

Drawing the bubble curtain for sound attenuation

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The idea of using compressed air in the water as a tool of environmental protection has been around for many years. This has been in the form of aeration for lake restoration, ice-prevention, reduction of salt and silt intrusion into ports and as pneumatic oil (bubble) barriers. Hydrotechnik Lubeck has built all of the aforementioned systems.

For the last two years Hydrotechnik has been investigating a new application for the bubble curtain which also plays a part in environmental protection: underwater sound attenuation in the vicinity of building sites where piles are driven, as well as during underwater blasting activities. In 2008 tests were carried out for both of these cases.

The attenuation effect during pile driving was measured during the driving of a 60 m long Monopile, with the diameter of 4.7 m for the research platform FINO 3, which is under construction in the north sea, 45 miles west of the island Sylt. During the pile driving operation, a bubble curtain of 460 m in length was placed around the site. The sound generated by the driving operation was measured by ITAP (Figure 1).

To protect the whales which are living in a nature reserve not too far from the site, the bubble curtain was in operation for the whole time of the pile driving. The measurements were taken inside and outside of the bubble curtain. In total the attenuating effect was between 12 and 16 dB which was higher than expected. Further and more detailed measurements of the effectiveness of the bubble curtain are planned during the construction of the offshore wind energy project alpha ventus in the spring of 2009.

After the war, a huge amount of ammunition was dumped into the North- and Baltic Sea. Normally these bombs, which consist of approx. 350 kg of explosive, were detonated as soon as they were seen as a danger to the public. Besides other marine animals, these blasts are endangering the last of the whales in the Baltic Sea and because of this, the removal of the bombs by detonation is no longer considered appropriate. Because at present there are no other practicable methods of removal than by ignition, the Interior Ministry of Schleswig Holstein and Hydrotechnik carried out 25 test blasts in which the effectiveness of the bubble curtain was measured by the FWG (Figure 2). The test shows that the bubble curtain is reducing shockwaves by 17 dB. Through this shockwave reduction, the endangering area of 3.1 km² has now been reduced to 0.054 km².

Based on the experience gathered in many other applications of underwater air systems, Hydrotechnik designed, manufactured and deployed special nozzle pipes to ensure an optimal distribution of the compressed air which formed the bubble curtains.

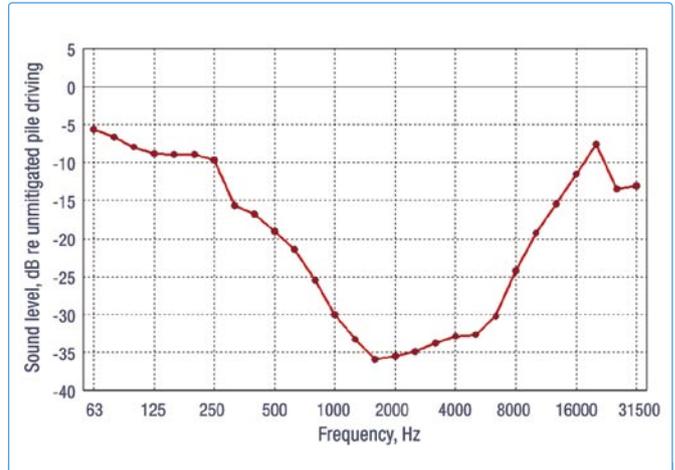


Figure 1. Pile driving: Frequency related effect of bubble curtain.

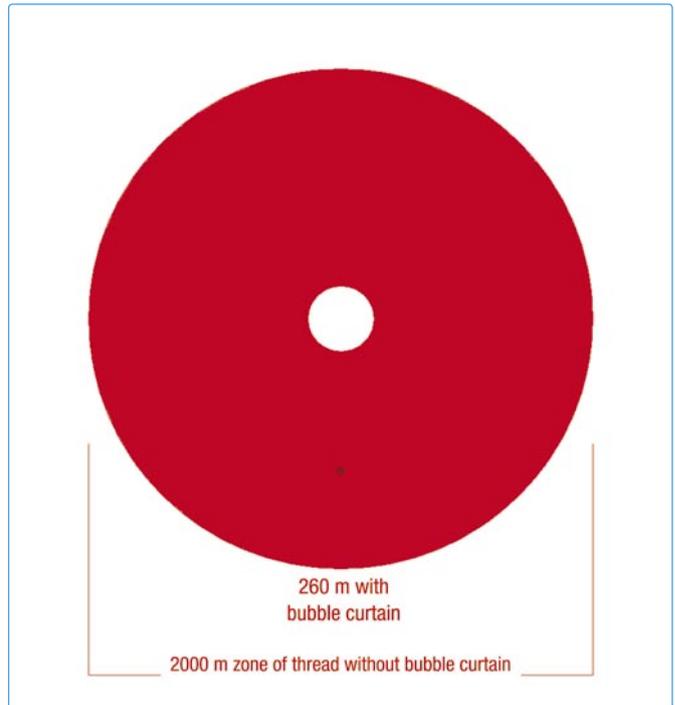


Figure 2. Blasting: Reduction of zone of thread.

ABOUT THE COMPANY

Based on more than 30 years experience in environmental protection and special marine construction **Hydrotechnik Lübeck** combines expertise in planning, manufacturing and installation under one roof.

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