

# PELS proves to be a “SMOOTH” operator

The national Dutch research project PELS (Project Energy-saving air-Lubricated Ships) was actually completed in December 2004 after considerable success, with net energy-savings resulting. MARIN is keen to convert this research into practical applications. Report explains.

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A presentation on PELS at the renowned Second International Symposium on Seawater Drag Reduction, held in Busan in May, received overwhelming positive feedback. The paper identified an important missing link – the validation that air bubbles reduce drag, even when they are applied close to full-scale Reynolds numbers.

The result was achieved by mounting a whole part of a ship's bottom in the measurement section of Europe's largest cavitation tunnel, the UT2 in Berlin. Reynolds numbers close to 108 could be tested this way in laboratory circumstances, even allowing for correctly scaling the ambient pressure.

Part of a ship's bottom built in the large tunnel of TU Berlin, tested at  $Re \sim 10^8$ .

For PELS' free sailing model experiments in calm water, MARIN's Depressurised Towing Tank was used. In this way, the compressibility of air was found to be responsible for several measurable scale effects on the micro and macro scale of air-lubrication techniques.

## Considerable savings

Final calculations have shown that one single inland shipping vessel could save as much as 130 tonnes of diesel on an annual basis (15 to 18%) and about 400 tonnes of CO<sub>2</sub>, five tonnes of NO<sub>x</sub>, plus about half a tonne of soot (PM10) particles.

Given the fact that these results apply to one single inland navigating craft, there has been a large amount of interest from inland shipping companies. There might also be sufficient interest to start a second Dutch research initiative on the subject.

All these positive results concerning air-lubrication are very important in both social and economic terms and research in this area is supported by the European Commission. Consequently, a European consortium of well-known partners, with MARIN at the helm, is currently preparing a 6th framework EU STREP proposal “SMOOTH” (Sustainable Methods for Optimal design and Operation of ships with air lubricated Hulls) to continue PELS.

The aim is to expand the fundamental research done in PELS I and to move a step closer to a practical application. There is certainly a great deal of interest in taking this project to the next stage. Interested potential partners are still welcome to join the consortia. The knowledge gained so far will be of great benefit to those who undertake further research into lubrication. And it will be very interesting to see if the first practical application validates the positive findings from laboratory experiments.

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