NEWSLETTER

November 2008

Welcome to EFFORTS

Jan Prahm,
Dissemination of Efforts project

Dear Reader,

EFFORTS is now well up and running. The work packages are getting ahead with their work which can be seen by the interim results they publish.

In this newsletter you will once again read about the latest proceedings in the WP 1.1. Tug Assistance with interesting insights to the latest development in simulator technology, WP 2.3. Port Air Quality which reports about important findings on how to filter Volatil Organic Compounds (VOCs) from oil tankers and and status report of WP 3.1. Port Processes where the current status of definition of the significant processes related to port operations is given. This theoretical approach gives important information on how ports work and lays the foundation for necessary improvements of efficiency.

I hope you had a joyful holiday season and are now repowered for the challenging work in EFFORTS.

Yours sincerely
Jan Prahm

WP 1.1 Tug Assistance

By Aage Damsgaard, FORCE Technology, Denmark

The aim of this work package is the advancement of the realism of tug simulators to the benefit of port pilots who are challenged by larger ships and new tug types. Tug operators are in need of accelerated training of masters and mates to meet crewing demand use the tug simulator. This work package demonstrates the power of the simulation tool in training, port planning and it will test an onboard display system.
This leads to three main work areas in this work package. First the improvement of the FORCE tug simulator in selected critical functionalities, second the validation of these functionalities by the tug masters and third the application of the simulator in case studies to improve tug assisted operations in the participating ports (Lisbon, Dublin and Hamburg) and training of cooperation between tug masters and pilots.

In the past period, i.e. May 2007 – May 2008, the work package partners worked on four tasks:

- Stereo vision system for distance perception
- Tug performance in waves
- Hydrodynamic ship-ship interaction
- Fender effects

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WP 2.3. Port Air Quality

By Jérôme Taranto, BIOWIND, France

Currently sulfur and Volatil Organic Compounds (VOCs) are the main air pollutants from port areas. The sulfur compounds are responsible for acid rains and some of the VOCs are toxic or carcinogenic. The VOC emissions from petroleum roducts loading operations constitute around 1% (140.000 t/a) of all VOC emissions in EU. Solutions exist, but their efficiency and/or cost can be improved. Therefore the treatment of the port air is necessary for the protection of the environment and health and to improve safety.

The sources of the different kinds of port air pollutants (e.g. sulfur compounds, VOCs, NOx, ...) are local, and influenced by atmospheric conditions: wind, ambient temperature and humidity.

The innovative solution envisaged in EFFORTS to treat these pollutants is based on the so called photocatalysis technology: It is a low cost, and non selective air treatment solution The technical principle is the following: Gaseous pollutants are destroyed when they are in contact with the catalyst activated by UV light. The catalyst is generally coated onto a support like a filter.

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WP 3.1 EFFORTS Process Modelling Platform – Process Library for Port Operation

By Phanthian Zuesongdham (ISSUS / TUHH)

One of the main tasks in Work Package 3.1 Port Processes is the priority to define the significant processes related to EFFORTS content as well as to cover all areas which are relevant to the ports.
EFFORTS **P**rocess **M**odelling **P**latform or EFFORTS PMP is therefore created to provide access to the generic process information relevant to port operations. The platform serves as a library for the ports to make reference to the processes of their interests and to compare them to their own operation in the specific ports.

Not only providing the information, the platform allows amendments and modifications to the original process descriptions since the port operation can also change over time due to the dynamic environment of the business.

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WP 1.1 Tug Assistance

By Aage Damsgaard, FORCE Technology, Denmark

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Stereo vision system:

Tug bridge with the helmet operated by Janne F. Olsen, one of the project team members Picture: Aage Damsgaard.

Display of the assisted ship (LNG tanker) which is in an adjacent room. The two monitors on the right are slaves of the helmet displays (two eyes) Picture: Aage Damsgaard

For the stereo systems two systems were selected:

The first one is a projector based passive stereo with colour separation (Projection Design/INFITEC), the second one is a head mounted display system (Cybermind) with tracking system. At the same time the development of a software for double image generation and tracking was completed.

The projector system was tested in May and June 2008 by eight Svitzer tug masters and mates. The initial assessment was that it might help with larger field of view, but the tested versions were not yet adequate. The head mounted display system which provides full view in all directions looks more promising.

Wave effect on tug performance:

Tug assistance to large LNG-tankers operating at offshore terminals is often influenced by wave action, which affects the performance of the tug. Model tests have been performed of direct and indirect steering and breaking the tanker by using the tug in still water and in waves and the results have been implemented in the simulator such that a more realistic tug performance in waves may now be simulated.

Ship-ship interaction:

When a tug is operating close to a large assisted ship it is influenced by the pressure and wave field generated around it, so-called hydrodynamic interaction forces. These forces may be large and sometimes cause dangerous situations for the tug. The aim is to implement a real-time calculation of the interaction forces by a potential flow solver linked to the simulator. The code has been developed for deep water and fixed surface and a parametric study has been performed to assess which gridding is necessary to generate sufficiently accurate results.

Calculation results have been compared to model measurements of the interaction forces and look good except for some cases, which display the shortcomings of the potential flow and fixed surface assumptions. Further work is being done to try to overcome these.

Fender effects

When tugs work in waves and push the side of the large assisted ship large vertical friction forces may be generated which may destroy the tug's fender. Such forces are not considered in present day's simulators. The task is therefore to develop a fender simulation module which determines both the push force and the longitudinal and vertical friction forces between the tug and the assisted ship. The first part has been to develop the collision detection module and from that to calculate the collision geometry. This has been completed. Next step is to calculate the force interaction and implement that in the simulator.

EFFORTS test simulator

An EFFORTS test simulator has been set up at FORCE Technology in Lyngby, Denmark, for testing and demonstration of all the functionalities developed under the EFFORTS project.

WP 2.3. Port Air Quality

By Jérôme Taranto, BIOWIND, France

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The objectives of the WP 2.3. Port Air Quality are to identify the main air pollutants and their sources in ports which in practice will be in the Port of Le Havre, to develop and perform the adequate photocatalyst, and to test prototypes on-site, in particular for the treatment of VOCS emitted during petroleum loading operations on the fuel delivering barge MISTRAL.

The impact of the technology on pollution will be then evaluated to allow adapted dissemination of the results. So the aim is the development of an innovative, non-existing, economic and ecologic device for air treatment in relative constringent conditions (explosive atmosphere ATEX, high humidity, dust, saline mist), therefore able to be transferred to other domains. The results achieved so far is the mapping of the pollutants and pollution sources in Port of Le Havre by bibliographical studies and analysis of existing data, interviews of concerned actors and the analysis of the meteorological aspects in collaboration with Air Normand. This included the identification of activities having impacts on port air quality which at the same time is a contribution of WP 3.1 and the requirements deducted from these findings. These requirements are the analysis of the general situation in European ports, a detailed description of the situation in the port of Le Havre, a legislation overview and an analysis of the benefits of photocatalysis compared to others air treatment technologies.

The analysis in the laboratory of VOCs of one sample of fuel emitted from tanks of a fuel delivering barge and the analysis of data obtained by the “Plan de Protection de l’Atmosphère” (Air Protection Plan) from the Port of Le Havre showed a high concentration of Volatile Organic Compounds. The petroleum pollutants were identified and some of them (i.e. benzene, methanol) are hazardous. All classes of chemical compounds have been identified: Alkenes, alkanes, alcohols. The concentrations and types of pollutants depend on the kind of petroleum products (fuel, crude oil, …). When the possibilities for practical testing of the prototype under real life conditions were investigated during a visit of the fuel delivering barge MISTRAL it was found out that the fuel delivering barge is an ATEX 1 zone which is the most constringent area for equipment installation where it will not be possible to install the catalytic device as originally planned.

So in a first step the polluted air emitted from tanks will be treated outside this zone next to the berth. Another problem identified is the necessity to filter the air from dust and humidity before it passes through the photocatalytic device. A ecological and economical solution (i.e. a reusable filter) has been found and validated for dust filtering .In a first approach, the photocatalytic devices were composed of 4 reactors, each one comprising of:

- a cylindrical Pyrex glass tube
- 8 UV lamps (outside the glass tube) to activate the catalyst,
- the photocatalytic support (inside the glass tube) shaped to optimize irradiance,

contact between pollutants and catalyst, and pressure loss. However, this configuration did not get agreement for utilization in ATEX conditions. Another configuration has been proposed and is waiting for its agreement. To test the photocatalytic devices an onflow lab-scale photocatalytic micro pilot for sulfur compounds and VOCs removal was built and different kinds of catalysts for sulfur compounds removal were developed. The test showed a total and stable removal efficiency for 15 ppm H2S for residence times longer than 10 sec and the first 100% solid SO4 selectivity (duration at total sulfur removal) was achieved.

The improvement of the photocatalytic materials efficiency is in progress. A great difference of efficacy has been observed between commercial photocatalysts. Other laboratory catalysts are actually tested. On-site analyses will be performed at the end of November and prototype performance measurements will be done after agreement for utilization in ATEX zone. Other tests will be planned in non-ATEX zone to measure efficiency of photocatalysis on sulfur compounds, particles and NOx.

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Events

- Intermodal 2008, 2. – 4. December 2008, Hamburg/Germany
- Port Strategy Medtrade Conference, 11. – 12. March 2009, Venice/Italy

WP 3.1 EFFORTS Process Modelling Platform – Process Library for Port Operation

By Phanthian Zuesongdham (ISSUS / TUHH)

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Many processes are included already, but to keep the processes up-to-date, input from experts in port operation is highly required. The expected input comprises of process information such as objectives, description of sequential activities, involved parties in processes, etc. This information can be submitted directly through the platform in the comment field. After receiving the information, the EFFORTS Modelling Team will amend the model accordingly.

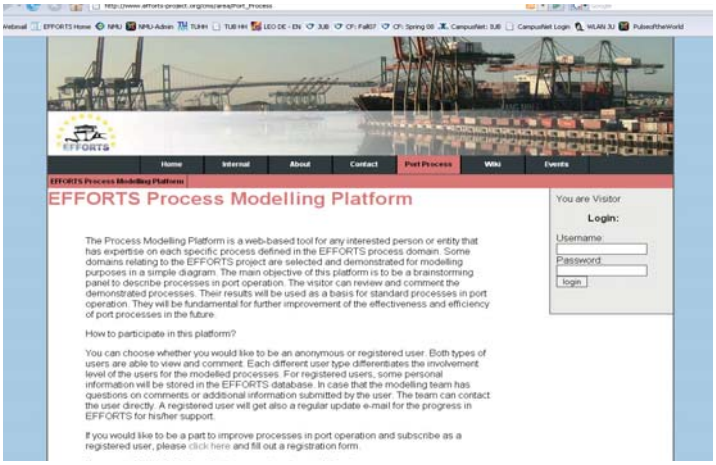

Figure 1.1: Introduction page of EFFORTS PMP

The platform can be accessed through the official EFFORTS website and the selection of "Port Process" on the navigation pane (See figure 1.1). The EFFORTS PMP is presented in accordance to the port process map developed in WP 3.1 as a tree structure for a better navigation of the map (See figure 1.2).

The users can select whether they prefer to contribute the process information anonymously or involve in the development of this process platform by a simple registration which allows the EFFORTS modelling team to contact for more information and include them in the process expert panel.
We hope that the port process information will be useful for all user groups especially stakeholders of the ports.

Everyone can share his/her knowledge and expertise to improve the process model in EFFORTS. Be a part of EFFORTS for the effective operations in ports!

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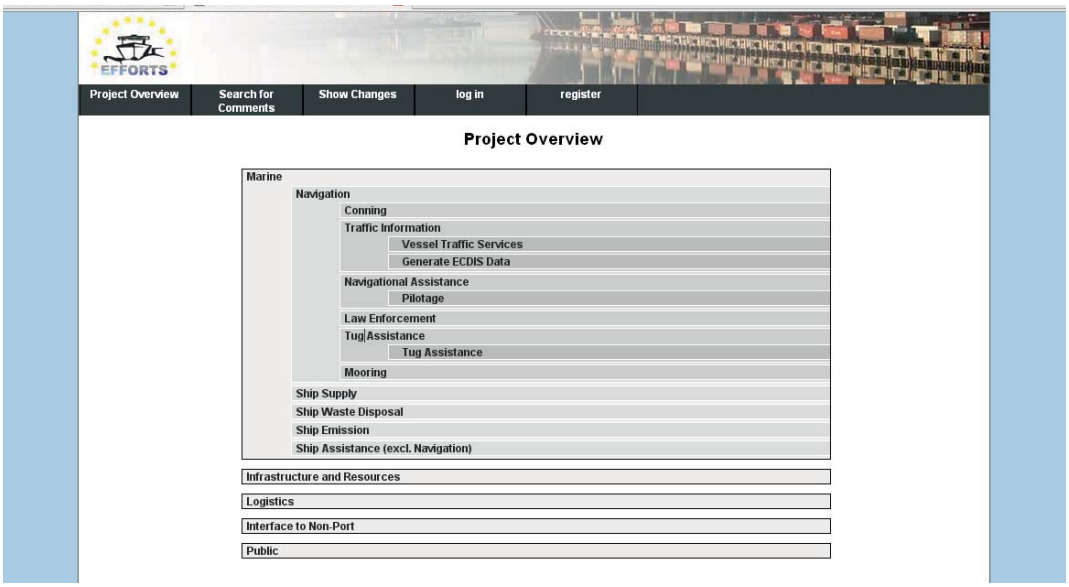

Figure 1.2: Process Overview Page – Process Map

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