

## **Sercel's solid streamer design reduces noise**

*Sercel's Sentinel<sup>®</sup> solid streamer solution can reduce noise in the seismic image by around 15dB compared to gel filled designs.*

Towing a streamer in turbulent seas inevitably introduces unwanted noise into the data recorded by the hydrophones. As well as external sources of noise such as rigs and other vessels, which can be filtered out, the major sources of noise are mechanical noise from vibration and fluid flow.

Vibration noise can come from many sources, including the variable stress on the cable as it is pulled through the sea, the towing vessel, tail buoy and sea motion and increases rapidly as the conditions become more turbulent. Flow noise is caused by the motion of water across the cable and is generally small compared to vibrational noise, so is only important in very calm sea conditions.

Minimising this noise is essential in order to generate the best quality data and Sercel's solid streamer design reduces the transmission of unwanted vibrations into signals at the hydrophones.

### ***Streamer design past and present***

Traditional streamers are filled with a fluid or gel and are divided by solid blocks which do not allow fluid to pass through. Axial vibrations, travelling along the cable, are transmitted to the hydrophones by bulge waves, where the skin of the streamer bulges out where the fluid is under higher pressure and contracts where the fluid is at lower pressure. These pressure variations are seen as signals by the hydrophones.

Several ways exist to minimise the effect of noise in fluid filled streamers. Since any single hydrophone can be very noisy, an array of hydrophones can be used together to give a better signal. In another approach, hydrophones can be placed so that bulge waves of equal strength but opposite polarity cancel each other out.

However, when sea conditions become more turbulent, problems with mechanical noise are still problematic, and this is often a reason for loss of operational time because of unacceptable degradation of streamer data quality.

In solid streamers the buoyancy fluid is replaced by a buoyant flexible polymer, usually either polyethylene or polyurethane based. The hydrophones are isolated by a stiff package which resists the stress and strain of the passage of axial extensional waves. In Sercel's Sentinel<sup>®</sup> design the individual hydrophone elements are isolated from the hydrophone carrier and the carrier is also isolated from the cable.

Using these construction techniques Sercel has achieved a 15dB to 20dB noise reduction compared to a typical gel-filled streamer at certain frequencies (see Fig. 6).

The company claim their < 2Hz performance provide the most precise low frequency data collection available allowing the application of advanced acquisition and processing techniques for more accurate interpretation and enhanced imaging of deep targets.

Solid streamers are also generally less sensitive to mechanical noise originating from sea swell effects, can be towed shallower without a significant noise increase, and are less sensitive to vibration from depth controllers (birds) and mechanical towing equipment. Sercel combine their streamer with Nautilus a specialist acoustic positioning and steering product to optimise seismic recording and maximise productivity even in marginal weather conditions.

Solid streamers can therefore extend the available data acquisition time while providing an improved signal to noise ratio. This makes the best use of operational time and also allows useful data to be obtained in higher seas.

### ***Sentinel<sup>®</sup> RD***

Sercel has delivered over 4,000 km of Sentinel<sup>®</sup> streamers to more than 60 seismic vessels worldwide since its introduction in 2005.

Its latest product, Sentinel<sup>®</sup> RD, has a reduced diameter, providing 7% less cable drag and 15% increased storage capacity onboard seismic vessels, which allows newly built vessels to be designed with smaller winches.

It weighs approximately 15% less while still maintaining the same performance as its predecessor system, and is fully compatible with Sercel Seal 428 data acquisition systems and Sentinel<sup>®</sup> streamers.