



Aurora Labs[®]

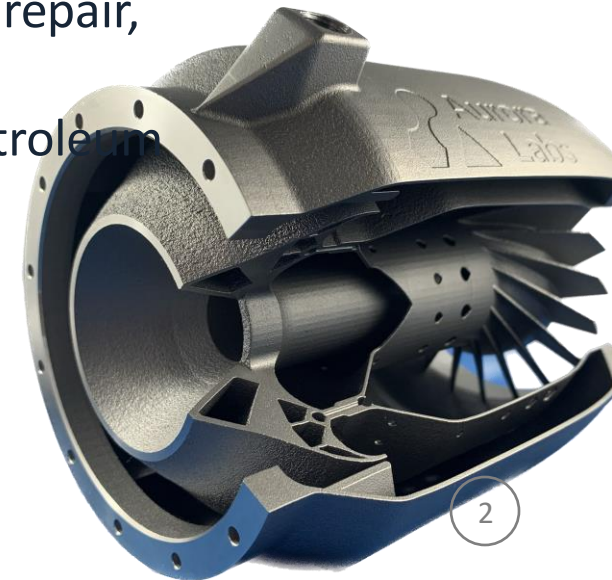
INDO PACIFIC MARITIME CONFERENCE
SYDNEY

NOVEMBER 2023

A3D | WHO WE ARE

A West Australian metal 3D printer manufacturer, focused on combining engineering and additive manufacturing expertise to provide:

- Designed, engineered and built 3D printing machines based on Laser Powder Bed Fusion (LPBF)
- Solving rapid provision of designed and engineered, high resolution, complex, metal 3D components printed in our machines for industry use to certification standards
- Build fabrication and post processing of metal or plastic parts to quickly produce repair, maintenance, or replacement components close to the point-of-need
- We meet high quality requirements. ISO 9001 qualified and work to API-20S (petroleum industry) additive manufacturing standards or others as required
- We understand complex material and metallurgical requirements



A3D | WHAT MAKES US UNIQUE

- ⚡ High-productivity, high powered 1.5kW lasers. This gives us a power and melting advantage with highly reflective alloys, such as copper and aluminium, we can melt faster, getting us parts sooner. We can also melt all standard materials at comparable build rates to other Laser Powder Bed Fusion (LPBF) machines in our size segment
- ⚡ On-demand technology to quickly produce metal repair, maintenance, or replacement parts close to the point-of-need, we can supply Australia wide, and can support your machine or troubleshoot your 3D printing processes.
- ⚡ Our 15 person AM team can provide solid expertise and 3D printer systems customised for workshop situations built on many years of experience. We provide the system and we can train you to metal print to an advanced level in the materials of your choice
- ⚡ Material characterisation and design expertise to help you get the best from your investment in a 3D printing machine



A3D | LPBF COMPARISON to OTHER 3D MANUFACTURING

METHOD	AURORA LABS	TITOMIC	SPEED3D	MARKFORGED'S METAL
TECHNOLOGY	LPBF - High precision, high density	Cold Spray - High-speed, high-density	Cold Spray - Efficient for large parts	Metal FFF - Strong and lightweight
BENEFITS	High strength, high precision, high complexity, near-full density parts, that can be fine featured. Versatile post-processing option, near net shape, post processing and heat treatment not always necessary but beneficial	Rapid large-scale production, high-density parts, enhanced mechanical properties after heat treatment	Efficient for large complex parts, high-density parts, enhanced mechanical properties after heat treatment	Strong and lightweight parts, versatile composite reinforcement, sintering for quality
TYPICAL APPLICATION	High-precision components for demanding industries	Ideal for large-scale manufacturing and aerospace	Efficient production of large, complex metal parts	Strong and lightweight parts suitable for various applications
AS-PRINTED DENSITY	Near-full density (Exceeds 99%)	High, approx. 95%-99% or higher	High, approx. 95%-99% or higher	Moderate, varies with composite, 90%-99%
POST-PROCESSING	Offers various post-processing options for precision and finish, near net shape possible	Requires Heat Treatment for improved mechanical properties and quality	Requires Heat Treatment for enhanced properties and quality	Includes Sintering for composite reinforcement and quality, but requires post furnace treatment
PRODUCTION SPEED	Moderate, focusing on precision and complex geometries	High, allowing for rapid part production	High-speed production, especially for large, complex parts	Moderate to High, balancing speed and strength
MAX THEORETICAL SPEED	20kg per day	100kg per day	100kg per day	10kg per day
COMPETITIVE STRATEGY	High-precision and diverse post-processing options, possibly quickest turnaround if parts are optimized for the process	Competitive advantage with rapid Cold Spray and improved part properties	Competitive advantage with fast Cold Spray and quality	Unique composite reinforcement for strong and lightweight parts
TARGET FINAL DENSITY (AFTER HIP)	Optional, typically for complex or high value parts. Full density (Exceeds 99%)	HIP required for achieving full, at full density exceeds 99%	Required for achieving full density. Full density exceeds 99%	Optional, typical for composite parts. Full density (Exceeds 99%)

A3D | DEFENCE SYNERGIES with AM

We are engaging with new customers to utilise cutting edge technologies to make unique products, fit for service and performance that support the vital role of defence in national security and the economy

New OEM parts (remote)

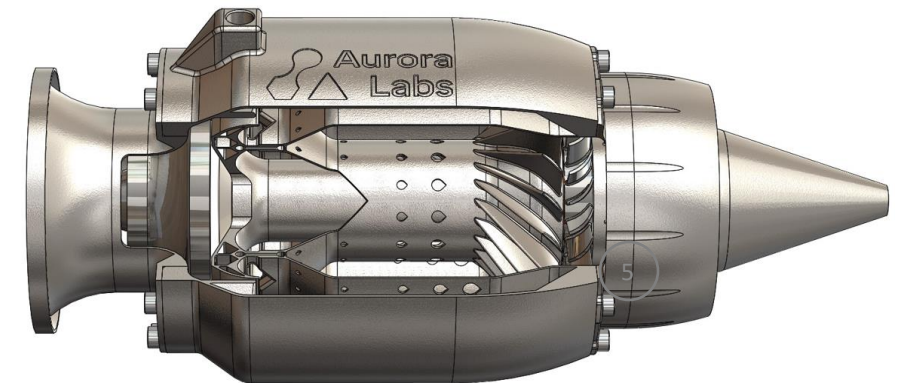
- Produce next generation parts with improved resolution and fidelity, reduce weight or improve geometries, increase part consolidation, while minimising environmental impacts.
- Make key advancements with new materials such as superalloys, titanium or copper alloys.

Remote, spare or obsolete part supply (locally deployed home print hubs)

- Rapid supply of certified spares to improve platform and equipment availability
- Reduce stock, warehousing, improve sustainability
- Accelerate prototyping

Front Line Commands (point of use)

- Urgent, short term, operational battle damage repair. This includes “get me home”



A3D | AM CORE CAPABILITIES



Mass customisation

The ability to create custom-built designs without the additional cost opens the door to a myriad of possibilities



New Capabilities

Complex products can be produced that are lighter, stronger, more powerful or efficient and can consolidate multiple parts into a single component.



Supply Chain Simplification

Production is closer to the point of demand, with reduced levels of inventory and less reliance on logistics.



Lead time and speed

Shorter design, process, and production cycles delivers products to end users faster.

A3D | CORE CAPABILITIES CONTINUED

- A3Ds Metal Laser Powder Bed Fusion printing – areas available for parts
 - AL420 420mm \varnothing x 300mm high
 - AL190 190mm \varnothing x 150mm high
 - AL250 – 250mm x 250mm x 300mm SQUARE (coming in 2024)
- Polymer printing, incl. high temp plastics like PEEK-CF, used in aerospace for high strength for dependable properties
 - INTAMSYS 300mm x 300mm x 400mm
- 3D Scanning, for reverse engineering of legacy parts
 - GOM scanner available for metrology work
- Engineering design and Design for Additive Manufacturing (DfAM)
 - Lightweight parts, reduce part complexity and number, build high resolution, complex, fine-featured parts
- Post-processing via mill, lathe, band saw, polishing, grinding & heat treatments such as HIP, ageing, annealing, etc
- AM application and materials research with university collaborations



A3D | AL250 PRINTER

Build Envelope	250 x 250 x 300mm (x,y,z)*
Layer Thickness	30 – 150 µm
Production Speed	up to 100cm ³ / hr**
Laser System Options	Fiber laser 1 x 1500W (cw) Fiber laser 2 x 1500W (cw)
Scanning Speed	Max 20 m/s
Spot Diameter	75 – 150 µm
Bed Pre-Heating	Up to 200 °C
Operating Conditions	18 – 32 °C
Build plate clamping system	Quick clamp mechanism
Connected Load	Approx power consumption 25A Power supply 3/n/PE AC 400V, 32A
Inert gas	Ar / N ₂ (external N ₂ generator optional)
Inert gas consumption	~5L / min
Filtering System	Integrated, 2 filter units
Dimensions	2,180 x 1260 x 2450 mm (W x D x H)
Weight	Approx 1700 kg



A3D | HIGH POWER PRINTING TECHNOLOGY

Market-leading metal printing using high-powered lasers that deliver:

3 x

the industry average
laser power

“The Barnes Global Advisors sees A3D’s technology contributing to a highly productive, affordable solution for the multi-laser market.”

Dr Kevin Slattery DSc, (previously Chief Scientist for AM at Boeing Research and Technology)



THE BARNES GLOBAL
ADVISORS



A3D | USE CASE: PART LOGISTICS

This redesigned impeller was manufactured in a harder material than the existing part specification, providing an additional benefit for the client.

Challenge: Maintaining stocks of obsolete spare parts in multiple regions can be a both a procurement and logistics challenge.

Solution: A modified pump impeller design based on a laser scan of the current part was developed. The design was optimized for duty, and additive manufacture (AM) technologies were used to create the replacement part.

Our client had many obsolete pumping systems in their operations, leading to difficulty in sourcing spare parts. Additionally, the obsolete impellers were very inefficient when compared to the latest best-practice impeller designs.

The Benefits: The improved design increases pump efficiency, balance of the impeller through improved manufacturing accuracy, also providing a long-term source of obsolete spare parts.



A3D | CASE STUDIES

Purpose of this project: An industrial customer needed to comply to the request for a regulator to ensure an increased degree of operator safety applied while conducting washdown of plant using a caustic water mix. The customer wanted greater safety functionality while complying with the regulator requirements.

Challenge: Hoses and fittings were rupturing and spraying caustic laden mud water onto skin of users. Misuse was the main reason for these incidents. The customer chose to engineer out the safety issue.

Solution: A3D engineering services, through an iterative process, designed a custom solution to meet customer criteria of dealing with a heavy hose and nozzle replacing it with a light-weighted wash-down lance that is ergonomic, has automatic shut-off (dead man switch), and all for minimal cost. *Manufacture of components for QUICK PROTOTYPING were completed with 3D printing for fast demonstration and integration.*



3D printed water nozzle with dead-man switch

A3D | WHY WORK WITH US

“Long, complex supply chains can be streamlined through 3D printing. Waiting times can be slashed, and accessibility in remote areas can be mitigated when local additive manufacturing businesses are integrated as regular suppliers.

Aurora Labs 3D can deliver increased flexibility, providing much needed supply chain diversification.”

Flavio Macau
WA President – ASCI



Chevron asked Aurora to demonstrate whether the same parts could be made using 3-D printing technology....

“We’ve learned a lot from those parts. The most important thing is that we’ve shown that **this flexible, right part, right time digital supply-chain approach can be successful, and it can meet our needs**”

Rob Rettew
Materials R&D,
Technology Development PM
Chevron Technical Centre



A3D | WHY PARTNER WITH US

- We are a **TRUSTED PARTNER**. Industries such as oil and gas, mining and defence companies trust us to provide them with AM expertise.
- We have **EXPERTISE and KNOWLEDGE**. Our staff are high trained and experts in their field. Alongside academic qualifications, industry knowledge runs deep.
- We are **CERTIFIED and ACCREDITED ISO9001**. In our own work, we can also test and work to a range of newly published additive standards such as API 20S and our team has contributed to SAE Standards Committees this past year on laser powder bed fusion.

A3D | INDUSTRY ENGAGEMENT

A3D's technology and print services are being explored by a variety of local and international organisations.



Q&A

DEFENCE OPPORTUNITIES