



# UWA's O-Tube program: A research revolution

CENTRE FOR OFFSHORE FOUNDATION SYSTEMS

Established in 2009, the Centre for Offshore Foundations Systems and Civil and Resource Engineering's award-winning O-Tube program is focused on a unique facility. Designed and built by UWA's in house technical team led by Liang Cheng and Dave White, the O-Tubes are recirculating flumes through which water is rapidly circulated, simulating extreme underwater wave and current conditions. Together, the large and mini O-Tube are revolutionising research on pipeline stability design and sediment transport. This program pioneers improvements in engineering designs and promotes safety, reduces human and environmental risks and optimises infrastructure investment.

## How it works:

The O-Tube can simulate some of the most severe underwater cyclonic conditions in the world in a controlled lab environment, demonstrating how seabed sediment, pipelines, other infrastructure and flora interact with the marine environment. By forcing 60 tonnes of water through the 1.5 meter square working section with a 16 m-long bed of natural seabed soil, researchers are able to track the impact of wave and current loading on underwater infrastructure.

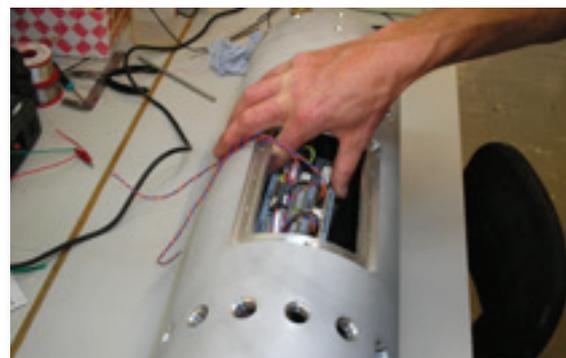
The mini O-Tube, at 1:5 scale of the larger O-Tube, allows for rapid turnaround on smaller scale experiments and has been instrumental in studying in-situ soil erosion, a new research stream made possible by funding from the Australian Research Council and oil and gas industry partners, who report a benefit-to-cost ratio greater than 10:1 on their investment.

## Clients:

The O-tube Program was initiated by UWA in partnership with Woodside, Chevron and the Australian Research Council, with support from local engineering consultancies Atteris and J P Kenny. O-tube tests have been conducted for leaders in the offshore industry including Advanced Geomechanics, Apache, Arup, Attaris, BHP Billton, BP, Chevron, JP Kenny and Woodside.

## Awards:

The UWA O-tube facility has won four awards over the past year, including the Innovation and Development category of the 2012 WA Engineering Excellence Awards, Australian Gas Technology Innovation Award and the Subsea Energy Australia Innovation and Technology award. The team also received a 3-year ARC Discovery Grant to tackle the fundamentals of seabed scour near pipelines.





#### The O-Tube Program by the Numbers:

- Planned length of pipelines to be installed offshore Australia in next 10 years: 3000 km
- Cost of pipeline stabilisation works for these pipelines, to be potentially reduced through O-tube research: \$5 billion
- O-Tube facilities in the world: 1
- Number of O-Tubes at UWA: 2
- Year O-Tube program was established: 2009
- Tons of water forced through a one meter high O-Tube flume allowing researchers to track the impact of wave and current loading on underwater infrastructure: 60
- Maximum current velocity in meters per second which can be simulated in the Large O-tube: 3
- Benefit-to-cost ratio of O-tube research reported by industry partner, Woodside: > 10:1
- Millions of dollars invested in developing UWA O-Tube program: > 4
- Number of parts in model pipe: > 150
- Scale of mini O-Tube to large O-Tube: 1:5

Find out more at: [cofs.uwa.edu.au](http://cofs.uwa.edu.au)



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