Advanced Materials for Commercial and Defense

aerospace applications

MATERION

MEET TOUGH AEROSPACE CHALLENGES HEAD-ON

The environments can be extreme and the demands somewhat daunting, but finding ideal aerospace material solutions is as easy as connecting with Materion. We've been engineering specialty alloys and lightweight metal matrix composites for commercial and defense aerospace applications for decades. Extreme temperatures, shock loading, heavy vibration or improving SWaP performance of mission-critical components — we understand the unique issues and requirements you face, and support you through a variety of innovative material options.

Beryllium Metals

With structural, raw and high-purity beryllium metals in a range of grades and forms, we can support any system or component application where nothing short of beryllium will do. Choose beryllium metals for performance, reliability and consistency at high altitudes.

ADVANTAGES

- High specific stiffness
- Unmatched modulus-to-weight ratio
- Resistance to vibrations and changing shape
- Good thermal conductivity with low thermal expansion

APPLICATIONS

- Lightweight structural components
- Situational awareness sensors
- Guidance and surveillance systems
- Aircraft instrumentation panels

STANDARDS MET

Specification	Material	Form
AMS 7902 G	Beryllium S200-F	Sheet, plate
AMS 7904 E	Beryllium S-65	Bar, rod, tube, shapes
AMS 7905 C	Beryllium, optical grade	Rod, tube, shapes
AMS 7906 D	Beryllium, S-200F VHP	Bar, rod, tube, shapes
AMS 7907 D	Beryllium, instrument grade	Bar, rod, tube, shapes
AMS 7908 E	Beryllium S-200F-H	HIPed rod, bar, block, shapes
AMS 7910 D	Beryllium S-200F-C	CIPed shapes

Copper-Beryllium Alloys (25, M25, 20C, 3 and 10)

Adding beryllium to copper results in alloys of remarkable strength, resilience and machinability. In fact, copper-beryllium (CuBe) alloys provide greater strength than any other copper-based alloy, making them an ideal choice for electronic aircraft contacts and components. Alloy 25 CuBe is especially well-suited for applications that come into contact with hydrogen.

ADVANTAGES

- Corrosion, wear and galling resistance
- High hardness and specific strength
- Non-magnetic and non-sparking
- Excellent thermal and electrical conductivity

APPLICATIONS

- Landing gear and other aircraft components
- Electronic connectors
- Horizontal stabilizers
- Airplane bushings and bearings

STANDARDS MET

Specification	Material	Form
AMS 4511 B	Alloy 20C AT	Castings
AMS 4530 J*, 4725 F	Alloy 25 A	Strip, sheet, plate (4530 J), wire (4725 F)
AMS 4532 H*	Alloy 25 1/2 H	Strip, sheet
AMS 4533 E*, 4534 E*, 4535 D*	Alloy 25 AT	Bar, rod (4533 E, 4534 E), tube (4535 D)
AMS 4650 N*	Alloy 25 A	Bar, rod, shapes, forgings
AMS 4651 C*	Alloy 25 H	Bar, rod
AMS 4890 D	Alloy 20C	Castings - A Temper
AS 81021 B	Alloy 3, 10	Strip
ASTM B194*	Alloy 25	Strip
ASTM B196, B643	Alloy 25, M25	Rod, bar (B196), tube (B643)
ASNA 3384, 3417, 6110	Alloy 25 AT	Bar (3384), rod (3417), tube (6110)
ASNA 3400	Alloy 25 1/2 HT	Rod
ASNA 3413	Alloy 25 1/2 H	Strip
BMS 7-353 Type 1,2	Alloy 25 AT	Rod, bar, tube; overaged (Type 2)
DMS 1904, 2088	Alloy 25, Alloy 25 AT, Alloy HT (2088)	Tube
QQ-C-530	Alloy 25, M25	Rod, wire

*Included in the MMPDS-16 Handbook

ADVANTAGES

- High specific stiffness, modulus and heat capacity
- Low density and lightweight
- Excellent dampening characteristics
- Good thermal conductivity

APPLICATIONS

- Electronics and electronics housings
- Avionics heat sinks and thermal management
- Optical, guidance and surveillance systems
- Situational awareness sensors

AlBeMet Metal Matrix Composite (MMC)

Challenging design applications call for innovative materials. AlBeMet® aluminum-beryllium MMC fits the bill, rising above conventional titanium, aluminum and other aluminum MMCs by combining beryllium's high-modulus, low-density characteristics with aluminum's outstanding fabrication and mechanical properties.

AlBeCast Investment Casting Composite

Ideal for rapid prototyping, AlBeCast® material is an investment cast aluminum-beryllium composite offering many of the same mechanical properties as AlBeMet MMC, plus an opportunity for significant cost savings. The near-net-shape process it uses requires less material and machining time than conventional processes, making it a cost-effective choice.

STANDARDS MET

Specification	Material	Form
AMS 7909 D	AlBeMet	Near net shape preforms - HIP
AMS 7911 D*	AlBeMet	Preforms - HIP, heat treated
AMS 7912 D	AlBeMet	Extrusions, annealed
AMS 7913 D	AlBeMet	Sheet, plate
AMS 7918 A	AlBeCast	Investment casting

*Included in the MMPDS-16 Handbook

ToughMet Alloys

ToughMet® copper-nickel-tin alloys can be an excellent solution for aerospace and defense applications that require strength, durability and stability under heavy loads and extreme temperatures. Designed for harsh environments where fatigue, corrosion, wear and galling are concerns, ToughMet alloys rise to every challenge. ToughMet 3 alloy is the only copper-nickel-tin alloy included in the MMPDS-16 Handbook.

ADVANTAGES

- Corrosion and wear resistance
- High hardness, resilience and specific strength
- Low friction, non-galling and non-magnetic
- Good for oxygen contact

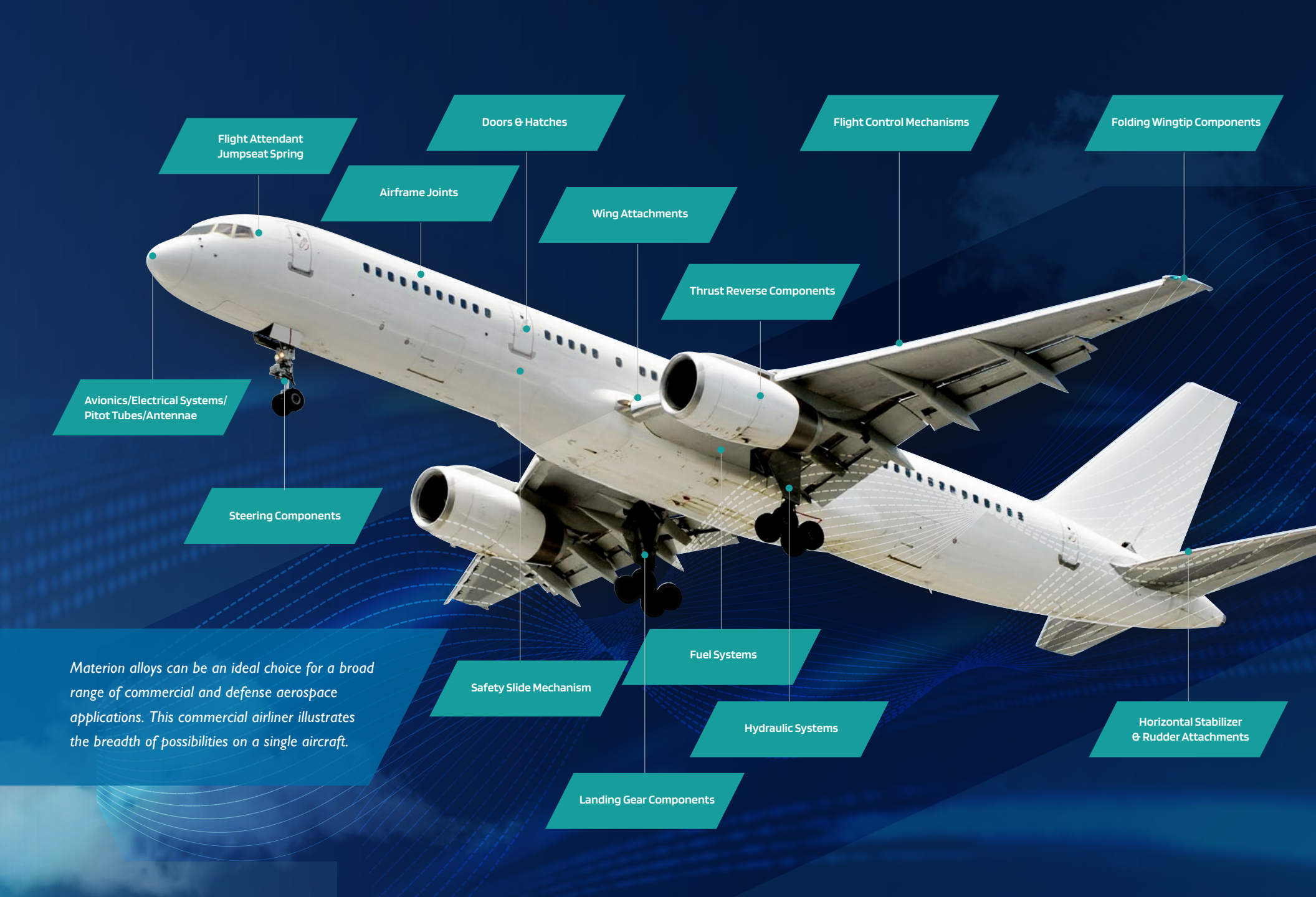
APPLICATIONS

- Jet engines and engine pylons
- Actuators, landing gear and hydraulic systems
- Airframes and airframe attachments
- Bushings and bearings

STANDARDS MET

Specification	Material	Form
AMS 4595*, 4596 B*, 4598 B*	ToughMet 3 AT	Plate (4595), bar, rod (4596 B), tube (4598 B)
AMS 4597 A*	ToughMet 3 TS	Bar, rod
AMS 4863	ToughMet 3 CX105	Castings
AIMS 02-04-002	ToughMet 3 AT	Rod, tube
ABS 5152, 5849	ToughMet 3 AT	Tube (5152), rod (5849)
BMS 7-373 Class 90	ToughMet 3 AT90	Rod, bar, tube
BMS 7-373 Class 100	ToughMet 3 AT 100	Rod, bar, tube
BMS 7-373 Class TS	ToughMet 3 TS160U	Rod, bar, tube
MTL 4112	ToughMet 3 AT110	Rod, bar
Ma-1705-12, 13	ToughMet 3 AT	TS rod (1705-12), tube (1705-13)

*Included in the MMPDS-16 Handbook



Materion alloys can be an ideal choice for a broad range of commercial and defense aerospace applications. This commercial airliner illustrates the breadth of possibilities on a single aircraft.

Niobium C-103 Alloy

Temperature extremes and high-frequency vibrations are no match for Niobium C-103 alloy, which leverages the collective properties of niobium, hafnium and titanium. With the lowest density of any of the refractory metals and a low ductile-to-brittle transition temperature, C-103 provides an ideal solution for high-performance aerospace components and cryogenic applications.

STANDARDS MET

Specification	Material	Form
AMS 7852	C-103	Plate, sheet
AMS 7857	C-103	Bar, rod

ADVANTAGES

- Excellent thermal conductivity
- Exceptional weldability and machinability
- High room-temperature ductility
- Exceptional load-bearing characteristics

APPLICATIONS

- Rocket nozzles and motors
- Additive manufacturing
- After-burner components
- Attitude control nozzles manufacturing

AyontEX Alloys

This aluminum-silicon alloy family offers superior thermal conductivity and provides critical structural properties that match copper's coefficient of thermal expansion. AyontEX™ 17 alloy provides the best balance of thermal conductivity and strength, while reducing weight. AyontEX 4632 performs even better when high temperatures and fatigue endurance are a concern, though with greater density and slightly reduced thermal conductivity.

ADVANTAGES (AYONTEX 4632)

- Lower CTE
- High tensile modulus
- Superior yield and fatigue strength
- Excellent fatigue resistance

ADVANTAGES (AYONTEX 17)

- Lightweight
- High specific stiffness
- Increased modulus (compared with conventional aluminum alloys)
- Refined, homogenous and stable microstructure

APPLICATIONS

- Thermal management devices
- Electronics
- Heat sinks
- Avionics

SupremEX Metal Matrix Composites

Stronger, stiffer and lighter than conventional metals and alloys, SupremEX® aluminum-silicon-carbide MMCs can help you reduce component weight while meeting strength and wear requirements. Their high ductility also provides superior damage tolerance. SupremeEX composites are available in a variety of forms and are much more easily machined than conventional AlSiC materials.

ADVANTAGES

- Lightweight
- Exceptional stiffness
- High fatigue and tensile strength
- Excellent thermal conductivity

APPLICATIONS

- Aerospace structures and mechanisms
- Optical, guidance and surveillance systems and sensors
- Swash plates, rotor heads, damper actuators and engine components
- Heat sinks and other thermal management components

STANDARDS MET

Specification	Material	Form
AMS 4355	SupremEX 225XE	HIPed shapes
AMS 4368	SupremEX 640XA	HIPed shapes
AMS 4369	SupremEX 225XF	Extrusions
AMS 4379	SupremEX 225XE	Extrusions

Health and Safety

Processing beryllium-containing alloys poses a health risk if safe practices are not followed. Inhalation of airborne beryllium can cause serious lung diseases in some individuals. Occupational safety and health regulatory agencies worldwide have set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Safety Data Sheet (SDS) before working with this material. The SDS and additional important beryllium health and safety information and guidance can be found at berylliumsafety.com, berylliumsafety.eu and Materion.com. For questions on safe practices for beryllium-containing alloys, contact the Materion Product Stewardship Group at +1.800.862.4118 or contact us by email at Materion-PS@Materion.com.

Quality Certifications

Our beryllium metal, copper-beryllium alloys, AlBeMet and AlBeCast metal matrix composites, and ToughMet alloys are produced at a site that is NADCAP-accredited for heat treating and materials testing. It is also certified to ISO 9001:2015, AS 9100D, and ISO 14001:2005.

The facility that produces our AyontEX alloys and SupremEX metal matrix composites is certified to ISO 9001:2015.

MATERION

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