

## News Release

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### **SEA SUPPORTS EXPERIMENTAL INVESTIGATIONS INTO UNDERWATER ACOUSTIC EMISSIONS MONITORING WITH THE UNIVERSITY OF EXETER**

Cohort company SEA is supporting the University of Exeter on a research project into how Acoustic Emissions (AE) signatures can be used to monitor the condition of synthetic mooring ropes widely used in securing floating offshore structures.

The research investigates using AE signatures to assess the degradation of mooring lines by subjecting the ropes to sinusoidal tension-tension loading in a controlled environment, using a large-scale dynamic tensile test rig. AE is widely used for condition-monitoring in air, and shows great potential underwater.

With a linear array of 3 broadband (20 Hz to 50 kHz) hydrophones, four main signatures are identified: low-to high frequency, low-amplitude signals (50 Hz to 10 kHz), low-amplitude broadband signals (10 kHz to 20 kHz), high amplitude signals (10 Hz to 48 kHz) and medium-amplitude signals (500 Hz to 48 kHz). These AE types are related to different stages of rope behaviour, from bedding-in to degradation and failure.

The main findings are that the failure location and breaking load can be identified through the detection of AE. The occurrence of high amplitude AE bursts in relation to the applied tensile load allows the detection of an imminent failure, i.e. prior to the failure event, compared to most existing monitoring techniques which are capable of detecting the failure but not the degradation of mooring lines.

Using AE for remote monitoring could therefore become an attractive and less costly option than using submersible vehicles, where the task is often made more difficult when operations take place in challenging environments.

SEA supported the research with the provision of key sonar hydrophones. Ultimately the partnership will be supported with a NarcineArray low profile towed array, the commercial sister to SEA's defence driven KraitArray.

Dr Philipp Thies, Senior Lecturer Renewable Energy - Offshore Reliability; Programme Lead Energy Engineering at the Exeter University: *"We are delighted to work with SEA on this research project. They have been forthcoming with timely solutions wherever possible. The kind provision of their ball hydrophone enabled us to carry out these first of a kind experiments and we are very much looking forward to continuing our collaboration through future projects."*

**Footnote:**

The work was kindly funded by the Natural Environment Research Council (NE/L002434/1) and the SuperGen UK Centre for Marine Energy Research (EP/M014738/1, EP/P008682/1).

**Citation:**

Bashir I, Walsh J, Thies PR, Weller SD, Blondel P, Johanning L. (2017) [Underwater acoustic emission monitoring – Experimental investigations and acoustic signature recognition of synthetic mooring ropes](#), *Applied Acoustics*, vol. 121, pp. 95-103, DOI:10.1016/j.apacoust.2017.01.033. [[PDF](#)]

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**Notes to Editors:**

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**SEA** was acquired by Cohort plc in 2007 and today is a major supplier of applied research, technology development, systems integration, specialist electronic systems, engineering and software design services to the defence and security markets. Its engineering and project management skills include naval communications systems, maritime combat systems, through-life support, dismantled soldier systems, subsea engineering and traffic enforcement. Complementing its work for the UK Ministry of Defence, SEA is growing its business overseas and extending its expertise into adjacent markets, including offshore, railways and roads.

SEA employs circa 300 high-calibre staff and has offices in Beckington, Bristol, Barnstaple and Aberdeen.

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