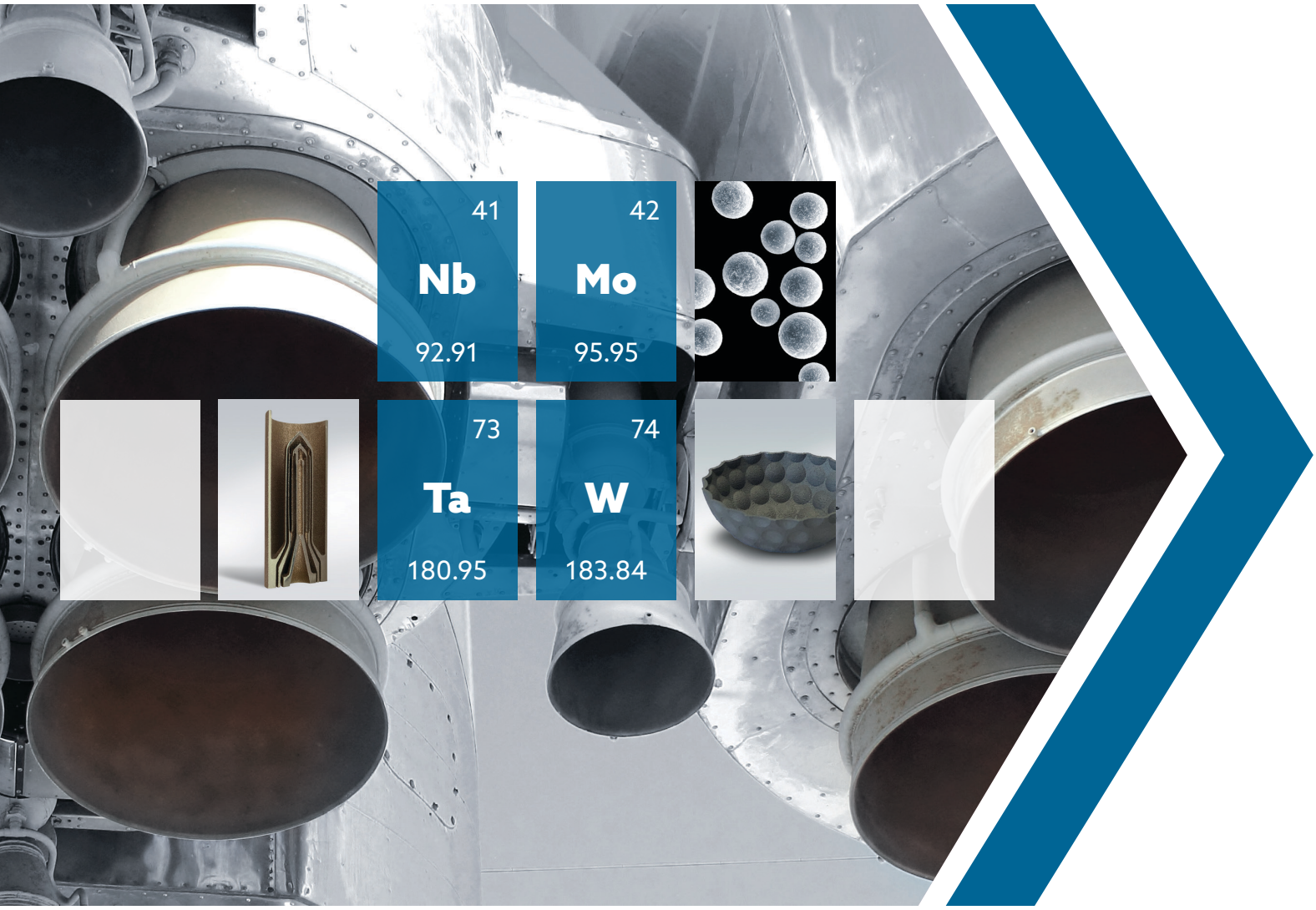
AM FOR AEROSPACE

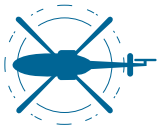
Launching New Solutions with Refractory Metals



ELMET
TECHNOLOGIES

Elmet Technologies' promise of the highest quality and optimal performance make us an ideal partner for even the most critical application areas including propulsion, ballistics, and flight control.

Additive Manufacturing (AM) has given engineers across all industries endless new design possibilities by being able to produce geometrically complex components without some of the constraints of traditional manufacturing. Combining Elmet Technologies' refractory metals with AM opens a new dimension for high-performance component development. Whether it is printing refractories in complex architectures or providing high temperature performance at a fraction of the weight of conventionally fabricated refractory metal parts, we find customized solutions for the most demanding aerospace and defense requirements.



- > Propulsion and Control Nozzles
- > Complex Aircraft Balance Weights
- > Radiation Shielding for Electronics
- > on Propulsion Grids
- > Missile Liners and Vanes
- > Niobium Alloys (C-103)
- > Tantalum Tungsten Alloys
- > Molybdenum Rhenium Alloys
- > Tungsten Heavy Alloys
- > Other Refractory Alloys upon Request

ELMET TECHNOLOGIES – PARTNERING IN AM FOR AEROSPACE

Elmet Technologies understands some of the challenges facing aerospace design engineers such as minimizing weight or reducing assembly costs. We offer refractory metal AM parts for application in satellite, fixed and rotary wing aircraft and defense that can help solve some of these challenges. We also offer customized powder for a variety of AM techniques to support your in-house efforts. All of this is backed by 100 years of history in processing of refractory metals. Turn to Elmet Technologies to support your AM needs.

Weight Reduction

Reducing mass is one of the key drivers in aerospace engineering. By utilizing the design flexibility offered by AM, engineers are no longer constrained by the limits of machining. They can minimize metal usage to only the critical areas were it is needed. For example, high density tungsten alloy radiation shielding and balance weights can be designed with increased complexity. This allows their overall mass to be reduced for application in protecting satellite electronics or reducing flutter and vibration in aircraft ailerons, elevators, and rudders.

Enhanced Performance Through Design

Design engineers are constantly pushing to increase part performance. Refractory metal propulsion nozzles are one example where an improved AM design results in not only increased propulsion thrust but can also cause a dramatic reduction in the mass of required fuel that a spacecraft must carry to complete its mission.

Missile liners are also constrained by the limits of traditional machining, forming, and assembly of refractory metals. With the ability to print tungsten heavy alloy or tantalum parts with complex geometries and densities as high as 17 g/cc, optimized designs can increase performance of these critical defense parts.

Improved Value

In some cases, multiple intermediate machining, bonding, inspection, or labor-intense assembly steps are currently needed to produce complex parts. Utilizing AM for tungsten heavy alloy missile assemblies can eliminate multiple processing steps and result in improved overall value.

Refractory metals can demand a high material value. Utilizing AM methods can reduce required machining time and the resulting material loss that might occur for applications such as C-103 propulsion nozzles.
Combining these savings with the potential for reduced lead times can be a tipping point for selecting refractory metals for any given application.

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ELMET TECHNOLOGIES
1560 Lisbon Street • Lewiston, Maine 04240

P +1.207.333.6100

sales@elmettech.com
www.elmettechnologies.com