

# Oil spill prevention from ship wrecks

**M**aritime disasters leading to major environmental pollution occur every few years. Examples are Amoco Cadiz in 1978, Tanio in 1980, Aegean Sea in 1992, Erika in 1999 and Prestige in 2002.

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## Project scope

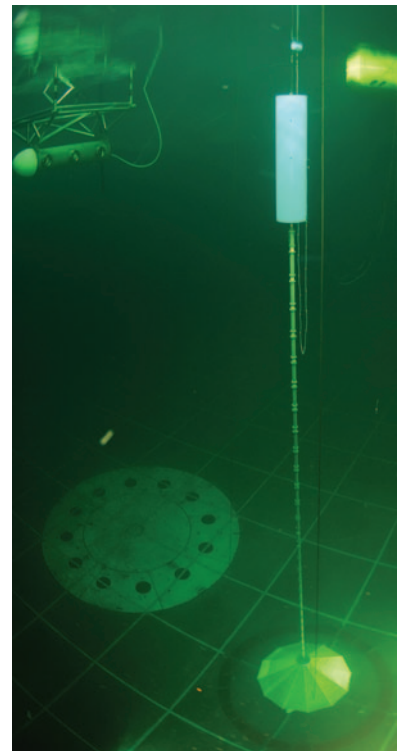
The scope of the European research project Double Inverted Funnel for the Intervention on Ship wrecks (DIFIS) is

the study, design and validation of an EU reference method for the prompt and cost-effective intervention on ship wrecks. The developed system should be able to deal with oil leaking from wrecks even in very large water depths. The proposed method will be of general applicability as long as the trapped pollutant does not dissolve and is of lower density than sea water.

## The DIFIS system

The envisaged solution relies on gravitational forces to channel the flux of spilt fuel towards the surface. This is achieved by means of a light, deployable flexible structure that should stay in place until all tanks of the wrecks are emptied and the pollution threat is eliminated. The leaking fuel is collected by a kind of inverted funnel, consisting of a fabric dome, solidly anchored around and covering the wreck. The collected fuel is channelled, along with sea water, through a long, flexible riser tube (diameter 2m) up to a buffer bell located 30-50m below the sea surface, where it is not affected by rough weather. The buffer bell is provided with standard offshore loading equipment. The buffer bell acts as a separator and reservoir,

*Double Inverted Funnel for the Intervention on Ship wrecks...*



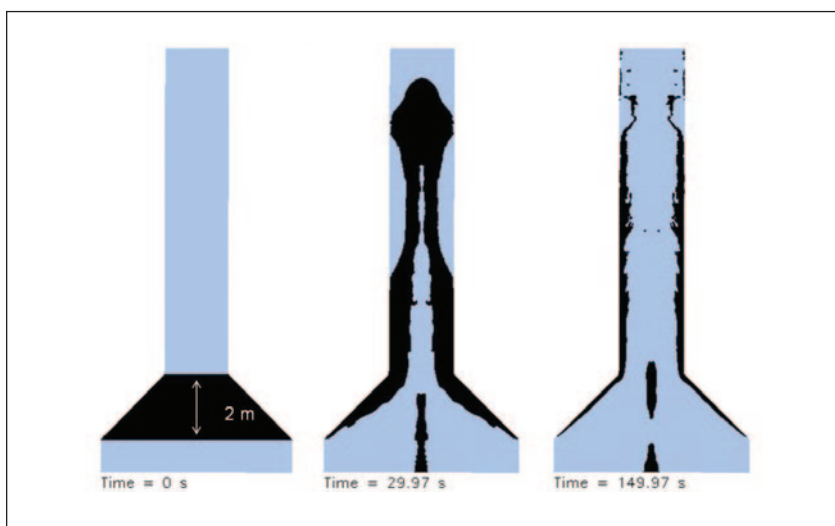
so it has the function of a terminal buoy, which keeps the whole riser line in tension, and provides for rapid periodic unloading to a shuttle tanker.

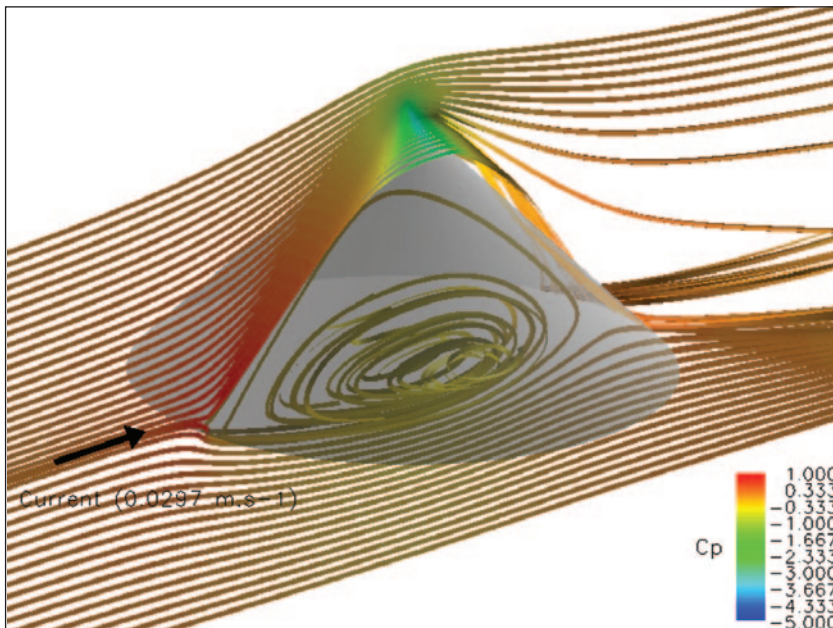
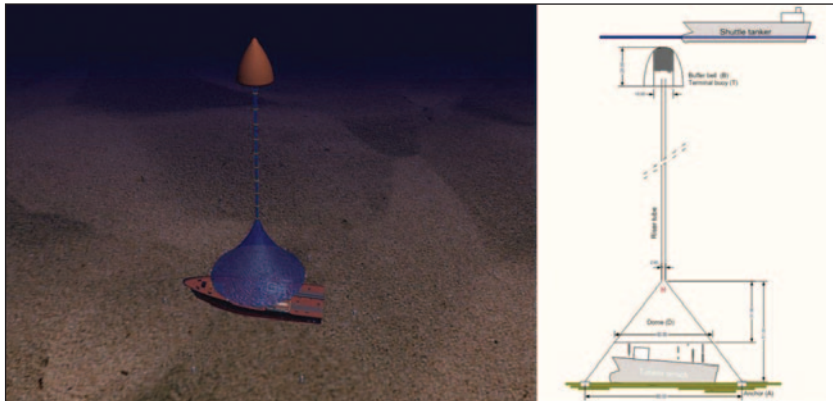
## Project approach

The project is carried out by a consortium of eight participants, each with their own field of expertise. The Maritime Research Institute Netherlands (MARIN) is the project co-ordinator. The participants are:

- MARIN (The Netherlands)
- SENER (Spain)
- IFREMER (France)
- C.E.A. (France)
- Cybernetix (France)
- Sirehna (France)
- I.S.I. (Greece)
- Consultrans (Spain)

The total budget is €3.2m, of which €1.8m is funded by the European





Commission. The scope of work includes system specifications, conceptual calculations and constructive design, numerical simulations, hydrodynamic scale model tests and deployment simulations, as well as an analysis of the system costs and planning.

Besides the above participants, the European Commission's Joint Research Centre (JRC) is involved as a scientific and technical advisor to the DIFIS project. In this respect, Dr Fivos Andritsos of JRC had the original idea for the system concept and was the originator of the DIFIS project.

**Schedule and expected results**

The DIFIS project had its kick-off in September 2005, for a total duration of three years.

Design iterations and preliminary design were achieved in 2007. On

this basis, concept verification was undertaken. The first task has concerned multi-phase (oil water mixture), time-domain flow calculations and system stability.

The first set of hydrodynamic scale model tests was performed at the MARIN basin in February 2007 to investigate the overall behaviour of the complete DIFIS system in environments of combined current, waves and wind. A new set of hydrodynamic scale model tests was performed in 2008. Several aspects of the system operations, such as survival conditions, operational conditions, offloading and deployment have been considered.

In connection with the work of definitive design, deployment and operational procedures were carried out, with the objectives to be safe and as quick as possible. These procedures comply with the regula-

tions and ensure that health, safety, and environment constraints have been taken into account. A scale model of the dome has been realised to verify the feasibility of the folding and unfolding.

Various phases of deployment procedure will be verified and illustrated by kinematics simulations.

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Finally, by the end of 2008, economical and logistic aspects were taken into account.

**DIFIS key figures**

The key figures of the DIFIS project are:

- EU research project in FP6
- Total budget €3.2m
- Total EC funding €1.8m
- Eight participants, from four different European countries
- Duration 36 months



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