Inexpensive Buoyancy Material HACK

**What:** Rigid foam insulation is an inexpensive buoyancy material for MATE ROVs that do **NOT** go deeper than 30 feet and can be found at most home building supply stores (Home Depot or Lowes).

**Who:** MATE Staff

**ROV System:** Buoyancy

**Competition Class:** NAVIGATOR, RANGER, and maybe EXPLORER depending on depth.

**When:** Multiple Competition Seasons

**Plus:** Inexpensive, readily available, can be cut into many shapes, will not absorb water, and can be hand painted.

**Minus:** Cannot be spray painted (spray propellants melts the foam) and is limited to 30 feet of depth or less.

**MATE Insights:** Most beginning ROV teams use pool noodles for buoyancy and in a few feet of water for short periods of time pool noodles are great. The variety of colors can be fun too! However, at deeper depth and longer durations, pool noodles will compress and get soggy, which results in a loss of their buoyant forces. Rigid foam insulation does not compress, nor will it absorb water and become soggy. In the US there are two primary manufactures of rigid foam insulation (closed cell foam made from Extruded Polystyrene (XPS)) that is readily available at most home supply stores: Owen Corning makes the FOAMULAR products and Dow makes Styrofoam Utilityfit products, often called Blue Board. The material can be typically purchased in a precut 2ft X 2ft sheet for under $6 USD or in 4ft X 8ft sheets for under $35 USD.

There are other rigid foam manufactures and the key specifications to understand for ROV buoyance material are: compression strength and water absorption. Compression strength is defined as the pressure (depth) at which the material deflect (compress) 10% resulting in roughly 90% of its
original volume and buoyancy force remaining. Water absorption is the increase in weight the foam will gain after it has been immersed in water for a specific period of time. Both the Owens Corning and DOW products have a compression strength of 15-25 psi (remember 30ft (10M) of water = approximately 15 psi (1bar) pressure) and a minuscule water absorption rating. Both of these are acceptable for the normal flight envelope of a MATE ROV. There are other commercially available buoyancy foams such as, R3312, that will allow your ROV to go deeper and run longer but they are more costly and available from fewer suppliers. In addition some advanced teams pour their own foam into custom models and then cover it with epoxy paint. This looks really cool and very professional.

When purchasing rigid foam insulation think blue or pink. Do not buy white foam, it generally does not meet the above ratings.

References: N/A

Search Words: Rigid Foam Insulation, Foamular, Blue Board.

Fun Facts: Open cell foams contain air spaces that absorb water (think of a kitchen sponge).

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