

# MPW DirectPowder™ Meets All ASTM Structural Performance Benchmarks for Laser Powder Bed Fusion Technology

## Key Highlights

- Independent testing confirms MPW's DirectPowder™ CP Titanium Grade 2 meets all ASTM B384 structural benchmarks for Laser Powder Bed Fusion (L-PBF) technology
- Successful L-PBF results build on previously announced cold spray validation, demonstrating performance across multiple additive manufacturing processes
- ASTM standards underpin material qualification for aerospace and defence applications and are widely used as a globally recognised benchmark for structural performance
- L-PBF (EOS M290) achieved 112 ksi UTS, 94 ksi yield strength and 29% elongation, meeting all three CP Titanium benchmarks and the higher mechanical thresholds of Grade 4, while maintaining Grade 2 oxygen control ( $\leq 0.25\%$ )
- MPW has produced hundreds of kilograms of DirectPowder™ CP Titanium Grade 2 to date – consistently meeting Grade 2 oxygen specification with no fines or satellites
- A third qualification process is currently underway with University of Dayton Research Institute (UDRI) targeting structural repair applications
- MPW has demonstrated a single feedstock capable of meeting structural handbook values across multiple AM processes

Metal Powder Works Limited (ASX: MPW) ("the Company" or "MPW"), a specialty materials company, is pleased to announce that independent mechanical testing has confirmed parts produced from its DirectPowder™ CP Titanium Grade 2 feedstock meet all three ASTM B384 structural benchmarks, tensile strength, yield strength, and ductility via Laser Powder Bed Fusion (L-PBF), the largest additive manufacturing (AM) market.

Building on previously announced cold spray AM validation results from HAMR Industries, these results demonstrate MPW's commercially available DirectPowder™ feedstock can meet stringent chemistry specifications and exceed structural qualification standards across two primary AM deposition technologies. MPW has already produced and supplied hundreds of kilograms of compliant powder to customers.

**Metal Powder Works Managing Director John Barnes commented:**

*"MPW can supply qualification-grade CP titanium at lower cost than atomised or HDH alternatives at equivalent or better oxygen control and purity, with better lot-to-lot consistency. This positions MPW powder to be qualified once and specified broadly across customer programmes."*

*"We have already demonstrated handbook values in cold spray AM, and these L-PBF results now confirm the same performance in the largest AM market. We have produced hundreds of kilograms of this powder, all of it meeting the Grade 2 oxygen specification – at or below 0.25% – which is the challenge with titanium that matters for structural aerospace applications. The mechanical results go further: we are meeting the higher mechanical thresholds of Grade 4, while maintaining Grade 2 oxygen control. We are approaching Grade 5, Ti 6Al4V. The powder has no fines and no satellites, it is consistent lot-to-lot, and is commercially available today. Our powder works."*



## Commercial Significance

ASTM B384 is a standard written for wrought and conventionally manufactured titanium, not additive manufacturing. Meeting all three B384 properties simultaneously in an L-PBF part is the specific combination required to advance toward aerospace and defense customer qualification submissions.

The result is stronger than meeting the Grade 2 minimums: the mechanical performance meets the higher thresholds of CP Titanium Grade 4, while oxygen content is controlled to Grade 2 specification ( $\leq 0.25\%$ ). Grade 4 permits higher oxygen – which increases strength but with less demanding chemistry – whereas MPW’s DirectPowder™ delivers Grade 4 mechanical performance within Grade 2 chemistry. That combination is a direct consequence of the room-temperature production process preserving source bar purity, and it is commercially significant: the powder already produced and sold meets a higher bar than the Grade 2 label implies.

The cold spray result adds a further dimension that is significant in its own right. HAMR’s 83 ksi UTS result, produced using air as the carrier gas rather than more expensive nitrogen or helium gases, demonstrates that MPW’s DirectPowder™ process performs at the feedstock level in a way that legacy atomization and recovered scrap Hydride DeHydride (HDH) powder production processes have not reliably delivered for structural cold spray applications.

Taken together, the L-PBF and cold spray results demonstrate something the broader powder supply market has not delivered: a single feedstock capable of meeting structural handbook values across fundamentally different deposition processes. Powder suppliers typically certify feedstock chemistry to standards such as ASTM B348 or F67, composition and particle size, not the mechanical properties of parts produced from that powder. MPW is doing both. Because the DirectPowder™ process produces powder at room temperature with >95% size yield and without fines or satellites, MPW can supply CP titanium at lower cost than atomised or HDH alternatives at equivalent or better oxygen control, with better lot-to-lot consistency.

## Background

ASTM B384 defines the minimum mechanical property requirements used by engineers to qualify titanium for structural use in aerospace and defence applications. Materials that do not meet these thresholds cannot be specified for structural design without additional constraints.

The three key benchmarks for CP Titanium Grade 2 are: ultimate tensile strength (F<sub>tu</sub>) of 50 ksi (340 MPa), yield strength (F<sub>ty</sub>) of 40 ksi (275 MPa), and elongation to failure of 20%.

MPW’s DirectPowder™ process converts wrought bar stock directly to powder at room temperature, without melting, gas jets, or crushing contaminated scrap. The result is powder that preserves the chemistry and cleanliness of the certified source bar, reducing the batch-to-batch variation that can limit the mechanical performance of parts made from conventionally atomised powder.

## Mechanical Testing Results – CP Titanium Grade 2

The table below summarises L-PBF test results relative to ASTM B384 minimum requirements:

Property	ASTM B384 Minimum	L-PBF (MPW in-house)
<b>Ultimate Tensile Strength (ksi)</b>	50	<b>112</b>
<b>Yield Strength (ksi)</b>	40	<b>94</b>
<b>Elongation to Fracture</b>	20%	<b>29%</b>

*L-PBF coupons were produced in-house using MPW powder on MPW’s own equipment. Testing was performed at an independent lab.*



Previously, the Company reported HAMR Industries met the strength values using MPW CP Titanium powder, producing the test pieces with air on their SPEE3D cold spray system, achieving a Deposition Efficiency of 99%.

### **Laser Powder Bed Fusion**

MPW produced and tested L-PBF coupons using its DirectPowder™ process to make CP Titanium Grade 2 feedstock and then printed them in-house on an EOS M290 L-PBF system. These results were consistent across the test programme and reflect full-density consolidation.

Laser powder bed fusion is a technically demanding process for powders of all alloys. The Company has demonstrated across multiple printing platforms and multiple alloys that the MPW powder moves in a controllable, consistent manner.

MPW will expand alloy system testing and begin formal property database compilation in preparation for customer qualification submissions.

### **Previously Announced Cold Spray Results – HAMR Industries**

HAMR Industries previously reported meeting handbook strength requirements using MPW's DirectPowder™ process feedstock via its SPEE3D system. Importantly, HAMR achieved 99% Deposition Efficiency while operating with air as the carrier gas. Cold spray additive manufacturing (CSAM) returned an ultimate tensile strength of 83 ksi – 66% above the ASTM B384 minimum of 50 ksi.

HAMR is progressing to component-level deposition trials, with a customer-facing qualification data package in preparation.

### **UDRI Structural Repair Programme Underway**

A third validation program is underway with the University of Dayton Research Institute (UDRI), under contract from the US Air Force Rapid Sustainment Office (RSO), targeting structural repair applications broadly. The Company will provide further updates as the programme advances toward government-contracted repair qualification.

*This announcement has been approved for release by the Board of Directors of Metal Powder Works Limited.*

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## ABOUT METAL POWDER WORKS

Metal Powder Works Limited's (ASX:MPW) manufacturing base is in Pittsburgh, USA and specialises in the production of high-quality metal powders for additive manufacturing and other advanced applications. MPW has developed a patented, non-thermal powder production process known as DirectPowder™. The MPW process represents the first true innovation in powder manufacturing in over 50 years. This innovative method converts premium bar stock into quality powder for a variety of materials and applications, significantly improving yield and affordability. MPW currently has 25+ powders in production including high strength aluminum, copper and copper nickel alloys, and specialty alloys including CP-Ti and Zircaloy. In 2024, Metal Powder Works was named as Material Company of the Year by the 3D Printing Industry Awards.

For further information please see [www.metalpowderworks.com](http://www.metalpowderworks.com)

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### Forward-Looking Statements

This announcement contains forward-looking statements relating to Metal Powder Works Limited. Forward-looking statements reflect the Company's current expectations regarding its future performance, technology programmes, and commercial outcomes. These statements involve known and unknown risks and uncertainties that may cause actual results to differ materially from those anticipated. The Company gives no assurance that anticipated outcomes will occur. The Company is under no obligation to update or revise any forward-looking statement. Nothing in this announcement constitutes investment, legal, tax, or financial advice. Recipients should make their own enquiries and seek independent professional advice before making any investment decision.

