

Metal Matrix Composites

uncompromising

performance, limitless design options



Advances that were unimaginable just a few years ago are table stakes today.

Lighter, stronger, more powerful and efficient — as technology requirements and expectations continue to evolve, the demands on your team are intense. They're up to the task for sure, but they need to have the right materials available to bring their design concepts to life in real-world settings, whether on the ground, in the air or out in space.

You can always count on Materion. Our engineers and metallurgists work tirelessly to deliver advanced materials with properties and potential conventional materials simply can't provide. From the metal matrix composites you'll read about here to clad metals, high performance alloys, technical ceramics and more, Materion offers solutions to help you and your team take technology to new heights.

Clive Grannum

President

PERFORMANCE MATERIALS



METAL MATRIX COMPOSITES

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Exceptional solutions for
aerospace and defense

**AlBeMet® Metal
Matrix Composites**



A value proposition that
outperforms Al, Ti and AlSiC

**AlBeCast® Investment
Casting Composites**



Optimal thermal management
with high specific stiffness

E-Materials



Extraordinary AlSiC options –
in space or on the racetrack

**SupremEX® Metal
Matrix Composites**



Let your creative spirit soar.

Material limitations should never impede your imagination. Looking for higher strength, stiffness, wear resistance, thermal stability? Need to go lighter? When conventional materials won't do, Materion metal matrix composites (MMCs) deliver all of the mechanical and physical properties you need to achieve high performance and efficiency.



Get to know AlBeMet[®], AlBeCast[®], E-Materials and SupremEX[®] — metal matrix composites with properties to fulfill a wide range of applications, from satellite and spacecraft components, to commercial and military plane electronics, to automotive powertrains. Materion's solutions are the stuff great ideas, and great designs, are built on.

Design flexibility meets high performance.



excellent
specific stiffness and
processing characteristics

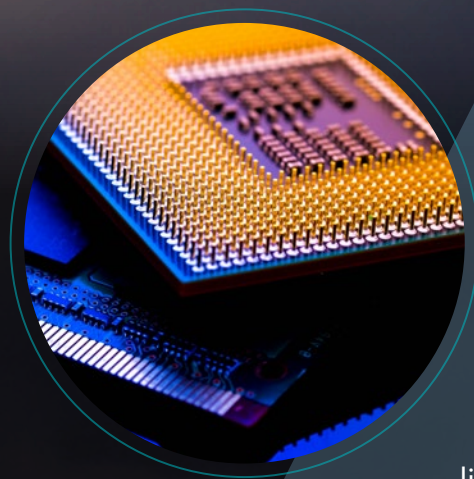


As aerospace systems and aviation electronics grow increasingly complex, weight sensitive and costly, engineers are relying on aluminum-beryllium metal matrix composites more than ever before. Materion's AlBeMet composites deliver a unique combination of high specific modulus of elasticity, low density and high heat capacity. They are the ideal choice for applications ranging from avionics and satellite electronics to semiconductor assemblies and space structures.

AlBeMet materials are simpler to use and easier to fabricate than organic composites — they're weldable and can be formed, machined and brazed, just like conventional aluminum metal matrix composites.

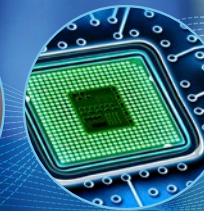
Key Attributes

- High specific modulus
- Higher performance with less weight
- Thermal stability over temperature ranges -50°C to 150°C
- Low coefficient of thermal expansion
- Higher thermal conductivity than aluminum



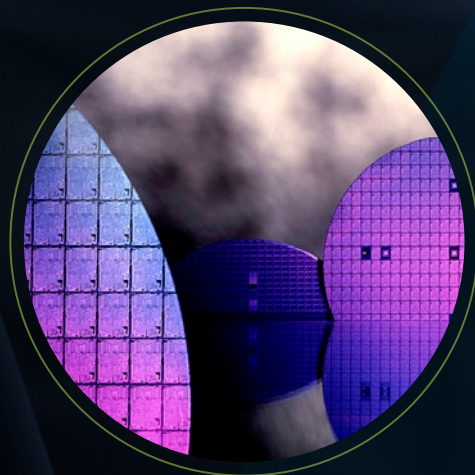
AlBeCast® Investment Casting Composite

The engineer's choice when affordability is key.



Reduced material and fabrication costs resulting from a near net-shape process make AlBeCast composite the right fit for a variety of applications — optical components, avionics packaging and space structures, to name a few. This aluminum-beryllium material provides many of the same mechanical properties as AlBeMet composite, enabling greater design flexibility and significant performance advantages over titanium, aluminum and conventional aluminum metal matrix composites.

The high specific stiffness and low density of AlBeCast composite makes it a good choice for reducing the weight of aerospace components and aviation electronics housings. It can also be cast through a rapid prototyping process to speed the identification of the most appropriate design for a specific application.



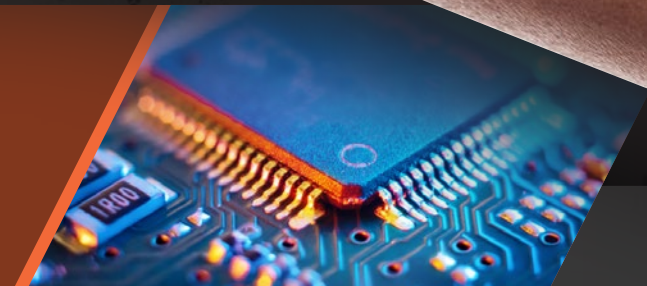
Here's how AlBeCast MMC outperforms aluminum, titanium and AlSiC for stiffness and density:

Property	AlBeCast®910	Aluminum A357-T6	Titanium 6AL-4V	AlSiC F3A205-T6
Density g/cm ³ (lb/in ³)	2.17 (0.078)	2.69 (0.097)	4.43 (0.160)	2.69 (0.097)
CTE @ 25°C ppm/°C (ppm/°F)	14.6 (8.1)	21.5 (11.9)	9.3 (5.2)	16.4 (9.1)
Modulus GPa (Msi)	193 (28)	72 (10.5)	110 (16)	72 (10.5)
Yield Strength, MPa (ksi)	165 (24)	248 (36)	880 (128)	165 (24)
Ultimate Tensile Strength, MPa (ksi)	211 (31)	317 (46)	950 (138)	196 (28)

Push beyond design challenges with breakthrough materials.



high performance
in extreme environments

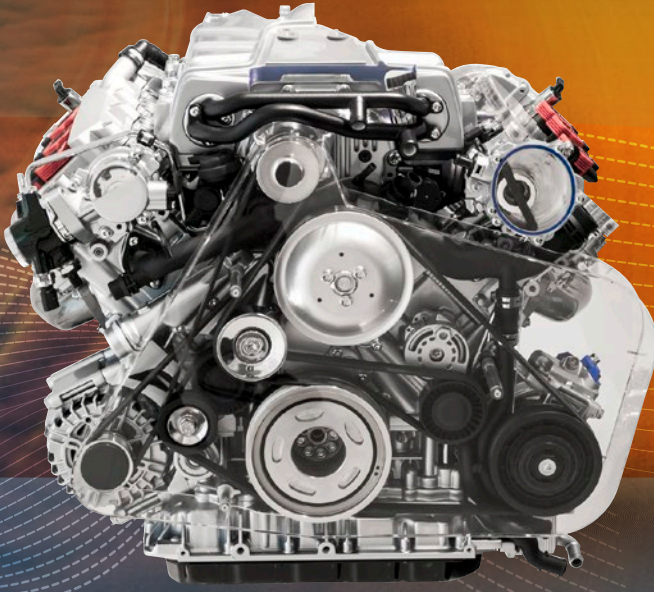


Advances in aerospace, microelectronics and semiconductor applications have created a need for substrate materials with higher thermal conductivity, lower weight, higher stiffness and improved thermal cycle reliability. Materion is meeting the challenge with a family of thermal management-grade beryllium and beryllium oxide metal matrix composites. These E-Materials are available in a range of grades and with customizable properties that surpass those of copper-moly-copper (CMC), AlSiC, CuW, Kovar, aluminum and other electronic packaging materials.

Key Attributes

- High thermal conductivity
- Outstanding stiffness-to-weight ratios
- Thermal cycle reliability over a broad temperature range
- High elastic modulus to help absorb vibration
- Lower coefficient of thermal expansion than beryllium

Demanding applications deserve SupremEX quality.



Materion's SupremEX family of aluminum-silicon-carbide composites offer extraordinary solutions for applications ranging from aerospace components and satellite structures to high-performance automotive pistons. Stronger, stiffer and lighter, these composites provide a balanced combination of properties unmatched by conventional metals and alloys. In aerospace applications, SupremEX composites can help you reduce component weight while meeting strength and wear requirements for lower fuel use and carbon emissions. For automotive projects, SupremEX materials are ideal for not only reducing weight but also improving engine efficiency in performance and passenger vehicles alike. And in space and optical applications, SupremEX reduces jitter, and improves reliability and stability in a range of temperatures.

Key Attributes

- Exceptional stiffness
- High strength
- Twice the fatigue strength of aluminum alloys
- High tensile strength at elevated temperatures
- Wear resistance

60%
lighter than steel

36%
lighter than titanium

