NORWAY – Unique solutions for oil spill prevention, surveillance and response

INTSOK.COM
August 2014
INTSOK

Founded in 1997, INTSOK – Norwegian Oil and Gas Partners – is an independent, non-profit network organisation established by the Norwegian oil and gas industry and the Norwegian Government with the objective of promoting the capabilities of the Norwegian oil and gas industry in the international market.

The upstream oil and gas sector is a vital element in the Norwegian economy, providing employment for some 250,000 people directly and indirectly in Norway. INTSOK’s objective is to work with the 300 partner companies including subsidiaries throughout the industry to expand business activities in the international oil and gas markets on the basis of the industry’s leading-edge experience, technology and expertise.

The industry has developed competitive, high-quality products and services in one of the most demanding oil and gas provinces in the world, the Norwegian Continental Shelf. From this home base the focus on global opportunities has increased significantly, not only amongst large Norwegian companies but also amongst small and medium-sized enterprises. Norwegian based supply and service companies’ international turnover reached the level of USD 30 billion in 2013.

INTSOK encourages an active dialogue between oil companies, technology suppliers, service companies and governments. The Norwegian Government actively supports INTSOK’s initiatives, and the activities are financed jointly by the industry and the government.
Founded in 1993, NOSCA – the Norwegian Oil Spill Control Association – is a non-profit co-operative of companies, R&D institutions and government pollution control authorities, established to develop equipment and contingency planning for oil spill emergencies. Through the exchange of knowledge and experience among the members, NOSCA continuously attempt to improve the expertise within all the aspects of oil spill preparedness, response and technology.

NOSCA members join forces to share their environmental technologies worldwide, assisting nations, port authorities and private companies to build an effective contingency infrastructure for oil spill prevention and recovery.

In this capability catalogue NOSCA and INTSOK are joining forces to present partner companies capabilities within oil spill prevention, surveillance, response, research and development and training services in order to promote these capabilities to clients in international markets. Solutions and services are provided in compliance with the strict health, safety and environment requirements set for the Norwegian Continental Shelf which also ensure the health and security of the personnel involved.

Nina Soleng
NOSCA chair

Sjur E. Bratland
Managing Director INTSOK

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**Detection and Operational Systems**

Detection systems are available for detecting oil spills. Detection systems may also include systems for vessel traffic management in port areas where chances of oil spills are likely.

**AllMaritim**

AllMaritim is a complete provider of oil spill response solutions. As a part of a complete package, the company offers Miros (OSD™), which is a radar-based, fully automatic oil spill detection system. In addition to the radar signals, the system is capable of integrating a thermal infrared imager to add the ability of localizing the area where the oil slick is the thickest.

**Aptomar**

To ensure confidence in oil spill detection and measurements of the combatable oil in all weather and light conditions Aptomar offers a network solution of complimentary sensors that work together. This is possible through the Aptomar integration and collaboration technology with stabilized active cooled infrared sensors for measuring and visualizing the relative thickness of the oil. When combined with a suitable oil spill detection radar the solution provides confidence in the detection of the oil spill and is also a powerful decision support tool.

**DNV GL**

DNV GL offers advisory services related to the performance of leak detection techniques and the evaluation of current leak detection systems on fields in operation. The performance of various leak detections systems can be measured against the requirements in Norwegian petroleum regulations and the Norwegian Oil & Gas Association’s standard for remote sensing. The selection of leak detection techniques are performed based on a proven best available technique (BAT) assessment method. DNV GL has implemented a Joint Industry Project (JIP) on offshore leak detection which will run in 2014-2015.

**Kongsberg Norcontrol IT**

Kongsberg Norcontrol IT provides the C-Scope system for vessel traffic services and coastal surveillance. C-Scope integrates the sensors necessary for detecting and tracking vessels, oil spills and other objects of interest, together with external sources of information such as weather services, cameras and satellite imaging. Whether the sensors are placed on land, on or below the sea surface, in the air or in orbit, C-Scope provides an integrated common operating picture that connects these inputs with sophisticated sensor fusion and alert management and all the services of interest to the operator.

**Kongsberg Satellite Services**

Kongsberg Satellite Services (KSAT) provides operational oil spill detection services based on radar images from satellites. The use of the Synthetic Aperture Radar sensor (SAR) from satellites has proven to be an excellent tool to detect oil slicks, vessels and installations at sea, thus being an efficient tool to assist national authorities in detecting oil discharges and locate potential polluters.

**Maritime Robotics**

Maritime Robotics is a leading provider of unmanned robotic vehicle systems for data acquisition in the maritime environment. The company’s three different product groups are Moored Balloon Systems (MBS), Unmanned Surface Vehicles (USV) and Unmanned Aircraft Systems (UAS). One of Maritime Robotics’ recent market successes is the OceanEye moored balloon system which is suited especially for the aerial monitoring of oil spills and the company delivers it to customers in the North Sea, the Gulf of Mexico and Brazil.

**Miros**

Miros offers a radar-based oil spill detection system (OSD™) applicable at offshore installations, vessels or shore-based stations, either as a standalone system or as a part of a sensor network. Data from Miros OSD™ are essential in providing a common operating picture and detection even in darkness when no areal data are available.

**Vissim**

Vissim offers automatic detection and surveillance of oil spills integrated with a Vessel Traffic Management Display System. Years of experience has enabled Vissim to provide an operational, fully automatic and continues early warning detection solution for oil spill surveillance including records of information which may be used in backtracking the possible causes of an oil spill.
Risk and environmental assessment is critical in oil spill preparedness planning and also an important real-time service for oil spill operations.

**DNV GL**

DNV GL applies modern technical risk assessment principles and possesses an extensive set of empirical data for accidents within the maritime sector and the petroleum industry. In-house assessment tools are used to identify hazards, perform oil spill modelling, estimate risk and specify spill scenarios. The assessments are used for identification of preventive measures and as input for oil spill contingency planning. DNV GL services also include assessing and quantifying the risk of oil and gas activity to ecological resources (e.g., shoreline habitats, seabirds, marine mammals and fish) and socio-economic resources (e.g., tourism and fisheries) according to the recommendations given in the Oil and Gas Producers (OGP/IPIECA) guidelines from 2013. The aim of the process is to achieve a tolerable risk level for the operating companies and secure sustainable operations.

**Lloyd's Register Consulting**

LR Consulting offers a wide range of environmental risk assessments, from high-level Environmental Identification (ENVID) workshops to detailed quantitative studies involving software simulations of an oil spill and detailed data gathering on ecological sensitivities to predict damage and restitution times. LR Consulting services also include analyses of emergency preparedness to assist clients to improve their plans and systems for handling offshore accidents.

**SINTEF**

SINTEF offers environmental risk assessment as part of an operator’s field development plan. SINTEF has extensive experience in carrying out contingency analyses and putting them into operational oil spill preparedness for offshore and coastal areas.

**Aptomar**

Aptomar provides the SECurus solution which features high sensitivity, actively cooled infrared sensors which, when combined with an oil spill radar, enables the measurement of the combustible oil on the water surface in any weather and light conditions. With unique geographical references of every pixel in the image the oil spill can be shown in accurate locations on maritime charts. The high sensitivity of the infrared sensors allows the detection of the thickest, combustable part of the spill, which is important in any surveillance system.

**Kongsberg Satellite Services**

KSAT may also be used for documenting whether or not an operation meets the requirements set out in the license.

**Maritime Robotics**

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**Miros**

The radar-based oil spill detection system (OSDP™) provided by Miros has become an essential tool for navigating the recovery vessel and the boom efficiently towards the oil slick. The system can be used in the identification of the thickness of the slick using thermal imaging. This is relevant for any surveillance system.

**Vissim**

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**Kongsberg Satellite Services**

Kongsberg Satellite Services’ (KSAT) services can be used pro-actively as part of a monitoring and surveillance system, and the government may use the system in a national monitoring program to detect accidental leakages from offshore installations, pipelines or illegal discharges of vessels close to their installations as early as possible. Results from Surveillance systems and imaging are available for detecting oil spills and for monitoring vessel traffic during operations.
Modelling

Modelling is critical for calculating the outreach and the movement of the oil spill.

**DNV GL**

DNV GL is one of the world’s leading users of the oil spill modelling tool OSCAR. This tool has been developed by SINTEF in cooperation with DNV GL and is an industry leading 3-dimensional modelling tool for oil spill risk assessment and oil spill contingency planning. DNV GL actively uses the OSCAR model system in services related to the modelling and assessing of oil drift, environmental risk and requirements for oil spill response systems.

DNV GL also provides analysis of alternative oil spill response strategies for offshore and coastal areas. Oil spill modelling provides a basis for comprehensive, quantitative environmental impact and net environmental benefit analysis (NEBA) assessments in the marine environment for alternative oil spill response strategies.

**LR Consulting**

LR Consulting uses state-of-the-art software tools such as OSCAR to model and simulate the effects of an oil spill during an accidental release from offshore installations and vessels. The OSCAR modelling tool provides insight in the behaviour of oil during an accident and captures the effects of contingency and response, allowing for contingency analysis and planning as well as hind- and forecasting. Combining a high level of theoretical knowledge with practical experience from the offshore industry provides the best possibility of offering advice and guidance related to oil spill prevention.

**SINTEF**

SINTEF offers OSCAR as the state-of-the-art model and simulation tool for predicting the fates and effects of oil released during an accidental release of oil, either from a platform or a vessel. OSCAR provides insight into the behaviour of oil during an accident and captures the effects of contingency and response, allowing for contingency analysis and planning as well as hind- and forecasting.

The model accounts for weathering and the physical, biological and chemical processes affecting oil at sea. Many of these processes are strongly coupled with laboratory activities at SINTEF on oil weathering. Contingency and response strategies provided range from the mechanical collection of oil to the dispersant application on surface and in water.

OSCAR also supports doing statistical or stochastic modelling, providing insight into how a typical oil spill scenario behaves under a wide range of weather or seasonal conditions.

Management Systems

Management systems are critical in oil spill preparedness planning and also important in real-time service for oil spill operations.

**Aptomar**

Aptomar’s Tactical Collaboration Management System (TCMS) provides input to the Common Operating Picture (COP) used in the management of operations. By combining different sets of sensor data such as oil spill detection radar, vessel traffic, video, satellite and GIS information, the COP creates and presents in real-time layers of information in a map-based environment. Data from different sensors in combination with other data are available for viewing and control via dedicated TCMS workstations using a web browser. This will provide timely and correct information to be used in any decision making situations in case of an accident.

Recovery Vessels

Different vessel are available for oil spill recovery situations.

**Rolls-Royce**

Rolls-Royce delivers fully integrated ship design and equipment packages for various types of oil spill recovery vessels.

**Skimmer Technology**

Skimmer Technology has developed the world’s first oil spill vessel approved by DNV GL for the recovery, storage and transportation of oil. The vessel is offered in markets where integrated capabilities are required.

**Ulstein**

Ulstein delivers the design, engineering, main equipment and building follow-up for different oil spill recovery vessels both with the conventional bow as well as with the specialized ULSTEIN X-Bow.

**VARD**

VARD delivers the design and construction of highly advanced oil spill recovery vessels. VARD operates ten strategically located shipbuilding facilities, including five in Norway, two in Romania, two in Brazil and one in Vietnam.
Recovery and Containment Systems

Recovery systems are available for collecting oil spills.

**AllMaritim**

AllMaritim AS is a worldwide provider of complete oil spill recovery systems for standby operations in offshore and coastal waters. The systems are tailor-made based on a wide range of highly efficient oil skimmers and oil containment booms designed to satisfy strong requirements regarding operations, reliability, low-cost maintenance and HSE. The systems offered may include:
- The NOFI Current Buster® technology is one of the world’s most efficient oil containment system, capable of containing and controlling oil in up to 5 knots towing speed without losing any of the contained oil.
- The NorMar 350 TI is an advanced oil containment system and includes integrated crane arm handling, a double barrel free-floating hose, and a multipurpose cassette system. The system is able to recover various types of oil in demanding offshore conditions efficiently.
- NOFI Current Buster 6 is the system offered for continuous discharge during oil spill recovery. This system is an integration of the NorMar discharge skimmer directly into the separator of the active oil boom. The system is controlled from the mother ship without any support vessels and makes it easier and more efficient to empty the separator tank during operation.

**Frank Mohn**

The Framo Oil Recovery System is delivered with a high capacity for recovering any kind of crude or refined oil whether on the sea surface or from grounded or sunken vessels. The system can operate in harsh offshore environments both day and night and in bad weather including icy conditions. The systems offered include:
- The Framo Transrec system which handles any unfortunate oil spill from oil production or vessel incidents through a range of available skimmers.
- The Emergency Offloading Compact units comprising a self-contained portable pumping system for salvage and the emergency offloading of any liquid cargo (viscous, volatile, toxic, abrasive) from disabled vessels. The units include different types of portable pumps, hydraulic hoses, cargo hoses, power packs and necessary tools for offloading operation. Seawater resistant aluminium containers for airlift transportation are also available.

**Egersund Group**

Egersund Group offers the MOS Sweeper as an oil recovery system applicable for both coastal and harbour areas. The system comprises a sweeper panel, handling/transfer unit, ocean boom vane, oil spill collector system and oil return pump. The MOS Sweeper is towed behind the vessel like a triditional trawl in an asymmetrical configuration. Oil is collected at the end of the sweeper and pumped up to the towing vessel. The MOS Sweeper can be operated by different types of vessels including fishing vessels, offshore supply vessels, coast guard vessels and stand-by vessels.

**H. Henriksen AS**

H. Henriksen offers an oil spill recovery system with two types of skimmers:
- The FoxTail rope mop skimmer is offered in a range of recovery capacities from 3m³/hour up to 80m³/hour with a collection efficiency of up to 95%.
- The KLK FoxDrum skimmer with a special shaped drum is designed to recover oil with very high viscosity.
- The Emergency Unload System is designed to quickly offload fuel oil or hazardous liquid cargo from a ship. The system is comprised of self-powered pumps, hoses, and a hydraulic power unit. The Emergency Unload System can be transported quickly to a distressed vessel by a small helicopter.

**H. Henrisken AS**

As one of the world’s leading companies within the development and manufacturing of oil spill recovery and containment systems NorLense offers design and advice in the selection of equipment and the training of personnel in using the system. With recent experience from the Macondo accident in the Gulf of Mexico NorLense can also offer experienced on-site commanders in operations. Some of NorLense’s solutions and services include:
- Dimensioning of systems according to oil spill scenarios
- Mechanical equipment for offshore response
- Equipment for high capacity containment and recovery
- Complete oil spill response packages for vessels, including engineering.
Tools & Equipment

Tools & equipments are available for collecting and handling of oil spills.

AllMaritim AS
As a worldwide provider of complete oil spill recovery systems AllMaritim provides:
- NOFI Oil Barge - temporary storage system
- The NOFI Inflatable Oil Barge is a versatile and important solution to the problem of the temporary storage of oil and oil emulsions.
- Boom Vane
- The BoomVane offers important advantages compared to both a two-vessel U- and J sweep towing configuration. Used together with any of the existing NOFI Current Buster series the system operates with a single-vessel sweep system which allows the vessel to operate single-handed without any backup from other parties.
- Absorbents
- AllMaritim provides absorbents and customized emergency solutions to prevent acute pollution.
- Secondary containment systems
- AllMaritim provides secondary containment systems and equipment to contain and limit the extent of the damage.

Frank Mohn
Frank Mohn has developed a tool for the remote offloading of a sunken vessel (ROLS). Putting safety at the highest level, this tool is offered when accidents have happened.

H. Henriksen AS
With a long track record in the market H. Henriksen AS is dedicated to producing effective, intuitive and reliable equipment for different incidents. A portable shoreline cleanup system is provided with the following equipment:
- FoxBlower
  A sorbent blower adjustable for speed and accuracy intended for use with bark or peat
- FoxMix
  Used to mix sorbents into oil in shoreline polishing operations.
- FoxVac
  Specialized vacuum equipment to recover oiled bark or peat.

All pieces of equipment in this system are powered by small petrol engines and are man-portable to remote spill sites with just one or two operators.

Furthermore, Henriksen offers the SeaClaw versatile launcher able to shoot a hooked grapnel or a casualty rescue projectile to capture a drifted ship from 60 metres away to prevent the vessel from collision with platforms or grounding.

Markleen
The Markleen Group offers specialised tools and equipment for oil spill incidents including:
- Dispersant spray equipment
- Sorbents
- Workboats
- Automatic Surface Vehicle (ASV)

NorLense
As one of the world’s leading companies within the development and manufacturing of oil spill tools and equipment NorLense offers advisory services related to the choice of equipment and the training of personnel.

Some of NorLense’s tools and equipment include:
- Mechanical equipment for coastal and harbour response
- Tools and equipment for Arctic and demanding weather conditions.

Parat Halvorsen AS
PARAT Halvorsen is a technology company that provides state-of-the-art solutions for steam or other heated medium-based processes. In close cooperation with partners, PARAT has developed a highly efficient and robust solution for standby oil recovery vessels based on steam injection into the tanks containing recovered oil. The system is offered to be fully integrated into the oil spill recovery vessels utility and heat recovery loop.

Tess
Tess offers a variety of tools and equipment for acute pollution incidents including:
- Container solutions for personal protection and clothing for shoreline clean-up operations
- Hoses and fittings for oil spill equipment
- Polypropylene and peat moss sorbents
- Portable tanks and bunds for temporary storage and to avoid secondary pollutions
- Wildlife rescue systems
- Tools and utilities for shoreline clean-up.
Oil spill response and management training critical for ensuring safe and effective operations. Research & development (R&D) is also critical for continuous improvement and innovation of new technologies, pollution control and environmental impact assessments of applications of various oil spill contingency solutions.

Aptomar
Aptomar offers training and exercises as part of tactical oil spill management. Training ensures that all involved are familiar with the use of equipment and are aware of the required work processes. Exercises validate the training to ensure it delivers the desired outcome and provides practice for personnel.

DVN GL
DNV GL delivers a variety of courses and training within oil spill preparedness and response. These cover training and exercises for all levels – action management to full-scale field exercises involving all relevant participants. The training and exercises can be tailored to individual customer’s requirements. Exercises and training enables:
- Unified and motivated preparedness organization
- Clarified lines of authority and communication
- Increased ability to operate under uncertainty
- Credibility towards stakeholders and self-confidence
As an independent foundation, DNV GL is investing significant funds into service development and R&D within oil spill prevention. At present DNV GL is leading two international joint industry projects within:
- Offshore leak detection
- Oil spill recovery technology (ORTech).

Frank Mohn
Frank Mohn offers seminars and tailor-made courses at Framo training facilities in Bergen, Rotterdam, Houston, Singapore, Pusan, Tokyo, Shanghai and Manila. The training programs are also offered on-site prior to delivery or as on-board training. Participants are awarded course certificates.

MMB AS
MMB has a depot and training facilities located in Norway with satellite communication to offices in Brazil and on the Faroe Islands. Without adequate pollution control and training of staff even minor spills can result in massive expenses due to pollution fees, loss of production capacity and poor reputation. Very few companies have the competence and personnel to maintain the necessary capacity in case of large or long-lasting oil spills. MMB offers the following training services:
- Management and resource allocation during oil spill operations
- Oil spill response training
- Rental of personnel and oil spill response equipment
- Environmental inspection
- Oiled wildlife response and planning.

Sintef
Sintef is one of the world’s largest independent research organizations within oil spill contingency and offers expertise in many areas. When oil spills happen the quick and adequate responses in order to reduce the environmental consequences are critical.

Sintef has contributed to better understanding of physical and chemical properties of oils and to the understanding of the fate and behavior of oil spill at sea with focus on Arctic areas. Among R&D topics are oil weathering studies, oil slick characterization, oil spill response technology and oil spill contingency and response analyses and consequences of sub-sea releases.
## Company webpages

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