

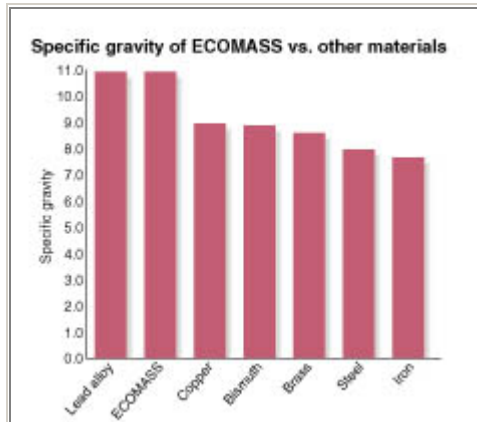
Thermoplastic composite gets the lead out

By Joseph Ogando, Materials Editor

Design News

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Cleveland, OH - Weigh the costs and benefits of using lead, and the scales don't always tip in favor of this toxic material, creating a big opportunity for alternatives. One such lead-replacement candidate was announced last month by M.A. Hanna Engineered Materials (Norcross, GA), which has weighed in with a high-density thermoplastic for weighting, balancing, and radiation-shielding applications.



The densest ECOMASS compounds have a specific gravity similar to lead alloy. What they don't have is the toxicity.

Called ECOMASS, these new composites can offer a specific gravity equal to that of lead alloy without any of the toxicity, according to Thomas Wilkinson, the company's VP of commercial compounds. The compounds consist of a non-toxic tungsten filler in a variety of base resins-including, so far, olefins and nylon copolymers. At up to 80% filler, "the plastic acts mostly as a binder," Wilkinson notes.

Eight ECOMASS formulations are currently available, covering a specific gravity range from 6.0 to 11.0 and offering a variety of mechanical property combinations.

Among them is an ECOMASS compound intended for radiation-shielding applications, in nuclear medicine, medical imaging, and radiation therapy. With a specific gravity of 6.9, its density comes in at roughly 35% that of lead. At the same time, it provides what the company reports as more than 90% lead shielding equivalency at typical X-ray energy levels.

Other grades have already turned up in non-toxic projectile inserts for small caliber ammunition. And still other grades are targeted at weight-and-balance applications in industrial machinery, sporting goods, and instrumentation markets. With mass properties so similar to lead, Wilkinson says, ECOMASS can serve as a "drop-in" replacement for the toxic material in applications that don't depend on lead's chemical properties-such as batteries. "But it's a drop-in with better yield strength," he adds. Suitable for injection molding, the composites can also be painted or plated in conventional finishing processes, Wilkinson adds.

Physical properties		
Property	NJ-96TP/000	Units
Density	11.0	gms/cc
Melt Point	351 (177)	°F (°C)
Flexural Modulus	1,220,000	psi
Tensile Strength	7500	psi
Ultimate Elongation	& lt;1.0	%
Notched Izod Impact Strength	1.45	ft-lb/in

Linear Mold Shrinkage	0.005–0.006	in/in
Deflection Temperature @ 66 psi	318 (159)	°F (°C)
@ 264 psi	311 (155)	
Surface Resistivity	0.21	ohms/sq