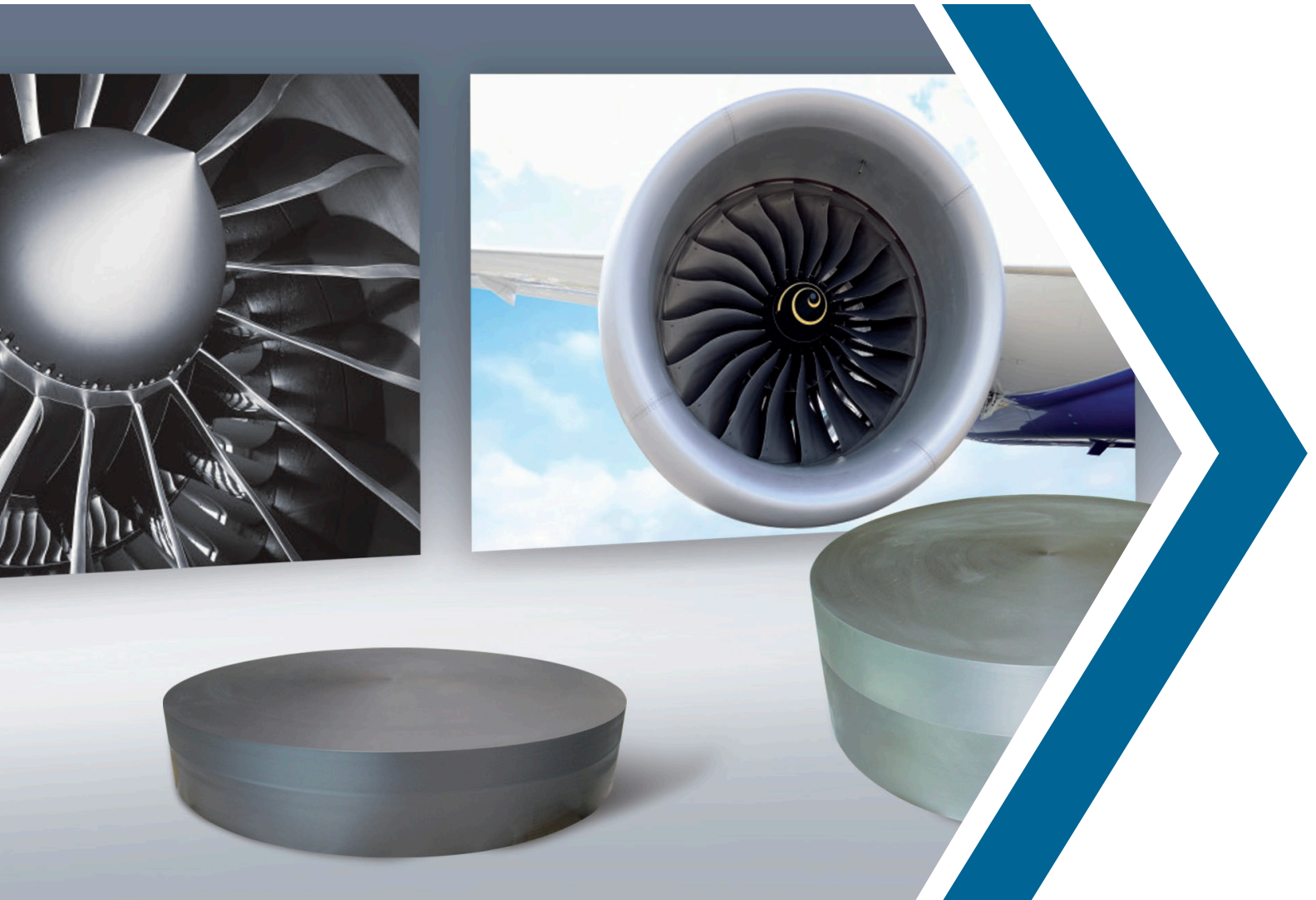


# ELMET TECHNOLOGIES' MOLYBDENUM ALLOYS FOR ISOTHERMAL FORGING & DIFFUSION BONDING DIES



Elmet Technologies' innovative molybdenum alloys offer improved forging performance in the production of isothermal forging and diffusion bonding dies and associated components for the fabrication of low and high pressure turbine blades, vanes, discs, hubs and rings. Our metallurgical and processing expertise ensures the highest quality molybdenum.

Suppliers of aircraft jet engines trust Elmet Technologies' application knowledge, experience, and advanced technological processes that enable us to customize our refractory metal alloys to meet a customer's precise requirements.

#### **Elmet Technologies' Forging Die Advantage**

- > Able to supply pressed & sintered, as-forged or fully machined blanks
- > Our large sizes in cylindrical or rectangular shapes fulfill current industry requirements
- > Finite element modeling of the high-temperature forging process
- > Capability to customize our TZM and MHC alloys to meet specific performance requirements
- > Highly experienced Customer Support and Engineering team
- > 25+ years supplying isothermal die components
- > Exclusive vacuum arc-casting process capabilities

We partner with customers to develop components including build-to-print components and design assistance in machining molybdenum alloy materials.



Red hot isothermal forging die

## Titanium-Zirconium-Molybdenum (TZM) Alloy

Elmet Technologies' TZM (0.50 Ti, 0.08 Zr, Bal Mo) is consolidated by either the powder metallurgy or our unique vacuum arc-casting processes. The titanium and zirconium carbides increase strength and creep resistance at elevated temperatures. The use of TZM also enables higher service temperatures without loss of strength in comparison to pure molybdenum.

## Molybdenum-Hafnium-Carbide (MHC) Alloy

Elmet Technologies' MHC is an established molybdenum alloy containing hafnium carbide, which is consolidated by the powder metallurgy process. The high recrystallization temperature, high strength, low thermal expansion, and high thermal conductivity of this alloy makes it ideally suited for die applications.

### Characteristics

#### MINIMUM DENSITY (based on 10.2 g/cc)

	TZM ALLOY	MHC ALLOY
Pressed and Sintered Billet	94%	94%
Forged Blank	>99.5%	>99.5%

#### MAXIMUM PRODUCT DIMENSIONS

	TZM ALLOY	MHC ALLOY
Pressed and Sintered Billet	29 in. diameter (74 cm)/10,000 lb (4536 kg)	29 in. diameter (74 cm)/10,000 lb (4536 kg)
Forged Blank	55 in. diameter (140 cm)	55 in. diameter (140 cm)



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