

Summary description of project context and objectives 4000 caratteri

The greatest part of oil spills has a strong impact on coasts, beaches and shoals. Even if the pollution takes place at open sea, vessels often do not reach the location in a fast enough time to contain the oil spot which rapidly expands. The oil hits those areas which cannot be easily reached by traditional vehicles/vessels, nor by land nor by sea for the lack of water depth or for the muddy land. Hovercrafts (*i.e.* vehicles which lift from the solid or liquid surface through an air lubricant layer and are moved by aerial fans) are the only vehicles which can operate easily in these environments; they move easily on any liquid or solid surface, also if rough, and can operate floating or at high speed.

The existing technological solutions for the costs and the shores remediation in case of accidental oil spill consist in a system which recovers floating oils before they reach the coasts. Currently, compact dimensions vehicles, which in practice are either small vessels or pontoons with a skimmer sucking the floating oil, are the only systems which can be found on the market. Nevertheless, these vehicles are capable of working in limited areas, ports, closed water areas and rarely in very shallow waters. The hovercrafts represent the only vehicles which can operate easily in these environments; they move easily on any liquid or solid surface, also if rough, and can operate floating or at high speed. Nevertheless, there are any available hovercraft on the market with appropriate characteristics for oil spill intervention and post-emergency actions.

The project proposes a specific air cushion vehicle, completely amphibious and capable of working on land and water, in areas with high and soft mud. It will be powered by a diesel engine coming from the automotive sector, with low environmental impact and low fuel consumption. The vessel will be designed to be cheap and with easy maintenance, capable of high operative speed (>30 kn.) and spilled oil storage. Its size will be such to make it quickly transportable by road, while it will also be possible to station it on land or on beaches near potential oil spill dangers with no need of harbours or other special structures which are needed for traditional vessels. The vehicle behaves at the same time as an amphibious transport mean, a floating pontoon, an operative platform on soft and inconsistent mud, and since it has no need to take engine cooling water it can work on land both as a generator and as a separator of washing waters, as well as being able to transport, supply and deploy crews and other equipments.

Main project objectives for the reporting period:

- Definition and realization of the executive design of the innovative soft-skin hull
- Manufacturing of the shaper for the soft skin hull
- Realization of the Multipurpose Air Cushion Platform (MACP, <http://www.softhull.com/>) which represents the base of the entire Hoverspill system
- Assembling of the MPS system and testing of the diesel engine
- Manufacturing and testing of the Turbylec
- Patenting of the Turbylec
- Participation to international dissemination events
- Interaction with Argomarine EU-FP7 project and participation to its concluding event

The project will study the best approach for the prevention and for the remediation and will use a specific air cushion vehicle, completely amphibious and capable of working both on land and water, and even in areas with high and soft mud. In other situations it can be used as a pontoon in floating conditions: this "vessel" will be designed to be cheap and easy to maintain, capable of high operative speed (>30 kn.) and with sizeable spilled oil storage capability.. Hoverspill is designed for both rapid responses in the emergency phase and cleaning operation in the remediation phase in case of oil spills event on coastal/river. It can also be used in geophysical

surveys, in the environmental management especially in wetlands, which represent the most important areas for the environment but also the most delicate and difficult to access.

The main objective of Hoverspill platform is the development of an innovative integrated system (technologies and procedures) for oil spill emergencies, with immediacy and efficiency during the intervention, and effectiveness during the remediation activities. HoverSpill is particularly effective, and actually unique in operations in the transitional areas between land and sea, where shoals, hard to reach, long distance from ports, make emergency intervention even more difficult to achieve in a timely manner.

Most of the efforts have been successfully directed to study and implementation of the compact and low-cost hovercraft, which is powered by a 130 kW Multi-Jet 16V diesel engine, with a low environmental impact and low fuel consumption. The mechanics of the system required a very complicated design phase in order to get to the ease of handling and is composed of a system generating the air cushion and the air propulsion. One of the most interesting results is represented by a Multipurpose Air Cushion Platform (MACP, <http://www.softhull.com/>) which represents the base of the entire Hoverspill System.

Description of work performed and main results 4000 caratteri

During the third reporting period the most important achievement of the Hoverspill project was the field trials of the vehicle consisting of real simulation of its intervention in oil spill scenarios analysed in WP1. Moreover, the Turbylec performances were tested in presence of oils with different densities to provide a kind of certification of the functioning of Turbylec on oil spills. Both Hoverspill and Turbylec prototypes gave very exciting results and their presentations/shows were really appreciated by all the attendants. In particular, the firemen who assisted the first tests session in St.Brèvin, were so interested to the characteristics of the Hoverspill platform and its versatility to be used in different emergency situations, that took personally part to the intervention recovery actions.

In addition to the already mentioned innovations achieved within the project, such as the soft skin hull, the MACP, and the Turbylec, during these lasts 6 months the innovative UNIK system was studied, realized and set up on the Hoverspill platform. This driving system was realized by cautiously studying the global kinematic. Its peculiarity is constituted by the perfect management of those extreme and intermediate positions essential for the reverse gear, “supercurve”, and directionality when operating at low and high speed.

The achievement of the above-mentioned objectives was the result of the concerted work conducted by the Hoverspill partnership who implemented jointly all the activities, whose contribution was fundamental to achieve the goal of the project. In particular, the activities performed in the last reporting period were related to:

WP6

- Engine calibration. The result is a specific Hoverspill dataset ready to run on the Hoverspill system. In June 2012, on the second prototype, the display monitor system was tested and calibrated. All alarms and data logging parameter were set. As expected only a short

functional test was necessary on the Hoverspill system to check the right engine system run. The test was performed in the Po River in Balossa Bigli (PV) on the 15th of May 2013

- Static tests of the MPS and its components with proof of duration and reliability also with salt spray protection verification
- Turbylec system: qualification tests were performed and proved very good separation performances at least for inlet oil cut values up to 25%.

WP7

After positive results of previous WPs, the last technical step of the project logically consisted in assessing the Hoverspill and the Turbylec prototypes on the field. This was the aim of the WP7 which mainly consisted in the field-validation step through the field trials that served the dual purposes of:

- validating the feasibility for Hoverspill to achieve the presumed oil spill scenarios and tasks
- gauging the interest of potential operative users in Hoverspill as an useful support in oil spill response operations as well as in any other field of use.

Field tests were organized in Italy firstly and the official demonstrations tests in France which were organized by Cedre (with the collaboration of TerraMediu for the Hoverspill platform) while the respective partners designers themselves implemented their own prototypes (*i.e.* Ylec for the Turbylec separator, and Hovertech/SOA for the Hoverspill platform).

WP8. The main results achieved are:

- Project Website updating
- Movie of the Hoverspill and Turbylec in action
- Modification of the patent application (Turbylec) by inserting a new claim
- Organization of the official trials in France, St-Brévin
- Official presentation and show of the Hoverspill and Turbylec in action at Cedre's premises
- Appreciative papers and videos in local French newspapers and on their websites.
 - http://www.ouest-france.fr/ofdernmin_-Un-aeroglisseur-antipollution-en-test-a-Saint-Brevin_40771-2195577-pere-pdl_filDMA.Htm
 - http://www.saint-nazaire.maville.com/actu/actudet_-Un-aeroglisseur-antipollution-en-test-a-Saint-Brevin_fil-2343616_actu.Htm
 - <http://brest.letelegramme.fr/local/finistere-nord/brest/ville/depollution-pouvoir-aller-la-ou-les-autres-ne-vont-pas-28-05-2013-2116754.php>
- Hoverspill in facebook
- www.hoverspill.com was opened for commercialization activities beyond project conclusion.

Expected final results and potential impact 4000 caratteri

The final result of the project is a hovercraft which behaves at the same time as an amphibious transport mean, floating pontoon, operative platform on soft and inconsistent and as it has no need to take the engine cooling water it can work on land as a great generator and as separator of waters washing resultants plant. Due to all these technical characteristics, the main social impact of the HoverSpill vehicle will be obviously on fishing resources and as a consequence on the entire value chain connected to fishing economy. Oil spills have also extremely serious consequences on the marine birds. A study of the International Bird Rescue Research Centre in Fairfield in the USA, it is estimated that every year at least half a million water birds die from accidents connected to oil spills. It has moreover the potential to positively mitigate the negative economic impacts

connected to oil spills accidents, by reducing the costs of the clean up activities. It will impact strongly the cost of clean up, the damages to the environment and the cost of prevention activities. In particular, the most direct economic impact is connected to the costs of clean-up operations at sea and coasts, which are estimated between 100 million and 200 million of euro. The above-mentioned figures demonstrate that the new technologies and procedures proposed by the HoverSpill project for oil spill remediation can have an enormous social and economic impact on the integrity of the marine ecosystem, ensuring the durability of the economical activities of the European countries. Finally, the innovative MACP platform (<http://www.softhull.com/>) can be fitted with specialized equipments, able to operate in several scenarios, in floods, for police surveys, amphibious ambulances, and eventually can improve, facilitate and secure human activities, especially in natural areas with few alternative mobility. Hoverspill will become the swiss knife for oil spill emergency interventions and will allow working quickly and in areas which are difficult to manage because of difficult access/high cost.

HOVERSPILL WEB site: <http://www.hoverspill.eu>

Dr. Federica Marotti (Project Coordinator)

INNOVA SpA

email: f.marotti@innova-eu.net

Mr. Marco Mastangeli (Technical Coordinator)

Hovertech Ltd

email: marco.mastrangeli@superhovercraft.com