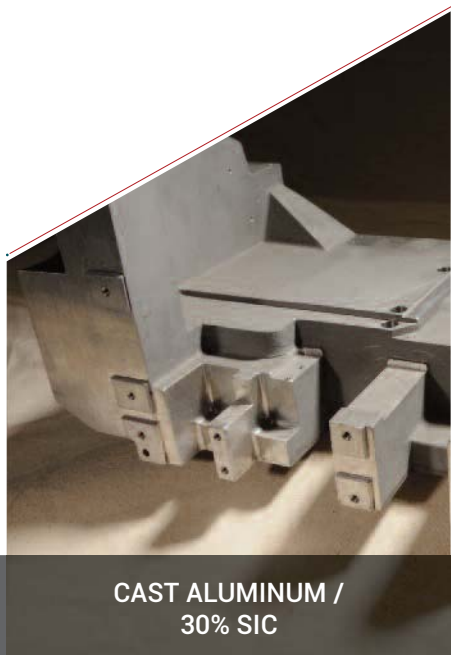




METAL MATRIX COMPOSITES

Aluminum alloy reinforced with ceramic particles.

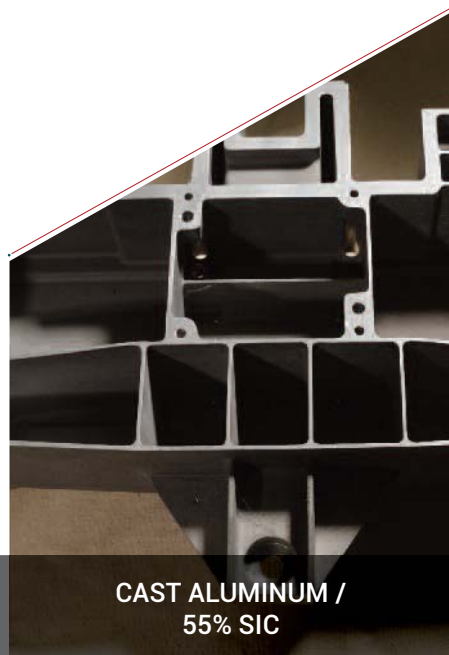
M Cubed Technologies has developed patented technologies used for casting large, complex shapes with very high reinforcement content.



CAST ALUMINUM /
30% SiC

Patented casting process unique in the industry

- Large installed capacity.
- Density similar to aluminum but with the stiffness of steel
- Formed using traditional foundry techniques
- Complex shapes can be cast as large as 10 ft. square, 2000 lbs
- Tight as-cast tolerances; can also be machined if required
- Extremely high fatigue resistance, excellent dampening properties



CAST ALUMINUM /
55% SiC

Produced using SiC preforms and a patented pressureless infiltration process

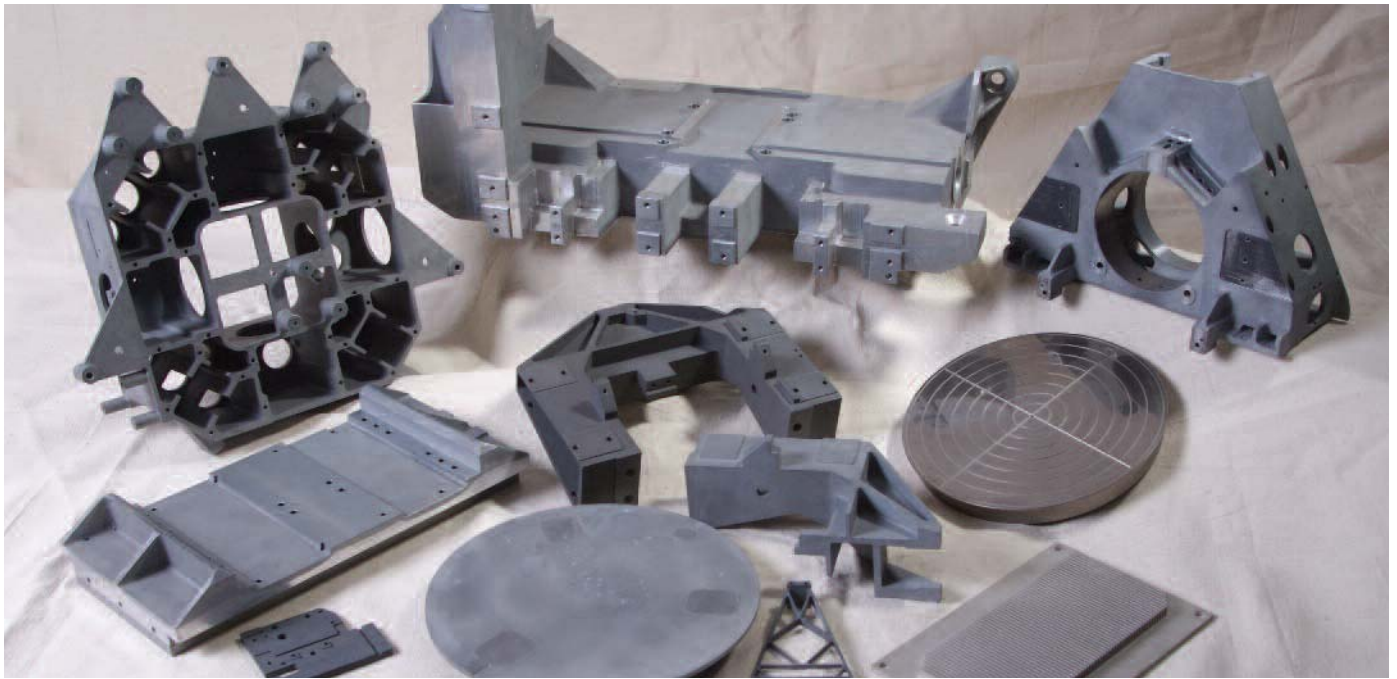
- High SiC content - very high stiffness and strength.
- Can be used to make very large, complex shapes
- Tight as-formed tolerances; can also be machined.
- Very low CTE
- Good wear resistance and hardness



50% ALUMINUM /
B₄C

Used for applications requiring neutron absorption

- Unique process yields very high B₄C content
- Can be used to produce large, complex shapes
- Complementary to M Cubed's reaction-bonded B₄C product line



M Cubed Materials Summary

Particle Reinforcement	
Vol. % Reinforcement	
Matrix	
Density (g/cc)	ASTM C-135
Young's Modulus (GPa)	ASTM E-494
Poisson's Ratio	ASTM E-494
Flexural Strength (MPa)	ASTM C-1161
Fracture Toughness (MPa-m ^{1/2})	ASTM C-1421
CTE 25-100°C (ppm/K)	ASTM E-831
Thermal Conductivity (W/m-K)	ASTM E-1461
Knoop Hardness - 2 kg load (kg/mm ²)	ASTM C-1326

Al-SiC			Al-B ₄ C	Al-Al ₂ O ₃	Al (reference)
ASC-301	MMC-S55	ASC-701*	ABC-501	AAC-501	AA-357
SiC	SiC	SiC	B ₄ C	Al ₂ O ₃	---
30	55	70	50	50	---
Al Alloy	Al Alloy	Al Alloy	Al Alloy	Al Alloy	Al
2.78	2.96	3.01	2.58	3.3	2.7
125	200	270	210	160	70
0.29	0.25	0.22	---	---	0.29
510	340	230	350	400	---
15	13	10	---	14	---
15.6	11.8	6.2	---	---	23
150	160	170	---	---	151
160	---	---	---	---	---

*ASC-701 is currently only available in plate form

Note: All of the above information is based upon internal testing. Although we believe the results to be reliable we expressly do not represent, warrant or guarantee their accuracy, completeness or reliability.

www.mmmt.com



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