



Raising the Skills Bar for Deep Water

Educational excellence through academic-industrial synergy

BY M. SHAHIR
LIEW, NOOR AMILA
W.A. ZAWAWI, AND
FAKHRULDIN M.
HASHIM

The days of “easy” oil are over. Available oil reserves are getting increasingly difficult and expensive to produce. Globally, exploration and production (E&P) are moving into unconventional and deeper water energy sources to fulfill the insatiable demand for energy. This leads to increasing needs for qualified professional talent with high levels of resilience, to replace the aging current workforce. Currently the average age of an oil and gas (O&G) worker is 50 years.

Joining the bandwagon, the government of Malaysia launched the National Key Economic Areas (NKEA) in 2011, a framework aimed at transforming the nation into a Southeast Asia main hub for O&G by the year 2017. One of the 12 targets set in NKEA addresses the oil, gas, and energy (OGE) sector. The key message of the NKEA is that change is critical if Malaysia is to benefit from the shift of economic power from the west to Asia. The government envisions Malaysia taking on a role as a cost-competitive

base for engineering, procurement, and construction, as well as being a strategic base for installation activities in the Asia Pacific region, by incentivizing major international companies in the oil field services and equipment industry to bring their business operations to Malaysia.

As an educational institution and a subsidiary of the national oil company PETRONAS, the Universiti Teknologi PETRONAS (UTP) has taken up the task of addressing the skill gaps in the OGE sector. In light of heavy foreign investment in the local market, UTP recognizes the importance of human capital development. With the enactment of the NKEA OGE initiatives, UTP is mandated to implement the objectives and goals of the advanced engineering, science, and innovation discipline sector.

The institution was set up in 1997, and is now a leading private university in Malaysia, offering a wide range of industry-relevant engineering and technology programs. The campus is situated 240 km north of Kuala Lumpur. The

overall layout of the new academic complex is in the shape of a five-pointed star made up by five semicircles.

UTP has produced more than 10,000 post- and under-graduates from more than 50 countries around the globe. For postgraduate programs, other than by research, the university offers a master of science program by taught course. Other degrees offered include Ph.D. and master of science in engineering, master of technology and energy management, bachelor of engineering, and bachelor of science in technology and in geoscience. The university conducts extensive research activities in collaboration with PETRONAS and other institutions and industries locally and abroad, focusing on enhanced oil recovery; carbon dioxide management; deep water technology (DWT); nanotechnology; green technology; biomedical technology; hybrid energy systems; and intelligent city and sustainable resources. UTP recently was awarded a 5-star rating by Malaysian Research Assessment Instrument for its research, development, and commercialization efforts.

Academic-industrial collaboration

The Offshore Engineering Center (OECU) is a center of research under the DWT research group. The center was officially established in 2011, but the setup began in 2009 through an academic-industrial collaboration of the faculty members of the Civil Engineering Department at UTP with the members of the Skill Group in Civil Engineering (SKG11) of PETRONAS. The meeting, initiated and led by Associate Professor M. Shahir Liew, the head of OECU, identified the areas of initiatives in which UTP can support SKG11 primarily and PETRONAS as a whole, through the setup of an SKG11-UTP steering committee. The thinking at the center is that academia and industry must develop hand in hand to ensure that industrial and technical skill gaps are properly addressed. The steering

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committee now has 32 members, equally subscribed by UTP and SKG11.

The road map of OECU was developed in 2010, focused on 11 broad area of expertise in offshore structures. These are metocean studies; onshore structures; deep water/floater; pipeline/risers; geotechnical and geohazard; structural design; structural integrity and reliability; geographic information system; decommissioning; coastal/estuarine engineering; climate change; and, most recently, offshore project management. To date, the synergy of this steering committee has made remarkable advancements in research, development, and consultancies, through OECU as the engineering research and consultancy center that addresses the business need of PETRONAS and the O&G sector in general. It is through this platform that UTP obtains networks to the industry leaders in O&G and embarks on joint cohesive research that seeks novel solutions to existing practice in the industry.

The educational program

In relation to deep water offshore structures, UTP offers various engineering programs at the undergraduate and postgraduate levels. The bachelor of engineering programs related to deep water and subsea are in civil engineering—which offers a major elective in offshore oil and structures—and in mechanical engineering with a major elective in deep water engineering.

Research activities in deep water offshore structures are actively undertaken via the 11 initiatives in OECU, focusing on development of research areas that address the business

needs of PETRONAS and the O&G industry in general. The same channel was used to develop the curriculum for the master of science in offshore engineering by taught course, leveraging the expertise of the industrial members in SKG11 and their commercial network. This master of science program is expected to be offered by mid-2014.

OECU also has initiated the master of engineering program for project management in O&G with the project management group at PETRONAS. This initiative was first mooted in the UTP-SKG11 steering committee as an area into which OECU should look. It was further reinforced when the Malaysian Oil and Gas Services Council (MOGSC) did a survey with its corporate O&G members on skill gaps, led by UTP and NExT, the development and training arm of Schlumberger, the world's leading E&P company in O&G. Project management ranked at the top in terms of skill gaps to be filled and also on the development of core competencies as a way forward. The survey results were presented to PETRONAS board members and were identified as initiatives that need to be addressed by the industry; thus, the emergence of UTP to look into this niche market. This master of engineering program by taught course is expected to be offered mid-2015.

While the faculty members in OECU provide guidance in their areas of expertise and help develop professionalism in each individual, the postgraduate researchers (known in OECU as research engineers) are encouraged to be actively involved in research and consultancy activities beyond their scope of study, and to seek opportunities to engage with the

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industry. This group consists of motivated and selected individuals who are technically developed for research and who are professionally groomed to be engineers with high levels of resilience and competency.

Transformation

PETRONAS is moving into deeper waters. Future deep water projects are in motion up until 2015, with one of the largest fields containing a 2.7 billion barrel of oil equivalent reserve, thus requiring large-scale commissioning services. In supporting PETRONAS's core business, OECU has developed a framework on this national agenda in line with the NKEA OGE sector. The center collaborates with various industrial and institutional partners, locally and internationally, including South Korea, India, and Thailand, in addition to collaborative partners as far as the North Sea. Locally, OECU has worked synergistically with the Construction Industry Development Board (CIDB) and the Malaysian Structural Steel Association (MSSA) in transferring skills in existing onshore capabilities to offshore capabilities to improve existing competencies in the O&G sector.

With the increasing energy demand outlook and more "difficult" oil, the competency of skilled workers is a pressing industry issue. UTP, through OECU, is a strategic partner in the launching of a diploma/executive diploma in marine vessel technology and offshore structures, and a P33 program by CIDB. OECU also has its presence in MOGSC through the Competency and Technology Working Group (CTWG), a sub-group under MOGSC. CTWG has been given the mandate by PETRONAS to create a standardized core competency-enhancing platform, tailor-made to O&G industry needs. These efforts complement CIDB and MSSA efforts in national transformation and enhancement of core competencies.

Key success factors

In just 4 years, OECU has successfully secured 13 research-oriented projects and 26 joint industrial partnership and consultancy projects, with grants worth more than \$2 million. The center has actively participated in research



The deep water wave tank in the offshore engineering lab at UTP.

exhibitions, bagging thus far 12 gold and silver medal awards, with 2 impending patents underway for application software under development with the PETRONAS Metocean Group.

From the research outcomes conducted by research engineers, the center has thus far issued two technical directives to the steering committee, based on the milestones achieved in research related to metocean studies.

The center has published more than 180 proceedings and conference papers, nearly 40 journal papers, and 3 book chapters in indexed and non-indexed publications. While publication is an important milestone and a great medium for sharing of research output, the center establishes its presence in the industry further by annually organizing annual conferences on offshore structures, focusing on up-to-date themes related to offshore structures, such as asset integrity and reliability. The Offshore Structures Asia 2012 and Offshore Engineering Asia 2013 were pinnacle offshore events within Asia. The three-day conferences were jointly organized by OECU and the MSSA.

Through the decommissioning initiative, OECU also has paved the way for the development of sustainable options to decommissioning of offshore platforms via the national workshop, Rigs-to-Reef 2013, in Kuala Lumpur. For the first time in Malaysia, the workshop brought together various stakeholders in rigs-to-reef and explored

the potential of decommissioned offshore platforms as artificial reefs. The supposedly conflicting interests of the stakeholders were openly discussed nationally. The workshop was supported by the National Oceanography Directorate, the national focal point for all oceanographic and marine science activities and scientific research and development.

In contrast to conventional research centers and academic institutions, OECU is not solely focused on research and education. The center aspires to be a center of excellence that is relevant to the industry while developing the younger generation in the process. The center is an enabler to people where every warm body is developed and nurtured by creating opportunities for growth and for developing a sense of ownership and belonging, while approaching life with passion.

To quote Rabindranath Tagore, "I slept and dreamt that life was joy. I awoke and saw that life was service. I acted and behold, service was joy." **MT**

M. Shahir Liew is associate professor and head of the Civil Engineering Department and the Offshore Engineering Center at Universiti Teknologi PETRONAS. Noor Amila W.A. Zawawi is deputy head of the Civil Engineering Department at Universiti Teknologi PETRONAS as well as the secretary of the SKG11-UTP steering committee. Fakhruddin M. Hashim is associate professor of the Mechanical Engineering Department and director of the Deepwater Technology Research Group.