



LIFE Project Number
LIFE04 ENV/DK/000076

Layman's Report -UK
Covering the project activities from 01.11.04-30.06.08

LIFE PROJECT NAME
Oil Spill Identification System for Marine Transport

Layman's Report on Project LIFE04 ENV/DK/00076

Introduction

Estimates show that one-third of all oil pollution of the world's oceans is caused by activities generally characterized as "marine transportation". The pollution damage threat from any vessel to ocean ecosystems and surrounding environments is serious and substantial. Both short term and long term effects of oil pollution have been assessed, resulting in general agreement that oil spills must be reduced from their present level.

OSIS has developed an innovative microwave sensing technology that automatically detects the area and thickness of oil spills and fuel leaks in the oceans. The OSIS system is based on advanced microwave sensors that identify and quantify oil spills with an accuracy of up to 90%. There are no comparable solutions in the marketplace that offers similar functionality combined with a powerful display and analysis software suite. Alternative detection methods and particularly existing radar technology are unable to detect the thickness of oil spills and hence OSIS drastically enhances the efficiency of online oil spill assessment as it tracks oil spills automatically 24-hour a day.

The overall objective of the OSIS project was to reduce the amount of oil contamination from marine transport by developing a new sensor system to monitor oil pollutants and ratify environmental legislative initiatives around the world primarily within the marine areas ratified as "Special Areas". The objective has been fully reached by designing, building and successfully testing the worlds first fully automated Oil Spill Identification System – the OSIS system.

The introduction of this technology will contribute to the fulfilment of the objectives set out under the 6th Environment Action Program regarding the priority issue "Nature and bio-diversity – Protecting a unique resource", by minimising pressures from human activity within exploitation of the Marine Environment. Further, it will contribute to the priority avenue of strategic action "Improving the Implementation of Existing Legislation".

The OSIS system will enable online oil spill prevention systems for vessels, offshore structures and loading terminals. It improves dramatically the ability to detect the oil spill volume generated through commercial offshore activities and increases the clean-up capability related to oil spills.

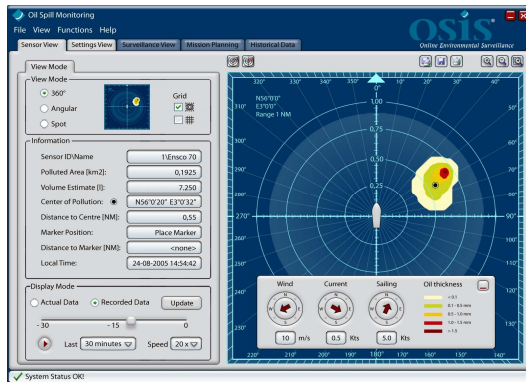
The demonstration project, LIFE04 ENV/DK/000076, was started in November 2004 and succeeded the first demonstration project LIFE02 ENV/DK/000151. The 2 succeeding projects have resulted in 2 well performing prototypes. The latest prototype, which was completed during this project, will constitute the first step toward commercialisation for which additional funding is required.

The OSIS Sensor System

The OSIS sensor utilizes two special frequency microwave radiometer units and one radar unit. The overall design of the system is illustrated below.

The dual frequency radiometer mounted below the radar consists of an offset parabola with two feed horns and a microwave processing unit integrated into the wave compensating gimbal.

The OSIS Onsite Data Viewer provides real-time information in the sensor modes selected on the screen. The contaminated area and volume is displayed with other essential information. The latest hour of recordings is stored automatically and can be replayed upon request. The functionality of the Onsite Data Viewer has been developed together with potential end users including the Danish Navy.



OSIS Onsite Data Viewer



OSIS SensorPack

The OSIS system can be used onsite, onshore or both. Used onsite, the system is a real-time oil spill detection tool providing instant information on oil spills around the sensor. The system is designed for local self monitoring and control with the oil spill data presented on location. Used onshore, the system is a near real-time surveillance system, where all sensors installed within a selected geographic area are integrated in a GIS based surveillance system

The system architecture is designed to transfer compressed data onshore via either satellite, VHF or the UAIS transponder system, which is now mandatory on all commercial vessels. This structure will dramatically reduce the high cost of satellite connections as satellite communication is only used when an oil spill is identified.

The system contains the Oil Spill Detection (OSD) module which is a proprietary system developed in-house and used to identify and quantify oil spills on the sea surface. In order to identify oil in the raw data a long list of sequences are processed to extract the information needed. Different filters are used to



OSIS Sensor system architecture

clean up the raw material and intelligent parallel processes are carried out to determine whether or not oil is within sensor range.

Test Procedures

The offshore test procedures carried out in the second half of 2007 included two full size offshore missions together with the Danish navy, where rape seed oil and margarine was used to simulate the oil spills. By using two different viscosities, oil slicks including both thicker and thinner layers could be generated for testing the system ability to track a large surface area as well as to quantify the oil slick.



OSIS Team members

The sensor was mounted on the front mast of Gunnar Seidenfaden. The mechanical structure of the sensor contains the new Wave Compensation module, which was evaluated and found to be very successful.



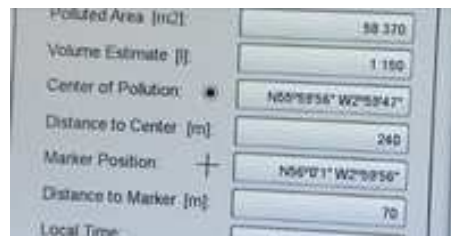
Sensor mounted in the front mast

The Wave Compensation module enabled the sensor to keep in balance whenever the vessel moved back and forth due to the waves, which secured the best possible data collection. This feature is specifically designed for vessel applications and applications where the sensor is mounted on moving structures.

The OSIS Onsite Viewer (seen in the pictures below) was used to visualise the oil spill and its ability to automatically identify and quantify the oil spill.



Onsite Viewer: Oil spill next to the vessel



Onsite Viewer: Oil spill data presented on the screen



Oil discharged to the sea



Oil sucked from the oil tanks

OSIS team members and the staff onboard Gunnar Seidenfaden carried out the tests following a well specified test plan.



Margarine and rape seed oil alongside the vessel



SensorPack mounted in the front mast with oil in front of the vessel

The slicks were discharged in two sequences as illustrated in the picture above. First, the thick margarine (light yellow) was discharged, followed immediately by the thinner rape seed oil (dark yellow). While the rape seed oil spreads out fast on the water, this is not the case for margarine, resulting in a large oil slick with a well defined core as clearly seen in the picture below.



Captain working with the OSIS Onsite Data Viewer

The results from the final tests verified that the OSIS sensor system mounted on a response vessel is a fully functional tool for oil spill identification and quantification during cleanup operations.

Further testing will be organized after completion of the LIFE project. Although the technology works well, the development work will continue after completion of the Life project and will hopefully result in the first production models manufactured for the commercial market.

Dissemination Activities

In marts 2006 OSIS participated at the International Oil Spill Exhibition and Conference in London, In December 2006, OSIS presented the system for a large audience on the Offshore Arabia conference in Dubai. This travel budget was especially approved by the Commission.

In October 2007, OSIS was invited by the Danish navy to present the status of the system on the Bonn Agreement meeting in Brussels and in December 2007 at HELCOM Commission meeting in Lisbon.

The Bonn Agreement is the mechanism by which the North Sea States, and the European Community work together to help each other in combating pollution in the North Sea Area from maritime disasters and chronic pollution from ships and offshore installations. The North Sea States are Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, and the United Kingdom of Great Britain and Northern Ireland. Ireland will shortly join the Bonn Agreement and the North Sea Area will be enlarged to include Irish waters. The HELCOM Commission works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental co-operation between Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, The Russian federation and Sweden.

These two organs are the most important political organs as both collaborate on legislative initiatives which are eventually ratified by the member states. The presence of OSIS reminds the delegates that the technology is now available to enforce more efficient legislation regarding the surveillance of oil spills from vessels and offshore structures in the North Sea area and Baltic Sea. During all presentations, the LIFE contribution has been clearly stated. More information about dissemination activities can be found on www.osis.biz/News.

A leaflet and a DVD was produced and distributed to primary target groups during testing and dissemination activities resulting in all primary target groups being informed about the functionality. Furthermore, the Project was featured in Danish television TV2 and in the newspaper "Ingeniøren".

After LIFE Activities

After completing the LIFE Project and completing additional design audits following further tests, the sensor system can be industrial produced at relative low costs. This could form the basic for a commercial venture to target the maritime segment of the global environmental industry which is in transition from being dominated by cleanup activities making up for the past to being dominated by prevention and monitoring. Global demand for oil spill detection and prevention equipment and related services is expected to grow significantly over the next decade, driven by increased commercial offshore activities, high clean-up costs, and the growing concerns of governments and the public about environmental issues which will accelerate implementation of regional, national and international conventions to protect the marine environment. In OECD alone the demand for environmental surveillance will increase by 30% per annum.