Intellectual Property Request Broadcast Description

Basic Information

IP Title	Improved materials and/or designs for the buoyancy modules used in subsea
IP Serial No.	**IPR-007-2 107-071112**

Date Issued	**7/11/2012**
Expected Delivery Date	**10/15/2012**

Description of Requested Intellectual Property

Improved materials and/or designs for the buoyancy modules used in subsea

Background

TxIS is looking for new and/or improved materials and/or designs for the buoyancy modules used in subsea operations. The research should concentrate on buoyancy modules used for umbilicals as a mean to maintain pre-defined installation configurations such as lazy-S, steep, pliant or W-wave, buoyancy systems used by the Remote Operated Vehicles (ROVs) and modules incorporated into various subsea tooling. These configurations allow the vessel a full range of surface movement without putting undue stress upon the subsea lines and to decouple wave action from the seabed.

In general the buoyancy element which generates the upthrust to the cable or umbilical consists of the foam core, an outer shell (barrier coating), a clamp to connect to the cable, and fastening (latches or straps). The design and installation of the ROV buoyancy modules is customized for each application.

The most common subsea buoyancy materials are polyurethane foam, co-polymer foam and syntactic foam, and their usage is dictated by the product operating conditions, which include:

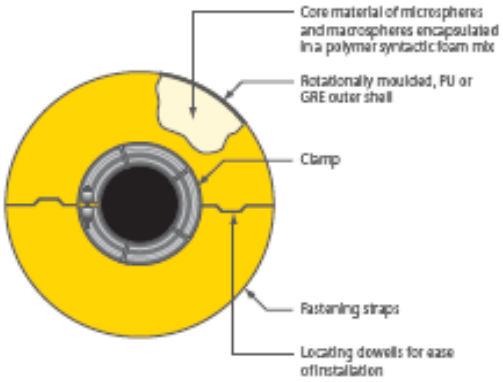
- Operating depth and duty cycle;
- Maximum depth;
- Required buoyancy;
- Element geometry;
- Method of installation.

The polyurethane foam provides cost effective buoyancy, is used for operating depths of up to 200 msw, and has a density range of 50 – 250 kg/m^3. The co-polymer foam enables buoyancy foams to operate at depths up to 600 msw (2,000 ft) and has a density rating from 40 to over 400 kg/m^3.

Syntactic foam is the material currently used for deep water buoyancy module application. Depending on the density and components this type of foam can be pure syntactic or composite syntactic. The primary constituent of pure syntactic foam is a base polymer mixed with microspheres – small hollow glass spheres, between 20 and 150 microns in diameter – which reduces the material's specific gravity to between 0.46 and 0.65. To still further reduce material density, a third component – macrospheres, which are hollow spheres with a diameter between 10 and 110 mm - is added. Inclusion of macrospheres can reduce the specific gravity of syntactic foam to between 0.275 and 0.56. This combination of polymers, micro and macrospheres is known as composite syntactic foam. The densities of the syntactic

foam range from 275 kg/m^3 to 650 kg/m^3 and are typically used down to 4,000 m. In general the buoyancy loss is rated at 3% after 20 years in service.

The materials used for external coating are polyurethane elastomers, polyurethane paint, polyethylene or glass reinforced plastic (GRP) and provide multiple benefits to the buoyancy module including abrasion and impact resistance, enhanced water ingress performance, marine growth resistance, highly visible pigmentation, and durability.



Request for Proposals (RFP)

Texas Institute of Science would like to research and identify new materials and/or designs allowing the manufacturer to increase buoyancy and reduce the module size. The best case would be to eliminate the buoyancy modules entirely. Ideally, a method to incorporate a buoyant material into a specific section of the umbilical, at the manufacturing stage, to float it would be the best solution.

The purpose of this request is to identify the most advanced technologies and designs that could provide our clients with a potential solution. If you or your group has a potential solution for the above mentioned topics, please contact TxIS with an initial description of your capabilities. TxIS will evaluate all submissions and select top 3 unique proposals to move forward with the idea. TxIS will compensate you $2000.00 if your idea is selected and will finance your work immediately.

The proposals should give a clear picture as to why the scientist thinks he/she can solve the problem, a brief definition of foreseeable way(s) the problem will be solved, and an explanation of the readiness of the development (in those cases where prior work has been conducted). It also should include the approximate time and estimated cost to reduce the solution to the proposed problem to practice.

NON-DISCLOSURE AGREEMENT

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Texas Institute of Science
Hossein Pasvar
Senior Vice President

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Signature

July10, 2012

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Date