



PHOENIX ENGINEERING SYSTEMS

Tailored Engineering Solutions for
Seismic and Defence Markets

WHO WE ARE

Phoenix Engineering Systems Pty Ltd is a cutting edge engineering and manufacturing business based in Sydney, Australia. The company has been in existence since July 2007 and is accredited to ISO9001:2008 for project management, systems engineering, hardware design, development and verification, and the manufacture of vibration isolation devices.

Phoenix is a multi-faceted business with a focus on the design, development and manufacture of vibration isolation devices for use in towed and ocean bottom sonar arrays, design and development of nano-particle hydrophones, and general engineering consulting in a broad range of industries including sonar, marine engineering, transport and construction equipment.

Our engineering team is at the forefront of design and research. Each team member brings a highly specialised skill set ensuring Phoenix is well equipped to cover all arenas of mechanical, marine, electrical, electronics, acoustics, sonar and chemical engineering.

Our production team consist of highly experienced operators whose expertise covers assembly and test of vibration isolation equipment as well as seismic cable cable repair, and operates under the leadership of a highly experienced management team.



Phoenix Calypso line was designed by Phoenix on lean enterprise principles. The line contains several special purpose machines designed and built by Phoenix.

TESTIMONIALS

Phoenix assisted us in managing a very important project by providing systems engineering and project management skills.

We have found their experienced staff to be very helpful in helping keep our project on scope and on time.

Dale Lambert

VP of Engineering

1/0 Marine Imaging Systems Division USA

Phoenix provided Benthic with engineering support on a highly technical project and contributed significantly to its success.

Stuart Weyland-Smith

General Manager Technical Services

Benthic

FACILITIES

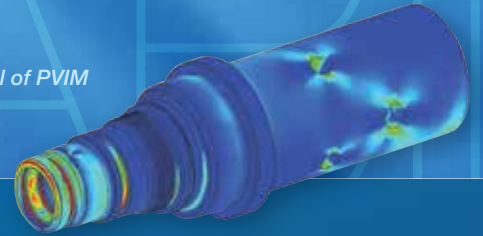
Phoenix has a dedicated design office and utilises the Autodesk Inventor 3D cad design suite with multi component, multi material finite element analysis capability. All design is carried out using 3D modelling techniques and the system is backed by a robust configuration management system.

Our flexible test and development lab includes a C-Boss test rig, a de-tensioning test rig, a vibration isolation test rig, long sample tensile test, crush testing, pressure testing and a 100Kn Instron universal test machine as well as various electrical test capabilities.

The company maintains two sites: one facility for the manufacture and repair various towed array products and general design and development work. The second is a high volume manufacturing facility for ocean bottom VIMs with a capacity of 200 to 720 VIMs/week.

CAPABILITIES

Finite element model of PVIM connector housing.



Research and Development

Being at the forefront of cutting edge engineering, it is a vital requirement that all Phoenix personnel possess an aptitude for technically sophisticated research. Each team member brings a highly specialised skill set providing them with the ability to carry out the necessary research and development for a multitude of fundamental projects. Research in the area of nano particle hydrophones and the physics of noise control in towed arrays are examples of the projects our engineers are working on both of which will play an important role in the next generation of sonar systems.

Our engineers are also highly capable of carrying out product design and development on exclusive products for clients like the proprietary interface and telemetry designs for VIMS or innovative product designs such as the ION Calypso VIM for ocean bottom applications.

Participation in the development of a deep sea bed shear wave velocity profiling system and assembly process instructions for a large construction equipment manufacturer are just two of the successful projects Phoenix have completed for external clients recently.

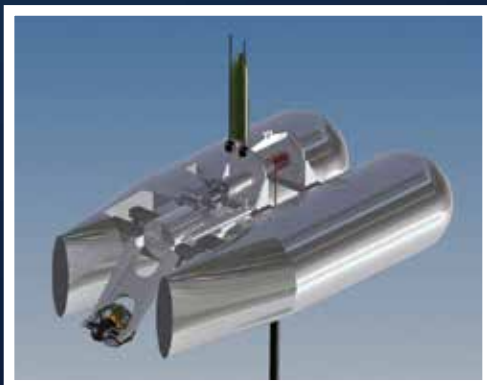
Production Tooling and Process Development

The capabilities of the Phoenix team are not just limited to product design and development. They are also highly skilled in the area of production process and tooling design. A recent project saw the completion of a new production facility for ocean bottom VIMS, based on the principles of lean enterprise, the key pillar of which is effective quality control. This facility incorporated the design of several new innovative machines designed and built by Phoenix and not available anywhere else.

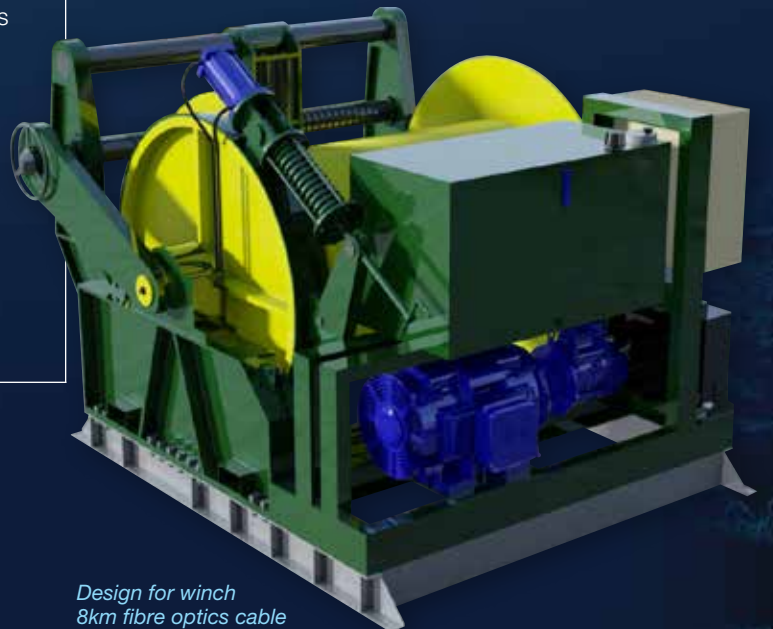


Product Design and Qualification

Phoenix engineers have a long standing reputation for creating ground-breaking products offering significant improvements in performance and overheads when compared to traditional products. Evidence of this is shown in the recent range of VIMs for towed arrays which offer significant operational benefits to Seismic operators.

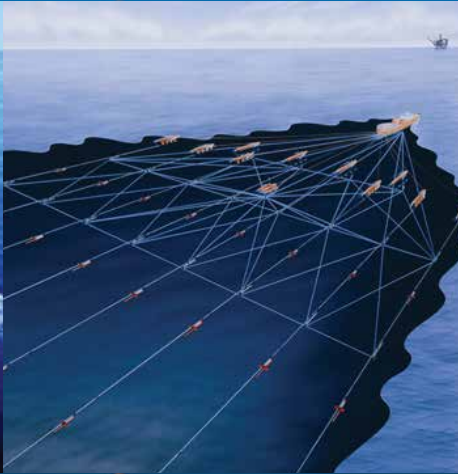


Design for Intelligent Head Buoy



Design for winch 8km fibre optics cable

WHO WE DO IT FOR



*Benthic ocean bottom drill, courtesy of Benthic.
www.benthic.com*



Phoenix has formed close working relationships with key leaders in their industry.

These include...

PRODUCTS AND PROJECTS

Phoenix VIMs for Towed Arrays

A large range of VIMs have been designed and tested in our purpose built facilities by our team of engineers. Phoenix VIMs are available in a range of lengths and three different load ratings. This offers operators the chance to achieve the best attenuation for a given streamer length as well as being able to target particular frequencies.

Leading operators within the industry have turned to Phoenix VIMs as they offer benefits in terms of flexibility, durability, noise, attenuation, operational efficiency, safety and are environmentally friendly.

No matter what the operating system or requirements, Phoenix's VIMs will deliver an optimised solution.

Phoenix VIMs are Available in Two Basic Types: **PVIM** and **PRVIM**



PVIM (Phoenix Vibration Isolation Module)

A Phoenix patented design, the PVIM offers a high level of noise attenuation in a very short length. The section is extremely robust setting the industry standard for damage tolerance. It has no oil or gel inside so there is no threat to the environment in the case of damage. PVIM's short length design makes for a section that is easy to store and handle on the back deck. If excessive bending moments are anticipated, PVIM can be configured with an integrated short flex section at either end to reduce loading on attached components.

PRVIM (Phoenix Radial Vibration Isolation Module)

Based on the radial VIM concept, the PRVIM is filled with a non-toxic and non flammable gel which has been formulated for this specific purpose. Radial VIMs are common in the market but generally have a poor reputation for reliability. Phoenix has conducted in-depth studies into the common causes of radial VIM failure and developed countermeasures to make PRVIM the most reliable radial VIM in the market. The Phoenix PRVIM is neutrally buoyant and typically offers a lower notch frequency than PVIM so is useful for operators targeting low front end weight in water or very low frequency noise. The high frequency attenuation of PRVIM is also excellent.



Phoenix PVIM - Mini streamer ends for reducing bending movements during recovery and storage.

*Robust design on PVIM
mechanical interface*

Both PVIM and PRVIM are low diameter sections and can be handled and stored using exactly the same equipment as is used for the main streamer. Both sections can be wound directly onto the drum on recovery, an advantage in terms of operational efficiency and back deck OH&S. Both sections can be configured to suit any telemetry system and mechanical interface.

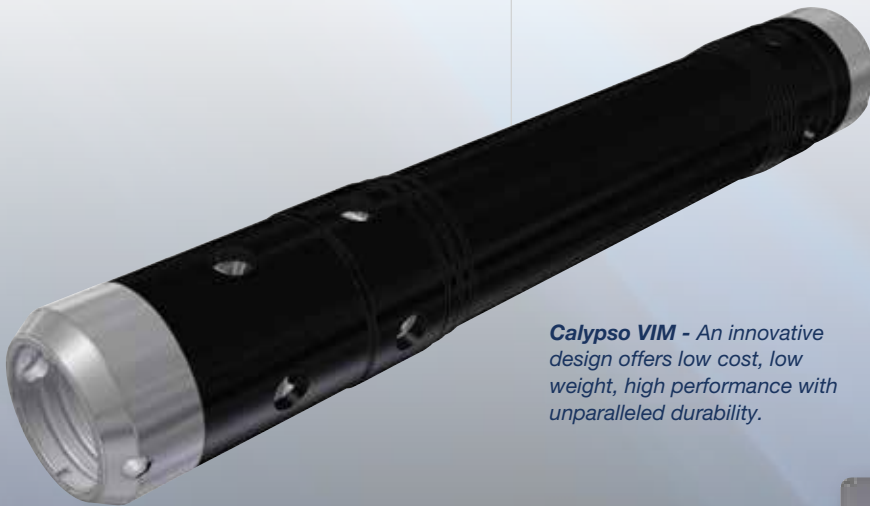
- **Nano Particle Hydrophone Design**

Phoenix is currently in the process of developing new technology in hydrophone and vector sensor design based on the use of nano particle materials. The technology offers the potential for offering a significantly lower channel cost and opens up exciting opportunities in design and application in the military and seismic markets.



- **Calypso Ocean Bottom VIMs**

Designed and manufactured on an exclusive basis for ION geophysical for use in their ground breaking Calypso 4 component ocean bottom system, Calypso Ocean Bottom VIMs were designed and developed to fit within a challenging set of cost, weight, strength and performance targets. Phoenix is able to work on exclusive products for customers providing there is no conflict with existing contracts.



Calypso VIM - An innovative design offers low cost, low weight, high performance with unparalleled durability.



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BUREAU VERITAS
Certification

