for Shell’s NaKika project. The umbilical delivered for Statoil’s Snøhvit field includes the 145 km long main umbilical from land to subsea and represents a record-breaking length. Nexans has a totally integrated umbilical operation, covering everything from engineering and steel tube welding to qualification testing and hook-up.
Who would have thought the solution to our challenges 1000 metres below sea-level was to be found in the
Who would have thought the solution to our challenges 1000 metres below sea-level was to be found in the Swiss mountains?
It is Nexans Norway’s philosophy to focus on customers’ future needs. Development of products and services is an inseparable part of the company’s goals and objectives, as well as a part of its daily work.

Beside testing our own products, we offer domestic and foreign customers facilities for the testing of virtually any type of component for power transmission systems.

High-voltage laboratory
Nexans’ goals and objectives led to the investment in an advanced high-voltage laboratory at the company’s Halden plant. This new laboratory – unique in its size and level of technology – is equipped with the latest appliances for the electrical testing of high-voltage components in accordance with international standards for rated voltages up to 765 kV AC and 800 kV DC. Flexible use of floor space is ensured by equipment being moved with the help of air cushions. The laboratory plays a key role in making the Halden plant an important centre in the field of high-voltage technology.

Materials research and development centre
This centre brings together the disciplines of metallurgy, instrumental and chemical analysis as well as the electro-technical testing of materials, models and polymeric technology. Besides serving high-voltage cable production in Halden, the centre acts as a service unit for all divisions in Nexans Norway and is a coordinating link to Nexans’ plants as regards special materials analysis. Being a part of the competence centre for submarine and offshore cables and umbilicals within Nexans, the centre is also responsible for research and development within these product ranges. It is continuously involved in the study of electrical and mechanical properties in materials used for special cables produced today, as well as for future products.

The centre operates four different units:
- Chemical laboratory
- Electro-technical laboratory
- Materials and extrusion technical laboratory
- Metallurgical laboratory
Mechanical test centre

Mechanical, tensile, bending and torsion testing is performed on full-scale prototype cable samples in a test plant which simulates laying and service conditions. Tension is applied from a hydraulic piston to a maximum of 150 tons, and the cable is bent around different sheaves - with diameters of 1.5 to 10 metres – in order to simulate stress induced around the nose wheel of the cable-laying vessel. Our manufacturing plant in Halden is also equipped with special advanced full-scale test rigs for dynamic cables and umbilicals, which have been absolute requirements in the development of these items. Test programmes have been established that subject test specimens to the fatigue loads to which they will be exposed during their defined life cycle. In our opinion our knowledge of all aspects of umbilical design, manufacture, installation and protection is unrivalled at present. These advanced laboratories form the basis for Nexans Norway’s engineering research and product development and offer power utilities and the offshore industry top-notch testing facilities needed during all stages of a project. Decades of experience lie behind our development of cables and umbilicals. Every product manufactured undergoes advanced test procedures to simulate real operating conditions before installation.

Innovation through experience

New concepts for more cost effective utilisation of oil and gas reservoirs present us with constant technical challenges. Decades of experience with cable production and turnkey installations provide good help in our work to meet our customers’ needs. We have today a highly skilled engineering staff working in the development, manufacturing and installation departments.
Tall wind turbines with power cables from Halden, Norway, overlooks the former hunting grounds of the Iroquois.
System design and engineering

Indians near Lake Ontario.
Submarine cables are of vital importance in any power transmission system, demanding the strictest quality standards.

Submarine cables, umbilicals and their related components must withstand great mechanical stresses and strains during laying and operation – especially in ultra deep waters. Cable and umbilical systems have limited access for maintenance after the installation is completed. To minimize the risk of costly recovery and repair operations, our engineers apply their profound understanding of how the cable and components operate as a “system”.

The design of submarine cables and umbilicals necessitates a detailed system knowledge and understanding, spanning a vast number of disciplines. These include:

- industry standards
- metallurgy and corrosion
- cross-section component design and manufacturability (tubes, electrical and fiber optic cables, power conductors, insulation systems, etc.)
- cable/umbilical cross-section design and manufacturability
- cross-section mechanical capacity calculations including installation capacities
- dynamic configuration design and analysis
- bend stiffener- and buoyancy system design and analysis
- hang-off/pull-in equipment design and analysis
- subsea termination design and analysis, including our field-proven ultra deep, pressure compensated electrical termination unit
- cable and accessories testing
- interface management
- project management
- hook-up and installation services and support.

Nexans Norway has in-house capabilities in all aspects related to cable and umbilical system design. Our competent staff covers all aspects of the project, and key personnel follow the process from research and development, through the bid phase, engineering, manufacturing, testing and installation.

**Engineering/R&D**

Nexans has an integrated suite of computer based design tools. These tools are continuously being validated through full-scale test activities in our advanced mechanical-, hydraulic-, material testing- and electrical laboratories.
Nexans spends a significant effort in R&D activities every year. One of the recent projects included the development of UFLEX, an FE-based, non-linear stress analysis tool for the analysis of complex umbilical cross-sections. UFLEX is validated by third party through extensive full-scale testing, and is unique in the industry. Our engineers have possessed knowledge and capabilities to assess the global, dynamic behavior of a cable system for more than a decade. With UFLEX, we now also have the ability to assess how this global behavior translates into local stresses and strains in all cross-section components, including the effect of internal friction. UFLEX is now a standard, integrated tool in Nexans’ design organization.

Nexans also participate in selected Joint Industry Projects to bring the industry further in areas found to have improving potential in ways that affect the performance of our products.

Thanks to Nexans Norway’s dedicated technology focus and technological achievements, we have gained the status as “Competence Center” for offshore products and submarine cables within the Nexans group, and we have several examples of being approached by end users for participating in technology development efforts.

Nexans Norway have recently developed and supplied an extruded submarine cable at 420 kV to the Ormen Lange terminal. A development programme for extra high voltage DC extruded insulation is ongoing. We consider extruded insulation to have an increasing role in future submarine cable systems, also for the highest voltages.

Nexans Norway is under contract to deliver power umbilicals to BP’s King Subsea Pump Project in the Gulf of Mexico. The umbilical will feed power to two subsea pumps at 1,500 m water depth, as well as supply the control functions of a regular steel tube umbilical.
Nexans is one of the major suppliers to the Tyrihans field.

Thomas Gobestad, Project Controller, Energy Division
Submarine power cables
Umbilical Systems
Electrical heating of subsea flowlines
Submarine power cables

Nexans Norway offers a complete range of submarine power cables, from 6 to 525 kV. The insulation system is for each implementation adapted to the customers’ needs, providing solutions for both AC and DC, by paper/oil or extruded polymer insulation systems. With our factory especially designed for manufacturing long lengths the limitations are more of a physical or geographical nature than manufacturing capacity.

Nexans Norway combines different elements in one cable. To suit a range of different needs a combination of other elements than the power phases can be incorporated in one cable. We have for example supplied an HVDC cable with an integrated return conductor and a fibre optic element. Our multiple core cables can contain power phases, optical fibre steel tubes and high pressure steel tubes for fluids to become what we denominate a power umbilical, or any combination of these elements.

Submarine cables are used to link islands, between platforms, subsea installations, across fjords and over the sea over hundreds of kilometres. High quality and reliability are extremely important design criteria for Nexans submarine cables and umbilicals.

Nexans Norway can connect over long distances and to deep water. During the years we have developed cable systems operating at AC or DC for very long distance connections. DC cables are now applied for over 500 km while 3-core AC cables for over 100 km are being designed. Higher voltages are sought after also for subsea applications in deep water.

Nexans Norway offers customised and cost-effective solutions for linking electrical and optical systems. From the company’s earliest days in 1915 we have supplied systems to connect islands with mainland, crossing of fjords and seas. At the emergence of the offshore oil and gas industry we contributed by interconnecting platforms. In this period of rapid development we also have provided cables supplying power and communication to offshore installations from energy sources onshore. A result of this is smaller sized platforms, reduced manpower and lower CO₂ emission. The first offshore field utilising this concept was the Troll field in
Installation of HV submarine cables for Horns Rev windmill park

the North Sea in 1995. The required 18 MW platform power supply is provided through a 67 km long, 52 kV XLPE insulated composite power and fibre optic cable. Nexans Norway was awarded an EPC contract that included design, engineering, manufacture, installation, protection. Later this concept has been developed to cover higher transmission capacities, longer distances and deeper waters.

The focus on offshore windmill farms has brought to our customers’ attention our vast experience with composite 3-core XLPE and fibre optic submarine cables.

Onshore wind energy has grown enormously lately and generates today more than 10% of the electric power production in Denmark and Schleswig-Holstein in Germany and is increasing all over the world. In order to avoid use of land and to reduce noise and visual pollution there is today a trend to move offshore. The first large-scale offshore windmill farms have now been built. The transport of power from the windmill farm to the grid on land requires the use of submarine power cables. As a major supplier to the international market including the offshore market of long AC and DC submarine power cables, Nexans Norway is well prepared to bring forward high quality and cost-efficient solutions.

The voltage for offshore windmill farms is normally 12-36 kV AC for the connection to the mills in the farm and 36 to 245 kV AC for the transmission of the power to the onshore grid. This means that our 3-core XLPE cables are suited for the purpose.

Horns Rev Windmill Park 170 kV 3-core XLPE insulated submarine power cable 630 mm² Cu-conductor Outer diameter: 194 mm. Weight: 79 kg/m

C/S Nexans Skagerrak

A complete range of HV power cables
Nexans Norway has cable design and manufacturing traditions reaching as far back as 1915. This vast experience lies behind the development of Nexans’ cable- and umbilical technology.

Nexans is a world leader in the manufacturing of subsea umbilical systems. We provide umbilical systems with all necessary steps reaching from design, engineering, and manufacturing, through testing, installation and commissioning.

Nexans Norway has a tradition of being a technology driver in the offshore umbilical industry. Nexans introduced the super-duplex steel tube umbilical to the market in 1993 with Statoil’s Statfjord and Sleipner projects. Nexans also introduced the dynamic super-duplex steel tube umbilical in 1995 with Shell US’s Mars project in the Gulf of Mexico.

Nexans umbilicals are used in all types of applications; connecting subsea installations; subsea installations and fixed- and floating platforms (semis) and FPSOs; as well as subsea to shore systems.

Nexans’ umbilicals are used worldwide, from both the Norwegian and UK sectors of the North Sea, to the Gulf of Mexico, offshore Brazil, offshore North- and West Africa, as well as in the Far East.

Serving the offshore industry all over the world, Nexans Norway puts its entire experience and qualified staff at the customer’s disposal. Nexans Norway has in-house capabilities in all aspects related to umbilical system design. Our competent staff covers all aspects of an umbilical project, and key personnel follow the process from the bid phase, through engineering, manufacturing, testing and installation.

There are two continuing trends in the offshore umbilical industry:

1. Oil production in deeper and deeper waters
2. The desire to perform subsea processing
Both these trends affect the umbilical design:

1. The weaker cross-section components must be able to withstand the larger forces and elongations.
2. The cross-section must include high voltage power elements.

Nexans Norway is well positioned to meet these challenges for three reasons:

1. We have in-house design capabilities and manufacture our own electrical- and fiber optic elements.
2. We have in-house design capabilities and manufacture our own power elements and power cables.
3. We have in-house design capabilities giving our engineers a profound understanding of how cross-section forces translate into stresses and fatigue through our UFLEX software.

“Systems thinking” is a winning mindset in the offshore industry — a mindset Nexans has implemented.

**Umbilicals in deep waters**

Offshore oil and gas production continues to move into deeper and deeper waters. This puts higher and higher demands on the umbilical systems to ensure operational integrity throughout the lifetime of the fields. In order to handle this risk increase, Nexans’ engineering experts need to have a profound understanding of which issues that govern the umbilical and accessories design.

The need for feeding of electrical power to subsea equipment, such as subsea pumps, is on the rise. Nexans Norway’s Power Umbilical serves this need, as well as the functions catered for by traditional electro/hydraulic umbilicals.

Nexans has a strategic goal of being technology-driven. One outcome of this is the UFLEX software — a state of the art FE-based, non-linear calculation program for stress analysis of complex umbilical cross-sections. Extensively validated through full-scale tests. The UFLEX tool is an invaluable tool for ultra deepwater umbilical engineering. Together with our full-scale dynamic flex test facility, Nexans has in-house capabilities to validate the advanced tools and sophisticated design methodologies.

Nexans has delivered dynamic and static umbilicals to several deepwater projects all over the world:

- Shell Nakika, 2300 m water depth
- Petrobras Roncador, 2000 m water depth
- BP Thunder Horse, 1890 m water depth
- BP Atlantis, 2150 m water depth
- ExxonMobil Erha, 1200 m water depth

**Umbilical Accessories**

Umbilical accessories form part of an umbilical system supply and comprise platform hang-off systems, dynamic and static bend stiffeners and -restrictors, J-tube or Hube centralisers or seals, and protection, repair splices, subsea terminations and buoyancy elements. Nexans’ subsea terminations include field proven pressure compensated electric and fibre optic splice boxes that have an excellent track record. The terminations have been pressure-tested for 3000 metre service.

For project details please ask for our reference lists.
Electrical heating of subsea flowlines

Principal drawing of direct electrical heating system for six flowlines
Direct electrical heating (DEH) system offers an attractive method for flow assurance with the potential of reducing OPEX. The system gives the possibility for active hydrate and wax control by controlling thermal conditions inside the flowline.

The principle behind a DEH system is to pass an electrical current through the pipe wall. By controlling the current, the pipeline inner wall will at all times be kept above the wax and hydrate formation temperature. As a result, problem free and reliable transportation will be achieved. Traditional methods for flow assurance, by use of chemical treatments and pressure evacuations, have considerable operations costs with long down time and may present a risk to the environment. Norwegian oil companies have since 1987 been investigating different electrical heating methods for flow assurance. Nexans has been involved in development of the alternative methods. As a result of this work, direct electrical heating has at the time of writing been installed at four different fields. Nexans supplied the cable and subsea components for all four projects.

The experience from the installations is that the systems are working according to expectations. At the time of writing, similar systems are planned for other projects.

<table>
<thead>
<tr>
<th>Project</th>
<th>Asgard</th>
<th>Huldra</th>
<th>Kristin</th>
<th>Urd</th>
<th>Tyrihans</th>
<th>Alve</th>
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<td>Number of flowlines</td>
<td>Length of flowlines</td>
<td>Reason for use</td>
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<tr>
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<tr>
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Det er ingenting vi setter så stor pris på som prosjekter hvor det kreves at vi strekker oss litt lenger.

Når de nye kablene mellom Long Island og Connecticut er ferdig installert høsten 2008, har Nexans satt enda en verdensrekord. 3-kjernet høyspentkabel med miljøvennlig XLPE-isolasjon er nemlig aldri tidligere produsert med så høy spenning som 138 kV. Prosjektet omfatter også fjerning av gamle kabler, og innbefatter 24 ... Dermed blir Long Island-kablene også de kraftigste og tyngste som noensinne er produsert for dette spenningsnivået.

A 70 degree temperature span on Sakhalin Island called for new ideas from Rognan.
Det er ingenting vi setter så stor pris på som prosjekter hvor det kreves at vi strekker oss litt lenger.

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Lars Øyvind Moen, Product Manager Oil & Gas

Submarine Fibre-Optic Cable Systems
Tether and umbilicals for underwater vehicle
Worldwide experience and knowledge
With more than 80 years’ experience of submarine cables and more than 20 years’ experience of fibre-optic submarine cables, Nexans has a solid technology base and worldwide project and customer references. This experience has been gained from completing more than one hundred projects, with 125 clients and the installation of over 14,000 km of cable. Nexans also holds the world record for the number of fibres installed in one single cable - 384.

The Nexans system offers:
Turnkey installations involving
- system engineering
- cable system supply
- marine works
- transmission solutions

Joints for the URC-1 cable family
Three joints are adapted to the URC-1 cable family; the URC-1 Nexans proprietary joint box, the Universal Quick Joint (UQJ) and the Universal Joint (UJ) for ROC-1. In addition, Branching Units (BUs) have been developed to suit the cable types.

URC-1 JB
The joint box (Type URC-1-JB) is intended to provide optical and mechanical continuity between cable sections and serve as both a planned factory joint and a repair joint for maintenance.

URC-1 BU
The URC-1 BU allows three different URC-1 cables to be connected in a predetermined manner. The unit is a passive element, therefore no rerouting can be accomplished from the terminal stations.

Special cables for offshore and subsea installations
For this segment we offer a number of cable products which cover applications such as instrumentation, monitoring and control. Composite cables with combinations of hydraulic hoses, copper conductors, optical fibres and coaxial elements are other types of special cables which cover a large range of applications for the marine and offshore industry.
Tether and umbilicals for underwater vehicle

Cables for Remotely Operated Vehicles (ROV)
Nexans Norway has supplied umbilicals to most of the well known ROVs such as the Solo, Scorpion, Scorpion, Sprint, Voyager, Remo, Seaowl, Seahawk, Seatwin, Trojan, Examiner, AIS, Triton, Triton XL, Demon, MRV, Recon, Viper, SCV, Millennium, Magnum, Boxer and others. We also supply umbilicals for special underwater vehicles like the Capjet Spider, Gater, Marlin, Mako, Weddelli, PL2. Electric power cores, signal pairs, coaxial cables, fibre optic cables and aramid yarn braided hydraulic hoses are laid up in special configurations to form the main configurations of the umbilicals.

Cables for seismology
We supply the following products:

- Bottom laid cables for 4D seismic acquisition
- Gun cables
- Lead-in and riser cables

Nexans Norway produced and installed the world’s first full scale 4D permanent system on the Foinaven field for BP Exploration together with Geco Prakla in 1995. Following this early success, we have developed a deep water OBC system “Deep Sea Link” together with Sercel. We are also regularly supplying the seismic industry with towed cables.

Topside cables
Supply of power cables and control cables of halogen free design, low smoke density, mud resistance, low corrosivity, fire retardant and/or fire resistance. We manufacture a fire resistant topside cable with fibre optics which satisfies the most stringent fire requirements (IEC 331 and 332).

Other areas for fire resistant cables
This cable can be used in tunnels and in other areas in which functionality in fire situations is of importance. All our composite cables with fibre optics are based on Fibre In Metal Tube (FIMT) technology. Our experience shows that FIMT gives our cables the best performance in dynamic as well as static applications.

Nexans Norway

Flame retardant cable from Nexans to the right
C/S Nexans Skagerrak. One of the world’s most powerful cable-laying vessels.
Transport and installation
Protection and trenching
Accessories and electrical installation
Being critical elements in any submarine transmission system, it is extremely important that cables and umbilicals are installed properly. Through 90 years of experience with more than 1,500 submarine installations, Nexans has the knowledge and equipment to optimise safe installation and protection services. Developments in the laying of long and heavy submarine cables at greater depths, have made it necessary to employ larger and more specialised transport and laying vessels built especially for that purpose. Special navigation equipment, dynamic positioning and sophisticated cable-laying machinery have been developed to secure accurate positioning of laying objects and proper handling during laying operations. Nexans Norway has greatly contributed to this development and possesses the experience needed for the entire installation operation including surveys, laying methods and equipment protection, site erection, electrical installation and commissioning. Based on world-wide experience, our engineering staff will choose, together with the customer, the optimal solution utilising the most updated technology and equipment available.

C/S Nexans Skagerrak

One of the world’s most advanced laying vessels, C/S Nexans Skagerrak, capable of loading 7,000 tons of cable on one turntable, is available for laying and repair operations all over the world. The vessel is purpose-built to install large-size cables and umbilicals, both in respect of total weight and length. With its purpose built large diameter (29 m OD) turntable and its unique cable capstan system, it can offer an efficient tool for demanding projects.
The vessel is equipped with a fully redundant state of the art DP system for accurate cable laying and is normally equipped with one ROV for cable touch down monitoring. The vessel is classed by Det norske Veritas, class DnV + 1A1 CABELESHIP: Mv EO DYNPOS. AUTR., for unrestricted trade.

The vessel has installed cables and umbilicals world-wide, including Vancouver, Canada, Gulf of Mexico, Strait of Gibraltar, Gulf of Aquaba, Philippines, New Zealand, the Irish Sea, the North Sea, and of course Norwegian and Scandinavian waters.

Some of her previous operations include some of the worlds largest (size and length) power cables.

C/S Nexans Skagerrak is owned and operated by Nexans Norway for cable and umbilical laying.

Other vessels and tools
Nexans Norway can provide additional vessels to cover particular project requirements. These can be equipped with required tools to enable cable and umbilical transport, installation and repairs.

Nexans Norway has an equipment pool consisting of various turntables, tensioners and various cable handling equipment to provide complete laying spreads. This enables Nexans’ experienced engineering and operational staff to provide customers with both flexible and efficient solutions.
The risk of damage to submarine cables and pipelines by ship anchors or fishing gear has increased considerably with the growing use of heavier and deeper-reaching trawls in the fishing industry, as well as with increased marine traffic. Also, the oil industry has discovered the great potential of thermal insulation of flowlines by means of trenching and also using the trenching spreads for pipeline free span correction. This requires trenching capabilities also in deep and ultra-deep waters. Based on our long experience with cable installation and protection, Nexans Norway saw the need for a more efficient and safe tool for cable trenching. This led to the development of the Capjet range of trenching vehicles.

**The Capjet system**

Nexans Norway’s water-jetting based systems, in use since 1976, has proven to be an efficient alternative to heavier equipment. The trenching system has buried more than 4000 km of cables, umbilicals and pipelines since it was first introduced. Originally developed for power cable trenching in shallow water, the Capjet system has been continuously developed to bury cables, steel and flexible flowlines and large diameter oil and gas transport pipelines at water depths down to 1000 m. The Capjet system is based on the principle of fluidising seafloor materials, and uses water jetting for both trenching and propulsion. It presents no risk of damage to the subsea lines or structures. The vehicle docks on the cable or pipeline, follows these objects and can start and stop trenching operations at any point along the route. Simultaneous back-fill with the fluidised materials is achieved during the trenching operation.
The backfill material is the means of insulation of the lines, and is becoming increasingly important for projects for oil exploration in deep water. The Capjet system is the preferred alternative to heavier equipment that can cause damage to cables, umbilicals and subsea installations. No forces are applied to the cable, umbilical or pipeline during the operation as the 4000 km track record without product damage proves. The Capjet system is capable of trenching in most clay and sandy soil conditions. For harder seabed materials, the system can be adjusted to increase its performance by adding pumping capacity and propulsion forces. Today, Nexans Norway offers two basic versions of the system: the Capjet Trencher systems and the Capjet SPIDER dredger system. All versions come in alternative designs, the pumping and power capacities which can be adjusted to fit specific project requirements.

All trenching units can be supplied with purpose built Launch And Recovery Systems (LARS) for safe and efficient operation from vessels of opportunity. The state of the art LARS features electrical umbilical winches with heave compensation and constant tension features.

Spider Dredger
Nexans Norway has developed a complete new Dredging vehicle, based on the Capjet basic design. This vehicle provides a large volume dredging capability in difficult topographical areas. It utilizes the Capjet platform with some added features like a unique seabed walking ability, flexible dredging arm and a large volume ejector system.

The vehicles are easily adapted to "normal" trenching duties as well as having the possibility to handle heavy duty subsea intervention tooling for a variety of tasks.

The system was used for dredging of the Ormen Lange project.
Accessories and electrical installation

For all cable installations, Nexans Norway will offer purpose-designed accessories, manufactured and tested in accordance with the same international standards as the cable itself, in most cases IEC standards.

Joints and terminations for oil-filled and XLPE-insulated cables are always designed as an integrated part of the cable system. Also transition joints between oil-filled and XLPE-insulated cables are included in our cable accessories program.

For oil-filled cable systems, Nexans Norway supplies oil pressure systems tailor-made for specific project conditions including stop joints, oil pressure tanks or pumping plants and relevant alarm and monitoring equipment.

Nexans Norway has developed and supplied to the market a new pumping plant, module designed with an automatic PLC monitoring system. One important design criterion for the plant has been to ease supervision and reduce maintenance of the pumping plant, thus increasing the reliability of the cable system and minimising outage time.
NEXANS NORWAY AS reserve the right to implement product changes without prior notice, as our products are being continuously developed.