Jacks of all trades and masters of some

European education has seen the development of a unique course in ship design with seven universities in six European countries offering opportunities to aspiring ship designers from around the globe. Philippe Rigo of EMSHIP reports

The shipping industry is looking for polyvalent engineers; that is engineers with expertise in two or three technological fields such as naval architecture, mechanical engineering, production, CFD, etc.

EMSHIP provides such an opportunity for new graduates, but also experienced professionals looking to update their knowledge.

EMSHIP integrates advanced education from seven top EU universities, each being a leader in its field of expertise – from hydrodynamics and ship design to ship structure and offshore technology. Therefore, a unique and outstanding scientific and technical education has been assured by this consortium.

Figure 1: The EMSHIP Partners (in Europe and outside EU)

Examples of EMSHIP internships combined with master's theses are:

- *"Modeling and Simulation of a Production Line (Panel Line) in shipbuilding Industry ...", URO-Germany, Feb. 2012 and internship at Fraunhofer Research Institute (DE),*
- *"Analysis of Structural Strength of FPSO Ship .....", ZUT-Poland, Feb 2012 and internship at DNV-Poland,*
- *"Energy Efficiency Design Index (EEDI) Impact on Superyacht Design", UNIGE-Italy, Feb 2013 and internship at Benetti Yachts (IT).*
- *"Non-linear Hydro-Elastic Response Analysis in Irregular Head Waves...", UGAL-Romania, Feb 2013 and internship at Icepronav.SA (RO).*

Information on EMSHIP is available at www.emship.eu and the EMSHIP coordinator can be contacted at emship@ulg.ac.be

In order to attain the main goal of EMSHIP, which is to guarantee the candidates' future career, we have integrated the market demands and European industrial needs into the educational programme.

The educational programme at EMSHIP is the only Erasmus Mundus Master's Degree dedicated to the field of naval architecture (ship and offshore design and production technology in Europe).

Teaching at all the universities is delivered in English but, students will have the opportunity to learn European culture in at least three countries. A Double Master's degree is delivered by the prestigious Ecole Centrale of Nantes (ECN) and by University of Liege (ULG) (coordinator of the project), including also six months internship and master's thesis completed with an industrial partner, under the supervision of a third university (URO-Germany, UNIGE-Italy, ZUT-Poland, UGAL-Romania or ICAM-France).

The 90 credit lectures, delivered during 18 months, provide relevant advanced knowledge in ship design, ship structures, ship hydrodynamics and ship production (offshore structures and particularly wind energy structures are also tackled).

Three mandatory mobility periods, Belgium and France for all students, and later either trips to Germany, Italy, Poland or Romania, which guarantee a wide opening to the EU market for job opportunities, in Europe, but also worldwide.

In "ship hydrodynamics" and "ship design", students start courses on ship theory, ship projects and ship design, design of high speed vessels, then continue with lectures in waves and sea state models for ship design, seakeeping: theory and numerical modelling, CFD for ship hydrodynamics multi-objective optimisation for ship design, experimental ship hydrodynamics and finally maybe get advanced lectures in ship manoeuvrability, ship propulsion or hydrodynamics and aerodynamics for sail boats, design of sails, masts and rigging, hull form and skeg design, general arrangements of sail boats, hydrofoils, planing and semi-planing crafts.

In "ship structure" and "ship production", students start at ULG with lectures on structural design of ships and offshore structures, and ship production and equipment. Then they continue with advanced lectures in structural materials (metallic and composite materials); structural modelling (FEA); Load assessments (rule based method versus direct analysis); structural responses: linear analysis, nonlinear analysis, ultimate strength, dynamic behaviour, fatigue; or in production technology: shipbuilding, reconstruction and conversions, maintenance, decommissioning.

To maintain the courses at the highest level, EMSHIP is supported by major universities from around the globe, which offer visiting professors for advanced lectures (UoM-Michigan, NAOE-Osaka, UFRJ-Rio, NSW-Australia and PNU-Korea, and where students can go for an internship and master's thesis).

EMSHIP attracts students from all over the world. Scholarships are available from the European Community (Erasmus Mundus), industrial partners (BV), and the Lloyd's Register Foundation (LRF).

The Strategic (industrial) Advisory Board (SAB), composed of 25 industrial partners, provides internships, master's thesis and often new jobs to graduates. The SAB members are from classification societies, including Bureau Veritas, DNV, GL, Lloyd's Register, Rina; shipyards [Blohm + Voss, Aberking & Rasmussen, Benetti, Intermarine, Perini-Navy, Baglietto, Damen, Stocznia Gdańsk, Crist; the marine & equipment industry and R&D institutes Aveva, Becker-IBMV, CMT, Deme, Flume, Friendship S., Genfer Design, Hochtief, HSVA, J. De Nul, Marin-Teknikk, Saipem, SDG, VDMA; shipowners Exmar and educational associations (WEGEMT). *NA*