October 2007

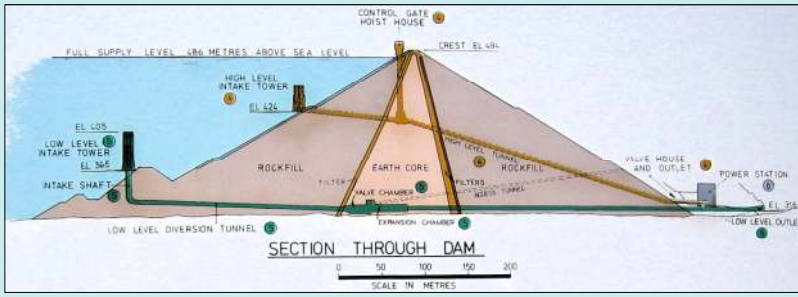
CMST News

The Newsletter of the Centre for Marine Science & Technology

#9

That Dam Job

Dartmouth Dam, in northern Victoria, is one of the highest dams in the Southern Hemisphere. Normally water is taken out of the dam from an outlet about 1/3 of the way down the wall, but the recent drought has resulted in the water level in the lake dropping below this level, which has necessitated switching to the dam's seldom used low-level outlet. The design of the low-level outlet, together with the high pressure head at this depth, results in cavitation in the flow downstream of the outlet's control valve. Under some conditions this can cause damage to the lining of the tunnel. CMST was approached to investigate the feasibility of acoustically monitoring the intensity of cavitation, and by inference, the potential for damage. Two site visits were undertaken late in 2006 to carry out some baseline measurements, after which a permanent acoustic monitoring system was built and installed on site in early 2007. CMST provided hydrophones, data aquisition equipment, and signal processing software developed in Matlab. This was rather an unusual application for CMST's marine acoustic capabilities but its success illustrates the group's multi disciplinary skills.



Cross-section of Dartmouth Dam illustrating the position of the low-level outlet.

PHOTO: ALEC DUNCAN

CMST's Mal Perry with the cavitation monitoring and data processing equipment.

Sonar Purchase

CMST has recently purchased a BioSonics dual-frequency sonar to support studies into:

- sonar performance in bubbly water,
- investigating the deep scattering layer of the Perth Canyon and the importance of this for feeding blue whales, and
- testing the feasibility of using high-frequency, sideways-directed sonar to study great whale blubber reserves.

It is envisaged that much of this research will be conducted jointly with the Centre for Whale Research.

Curtin's Inaugural Innovator-in-Residence

CMST will host the inaugural recipient of the newly created award of Curtin Innovator-in-Residence. Dr Nigel Gee, Royal Designer for Industry, and immediate past president of the Royal Institution of Naval Architects, will be hosted by CMST for 4 months in late 2008. Dr Gee was the founder of BMT NGA, designers of high speed ships, and is perhaps best known for his ground-breaking pentamaran ship design. The activities planned for his visit will address the following community issues:

- How should we engage industry and academe for maximum benefit of the marine community?
- What are the future needs and expectations for marine technology research?
- How do these needs impact industry and the wider WA community?
- What education and training programs need to be put in place to meet expectations?
- How do we link the Science and Arts components of marine design?

Dr Nigel Gee

Underwater Technology

As part of CMST's activities under the Facilities Program of the WA:ERA (Western Australian Energy Research Alliance), a new research fellow has been appointed. Mr Stuart Barrow joined CMST in September. He has a background of applied R&D in the underwater industry, particularly in the development of innovative underwater inspection techniques using ROVs. One of his first tasks is to conduct a review of underwater technology which was a recommendation of the WA:ERA Underwater Technology workshop hosted by CMST in late 2005.

Stuart Barrow

Chinese Collaboration

Sasha Gavrilov, John Penrose and Alec Duncan have been invited to participate in joint workshops at the Institute of Acoustics (IOA), Chinese Academy of Sciences, Beijing and the Second Institute of Oceanography (SIO), State Oceanic Administration, Hangzhou, China for 10 days in November. The workshops will cover a range of underwater acoustics topics including seabed classification and acoustic data acquisition.

For 2008, the Chinese and Australian Academies of Science have agreed to support the visits to Australia of 14 Chinese scientists. Of these fourteen, two are coming to work with CMST. Professor Jian-heng Lin and Assistant Professor Tao Hu, from IOA, will visit CMST in January 2008 to work with Sasha Gavrilov for 3 months.

Stereoscopic Cameras

CMST recently completed the development of five underwater stereoscopic video cameras. Four of these cameras were delivered to Welaptega Marine Ltd in Canada for use in ROV intervention projects (primarily in the North Sea) and the fifth unit is being retained by CMST for research and industry promotion.

The Centre for Marine Science & Technology (CMST) conducts world-class consulting, research, development and education for the marine industry and for government agencies.

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Waterfront Research

CMST's Waterfront Research Facility (WRF) at Fremantle Sailing Club, which opened in March this year, is now a hive of activity. It is providing a base for research staff to perform a range of work, in particular a large project investigating the effects of seismic activity on fish. Several fish tanks have been installed to house fish collected during a recent field experiment off North-West Australia. The fish will be observed for behaviour changes to different sound levels and frequencies as part of the continuing effort to answer the question: how do marine fauna respond to human-made noises in the water?

Another project about to start at the WRF is the trialling of an underwater acoustic communications system. This involves mooring a surface buoy and acoustic modems in a quiet corner of the harbour and monitoring the communications link over a period of weeks. This trial is a collaboration with metocean company RPS (formerly MetOcean Engineers), and forms part of CMST research student Grant Pusey's project on the use of acoustic modems for subsea pipeline condition monitoring.

CMST has also reached agreement with the WA section of the Royal Institution of Naval Architects to house their library of specialist naval architecture publications at the WRF. This is possibly the State's largest repository of naval architectural works.

The collaboration with Fremantle Sailing Club continues to grow, with CMST staff and students helping the Club with their annual harbour cleanup on a wet and windy Sunday in August. This was a great team effort with dozens of Club members and staff, some Curtin volunteers, and many student divers from UWA and Murdoch University all cleaning up the harbour seabed.

Fish tanks at the CMST Waterfront Research Facility

CMST Lunchbox Seminars

CMST holds weekly seminars, with speakers from interstate and overseas, as well as CMST staff.

The schedule of seminars is listed on our website:
www.cmst.curtin.edu.au/seminars

If you would like to receive email updates regarding CMST seminars, simply send an email to the following address:
seminars@cmst.curtin.edu.au