



Technology DRDO 002: Syntactic Foams

The innovation is a liquid castable system and can be produced in desired intricate shapes. The material technology developed is in form of a liquid-paste form and can be easily formulated into the desired shape. The density of the syntactic foam can be controlled to the desired values. Syntactic foams of various predefined shapes and densities are available from limited number of sources, however none of them provide flexibility to form custom shapes and customized densities as per user requirements

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A two part viscous liquid formulation consists of hollow microspheres filled resins and hardener. By adjusting the formulation, the viscosity can be varied from 2,000 to 10,000 cps, the density of the material $0.85 - 0.25 \text{ g/cm}^3$ and the compressive modulus is $9 - 2.5 \text{ MPa}$ depending up on the application requirements. The filler is a hollow pre-expanded polymer microsphere ($d_{50} = 40 \mu\text{m}$). Unlike the pre-slabs commercially available, the present materials is mixed and poured into the required site /mould as and when required. The properties of the foam can be customized by suitably selecting the matrix resin, microspheres, and their relative ratio.

The innovators have developed liquid castable syntactic foam formulations having varying mechanical, thermal, electrical properties and density characteristics. The material can be cast into any size and shape, as it is a liquid castable form. Since the material developed is a two part system, they can be mixed and cast. A provision for customizing the properties of the foam by adding suitable additives is the formulation also exists. As the formulation is having microsphere content, shrinkage, warping and exotherm are minimal and machinability, paintability and printability are improved.

Features:

- Liquid Castable Material System for achieving unthinkable shapes
- Positive buoyant syntactic foam with ability to manipulate density to the user requirement
- High Mechanical Strength to withstand all types of loading
- Acoustically Transparent in underwater
- Inert and stable in various corrosive environment including marine environment.

Applications include low density encapsulates, umbilical floats, instrument collars, bend restrictors, underwater floatation systems, aerospace industries, boat repairing industry and others.

Development Status

Development completed. The product has been used in various in-house systems including ultrasonic fuel gauge and MEMS vector sensor.

IP Status

- An Indian patent is pending.

Partner Opportunities

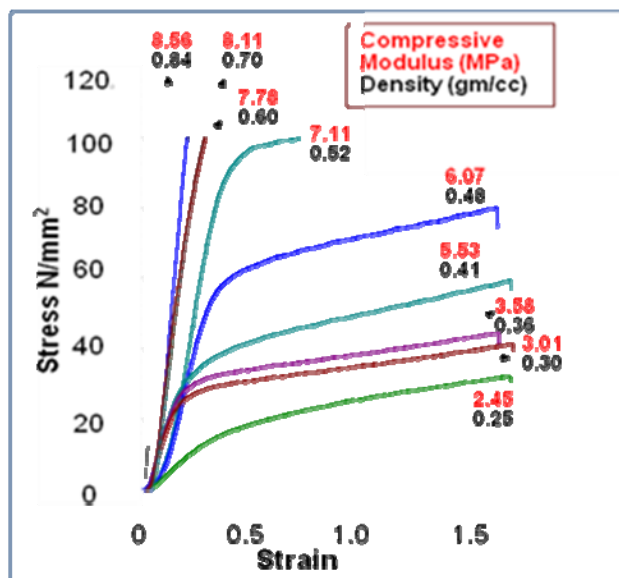
- Manufacturing licensing agreements.

For additional information contact Earle Hager, IC² Institute Global Commercialization Group at 512-475-7789, 512-431-3940 or ehager@ic2.utexas.edu.





A LOOK AT VARIOUS PROPERTIES



Mechanical Properties

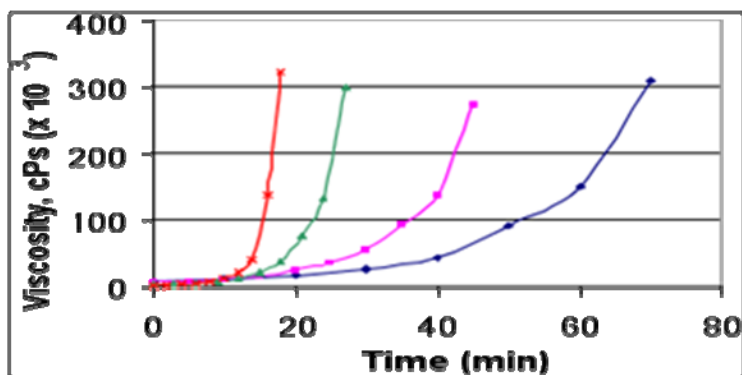
Density (g/cc)	% Water Absorption (by weight)	% volume compressibility
0.21	3.96	20.17
0.38	1.60	4.75
0.54	0.93	2.16
0.66	0.78	1.64
0.78	0.53	0.62
0.86	0.63	0.78

Environmental Stability

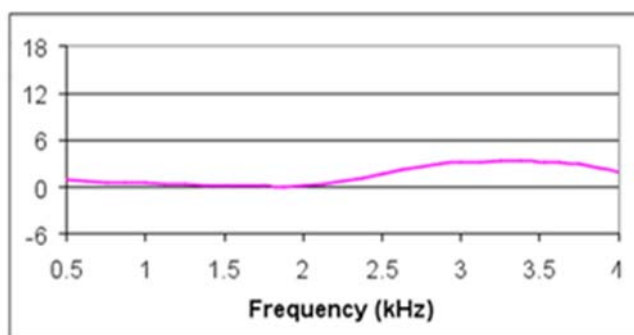


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Curing Characteristics



Acoustic Transparency



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