

A HERCULEAN undertaking

There is an old adage that says the future belongs to the people that invent it. Arguably, in marine engineering terms the man at the forefront of this drive is Professor Nikolaos Kyratos, director of the laboratory of marine engineering at the National Technical University of Athens, Greece.

A past-president of CIMAC, and recent chair of the CIMAC Circle held at SMM in Hamburg, which appropriately enough considered 'next generation marine diesel engines — visions for the next decade', Prof Kyratos has spent the last two years or so coordinating the HERCULES (High Efficiency R&D on Combustion with Ultra Low Emissions for Ships) research project.

This has involved overseeing a consortium of 41 partners, led by MAN and Wärtsilä, in a research and development project designed to realise new technologies that will dramatically reduce gaseous and particulate emissions from marine engines and simultaneously reduce specific fuel consumption, CO₂ emissions and engine lifecycle costs. The work has been structured in nine work packages, 18 tasks and 54 subprojects and its €33M budget has been partly funded through a €15M subvention from the European Commission under the Sixth Framework Programme (FP6) and a €2.8M grant from the Swiss government. Patently a Herculean task by any standards!

To achieve the project goals Prof Kyratos says a 'holistic approach' has been taken, with 'several prototypes already running, and some impressive results attained.'

While it is invidious to highlight one aspect of Hercules over another, Prof Kyratos says a major accomplishment has been the development and operation of two prototype 'extreme parameter engines'.

'The main objective here has been to design and develop mechanical components for diesel engines operating under extreme thermal and mechanical loads.

'A 200mm bore and 280mm stroke single cylinder research engine, capable of operating with firing pressures up to 400 bar and BMEP above 35 bar were built for extreme testing of components. Several CFD/Cycle simulations and material studies have been performed and engine bearings and fuel injection systems have

Pushing the parameters of next generation technology

been produced and assessed on test rigs.

'Numerous CFD pre-calculations and thermodynamic simulations have been performed and new engine components have been designed, and are in production. Ultimately these will be evaluated with full scale tests.'

A detailed report on all of the outcomes of the first Hercules Project will be presented at the upcoming CIMAC Congress to be held in Vienna 21-24 May 2007.

Prof Kyratos is now in the process of applying for funding from the European Commission (EC) for the second part of the Hercules project 'Hercules β ' under the aegis of its Seventh Framework Programme.

'The Hercules Project was initially conceived as a seven year project,' explains Prof Kyratos 'even though it has now been split into two parts. The second — if commissioned — will run for four years and have a €60M budget.

'Our principal hope for part two is the EC will recognise that we now have a large body of work, so know what should be done to reach the goals that were set up four years ago. Additionally, the project brings together a cross-section of leading industry companies, including the two leading engine manufacturers, so meaningful work can be achieved if they ratify.'

The main aim of Hercules β is to improve the efficiency of marine diesel propulsion systems to at least 60%, in the process substantially reducing fuel consumption and CO₂ emissions. The project will deliver a number of Technology Demonstrator engines, which will showcase a range of new technologies that will be validated onboard newbuild vessels.

'Against the backdrop of a record world newbuilding orderbook, the need for a concerted approach towards mitigating the environmental impact of marine technologies has never been greater,' argues Prof Kyratos. In other words if it is the case that 'the future belongs to those who invent it', then the regulators hold the key.



Coordinator of the Hercules Project and director of the laboratory of marine engineering at the National Technical University of Athens, Professor Nikolaos Kyratos

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