nano MAG
a revolution in magnesium Mg

NanoMag Composites

NanoMag composites bonded from NanoMag sheet and fiber composites have demonstrated very high strength/density ratios. Layups were fabricated in the sequences Mg/Epoxy C Fiber/Mg and Epoxy C Fiber/Mg/Epoxy C Fiber. These NanoMag composites are compared to competitive materials in Table I and Figure 1.

Table I. Experimental Results on New NanoMag Mg/Epoxy/Carbon Fiber Composites Compared to Commercial Glare and Experimental Composites from Commercial Mg Sheet Made by Cortes

	NanoMag, TTMP AZ61Mg/ Epoxy/Carbon	GLARE (ref 1) 2024Al/Epoxy S Glass Fiber	Cortes (ref 2), AZ31Mg/Epoxy/ Glass Fiber	Cortes (ref 3), AZ31/Epoxy/ Carbon Fiber
E,GPa	63 to 97	55	34	46
Density, ρ (g/cc)	1.70	2.38	1.88	1.68
E/ρ	37 to 57	23	18	27
YS, MPa	820 to 910	317	--	--
YS/ρ	482 to 535	133	--	--
UTS, MPa	820 to 910	580	440	420
UTS/ρ	482 to 535	244	234	250

Ref 1 – A. Vogt, J. Gunnick, "Fiber Metal Laminates", Kluwer Academic Publishers, Dordrecht, 2001.
Ref 2 – P. Cortes, W. Cantwell, Composite B, 37 (2006), 163.
Ref 3 – P. Cortes, W. Cambell, J. Materials Science, 39 (2004), 1081.

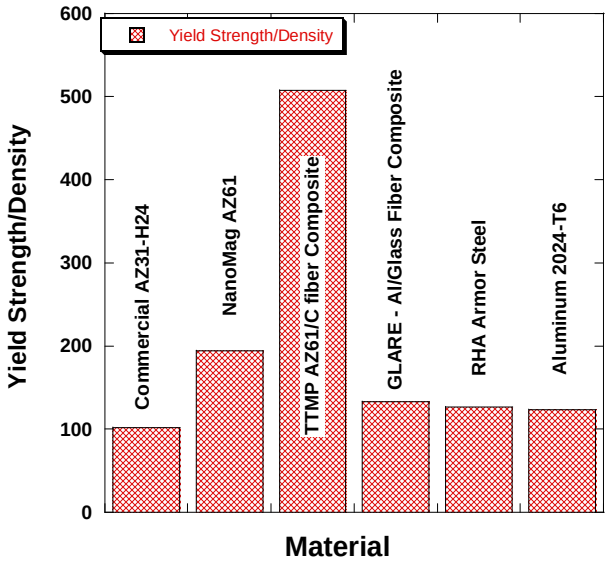

Figure 1. Yield strength/density ratio of NanoMag AZ61 sheet and NanoMag AZ61 / Epoxy / C fiber composite compared to commercial AZ31 sheet and commercial GLARE (Aluminum sheet / Epoxy / Glass fiber).

The NanoMag composite demonstrated about 2 times the Modulus of Elasticity (E) and 2 times the UTS/density ratio of commercial GLARE and the previous Mg composites constructed by Cortes.

As shown in Table II, dent resistance, bending rigidity and crash resistance of NanoMag composites are superior to GLARE commercial Al based composite.

Table II. Comparison of Modulus of Elasticity, Bending Rigidity, Dent Resistance and Crash Resistance of NanoMag Composite with Glare and Cortes Composites.

	NanoMag, TTMP AZ61Mg/ Epoxy/Carbon	GLARE, 2024Al/Epoxy S Glass Fiber	Cortes, AZ31Mg/Epoxy/ Glass Fiber	Cortes, AZ31/Epoxy/ Carbon Fiber
E,GPa	63 to 97	55	34	46
Density, ρ (g/cc)	1.70	2.38	1.88	1.68
Bending Rigidity, $E^{1/3}/\rho$	2.34 to 2.70	1.60	1.72	2.13
Dent Resistance, $YS^{1/2}/\rho$	16.8 to 17.7	7.5	--	--
Crash Resistance, $E^{1/5}/\rho$	1.35 to 1.47	0.94	1.07	1.28