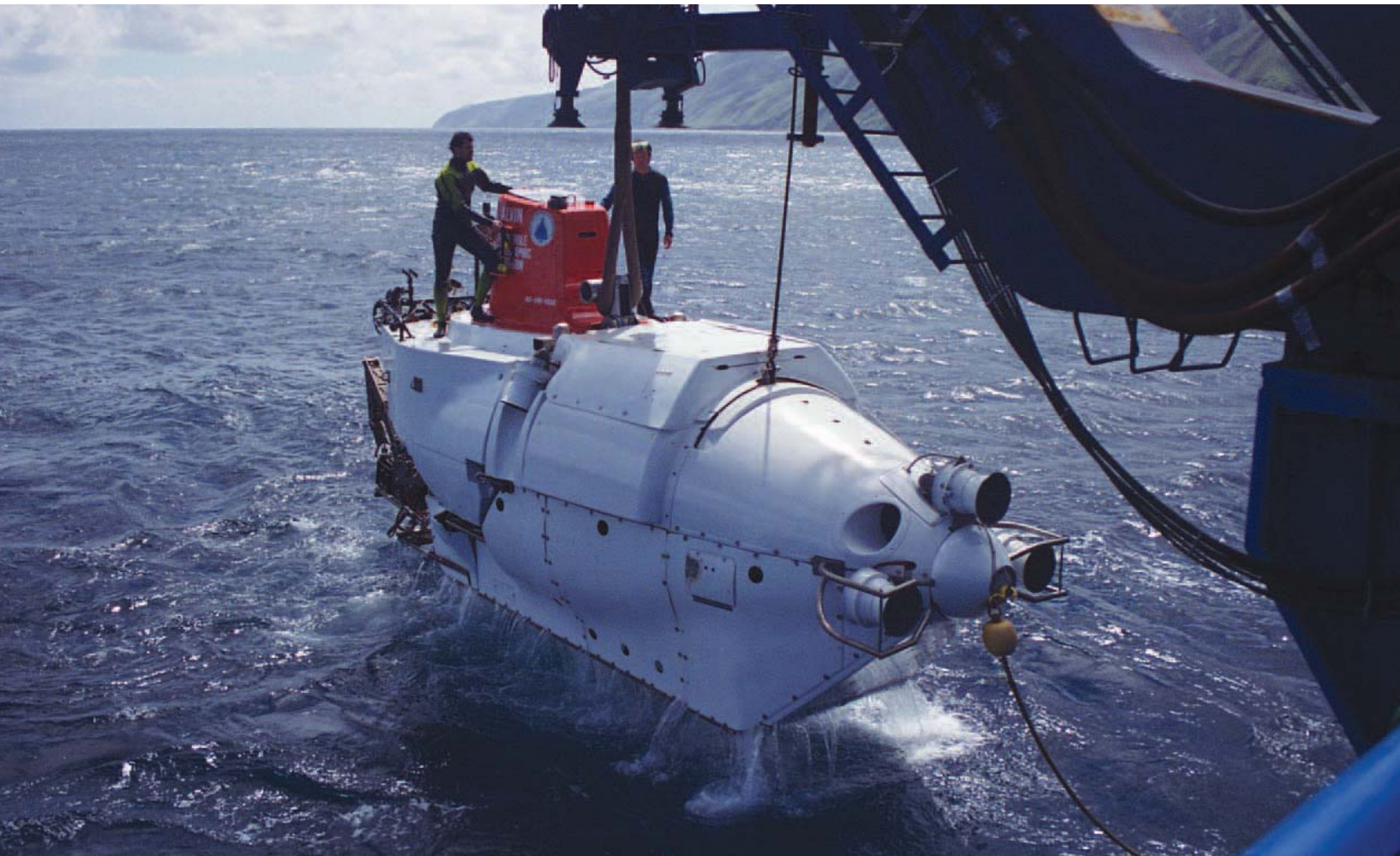
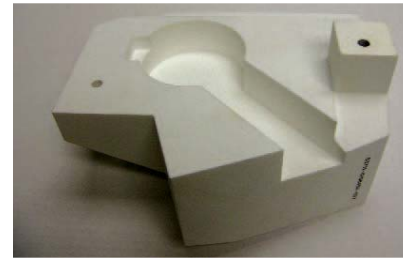
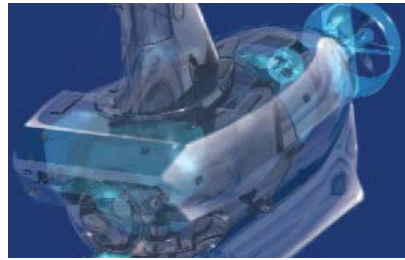


Syntactic Foams

Trelleborg Emerson & Cuming, Inc.



Trelleborg Emerson & Cuming, Inc. manufactures several different classes of syntactic foam for undersea buoyancy applications. Blocks of the foam are typically cast in 0.5 and 1.0 cubic foot sizes, which then are used to prepare large buoyancy modules that can be readily shaped to conform to hull contours and outfitted for installation in the forward and aft free-flood areas of submarines.

Oceanographers also depend on syntactic foams to suspend instrumentation in deep ocean studies. For these applications, the syntactic foam is used in either block form or custom molded shapes for installation in manned and unmanned submarines such as the famed Alvin and Jason vehicles that were used to discover and explore the Titanic.

Characteristics of Trelleborg Emerson & Cuming Microballon-based Syntactic Foams

Trelleborg Emerson & Cuming produces four different types of syntactic foams to meet the broad range of requirements of its customers.

EL Grade epoxy syntactic foams have been the materials of choice for manufacturing manned and unmanned submersibles for years with their range of densities and ability to withstand exposure to diesel fuels and hydraulic fluids.

TG Grade syntactic foams are lightweight and economical for building manned and remote operating vehicles. The foams have also been used to manufacture mine neutralization systems because of their zero magnetic and sea-water comparable acoustic signatures and to fabricate eyebrows for 688 class U.S. nuclear submarines because of their buoyancy, acoustic profile

and ability to significantly improve sonar functions.

DS Grade syntactic foams combine lightweight glass microballoons with multifunctional epoxy resin to produce ultra-high strength-to-weight materials for high-performance, deep sea applications including unmanned submersibles rated to perform at ocean depths up to 20,000 feet as well as man-rated submersibles.

VF Grade epoxy syntactic foams combine microballoons and macrospheres for ultra-light weight applications such as filling control surfaces on 688 class U.S. nuclear submarines. The Grade A shock-qualified castable syntactic foams are sold as kits for on-site/field use.

Product*	Density, ± 2 pcf	Service Pressure, psi	Service Depth, FSW
EL-30 EL-34 EL-36	30 34 36	3,000 9,000 11,000	6,750 20,000 24,000
TG-24 TG-26 TG-28	24 26 28	3,000 4,444 5,287	6,560 10,000 13,124
VF-22 VF-25S VF-38	22 26 38	266 1,000 1,332	600 2,252 3,000
DS-28 DS-30 DS-33 DS-35 DS-39	28 30 31-33 35 38	5,098 7,280 8,880 11,888 16,872	11,482 16,400 20,000 26,700 38,000

* Most product names reflect the density of the foam used in each material.

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