



A Pillar of Malaysian Maritime Industry

by Zoe Phoon



Ir. Prof. Dr Ab. Saman is a Professor in Marine Transport System at the Faculty of Mechanical Engineering and Director of Marine Technology Centre of Universiti Teknologi Malaysia (UTM), Skudai, Johor. He possess 3rd Class Marine Engineers on top of B.Eng, Masters and PhD in various marine related areas. He used to sail on board a ship for a year on internship program and later joining UTM as an academic staff since 1983 until present. He has taught a number of undergraduate courses in the Marine Technology program at UTM including Marine Safety & Environment at the post graduate level. He has been involved in a number of marine related R&D and consultancy projects as well as being in various management positions at UTM.

Malaysia's only marine hydrodynamics laboratory, Marine Technology Centre located in its Skudai Johor campus in Universiti Teknologi Malaysia, is the second largest in ASEAN region. It is set to do more for the marine industry and economy.

The Marine Technology Centre (MTC) is one of the many research centres in Universiti Teknologi Malaysia (UTM) supporting the university in maintaining its status as a research university. It also carries out consultancy works and short courses to generate income to sustain some of its activities.

MTC's marine transport management research group focuses on the economic coverage of operations and management of marine transportation, marine safety, marine power plant and sustainable development of the marine transportation system.

On the other hand, the marine and offshore hydrodynamics research group is involved in creating new designs and improving existing designs of marine vehicles and offshore structures. It specialises in the study of the behaviour and safety of marine vehicles and offshore structures, taking into account their operating environments. Its research covers marine hydrodynamics, dynamics and control, artificial intelligence and computer simulation.

Officially opened in 1999, MTC also enables the university's development of human capital to produce industry-ready graduates in support of Malaysia as a maritime nation.

MAKING RESEARCH PAY

Creating fresh ideas through research and turning them into commercial successes is the key to prosperity for any country. This includes commercialisation of the results of university research.

MTC director Prof. Ir. Dr Ab Saman Abd Kader, who was in Kuala Lumpur recently to attend the annual Industry Advisory Panel (IAP) meeting between UTM and industry professionals, said MTC's major focus is to carry out research to target the tangible outcomes.

Besides publications and intellectual property rights, he said, part of the research outcomes can be commercialised for financial and economic benefits for the industry and the country. On top of that, MTC is also entrusted with the training of postgraduates. A good number of international students are doing postgraduate studies and these have a significant positive economic impact, too.

"Along with its research infrastructure and facilities, we work with the industry and conducts short courses for marine-related companies, which includes providing them with the necessary modules and training packages. These also generate income for UTM," he said.

Prof. Saman is a professor of marine technology with UTM's Department of Aeronautic, Automotive and Ocean Engineering of the Faculty of Mechanical Engineering. He was appointed a director of MTC under the Institute of Vehicle Systems and Engineering (IVeSE).

According to him, all academic staff at MTC must, in addition to teaching, also focus on obtaining research grants from both internal and external sources, including international bodies.

In the process, they have to cooperate and collaborate with other research partners. At present, MTC is engaged in numerous collaborations with the academia and industry, locally and internationally, in areas of joint research, journal publication, postgraduate supervision and consultancy.

Via memorandums of understanding or memorandums of agreement, UTM is collaborating with institutions of higher education such as Monash University, Universitas Indonesia, University of Southampton, Newcastle University, Kobe University, Hiroshima University, University of Strathclyde Glasgow, Universiti Teknologi Petronas and National University of Singapore.

“ There are plans to expand the hydrodynamics facilities which are currently fully utilised and to make MTC a one-stop referral centre for marine expertise. ”

Meanwhile, MTC's collaborations with industry include MISC Bhd., Bureau Veritas, Shell, Lloyd's Register, Technip, Port Tanjung Pelepas, Boustead Heavy Industries Corporation Bhd., Institute of Marine Engineering, Science and Technology (ImarEST) and Wartsila.

On MTC's consultancy works to date, Prof. Saman said that among the bigger

ones are developing the first Malaysian-designed offshore supply vessel with Boustead Heavy Industries, vortex induced vibration (VIV) for vertical tandem riser testing with Shell Malaysia, model tests on the semi-submersible Gumusut with MISC, resistance model tests for 35m patrol boat with Italhai Marine Ltd. of Thailand, resistance model tests for 160ft self-propelled jack-up with Singapore Amerin Ltd., and resistance model tests on the 18m cathedral hull vessel with Global Marine Design Pty Ltd. of Australia.

Its consultancy works are normally related to design and model tests. For design works, MTC has a number of design software such as Maxsurf (CAD package), Shipflow, Moses, Abaqus, Fluent, Hydrostar (Bureau Veritas), Ariance (Bureau Veritas) and Ansys Aqwa. Finally, it also built the scaled model of the intended ship and offshore structure for hydrodynamics tests at its towing tank facility.

Prof. Saman said UTM has a specific policy with regards the commercialisation of research and consultancy initiatives at MTC. He explained: "The income that MTC generates is part of the key performance indicators



Data Acquisition and Analysis



Towing Carriage

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(KPIs) that we have to achieve at the research centre. The amount of income generated differs from project to project, and part of that income is used for the maintenance of the facilities to reduce dependence on UTM’s funds.”

The commercialisation of research includes the hovercraft and offshore supply vessel (OSV) and MTC staff members have been involved in the design and construction.

“These products are potentially strategic for Malaysian use. For example, hovercrafts are useful for surveillance and rescue operations in coastal or riverine areas by enforcement personnel while OSVs are used for offshore O&G operations to meet commercial operational requirements,” said Prof. Saman.

“But MTC has produced a lot more research products than just hovercrafts and OSVs. It has designed, produced and tested the ocean wave energy device as well as developed the point absorber energy converter, vertical axis marine current turbine, wave buoy, semi-Swath (small waterplane area twin hull) boat, amphibious boat, wing-in-ground vehicle, airboat and so forth.”

TAKING MTC TO NEXT LEVEL

MTC’s marine hydrodynamics laboratory comprises a ship design structure, model making facility, equipment and model testing facility. It is used to support the projects of

undergraduates and postgraduates as well as for UTM staff to do research, consultancy work and conduct short courses.

According to Prof. Saman, MTC is the only place in the country with hydrodynamics facilities and these are currently fully utilised. There are plans for expansion and a working paper is being prepared for submission to the UTM management and the government.

The existing facilities are a towing tank (120m long and 4m wide with a water depth of 2.5m), a towing carriage that tows ship models at speeds of up to 5 m/s, a computer-controlled wave generator capable of generating regular and irregular waves over a wave period ranging from 0.5 seconds to 2.5 seconds, and a data acquisition and analysis system that collects measurement data from the instrumented channels in model test set-ups, stores the measured information and performs preliminary analysis as well as offers realtime onscreen information.

Two other facilities are the planar motion mechanism which consists of two electromechanical actuators that can be mounted vertically or horizontally to the test frame of the carriage, and a motion camera with optical motion capture technology whereby models can remain completely unaffected by heavy sensors, so every small and light model can be used.

“Traditionally, this was accomplished with potentiometer systems attached to a model or with bulky

and expensive gyroscopes and accelerometers. Tracking vessel motion under different wave, current or wind conditions, is a fundamental task at a hydrodynamics laboratory or a naval test site. This system makes it easy to obtain accurate 3D and 6DOF positions in realtime," Prof. Saman explained.

The marine hydrodynamics laboratory also has computer-aided engineering (CAE) facilities. He said the CAE Unit provides services and facilities for intelligent and efficient use of the computing technologies in the ship model testing field at MTC.

This includes providing a variety of resources for researchers and students. The CAE Unit provides access to over 20 types of non-commercial software such as ship hydrodynamics and commercial software. The Computational Fluid Dynamics software has been installed on two super workstations and can be accessed using wireless or wired communication throughout the MTC building.

With its present equipment, he said, MTC offers the following services:

1. Resistance/drag measurements (resistance of a ship model against speed in calm water or in waves. Tests can be conducted in both deep and shallow water).
2. Propulsion tests (thrust and torque against rotational speed of a propeller running behind or in front of a ship model while being towed. The towing force can be measured in calm water or in waves)
3. Fluid flow and body interaction analysis (analysis of fluid flow, measurement of fluid velocity in one direction at an arbitrary location around a model)
4. Sea-keeping behaviour in waves (behaviour of ships in waves and measurement of motion characteristics at different forward speeds).

Other services also offered include ocean and coastal engineering modelling (wave forces acting on fixed and floating structures, and behaviour of structures during float out and installation), manoeuvring simulation (hydrodynamic reaction forces in drift tests or from oscillatory motions forced on the model), lightship survey

(including inclining experiments), stability assessment (stability curve and stability assessment according to standard criteria), design service (hull form design for a specific purpose, and general arrangement drawing), vibration monitoring and mitigation, full scale motion and monitoring (ship motion measurement and analysis, and motion assessment according to standard criteria for ship, equipment and personnel onboard) and full scale powering measurement (sea wave measurement, vibration problem identification and solution, ship motion monitoring and engine torque measurement).

Going forward, Prof. Saman said MTC is planning to raise UTM's global ranking and profile through obtaining more international research grants to commercialise research products on the international front and by carrying out more joint publications with foreign universities. Plans are also afoot to make MTC a one-stop referral centre for marine expertise.

One of MTC's roles at present, he said, is to assist the shipping industry in Malaysia where 70,000 ships pass through the Straits of Malacca alone each year. This help can be in the form of R&D, design and testing or education and training of manpower.

"Things can be improved in terms of ship safety in navigation and environmental protection. Through R&D and short courses at MTC, we are playing our role in reducing the risks," said Prof. Saman.

"For instance, we carry out research on improving the automated ship identification system (AIS) and its operation. MTC also conducts a short course on this for staff members from various marine-related companies. Similarly, staff members and postgraduate students are doing research on the AIS performance."

CHANGING WITH THE TIMES

Universities around the world are changing with the times and the key factors driving change are globalisation, technology and the growing needs of markets and industries.

UTM had been offering the marine technology programme since 1982 at its Kuala Lumpur campus before



Towing Tank



Wave Generator



Motion Camera

it moved to its main campus in Skudai. Prof. Saman said UTM, in response to market demand and feedback from stakeholders (including external assessors, professional bodies and industry players) in recent years, replaced that programme with the naval architecture and offshore engineering programme in 2011.

It has continued to receive good feedback from the marine industry, such as those involved in port and shipping, offshore operators, oil and gas (O&G) companies and consultants.

Asked to comment on the observation that there is a need to look into other fields of study as Malaysia reduces its dependency on petroleum, he said the UTM programme remains relevant.

"The country still has a good amount of O&G reserves, at least for the next 20 to 25 years. That will require graduates from our naval architecture and offshore engineering programme in order to minimise reliance on foreign experts in the field," he said.

"The programme will still be relevant beyond 25 years in producing graduates for ship design and construction as well as repair and maintenance. After all, academic programmes are dynamic and require periodic reviews and improvements.

"The career prospects have been extremely good up till now as most of our graduates are gainfully employed. Some companies even carry out recruitment exercises at UTM among third-year students doing the four-year programme."

On the public or employer perception that graduates generally lack the necessary skills to meet market requirements, he said that "while this is true in certain areas of employment", UTM has continuously addressed such concerns via a number of approaches as a result of feedback from the accreditation process and employer surveys.

He noted: "One such approach is our continuous quality improvement (CQI) initiative to improve the curriculum and content of our courses to address the generic skills requirement. In addition, we receive feedback from the IAP which we call on annually to view the curriculum and its implementation, including the standard of the examination Q&A scheme."

As for market requirements in the marine industry, Prof. Saman said sectors such as port and shipping and offshore O&G specifically require graduates who are able to design and use relevant software such as computational fluid dynamics and finite element analysis, do programming and so forth in their daily work. They are also required to be able to carry out project management in anticipation of the growth in the marine industry.

"The graduates of UTM, particularly from the marine background, are very good, with very promising employability rates even with reputable marine companies. Our curriculum addresses the entire knowledge acquisition process, including soft skills such as leadership, critical thinking, innovation and entrepreneurship," he said. ■

Prof. Saman (6th from right) with staff members from industry partner Technip Geo-Production Sdn. Bhd.

