

SEA CON: More Than 40 Years of Underwater Connector Innovations

By Michael Mulcahy

President

Michael Mulcahy & Associates Inc.

Alexandria, Virginia

In today's international business climate, companies often expand or move into new business areas by acquisition. By contrast, SEA CON® Brantner & Associates Inc. (El Cajon, California) has expanded the old fashioned way—through sustained internal growth. The company that began as a small connector manufacturer outside San Diego, California, has steadily grown and now has more than 600 employees. SEA CON is now the world's largest privately owned connector and connector systems manufacturer.

As company capabilities have evolved and global demand for its electrical and fiber optic connectors and systems has increased, SEA CON has established regional divisions in three countries, with offices in El Cajon; Bellville, Texas; Great Yarmouth, England; and Tijuana and Xalapa, Mexico.

SEA CON's divisions range in age from five to more than 40 years old, synergistically sharing the technological benefits of their common history from a small enterprise. This synergy allows SEA CON as a whole to maximize its responsiveness to its global customer base.

The four divisions share common capabilities, such as research and development (R&D), design and engineering, machining, manufacturing, hydrostatic pressure testing, molding and sealing technology, quality control, and field service. While each division



SEA CON Brantner & Associates Inc. employees at their headquarters in El Cajon.

specializes in certain products, orders placed through one division may be filled by another. The linking of all four SEA CON divisions not only allows the customer to benefit from shared technical knowledge and capabilities, but also results in customer savings through practical inventory management and economy of scale.

SEA CON Brantner & Associates Inc.

Founded in 1964 by Willard Brantner, Brantner & Associates started manufacturing rubber underwater electrical connectors in San Diego in 1968. The company moved to its present El Cajon facility in 1983, which currently encompasses 40,000 square feet.

While still providing military standard connectors, Brantner has focused on commercial connector solutions since the 1960s, developing tens of thousands of connector solutions for

use in some of the world's most challenging environments. Dry-mate electrical connectors were the focus for the first 20 years, and then optics were added. In the late 1990s, underwater mate-able electrical and fiber optic options were added to the product line.

SEA CON won its first U.S. Navy contract in the 1970s to supply connectors for a number of diverse applications. Since the 1980s, Brantner has been the connector manufacturer for the Navy submarine fleet's noise-monitor systems and has provided the Navy with numerous vertical arrays for classified applications, each with multiple break-away connectors that separate when the arrays/objects are deployed. The experience gained in supplying these assemblies enabled Brantner to design a cable assembly system for a completely different application, the Ice Cube Project, which involved deploy-

Reprinted from *Sea Technology* magazine.

For more information about the magazine, visit www.sea-technology.com



(Left) SEACON (europe) facility in Great Yarmouth.

(Below) Multiplex cable reel prior to installation of connector termination.



ing sensors within the Antarctic ice cap for neutrino detection.

Often, Brantner has developed technology in its California division that has been later refined by other divisions, sometimes developing applications that were unplanned at the outset. Brantner was the original development arm for most of the SEA CON divisions. In addition to the applications the divisions have developed on their own, they all work with technology and products that began at Brantner. Customers benefit from the company's long corporate memory and the fact that many Brantner employees have been with the company for more than 25 years.

SEACON Advanced Products LLC

SEACON Advanced Products LLC's growth has become a blueprint for expansion to keep pace with techno-

logical advancement and increasing capacity. In 1999, the Advanced Product group was formed at SEA CON's El Cajon headquarters to market two Lockheed Martin (Bethesda, Maryland) products—the HYDRASTAR wet-mate electro-optical connector and the CM2000 wet-mate electrical connector.

In early 2000, SEA CON developed a second-generation product, the eight-channel HYDRALIGHT, in collaboration with a Norwegian partner. The HYDRALIGHT was a variant of the earlier HYDRASTAR, with several major design enhancements resulting from customer feedback and an independent failure mode, effects and criticality analysis. In 2003, the HYDRALIGHT became the world's first connector to meet the Norsk Hydro (Oslo, Norway) Optical Connector Specification's

requirements for operation in harsh underwater conditions.

In 2004, SEA CON formed SEA CON Advanced Products LLC (SAPL) to continue developing underwater products. At the outset, SAPL was headquartered in El Cajon and had a staff of 14. Products and services included optical penetrators, low-cost optical wet-mate connectors, underwater switches and underwater connector consultancy services.

In late 2005, SAPL relocated 1,400 miles east to a five-acre facility in Bellville, about 50 miles west of Houston. By moving key engineering and technical staff from El Cajon and launching a local recruitment drive, SAPL immediately started production of optical connectors in Bellville.

In 2006, staff more than doubled to 33. Manufacturing of dry-mate optical

connectors, including the highly successful RUFF-NEK field-installable connector range, was transferred from the main company to SAPL, along with the design, development and manufacturing of underwater switches. SAPL established a field service and after-sales support department, operating 24/7, and installed in-house shock, vibration and temperature test equipment.

By 2008, SAPL sales growth continued and staff increased to the current level of 75. The company added a new 1,900-pound-per-square-inch pressure tank with an internal diameter of three feet and a length of eight feet. Investment in additional capacity, plus increasing in-house stock levels, resulted in a nearly 50 percent acceleration of delivery times. SAPL also introduced new products, including electro-optical subsea umbilical termination assemblies; optical jumper assemblies for production controls, defense, oceanographic research and remotely operated vehicles (ROVs); and the G3 (third-generation) optical wet-mate connector, which is a smaller, lower cost derivative of the second-generation HYDRALIGHT, achieving the same reliability in the field.

In 10 years the small in-house group that became SAPL has helped develop one of the industry's first wet-mate optical connectors, collaborated with Lockheed Martin to market a product developed for offshore oil industry applications, developed the industry's first field-installable down-hole optical splice system, formed a strong team of 10 highly trained technicians available at all times for cable installation and termination work around the globe, and expanded its product line from two to more than 20 product streams.

SEACON (europe) Ltd.

SEACON (europe) Ltd. (SCE) was formed in 1987 in Great Yarmouth, England, to supply the European market with electrical and fiber optic connectors and cable assemblies. The company's custom-built, 24,000-square-foot facility is home to a staff of 84. Although originally primarily a sales outlet, SCE now encompasses all the elements of a SEA CON manufacturing division, including R&D, design and engineering, manufacturing and machining.

To leverage its strategic location in the midst of the North Sea offshore oil

market, SCE stocks a wide range of its own connectors and those from other SEA CON divisions. Standard products can be dispatched quickly to meet urgent delivery requirements. Conversely, when required, SCE can tap the expertise of other divisions in the areas of engineering and manufacturing support.

Since its introduction in 1987, SCE's first connector, the wet-mate-able WET-CON, continues to be one of the company's most successful standard products. It is specified for applications including underwater cameras and lights, diver communications and ROV systems.

“The company that began as a small connector manufacturer outside San Diego, California, has steadily grown and now has more than 600 employees.”

In early 2000, SCE's continuous R&D effort led to the development of an explosion-proof connector based on SEA CON metal shell series technology. The dedicated design and engineering group applied the latest computer-aided design software packages and state-of-the-art computer numerical controlled machines during this development.

A requirement for a more robust wet-mate-able connector suitable for harsh environments led to SCE developing the U-MATE series. This connector range adapted the WET-CON series' proven sealing technology to a connector encased in a stainless steel shell. The latest version of the shell has a separate insert, making it fully interchangeable and more user-friendly. Renamed SEAMATE in 2005, this connector range is available in oil-filled or molded versions. Most recently, SCE has added an ROV version.

In addition to the large-scale electro-optic, oil-filled, pressure-balanced systems used extensively on blowout preventer monitoring equipment and its 48-channel connectors used for scien-

tific applications, SCE developed a standard dry-mate, fiber optic hybrid connector range called OPTI-CON. This unique design allows customers to choose any combination of optical and electrical configurations via interchangeable electrical or optic contacts.

SCE has developed progressively more sophisticated molding capabilities using materials such as polyurethane, neoprene, Hypalon, natural rubber, hydrogenated nitrile butadiene rubber and polyethylene. SCE was one of the first companies to develop the difficult process of bonding polyurethane to polyethylene.

In support of the group's global field service support, SCE maintains a team of highly trained engineers and technicians with the required survival and medical certificates to provide an immediate, professional response to any service requirement worldwide.

SEA CON Global Production

SEA CON Global Production (SGP) was established in 1989 in Tijuana, across the Mexican border from San Diego. This location was attractive to SEA CON because it was close to its California facility, so training and skill transfer could be easily managed, and the area offered high availability of skilled labor.

Starting as a small operation with five rubber-molded presses, the facility now has 40 presses and focuses on the production of standard SEA CON connector ranges, emphasizing high volume and low cost for original equipment manufacturer accounts. The original staff of seven has grown to more than 300.

The original range of products included Marsh and Marine® RUBBER MOLDED connectors, WET-CONs/Micro WET-CONs and ALL-WETs.

Glass-reinforced epoxy (GRE) work began in 1995 with a single press and has increased to eight presses, including three polyurethane presses. SGP has become the main GRE and rubber-molded manufacturer within SEA CON, and it produces more than 5,000 pieces per week.

From its original 800-square-foot facility, SGP now boasts a total of 30,000 square feet of manufacturing, testing and production space in both Tijuana and its newest plant, which opened in 2007 in Xalapa. SGP was attracted to this location because of the

“SEA CON is now the world’s largest privately owned connector and connector systems manufacturer.”

extraordinarily high level of technical education and low industrial turnover rate in the area. The Xalapa plant was established to produce standard high-volume connectors to not only enable SEA CON to meet ever-increasing delivery and quantity demands, but also to allow the Tijuana facility to focus on product development and the manufacture of more specialized products.

In 2004, SGP released the HUMMER connector series, a low-cost, small-profile, high-contact density dry-mate electrical connector, designed for use in the ROV/autonomous underwater vehicle markets and equipment and instrumentation throughout the oil and gas markets. In 2007, SGP released the GLOBE-CON, a more robust, high-temperature-tolerant variation of the HUMMER, designed specifically for the “pigging” (pipeline inspection) industry.

With a focus on new markets, SGP developed a system of in-ground lights in 2008 and then in 2009 developed Ethernet connector ranges based on existing SEA CON connector ranges built for Cat5, Cat5e and Cat6 applications.

Future Developments

SEA CON’s president, Pat Simar, joined SEA CON as sales manager in 1969 and has been in a position to witness the full history of SEA CON’s expansion of products and services. He sees a continued bright future for the corporation.

“Even in rough economic times, a company that parlays its strong technical grounding and sensitivity to customer issues to enable reliable equipment performance at ever-increasing ocean working depths will succeed,” he said. ■

Visit our Web site at www.sea-technology.com and click on the title of this article in the Table of Contents to be linked to the respective company’s Web site.

Michael Mulcahy is a former U.S. Navy officer and Sea Technology magazine managing editor. He has written more than 100 articles for the magazine. His interests include under-sea cables and connectors, marine engineering, naval architecture, commercial and military diving, remotely operated vehicle operations and ship salvage engineering.

©Copyright 2009 by Compass Publications Inc. *Sea Technology* (ISSN 0093-3651) is published monthly by Compass Publications Inc., Suite 1001, 1501 Wilson Blvd., Arlington, VA 22209; (703) 524-3136; FAX (703) 841-0852. All rights reserved. Neither this publication nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of Compass Publications Inc.