



The Shell EMI Chair in Offshore Engineering at UWA



UWA'S UNIQUE O-TUBE FACILITIES ALLOW FULL-SCALE SIMULATION OF OCEAN-SEABED INTERACTION IN EXTREME METEOCEAN CONDITIONS



The Shell EMI¹ initiative in offshore engineering aims to strengthen UWA and Western Australia's position as a global offshore engineering hub, through world-class research and education. Shell Australia supports four UWA academics:

- The Shell EMI Professor of Offshore Engineering, David White
- The Shell EMI Professor of Offshore Structures, Mike Efthymiou (formerly Shell's General Manager of Offshore Structures)
- Two Assistant Professors: Dr Wenhua Zhao and Dr Hugh Wolgamot.

¹ EMI: UWA's Energy and Minerals Institute

These academics are integrated into UWA's wider team of ~40 researchers in offshore oil and gas. The Shell EMI team teach across UWA's cohort of >100 undergraduate students in offshore engineering, as well as delivering courses to industry in Perth and overseas. Their research involves close collaboration with companies in Perth and at other global oil and gas hubs including Houston, London and Oslo.

The research spans offshore engineering, from geotechnics to metocean, building on the platform of UWA's world-leading Centre for Offshore Foundation Systems. A key aim is to realise Australia's first mover advantage in the expertise of efficient FLNG operations.

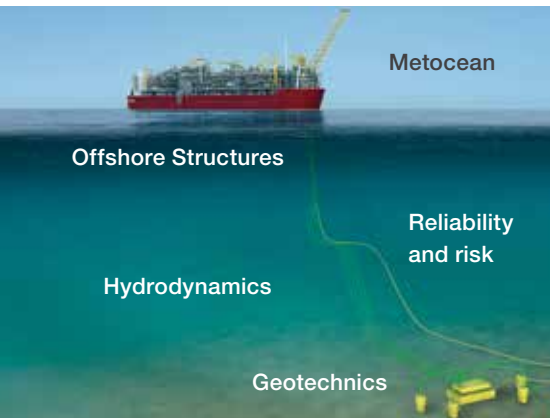
The first two years of the Shell EMI Chair in numbers

- 4 academic staff appointed
- \$2M of new research initiated
- 5 short courses taught to Shell and the wider industry
- 14 lunchtime briefings given to an invited industry network



(LEFT TO RIGHT) PROF. MIKE EFTHYMIU, PROF. DAVID WHITE, DR WENHUA ZHOU AND SHELL'S JAN FLYNN IN THE UWA CENTRIFUGE CONTROL ROOM.

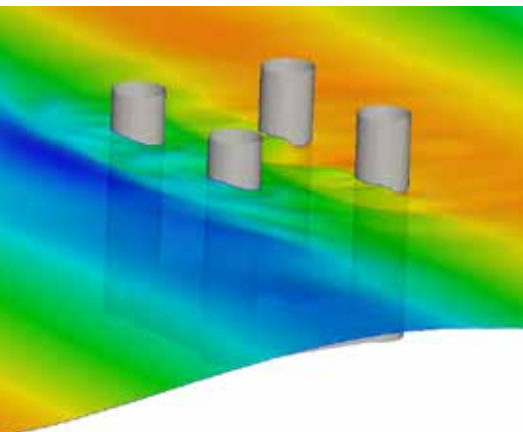
- 47 academic papers produced including 5 contributions to OTC Houston
- 4 awards, recognising excellence and innovation
- 8 research workshops held with Shell – in Perth, KL and Rijswijk
- >200 students lectured on offshore engineering – from floating systems to geomechanics



SCOPE OF THE SHELL EMI CHAIR IN OFFSHORE ENGINEERING.

UWA: world-leading facilities

UWA's offshore engineering research is underpinned by world-leading facilities for modelling offshore systems, including Australia's National Geotechnical Centrifuge Facility, and three O-Tube cyclone simulation flumes – which are uniquely capable of reproducing extreme metocean conditions at the seabed, for example to study pipeline stability. UWA also has leading technologies for numerical modelling of geotechnical and hydrodynamic systems.



UWA'S CFD TECHNOLOGY ALLOWS SIMULATION OF COUPLED WAVE-STRUCTURE INTERACTIONS, SUCH AS WAVE-IN-DECK.

Examples of 2013-4 research FLNG hydrodynamics and mooring

Physical and numerical modelling of multi-body hydrodynamics is being used to optimise predictions of FLNG operations. Outcomes from research by the Shell EMI team are being applied to Shell projects. Shell-UWA collaborative research is also exploring improved predictions of the metocean environment offshore Australia as well as new solutions for anchoring FLNG units.



SHELL AND UWA ARE COLLABORATING ON PHYSICAL AND NUMERICAL SIMULATIONS OF FLNG OFFLOADING AND OTHER FLOATING SYSTEM RESPONSES.

Remote intelligent geotechnical seabed surveys JIP

Shell is supporting a JIP led by Shell EMI researchers that is developing new geotechnical survey technologies, to provide improved predictions of seabed properties.

Buckling and walking of pipelines

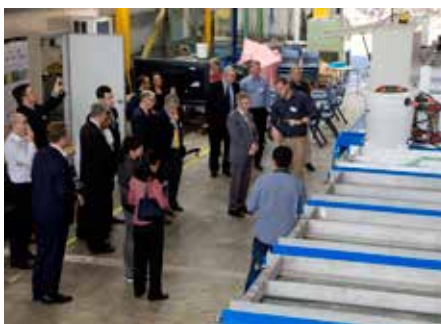
The Shell EMI researchers have developed new methods for assessing pipeline-seabed interaction. The research has seen rapid adoption in the 2014 update of the SAFEBUCK Guideline which will soon merge with the DNV RP-F110 design code. The new methods are being applied by Shell and other operators, leading to improved assessments of lateral buckling and axial walking, often with cost savings through reduced mitigation works.

Pipeline stability on mobile seabeds

New procedures for pipeline stability design are being pioneered by the Shell EMI researchers, through UWA's O-tube program and the STABLEpipe JIP. The research uses a new paradigm with the stability of the seabed as the foremost element. A new guideline has been approved by DNV and is unlocking designs with more efficient stabilisation strategies. This project has won numerous industry awards.

Stakeholder engagement

The Shell EMI initiative has raised the profile of Western Australia's offshore engineering expertise through community events such as UWA's Open Day and Shell's Innovation Open House.



A DELEGATION INCLUDING THE WESTERN AUSTRALIAN MINISTER FOR PETROLEUM, BILL MARMION, VISITED UWA'S LARGE O-TUBE FACILITY TO LEARN ABOUT OUR PIPELINE STABILITY RESEARCH AND TO EXPERIENCE A SMALL CYCLONE.

Learning and development

The Shell EMI initiative supports learning and development within Shell and across the industry. The education programme includes a range of activities:

- specialised short courses to industry practitioners, in Perth and overseas
- undergraduate teaching and postgraduate training at UWA
- public lectures and invited briefings on advances in research and practice, as well as current Shell projects such as Prelude FLNG.



SHELL EMI PROFESSOR OF OFFSHORE STRUCTURES MIKE EFTHYMIU DELIVERED THE 2ND LLOYDS REGISTER LECTURE IN SINGAPORE IN 2014, ON THE SAKHALIN PROJECT AND PRELUDE FLNG – SHOWN HERE WITH PROF. Y.S. CHOO OF NATIONAL UNIVERSITY SINGAPORE.



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