

LASER POWDER BED FUSION · A30 · A50 · A100

Real metal printing a lab can simply buy.

From **\$59,000**, designed and manufactured in the U.S.A.
Every process parameter is open to you, and trying a
new alloy costs **tens of grams** of powder.



WHAT THE METAL AM MARKET IS BUILT FOR

The industry sells production. Most organisations need something else first.

Metal AM is sold on throughput and cost per part — the metrics of a factory running a qualified alloy at volume. Six figures, three-phase power, a dedicated room, parameters you may not touch. Cheaper machines offer the same job for less, usually through sealed cartridges and an approved-material list.

Neither answers the three things people actually come to us with.

Research

Developing the material itself. What matters is the cost of one experiment — how much powder a run consumes, how quickly the material can be changed, and whether the process parameters are yours to set.

Education

Learning the technology properly, with hands on a real laser powder bed fusion machine — not a polymer printer and not a bureau invoice. A department needs students to open the machine, break a build and understand why.

Small-series manufacturing

Making real metal parts in small numbers — dental frameworks, jewellery, inserts, fixtures, spares. The parts are small and valuable, the batches are short, and a production-scale machine is the wrong tool entirely.

AO Metal is built for these three. They look different from the outside, but they need the same machine: small builds, fast material changes, open parameters and a price a department can actually approve.

WHAT AO METAL IS

A way into metal — and an instrument for developing it.

For most labs the A30 is simply the first real LPBF machine in the building: not a polymer printer, not a service bureau, and not a two-year wait for capital approval. For a materials group it is something else again — a machine whose every parameter is yours, on which a new alloy can be tried for the cost of a few dozen grams of powder.

- **Affordable, and we say so.** \$59,000 for a true LPBF system, designed and manufactured in the United States. No cartridges, no licences, no subscriptions — after the machine you pay for powder.
- **Open where it matters.** Every process parameter is yours to set, in our own slicer. Proven parameter sets exist for the alloys we run, and the owner of the machine gets full access to them.
- **Serviceable with ordinary parts.** We designed it so the wear items — filters, seals, hoses, fittings, the recoater blade — are standard components you can buy locally, not proprietary spares with our label on them. A machine you cannot maintain is not really affordable.
- **You can make the powder too.** Atomiser, particle analyser and open printer from one partner — a package no competitor offers and a discount cannot copy.

From \$59,000

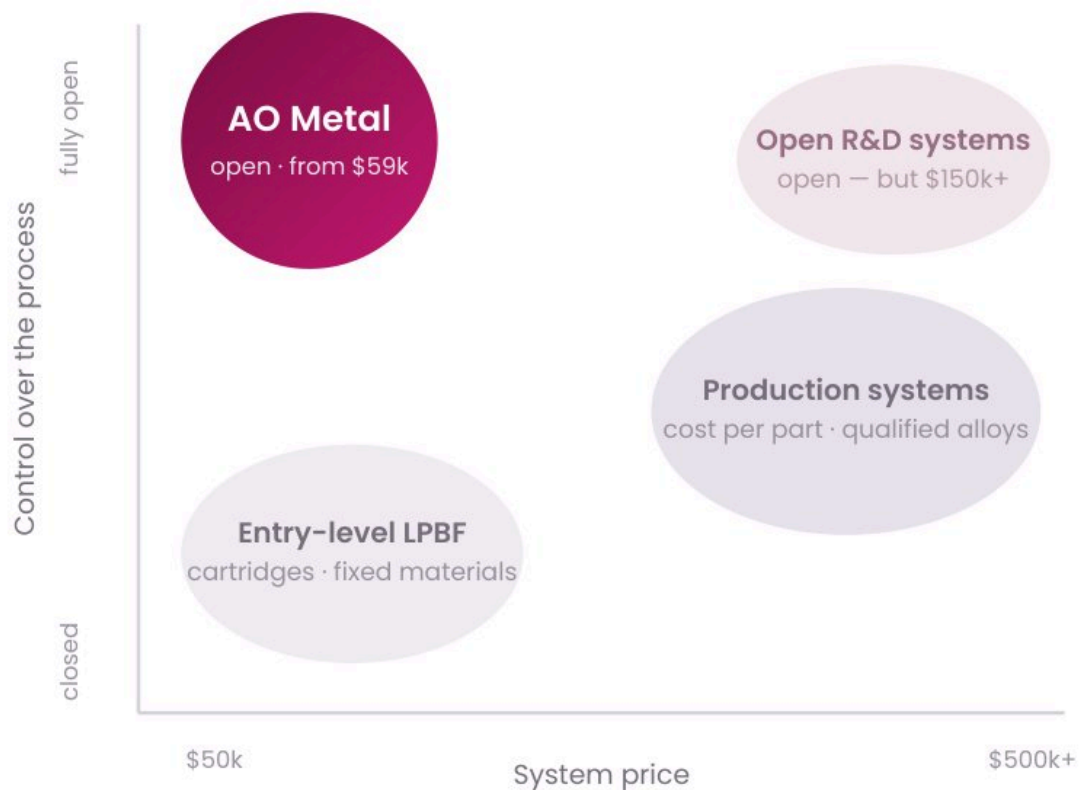
110 V single phase · 2 kW

Benchtop · ≈100 kg

Made in the U.S.A.



A technology this important should not be this hard to get into.



Why this corner was empty

Open architecture has always existed — at research-institute prices. Affordable machines have always been closed. Nothing sat where a lab could both afford the machine and own the process, so most organisations never got to try metal at all.

Access is what moves the technology

Every lab that can finally run its own machine trains engineers, publishes results and qualifies alloys that did not exist before — and those people carry metal AM into their industries for the rest of their careers. We would rather grow that population than argue over today's.

Why we went here

Metal printing is one of the most consequential manufacturing technologies of the decade, and it has stayed out of reach of the people who would advance it fastest. We set out to serve that user — and the more labs, departments and small shops can actually run a machine, the faster the whole technology matures.

SIXTEEN PARAMETER SETS, ONE BUILD PLATE

This is what an open system actually looks like.

Sixteen cubes on one plate, each printed with a different combination of **laser power** and **scan speed**. Afterwards every one is sectioned, polished and measured under a microscope.

That is how a process window is found: at low energy the sections are porous, at high energy they are almost clean, and somewhere between the two is the setting you will run for the next year. Sixteen experiments in a single build, from well under a kilogram of powder.

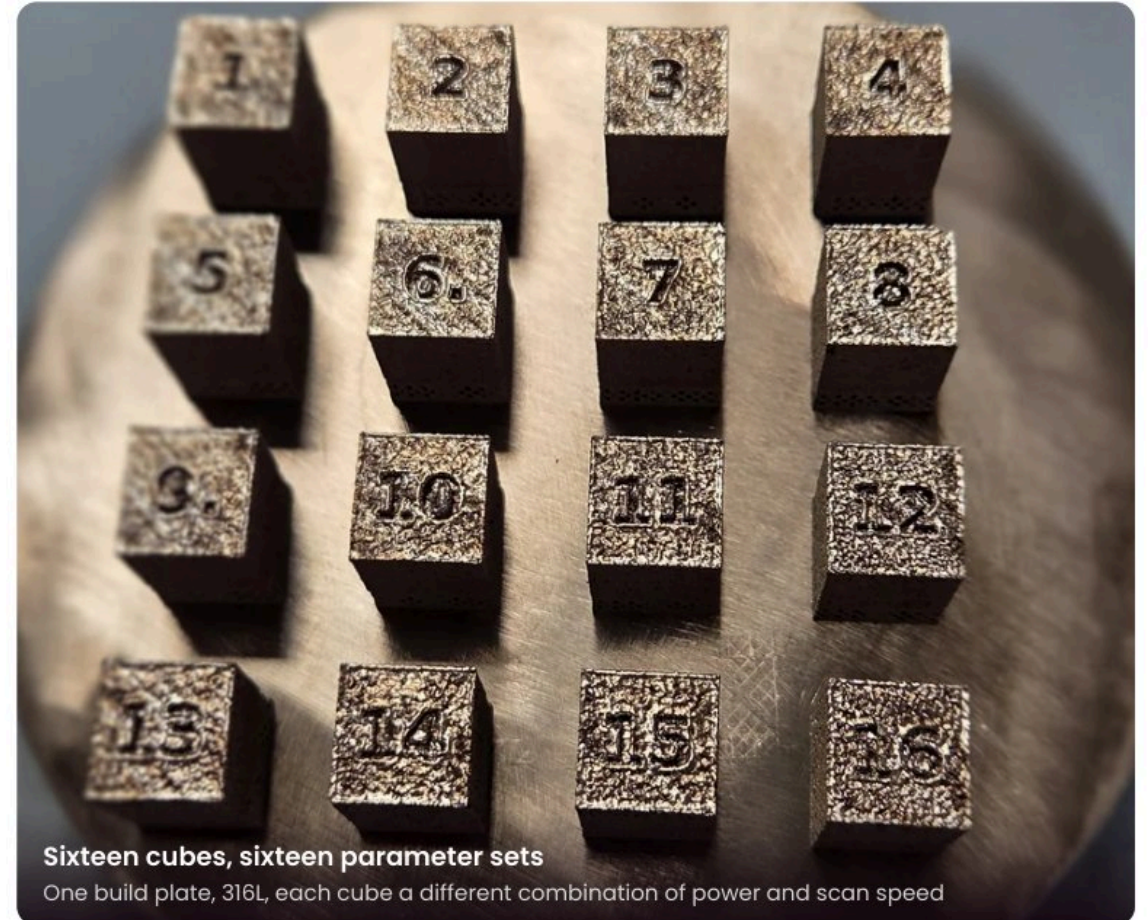
On a closed machine this page cannot exist: the parameters are the vendor's, not yours, and you get whichever window they qualified. On an open one it is an afternoon's work — and it is how a material nobody has printed before becomes a material you can print.

316L stainless

One build, sixteen settings

Sectioned and measured

Handed over with the machine



WHAT THE MACHINES MAKE

Fully dense metal, one process step, no sintering shrinkage.



Turbine wheel

Thin curved blades



Topology-optimised bracket

Organic load paths



Pump housing

Internal channels



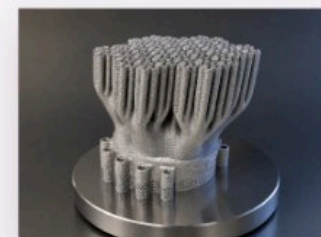
Lattice manifold

Geometry no other process makes



Polished dome

As-printed to finished



Heat exchanger

Lattice core, one piece

Every one of these is a shape that casting or machining either cannot make or can only make in several pieces. On an AO Metal system they come off the plate in one build, in one material, with no second process step.

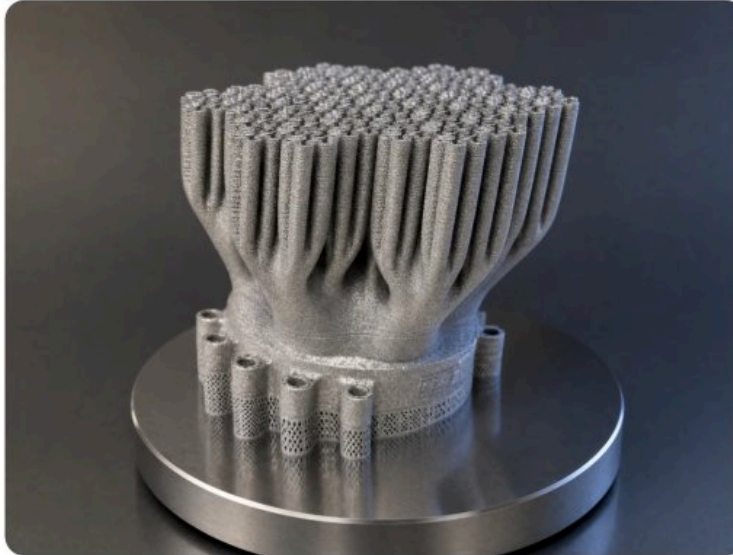
Sizes shown span the line: the smallest fit an A30 build cylinder, the larger ones are A50 and A100 work. The physics is identical across all three machines — only the envelope changes.

Three jobs customers bring us, and what each one really tests.



Impellers

Curved, overhanging blades normally demand a forest of supports. Here they print with very few — less powder consumed, less time cutting supports off afterwards, and a cleaner surface on the blade where it matters.



Heat exchangers

The outside is simple; the performance is all inside. Supports in an internal channel are hard to remove and sometimes impossible — so they compromise the part's function. Printing these channels without supports is what lets an engineer design for performance instead of around the process.



ASTM E8 test specimens

Every materials lab needs dog bones, and they are only useful if they are dimensionally repeatable. The machine prints them to standard, run after run, so the time goes into studying the material rather than into checking the samples.

Copper and niobium alloys at Oak Ridge National Laboratory

The problem

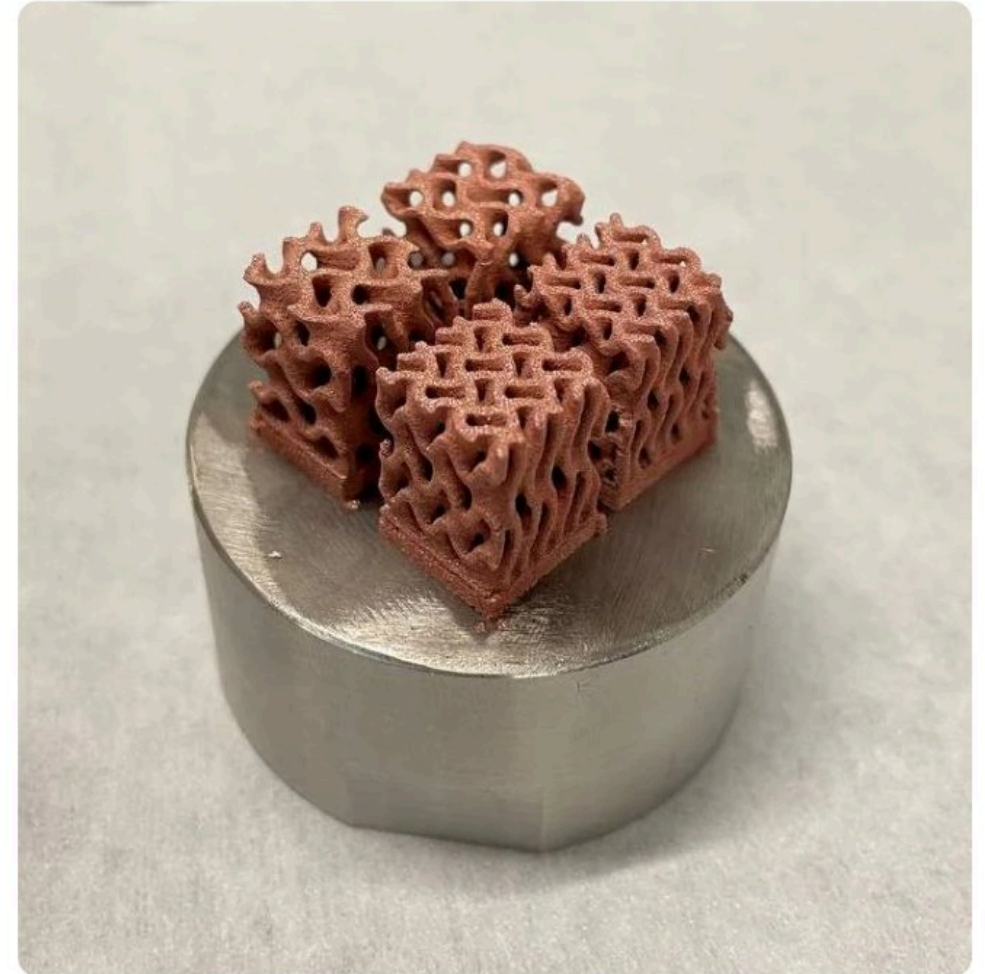
ORNL's material-synthesis programme was limited on two fronts: infrared lasers couple poorly into highly reflective alloys such as copper, and every experiment consumed expensive powder in a machine built for production-sized beds.

What we built

A system on a $\varnothing 50 \times 100$ mm build area, so a single experiment costs grams instead of kilograms — with blue-laser capability at 445 nm, where copper absorbs energy far better than at 1064 nm, and with every process parameter left open for the team to set.

The result

ORNL processed advanced copper and niobium alloys that had been out of reach, with materially less waste per experiment — and gained a platform for new alloy compositions rather than a machine for known ones.



LASER POWDER BED FUSION

One layer at a time, in argon, at up to 12 m/s.

1 Powder feed

The dosing chamber platform rises and delivers a measured dose of powder.

2 Recoating

The recoater spreads an even layer across the build plate; excess powder is captured in the recycling bin for re-sieving.

3 Laser melting

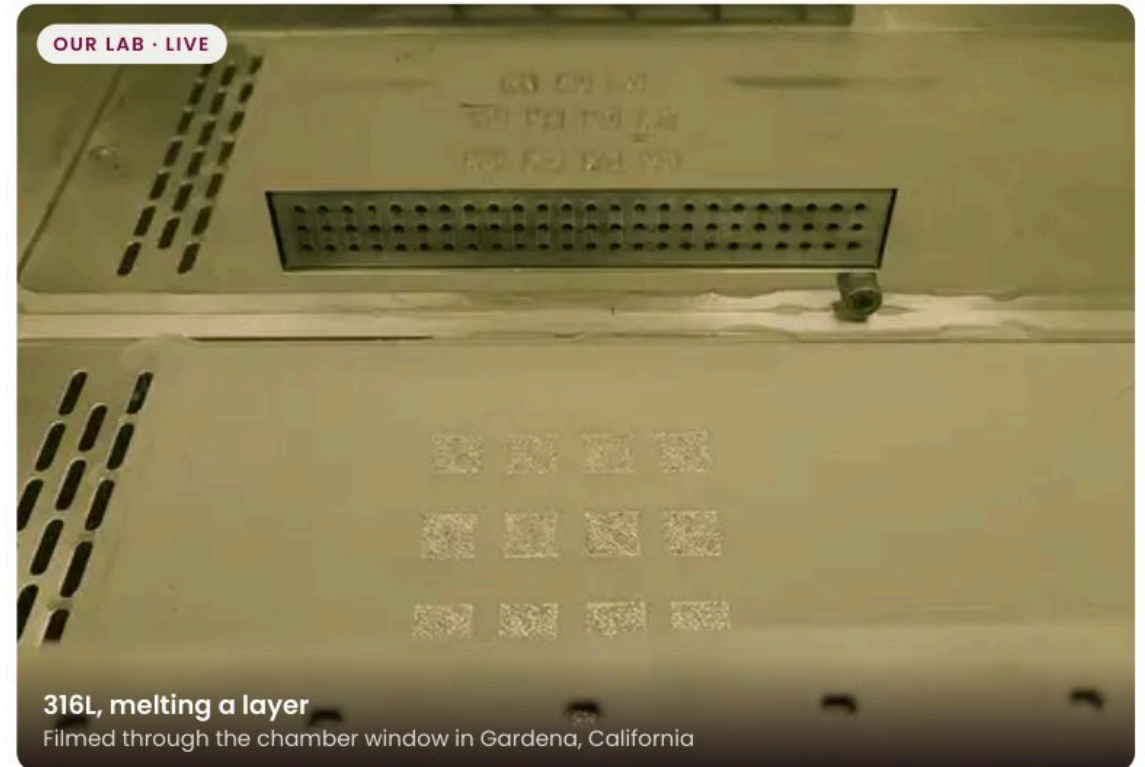
The scan head steers the fiber laser across the layer, melting the powder into a continuous, fully dense layer of solid metal.

4 Platform descends

The build platform drops by exactly one layer thickness — 15 to 100 μm , set by you.

5 Repeat

The cycle repeats until the part is complete. No second process step, no debinding, no sintering shrinkage.



THE ONE THING A CLOSED SYSTEM CANNOT GIVE YOU

The parameters are yours. That is the whole difference.

Proven, and handed over

Nine alloys are already dialled in on the A30, sixteen and more on the A50 and A100. Those proven parameter sets come with the machine and the owner gets full access to them — on a closed system the parameters *are* the product, and they stay with the vendor.

And not a fixed list

Nine is where we are today, not a ceiling written into the machine. Nothing restricts what you may run: if you can source or atomise a powder, you can develop a window for it yourself.

Reproduce any process

Every setting is exposed, so a process developed on another machine can be rebuilt here — layer thickness, energy density, scan strategy — proved on coupons that cost grams, then carried unchanged to a production system. Qualify small, scale later.

Nothing metered

Laser power, scan speed, hatch, layer thickness, scan order and support strategy — all settable, per zone of the part, in our own slicer. No annual software fee, no consumable contract, no vendor sign-off on what you are allowed to print.

For a research group this is the whole argument: a closed machine can only reproduce what its vendor has already qualified. An open one can be the instrument that qualifies something new.

No cartridges

No approved-material list

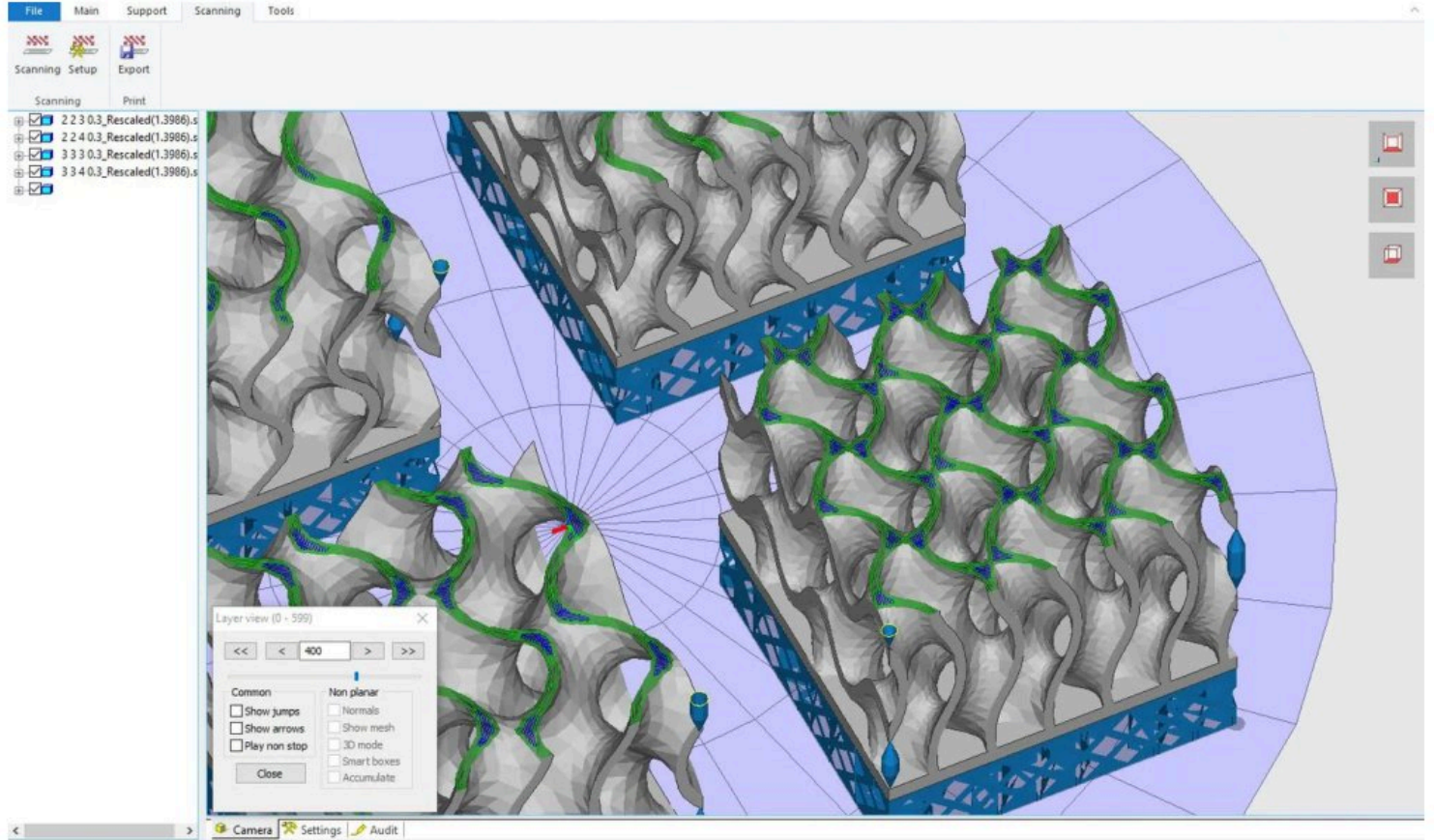
No annual licence

Parameters per zone

AO BUILD STUDIO + AO BUILD SLICER

Our own slicer, with nothing hidden behind it.

- Hatch spacing, laser power and scan speed set **per zone of the part**, not per build.
- Scan order customisable to control thermal history.
- Support generation with pattern libraries plus fully manual, individual supports.
- All process parameters open, so the physics of the build is available for study.
- Built on our own core — included with the machine, no annual licence.



Make the powder. Measure it. Print it. Same week.

Alloy development normally stalls in procurement: a new composition means a minimum order, a lead time and a vendor who has to be persuaded to make 5 kg. Atomise it yourself and that wait disappears.

1 ATO Lab — atomise

Ultrasonic atomisation of your own composition in the lab, in gram-to-kilogram quantities.

2 Camsizer X2 — measure

Particle size and shape analysis from 0.8 μm to 8 mm; confirm the powder is printable before you print it.

3 AO Metal — print

Open parameters mean a brand-new powder can be characterised and dialled in on the same machine.

Years → days

Grams, not minimum orders

Nothing leaves the lab



Your own powder



Your own part

THE NUMBER NOBODY ELSE QUOTES

Trying a new alloy costs tens of grams of powder.

Every vendor quotes the price of the machine. None of them quotes the price of an experiment — which is the number that actually decides whether a new composition gets tried or gets postponed.

Powder to start a build	316L steel	Ti-6Al-4V	Aluminium
A30 · test parts 10 mm tall	71 g	41 g	25 g
A30 · a build of 20 mm parts	143 g	82 g	49 g
A30 · dispenser filled to full height	453 g	260 g	156 g
A50 · dispenser filled to full height	2.68 kg	1.54 kg	0.92 kg
A100 · dispenser filled to full height	10.49 kg	6.02 kg	3.60 kg
Metal in the part itself — a 10 mm cube	7.9 g	4.5 g	2.7 g
Time to change material	1 hour	A50 · 2 hours A100 · 3 hours	

41 g

TITANIUM TO TRY A PARAMETER SET ON AN A30

Why this number decides the purchase

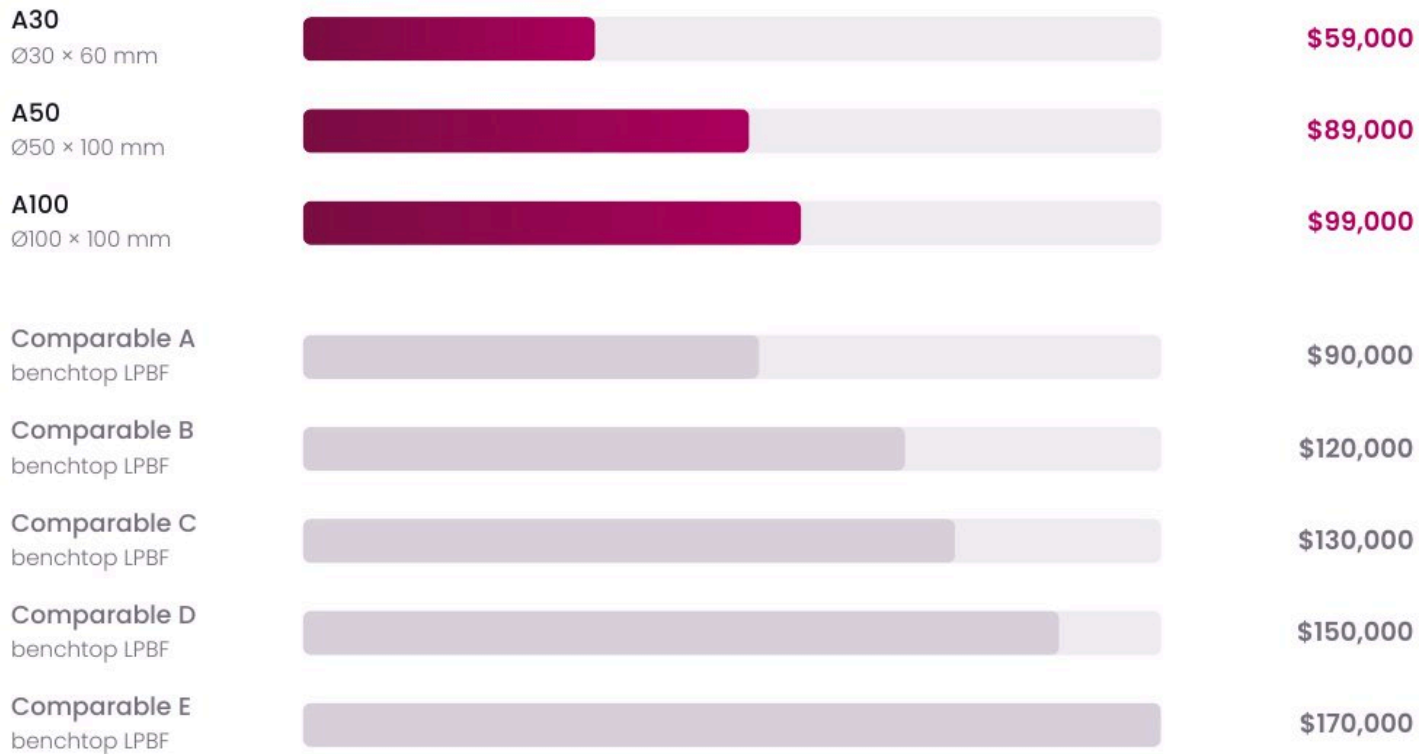
On a 150 × 150 × 150 mm bed the same first trial is a different order of magnitude — kilograms of powder before a single coupon exists. For a group developing an alloy that does not yet exist, that is the difference between running the experiment and writing a proposal to fund it.

And the small bed is the reason

A Ø30 × 60 mm cylinder is a deliberate choice, not a compromise: it is what makes a single experiment cost grams.

MARKET POSITION

**\$59,000 buys a true LPBF system.
The category starts at \$90,000.**



Same class, not a smaller class

Every machine above is a benchtop or lab-scale LPBF system with a build envelope in the same order of magnitude, a 100–500 W fiber laser and an argon chamber.

What the gap buys you

At \$59,000 an A30 can be bought on an operating budget or a single grant line instead of a capital request — usually the difference between this year and the year after next. The A50 sits below the band as well; the A100 sits at its floor with the largest envelope we build.

80× less volume

to inert, to fill with powder, and to keep optically flat



ENGINEERING, NOT A DISCOUNT

We designed for the lab job. We didn't strip a factory machine.

- **A cylindrical build chamber, not a square one.** A $\text{Ø}30 \times 60 \text{ mm}$ cylinder is a fraction of the volume of a $150 \times 150 \times 150 \text{ mm}$ cube — less chamber to inert, far less powder to start a campaign, a smaller optical field to keep flat.
- **Laser matched to the chamber, not to a spec sheet.** 200 W is the right power for this bed, which is why the machine runs on ordinary **110 V single phase at 2 kW** — no electrical work, no dedicated circuit.
- **Standard industrial optics.** Galvo scan head and F-theta lens, $75 \mu\text{m}$ spot, up to 12 m/s — proven components bought at scale, not bespoke assemblies.
- **Nothing in the price waits to be recovered later.** No powder cartridges, no per-material licence, no software subscription — so the number on the quotation is the number.
- **And the same discipline scales.** A50 and A100 share one chassis, one control system and one slicer with the A30 — which is why a machine with four times the build area costs \$99,000 rather than three times as much.

Where this machine earns its place — and the one limit worth stating.

University labs

Coupons, tensile bars and parameter development all fit inside Ø30 × 60 mm and need nothing larger. Buy it on a grant line rather than a capital budget, and teach on a machine where every parameter can be opened, broken and explained. Installed at Oak Ridge National Laboratory.

Corporate & defence R&D

When developing the alloy matters more than the size of the part. Iterate weekly on high-value materials without sending geometry outside the building or waiting in someone else's queue.

Proving a process before you scale it

Because nothing is locked, you can rebuild another machine's process on an A30 — same layer thickness, same energy density, same scan strategy — qualify it on coupons that cost grams, then carry the settings straight to a production system.

Jewellery & dental labs

Here the small build volume is not a limitation but the norm: the pieces are small and the metals are expensive. Pair it with an ultrasonic atomiser and unused gold or silver goes back into printable powder instead of being written off.

Aerospace & hardware startups

Small parts and fast iteration, plus short production runs of the brackets, nozzles and fittings that would otherwise sit in a bureau queue for weeks. Anything larger goes to an A50 or A100 — or we print it while your own machine handles the daily loop.

The one real limit is size, not purpose. An A30 is a perfectly good production machine for small metal parts in small numbers — inserts, fixtures, dental frameworks, jewellery, spares. What it cannot do is large components: anything that does not fit Ø30 × 60 mm belongs on an A50 or an A100, or comes to us to print. We would rather say that now than after the invoice.

Grant line

BELOW MOST CAPITAL THRESHOLDS

Made in the U.S.A.

DESIGNED AND BUILT DOMESTICALLY

Three machines, two decisions — and only one of them is about size.



A30 — get into metal

Ø30 × 60 mm · 200 W · from \$59,000

The only machine here that runs on a wall socket and sits on a bench you already own. It exists so that a team can learn real LPBF and develop parameters without a board-level purchase — coupons, tensile bars, jewellery, teaching. Nine alloys proven, and an experiment costs tens of grams.



A50 — take on hard materials

Ø50 × 100 mm · 300–1000 W · from \$89,000

The step up is not really volume. This is where the 445 nm blue laser and the 900 °C platform become available — the two things that decide copper and other reflective alloys, refractories, and any material that cracks as it cools. Sixteen and more alloys proven.



A100 — make real components

Ø100 × 100 mm · 300–1000 W · from \$99,000

Everything the A50 can do, over four times the build area. This is where research output turns into parts you can ship — without changing the software, the workflow or the way the team works.

A30 → A50 buys materials. If the work is copper, tungsten, refractories or a superalloy that will not survive a cold plate, that is the reason to move up — not the extra 40 mm of diameter.

A50 → A100 buys space. Same lasers, same options, same slicer. One chassis, one control system and one software across all three, so a lab that starts on an A30 relearns nothing when it grows — and its parameter sets travel with it.

A30

METAL 3D PRINTER

\$59,000 STARTING AT



THE ENTRY POINT INTO LPBF

The smallest true LPBF machine we make — and the only part of the line that runs on an ordinary wall socket and sits on a bench you already own.

Build envelope	Ø30 × 60 mm (Ø1.18 × 2.36 in)
Laser	200 W fiber, 1064 nm · 300 W option \$64,000
Spot / layer	75 µm · 15–100 µm
Scan speed	up to 12 m/s
Power	110 V, single phase, 2 kW
Footprint	1000 × 620 × 1100 mm · ≈100 kg
Material change	1 hour
Build plate	unheated
Alloys proven	9 to date — not a fixed list
Argon	< 2 L/min

Best fit

Tensile & density coupons

Alloy development

Jewellery

Teaching labs

Precious metals

A50

METAL 3D PRINTER

\$89,000 STARTING AT



REFLECTIVE ALLOYS AND HOT PLATFORMS

Where the line gains the two capabilities that decide hard materials: a blue laser for reflective metals and a 900 °C platform for alloys that crack when they cool too fast.

Build envelope	Ø50 × 100 mm (Ø1.97 × 3.94 in)
Laser	300 W fiber, 1064 nm (500 / 1000 W optional)
Dual-laser option	1 × 500 W (1000 W) 1064 nm + 1 × 250 W 445 nm blue
Platform heating	250 °C standard · 900 °C optional
Spot / layer	75 µm · 15–100 µm
Scan speed	up to 12 m/s
Power	110 V single phase at 300 W · 3-phase for 500/1000 W
Alloys proven	16+ to date
Material change	2 hours

Best fit

Copper & reflective alloys

Refractories

High-temperature research

Functional prototypes

A100

METAL 3D PRINTER

\$99,000 STARTING AT



THE LARGEST ENVELOPE IN THE LINE

Ø100 × 100 mm — enough for real components, small production batches and full-size test articles, with the same open architecture as the rest of the line.

Build envelope	Ø100 × 100 mm (Ø3.94 × 3.94 in)
Laser	300 W fiber, 1064 nm (500 / 1000 W optional)
Dual-laser option	1 × 500 W (1000 W) 1064 nm + 1 × 250 W 445 nm blue
Platform heating	250 °C standard · 900 °C optional
Spot / layer	75 µm · 15–100 µm
Scan speed	up to 12 m/s
Power	110 V single phase at 300 W · 3-phase for 500/1000 W
Alloys proven	16+ to date
Material change	3 hours

Best fit

Functional components

Small series

Aerospace & energy R&D

Multi-material programmes

Specifications

Model	A30	A50	A100
Build envelope	Ø30 × 60 mm Ø1.18 × 2.36 in	Ø50 × 100 mm Ø1.97 × 3.94 in	Ø100 × 100 mm Ø3.94 × 3.94 in
Laser	200 W fiber, 1064 nm (300 W option)	300 W fiber, 1064 nm (500 / 1000 W optional)	300 W fiber, 1064 nm (500 / 1000 W optional)
Optional blue laser	—	445 nm, 250 W dual-laser configuration	445 nm, 250 W dual-laser configuration
Spot size	75 µm (55 µm optional)	75 µm (55 µm optional)	75 µm (55 µm optional)
Scan system	Galvo scan head + F-theta lens	Galvo scan head + F-theta lens	Galvo scan head + F-theta lens
Max scan speed	up to 12 m/s	up to 12 m/s	up to 12 m/s
Layer thickness	15–100 µm	15–100 µm	15–100 µm
Build plate heating	not heated	250 °C standard 900 °C optional	250 °C standard 900 °C optional
Atmosphere	Argon, < 2 L/min	Argon, < 2 L/min	Argon, < 2 L/min
Material change	1 hour	2 hours	3 hours
Power supply	110 V, 1 phase · 2 kW	110 V, 1 phase · 4 kW (3-phase for 500/1000 W)	110 V, 1 phase · 4 kW (3-phase for 500/1000 W)
Dimensions (W × D × H)	1000 × 620 × 1100 mm 39.4 × 24.4 × 43.3 in	1150 × 730 × 2050 mm 45.3 × 28.7 × 80.7 in	1150 × 730 × 2050 mm 45.3 × 28.7 × 80.7 in
Weight	≈100 kg / 220 lb	350 kg / 772 lb	350 kg / 772 lb
Software · file format	AO Build Studio + AO Build Slicer · STL	AO Build Studio + AO Build Slicer · STL	AO Build Studio + AO Build Slicer · STL
Alloys proven to date	9	16+	16+
Lead time	8–14 weeks	8–14 weeks	8–14 weeks
Price	\$59,000 · 200 W \$64,000 · 300 W	from \$89,000	from \$99,000

SO YOUR PURCHASING OFFICE DOES NOT HAVE TO ASK

What a system comes with

Lead time

8–14 weeks

From purchase order to delivery. An order placed now takes a production slot this year.

Warranty

12 months

Factory warranty on laser, scanner, blower, motors and electrical systems.

Delivery

DDP, U.S.

Duties and domestic shipping included in the quoted price. No customs surprises at the loading dock.

Installation & training

Installation and operator training are included, not billed separately. A named engineer stays with the account after handover.

Financing & academic pricing

Equipment financing is available, so a system can be taken on an operating budget rather than a capital one. Universities and colleges receive academic pricing on the printer.

Powder and platforms

The first powder order can be quoted with the machine, in the alloy you intend to run, along with alloy-matched build platforms. Nothing is metered and nothing is proprietary.

A named engineer

One person who knows your account, your alloys and your builds — not a ticket queue. The same engineer who commissions the machine answers the phone six months later.

A reserved production slot

A refundable \$4,500 deposit holds your place in the build schedule and is credited against the order. It is the only way to fix a delivery date before the paperwork is finished.

Serviceable with ordinary parts

Filters, seals, hoses, fittings and recoater blades are standard components you can source locally. Nothing on this machine is a proprietary spare that only we can supply.

Sold and supported in the United States by Additive Plus — a California-based manufacturer and full-stack additive partner. AO Metal systems are designed and manufactured in the U.S.A.

Prices in USD. Terms confirmed on each quotation.

A printer is not a process. Here is what goes around it.



REQUIRED

Wet vacuum cleaner

Explosion-proof where reactive metals are run. Chamber and area cleaning between builds.



REQUIRED

Sieving machine

Reconditions used powder and removes contamination. Grade set by how much you plan to print.



RECOMMENDED

Heat-treatment furnace

Stress relief and the heat treatment that gives the alloy its final properties.



RECOMMENDED

Bandsaw

Separates parts from the build platform without damaging them.



RECOMMENDED

Small lathe

Re-faces the build platform so it is flat and ready for the next build.



RECOMMENDED

Polishing tool

Support removal, deburring and surface finishing on the bench.

We quote the whole set

Every item is available with the machine, specified for the alloys you actually intend to run, so nothing is discovered missing on installation day. Ask for a workflow quotation, not a printer price.

Included with every system

AO Build Studio and AO Build Slicer, installation, operator training, a starter build platform set, and 12 months of factory warranty.

Powder, if you want it from us

Stainless, tool steels, Inconel, Ti-6Al-4V, aluminium and more — or bring your own. The machine does not care where the powder came from.

Specified against your alloys

Every item is in daily use in our own lab, so the set is chosen for the metals you intend to run rather than copied from a catalogue.

Questions our customers ask most often.

"That seems too cheap for metal."

Fair question. Half-million-dollar machines buy production throughput — multiple lasers, big beds, lights-out running — not better physics on a coupon. What you are looking at is sectioned, polished and measured; judge it on that.

"Which materials are supported?"

Nine are dialled in on the A30 today and their parameter sets come with the machine. The list is not locked by us: the slicer is ours and the parameters are open.

"The build volume is small."

It is — deliberately. It is what makes an experiment cost grams instead of kilograms. If you need volume, that is what the A50 and A100 are for, and we can print the series for you in the meantime.

"We need to justify the purchase internally."

That is usually the real question in the whole deal, so we write the justification with you and hand you a single page your committee can act on.

"Can we see one running?"

A video call with the machine printing on camera, and as much time with the engineers who run it as you need. It costs you nothing.

"We will try a service bureau first."

A bureau will give you a part. It will not give you the parameters that made it — and for materials work, the parameters are the result.

1 · Talk to our engineers

Half an hour on a call covers more than any document: your alloys, your parts, the parameters we would start from, and a straight answer on whether an AO Metal system is the right tool. The machine can be printing on camera while we talk.

2 · Take the budget justification

We write it with you: the problem, the expected result, running cost, timeline and price, on one page your committee or department head can act on. It is the document that usually decides these purchases, and it costs you nothing.

3 · Request a formal quotation

On letterhead, with configuration, price, lead time and terms — what purchasing needs to raise a PO. A refundable deposit holds a build slot while the paperwork is finished, and equipment financing is available.

NDA on request

Academic pricing available