

E3 Tug

Development of an environmental friendly harbour tug



Introduction

As a world wide service provider in towing services in harbours and coastal waters, SMIT is aware of the fact that its operations have an impact on the environment. Therefore, the so-called Greening SMIT program was initiated in 2007, which has the objective to determine and decrease the environmental impact of our operations. Among others, Greening SMIT involves developing green vessels together with partners in the market, investigating modifications to improve vessel's emissions and fuel economy, and embedding the green mindset in our work by training our people.



Environmentally Friendly

Economically Viable

Efficient in Operations

The Project

The *objective* of the E3 Tug project is to decrease the effects of harbour tug operations on the environment. E3 stands for: Efficient in operations, Environmental friendly and Economically viable. The project intends to make the performance improvement towards the environment, operational affectivity and costs accessible and measurable for representative operational profiles and the life cycle of the ship.

The *challenge* of this project is to apply new and developed technology to a propulsion and energy system build for various operational conditions; in this case a harbour and coastal tug boat, for which the operational conditions exist of standby, transit free

sailing and various towing functions, all having various requirements to the propulsion and energy generation system. The *results* of this project will provide insight in the influence of tug operations on the air quality in and around the harbour and feasible improvements by applying emission reducing measures on short and medium term.

Approach

The first phase consists of determining the environmental impact of a harbour tug's operations. The ship's performance regarding fuel consumption, emissions, and operational costs are measured. A long term measurement program in the second half of 2008, measuring various engine parameters and task characteristics, resulted in an operational profile. Early 2009, emissions were determined while the operational profile was simulated in practice in 18 operational modes, covering load, free sailing and transient conditions.

The second phase focuses on the actual development of an as-environmentally-friendly-as-possible harbour tug, or an E3 Tug in other words. For this purpose, the best available technology will be used for all design aspects of the ship. For example, a hybrid energy generation and propulsion system and exhaust gas treatment will be investigated. When the most optimum layout is determined, the prototype E3 Tug will be build. When the tug is in operation, which is expected to be in 2011, a performance evaluation takes place in the light of the benchmark.

The third phase combines the experience and performance evaluation of the E3 Tug with emerging technologies for energy generation and emission reduction into a new concept design. For example,

the optimal combination of main engine power, batteries and fuel cells will be investigated in the light of future operational and design requirements. The option to retrofit the E3 Tug will be considered.



The 'Smit Elbe' was used to perform engine and emission measurements for the benchmark.

The fourth phase results in knowledge dissemination in different areas like: governmental policy regarding effects on the environment of shipping and towing operations in harbours and coastal waters; the affectivity of emission reducing energy and propulsion systems on board of ships for representative operational profiles and total cost of ownership of these configurations; and methods to measure and analyze emissions, operational profile and total cost of ownership.

Concluding

This short project outline shows that SMIT is actively working on decreasing the environmental impact of its operations. E3 Tug is merely one example in the search for continues improvement.

