

Benthos, INC.

With 43 years in business, Benthos, Inc. is one of the oldest oceanographic equipment manufacturers in the world. Today, the company is in the process of re-inventing itself as a leaner, stronger organisation poised for further growth in the 21st century.

Benthos was founded in 1962 by Samuel O. Raymond in a barn behind his home in North Falmouth, Massachusetts, a few miles from the research facilities at Woods Hole. During its first three decades, the company placed particular emphasis on supplying underwater equipment to military, government and research markets. In 1999, Benthos expanded its offerings by acquiring Datasonics, Inc., a supplier of geophysical products for commercial users.

Lean Enterprise

Financial support for remaking Benthos came from the Commonwealth of Massachusetts when, in October 2000, a US\$240,000 grant in matching funds was awarded to the company. This allowed the company to embark on a two-year programme towards becoming a best-practices lean enterprise, based on lean manufacturing concepts.

These efforts had a positive effect. Benthos was value mapped, fully understood, analysed and re-made into a lean enterprise. Training was provided for manufacturing, administrative and engineering personnel. Specific courses included, Lean Manufacturing, The Visual Workplace, Administrative and Manufacturing Kaizen Blitzes, The Voice of the Customer, World Class Engineering Design Practices, the Supply Chain/Purchasing and Statistical Engineering. In total, more than ten thousand man-hours of training, implementation and project work was conducted.

Benthos was able to achieve a considerable reduction in manufacturing workspace; on one product line, a 70 per cent in workspace reduction was achieved. The company was also able to consolidate all of its operations into one primary facility where it had previously had two. These improvements aided significantly in the production of 48 MiniROVER MKII systems delivered to a customer in Malaysia in the second quarter of 2002. These units were built in only 46 days from receipt of the order to shipment.

Another area targeted for improvement was the product development process and this has been a primary focus over the past year. A new product development process is now in place that helps Benthos engineering more efficiently target the most important market opportunities. New procedures have resulted in a complete update of the company's geophysical products, the first major redesign of these since they were acquired from Datasonics in 1999. Benthos is now unveiling two new geophysical systems: a multi-ping sonar system and a swath bathymetry 3D side scan sonar system.

As of August 2003, the management of the company believes that it has already emerged stronger and better equipped to handle the challenges of the ocean industry.

Products

Today, the company's line of undersea products and systems includes:

- Acoustics

The acoustics product line features deep-water, heavy-duty releases rated to depths of 12,000 meters. The line also includes low-cost releases for very shallow water and to depths as great as 2,000 metREs. The releases feature load capacities ranging from 4,400 to 50,000 pounds. The acoustic product line also includes both expendable, low-cost, transponders designed for use when ship time is critical and the recovery of the transponder is neither desirable nor necessary, and recoverable transponders designed for use in those undersea operations requiring cost-effective deployment where recovery is a necessity. The acoustics products line also includes a full range of relocation products, including pingers, transponders, emergency locator beacons, and commercial and recreational diver products. Benthos' FAA pingers are used on flight data and voice recorders required in all commercial aircraft.

- Flotation

Benthos is a manufacturer of deep-sea glass spheres, used to provide buoyancy to underwater products and systems and to house underwater instruments and electronics. A revolutionary concept when first introduced to the world in 1969, deep-sea glass spheres have become commonplace in seas throughout the world.

- Geophysical

Until 1999, Datasonics was known as a supplier of geophysical products. Now under the Benthos umbrella, this product area continues to thrive and includes side-scan sonar systems and sub-bottom penetrating sonar systems. These systems are used to obtain profiles of the contour of the ocean floor by searching for unusual shapes that could indicate a man-made object, such as a shipwreck.

A typical system includes a towed body transducer array, onboard signal processing electronics, and control and display software running on a PC or workstation. New product developments will allow Benthos again to bring innovation to the marketplace with the first combined high-resolution swath bathymetry and side-scan sonar. The co-registered topography and side-scan imagery is designed to be of value for many applications, from military, harbour clearance, and oil and gas to marine fisheries habitat studies. The technology also provides great flexibility for working on fixed-mount towed vehicles, AUV, UUV and ROV platforms.

- Hydrophones

Benthos hydrophones have proven invaluable in locating promising oil and gas mining sites. These hydrophone products are also used by the military to detect submarines and other vessels both under and on the surface of the ocean. The company also supplies hydrophones to research institutions where they are used for various purposes, such as listening to marine animals.

- **Modems**

In many underwater applications, a wire connection with submerged instrumentation is either prohibitively expensive or not feasible. Benthos has pioneered the development of underwater acoustic modems for the wireless transmission of data underwater. These modems provide reliable, wireless digital communication between deployed underwater instrument packages and surface or sub-sea platforms or shore-based stations at data rates up to 2,400 baud. Product development has been strongly supported by both military and commercial interests and has resulted in the most advanced multipath and noise tolerant communication system yet available.

- **Remotely Operated Vehicles (ROVs)**

Benthos is currently producing the Stingray ROV system. Stingray systems are small, lightweight, inspection-class ROVs designed to perform a variety of underwater missions. They are equipped with high-resolution video cameras, lights and powerful thrusters which allow them to operate in marine environments that could pose a risk to divers. A single system includes an underwater vehicle, a remote control operator handbox, a topside control console, high-resolution video display and a tether with storage reel. The Canada Customs and Revenue Agency recently selected this system for use in harbour and port security operations, particularly ship hull inspections. These inspections can include searches for parasitic attachments containing illegal narcotics, explosives and weapons of mass destruction.

Personnel

Ronald L. Marsiglio is Benthos President and CEO. Mr Marsiglio graduated from the University of Illinois with a degree in electrical engineering and later earned an MBA from Loyla University of Chicago. He spent most of his career working in the consumer electronics industry with Philips Electronics, holding positions in product development and marketing, including the position of Vice-President of Marketing for the Magnavox and Philips brands. In 1995, Mr Marsiglio was promoted from his position as General Manager of the Philips North American Television Business to become President and CEO of Philips Automotive Electronics. He most recently served as President and CEO of VDO North America, a major manufacturer of electronic components for automotive OEMs.

Other key company staff includes Francis E. Dunne, Francois Leroy, Art Robleto and Rick Martin. Mr Dunne, who has an extensive background in finance and accounting, serves as Benthos Treasurer and Chief Financial Officer. Mr Leroy, Vice-President of Sales and Marketing, joined the company earlier this year and was formerly Vice-President of Finance and Sales for Triton Elics International, Inc. of Watsonville, CA, a developer of specialised software and integrated systems for underwater acoustic imagery. Mr Robleto, Director of Engineering, joined the company in 2002 and is the former Director of Systems Engineering for the Optical Networking Division of Verilink, Inc., Boston, MA. Mr Martin, Director of Manufacturing, also joined the company in 2002 and was formerly the Materials Manager for Danaher Corporation - Pacific Scientific in Wilmington, MA.

The external Board of Directors is headed by Chairman Dr Stephen D. Fantone. Since 1982 Dr Fantone has been President and Chief Executive Officer of Optikos Corporation, an optical engineering firm that he founded and which specialises in the design and manufacture of optical products and instrumentation and optical test equipment. Other Benthos directors include Samuel O. Raymond, founder of Benthos, who in 1997 was elected Chairman Emeritus of the Board and Director of Research to the Company.

Today Benthos is a company motivated by growth. "Our primary goal is to remain a technology innovator," says Ron Marsiglio. "We wanted to seize upon the many new techniques and processes that were developed by other technology innovators and, as a result, have become a leaner, more streamlined organisation - ready for the challenges ahead."