Amaero Pitches End-to-End Solutions for Aviation, Defence, Tooling

Barrie Finnin, CEO of Amaero International, traces the company's origins from university start-up to providing end-to-end 3D printing solutions.

By Alan Kohler · 13 Jul 2021 · 5 min read

Barrie Finnin is the CEO of Amaero International which has got a code of 3DA, they're an additive manufacturing or 3D printing company, came out of Monash University back in – 2013, the thing was started, based on some IP that Monash developed and now they're off and running, they've got a few projects on the go. They're still burning cash, but he reckons they'll get to cash breakeven relatively soon, but of course they've got a fair bit of growing to do, so they won't be throwing off dividends any time soon. However, they have raised a fair bit of money, they've got $11 million dollars in the bank so they're okay for cash and quite an interesting set of technologies that they're doing. I think it's a very interesting business.

Here is Barrie Finnin, the CEO of Amaero International.

Barrie, we always start these interviews talking about cash. You still are burning cash of course, can you tell us what your burn rate is at the moment and how much you've got in the bank?

Yeah, our burn rate at the moment is around about half a million…

Per month?

Per month – and we've got just over $11.1m in the bank at the moment.

You've just raised some money six months ago, where did you get the money from?

Yeah, we had an SPP and in addition to that, we had an on-market raise. So, we ended up with around about $13 million from that capital raising, so that was pretty successful.

Did all of your main shareholders support the capital raise?

Yeah, we had – obviously, there's a limit of how much you can get through an SPP of 30,000, but there was strong support. We also had very strong support from PPK, who underwrote the raise and they ended up with, I think, just over half a million or a little bit more than that.

We've interviewed them a few times, we know about them, they're a good little business.

Yeah, they're an interesting business. We established a joint venture with them last year to establish some new technology in materials, basically developing new versions of super alloys based on the addition of boron-nitrate nanotubes and that's quite an interesting project in its own right.

Okay, well we might get onto that in a moment. Fill us in on the history of the business because it started out of Monash University back in 2013, so quite a while ago, early days of 3D printing, when they had a…

I'm not sure about early days of 3D printing, I think 3D printing had been around but really, the big change is that in those days 3D printing was about prototypes and research and development projects. Whereas, today it's actually going into mainstream manufacturing for some critical components particularly in the aviation, defence and space sector.

The people at Monash created Amaero – I suppose what I mean, is that was early days to think of creating a company out of it.

Yeah, I think basically the thinking at Monash University when Amaero was created is that they'd been doing research on additive manufacturing technology and in particular, laser powder bed fusion and they found that they were actually meeting the mechanical properties required by the aviation sector for load-bearing components. And then, there was the world's first 3D printer jet engine project and Amaero was spun off because universities don't turn into manufacturers and they actually didn't have another Australian player that was a good fit to pickup the technology, created Amaero as a start-up.

Amaero went through several years of doing research and development until we finally actually started doing some production work back in 2018 in a project with Safran, and Amaero got involved with Innovyz, Stuart Douglas's company, back in the end of 2018 to restructure the business and prepare it for listing, which we did in December 2019. The big changes that we did in terms of the structure of the business at that time was to create a US subsidiary, because all of our major customers, particularly in defence and aviation are based in the US. They were telling us that we needed to be there in order to secure business opportunities, so we did.

I note the university's still got 15 per cent or so of the company. Do you have ongoing agreements, agreements and licences with Monash?

Yeah, we do. In fact, Monash is a key partner to us for a number of reasons, we share facilities and resources, but also they've got one of the world's largest additive manufacturing research institutes in the Monash Centre for Additive Manufacturing. That basically gives us the opportunity to tap into 50-plus research scientists who were focused on additive manufacturing of metals. That's kind of almost an increase in our bandwidth because we were able to access those resources at cost and we can essentially use them to help us scale things when we've got high demand projects.

What IP does Monash still own?

Monash still owns a number of the pieces of intellectual property. We have a couple of patented alloys. Monash is still the owner of those patents. Amaero also has some patent applications that have been developed by Amaero and are Amaero-owned. Then there's also some intellectual property arising from the major projects that we've done with Monash out of the SIEF Project, which is Science Industry Endowment Fund, for the world's first 3D printed

jet engine, plus the ARC Industry Transformational Research Hub for additive manufacturing. Amaero still has rights to the outcomes of those projects and the intellectual property, but Amaero is not the owner of those pieces of intellectual property.

How long has the licence agreements with Monash, is there any time limit on those?

For some of them, they're perpetual, some of them have got performance requirements, but basically they're perpetual so long as we meet our performance requirements.

Did they come up with, at Monash, specific and new ways of doing 3D printing and additive manufacturing that are still different in some way? I mean, I'm not an expert or very familiar with the whole field, so I'm just wondering if…

Perhaps the best way to describe it, is if you buy any of the available 3D printing machines and you just plug it in, fill it with metal, switch it on and start printing, you're not going to meet the mechanical properties that are required by the aerospace sector. You need to be able to tune the process or optimise the process so that you can eliminate the porosity or defects that cause poor performance of the components. That's where the underlying intellectual property that Monash created benefitted Amaero in its early days. We're actually capable of doing all of that ourselves now. We can do that in-house and we've also got access to new equipment and the new equipment was designed by my former Monash University colleagues and Amaero exploits that.

That equipment has been designed to be more productive and safer and more reliable in terms of delivering those properties. Really, Amaero's offering based on intellectual property generated by Monash is the component manufacturing to meet the quality standards required by the aviation sector, but also the 3D printing equipment or the machines in addition to what's available on the market. The other major revenue opportunity generated by IP out of Monash is the new alloys and you may have seen that we've actually committed now to a titanium powder production facility and so we'll be able to exploit some of those other alloy intellectual property elements using that new process.

Does all that mean that your processes are suited mainly for aerospace?

It's suited to a lot of different applications. When Innovyz got involved with the business and we restructured it, one of the things that we did was set up the facility in the US, mainly to support the defence customers. But the other pivot that we made was a focus on the tooling market, because tooling is one of those industries where the benefits of additive manufacturing which is where you're able to design structures that you can't make using conventional methods, will provide you with a performance improvement in tooling. A good example of that is conformal cooling channels. We can actually 3D print a tool with conformal cooling channels and that can be used to reduce the cycle time or improve the quality of conventional manufacturing methods like dye casting or injection modelling.

Will you take us through the business model and how it works? You basically do contract printing for people, is that the way it works?

No. Amaero offers an end-to-end solution. We have the machines which I mentioned, we're offering those machines for sale or as part of a turnkey package. We have the metal powders which some of them will be sanded alloys and some of them will be Amaero intellectual property rights. Then the contract manufacturing is another part of the model and that supports different markets. Our aviation, defence and space customers want us to make components for them, but the tooling customers on the other hand are actually interested in manufacturing the tooling. For the tooling customers, yes, we might make some components, but we're more likely to be selling them a turnkey machine package.

The other key part of the business model is being able to stand up that end-to-end solution and we have four major projects at the moment and one of them that cuts across all of the others is a defence offsets play, where the country to whom the offset obligation is owed, is going to get Amaero to establish an additive manufacturing industry, including how to manufacture additive manufacturing machines and post processing. That's the nature of Amaero's business, we're kind of the end-to-end solution provider, not just powder, not just machines and not just component sales.

Where do you get the machines from?

Well, the machines are either off the shelf equipment or they're the Amaero SP series machines which are manufactured by a sister company here in Australia.

Can you give us a sense of the proportion that you're likely to – I mean, obviously your revenue isn't up to where you're going to be, but do you expect to be 50-50 between selling machines and end-to-end packages and contract manufacturing? How's it likely to work?

Well, I'll canvass it in the four major projects that we're focusing on at the moment. In terms of those four projects, we have the powder manufacturing and the powder manufacturing will generate revenue from selling powders, a commodity that's in growing demand by the additive manufacturing industry.

Is that mainly titanium or is it all sorts of powders?

Initially, it's focused on titanium, but we will be providing other powders as well. That facility is capable of producing an output of about 120 tonnes per annum. The going rate is around about $300 Australian Dollars a kilogram, so we're estimating roughly $30 million per annum as being the expected revenue output from that.

What sort of margin do you get from that?

A very handsome margin, we're not disclosing that at this point.

Right, but it's not supermarket margins, it's pretty good?

It's very good margins.

Very good, keep going.

The second project is about additive manufacture tooling. The tooling project is focused on the tools that are used for producing pink batts, the glass/wool/insulation-type material. We started this project about a year ago with Fletcher Insulation and their licensor has a global demand for roughly $US350 million per year, just in this one tool design. We think that's probably the largest single tooling consumption of anything and…

$350 million per year consuming the tool?

Yeah.

Wow!

These tools only last about four days in the process…

Oh right, crikey, that's terrible!

It is. What Amaero's done, is looked at the way that we can recycle the tools and also 3D print them and because of the advantages of the 3D printing process and the approach that we've taken and also some clever material science that we've done, we should be able to extend the life of those tools and 3D print them at a fairly handsome margin compared to the incumbent technology. When that project takes off, we're going to have to ramp it up because the global demand is going to require literally hundreds of machines and these are million-dollar-machines, so it's actually going to require ramp-up from us, we're going to have to ramp up to that in order to be able to make it support itself from a cash flow perspective.

How many machines are you going to buy?

It depends on the model that we end up with. We're not certain at this point that Amaero is going to be the one who owns all of the machines. we may in fact licence that to someone else. But the interesting thing is, even if we do that, there'll be machine sales for us. So, there will be a substantial amount of cash generated from that activity…

Are you building these machines?

Yeah, we're building the machines. They're built by a sister company at the moment here in Australia, but the intent actually is that we will eventually be doing that in the US. Most of the market for these things is in the US, so it makes sense for us to be able to do that. It's really an assembly of components sourced all over the world. We've got some bits frames, etcetera, that are being manufactured in China. The lasers can be sourced from Europe or the US even, and those components and the electronics are all put together here in Melbourne at the moment.

This is potentially a big business for you. Are you pitching against other people for it?

Well, we were clever enough to take out a patent on the method that's being used, so at the moment we think we're in a reasonable position from an intellectual property perspective. Obviously, if somebody else comes up with a different solution that gets around the patent, then they could be a competitor, but we're going to have a pretty good head start on them.

How many potential customers are there? I imagine, Fletcher Insulation doesn't have a global monopoly, do they?

No, they don't. The major players, there's about three or four major players who have the world market and when I talk about the market being $US350 million, that's actually just the US customer that we would be focusing on.

One customer?

Yeah. Their facility is actually doing the production testing on it, so they have complete visibility of what we're achieving. They're a global company, they have facilities probably in 20 countries around the world, but they'd be the single source of our business, working through them.

So, do I take it that you're proposing to build 100 $1-million-dollar-machines?

It's going to need that, maybe even more, so that's going to be part of it. How much we decide to manufacture and whether or not we licence that to someone else, remains to be seen. We can work with either business model. We are relatively agnostic with regard to whether or not we become the component manufacturer, because we are obviously going to be limiting our growth rates if we decide that we're going to try and manufacture every component when we can in fact licence it to somebody else and have somebody else share the risk and help with the scale investment.

I suppose it's mainly a funding decision, is it? Or partly at least?

It's not just funding though, because you're talking about an industry that's in its infancy where the number of people who have skills in the area is actually in short supply. You can't just go out and hire people who are experts, you've got to grow them. That would be a rate limiting factor – if we were to just try and switch on a hundred-machine facility, that'd be a challenge.

Yes, I imagine so. I imagine a lot of this sort of business tends to flow into other things. If you were building or creating, making these tools for making pink batts for insulation, there's probably other products that are allied to that in some way, is that correct? I'm just wondering what this business would lead to?

That's right, there will be other opportunities, but we're focused on that one because it's attractive because of the scale, it would be the biggest additive manufacturing play ever and probably would remain so for quite some time. You really like it when you get big volumes with something because it enables you to be clever in operating a lean manufacturing process and mature things, when you can just focus on the same thing day-in-day-out, you can mature your processes and improve your productivity and your yields as a consequence of that and hence, profitability.

You've also done a deal with Rio Tinto about aluminium alloys, a high-temperature aluminium, tell us about that?

One of the alloys that was invented by Monash is a scandium-bearing aluminium alloy, which has much higher operating temperature than the standard aerospace alloys. The standard aerospace alloys usually will go up to about 130C or in some cases, 150C degrees, before they start losing their properties. This particular alloy is able to achieve 250C degrees, so about roughly double what the incumbent alloys in the aerospace market can achieve. What that means, is it can go into applications where you're going to have high thermal cycling, so it's a particular interest in the cold parts of jet engines and in satellites where they go through a significant thermal cycle with the operating temperatures and environment that they work in, that will be an important niche.

We engaged Rio Tinto because Rio Tinto's invested in a scandium production facility and also, they have the capability to producing lots that we can then atomise using our atomisation process. Rio Tinto were interested in becoming a partner for that because it gave them a path to market for their scandium outputs and we're obviously happy to work with somebody with the wherewithal and capacities of somebody like Rio Tinto as a supplier.

And you're saying that that IP is owned by Monash?

It's owned by Monash and Amaero has exclusive rights to that.

That sounds like it's a bit further away than the insulation tools?

Absolutely. The ones that we're focusing on at the moment are the powder project, the Fletchers project, we've got a project in El Segundo, which is a suburb of Los Angeles, which is focused on producing satellite components for one of the world's largest aerospace companies and basically, that company will fill that facility with their demand and that'll happen in the next 12 to 18 months. They've already told us to start looking for another facility as an expansion facility and we'll identify that facility by the end of this calendar year. The other project is a defence offsets project, where we're going to stand up a whole industry in a Middle Eastern country.

Those are the major four. The offsets project is roughly a $100 million project; the powder facility I mentioned before; the spinner tooling project is a tooling project and again, in the hundreds of millions. Those are going to be the cash flow and growth engines for the business in the short-term. The other alloys, the other materials work that we're doing are part of our future strategy. Our future strategy includes improvements on the additive manufacturing machines which will improve the outputs and quality of outputs. We've also got material science work in the pipeline, we've got other research and development projects looking at various different types of other additive manufacturing technology, not just the laser powder bed fusion technology.

That new intellectual property, which I'm keeping a lid on at the moment, is going to provide us with more high-tech growth solutions into the future and there's a timeframe around some of these things. Even though that aluminium manganese scandium alloy or Amaero high-operating-temperature aluminium, as we call it, hot-al, even though that's ready for us to start working with, you need to go through a qualification process and that qualification process, particularly if you're talking about for flying components in aviation applications can

take several years, the small jet engine project, to give you an idea, from the time that we started that project until the time that we're actually approved for production for components out of that project, was about five years and that's just what it takes. You need to have one lot of activities that are going to give you shorter-term revenue and one lot of activities which is going to be your engine for growth in the future.

When you say short-term and cash flow, how short-term? When do you expect serious cash flow to be coming in from these operations?

The powder will be next financial year, but the Middle East project will be this financial year. Possibly even before the end of this calendar year. The glass spinner tooling project is going to be generating revenue this calendar year, but obviously it won't be at the full level within this calendar year. That's probably going to take a few years to max that out.

How soon do you think you'll be cash flow positive?

With all of those things happening, basically as soon as the Middle East Project kicks off, we're going to be cash flow positive. Then we're going to have sustainable cash flows from commodity sales once the powder facility's operating. And so, at that point we'll be in a very strong cash position, but bear in mind we've got to fund growth as well, so depending on how aggressively we pursue the growth for that spinner tooling market, how aggressively we pursue growth for the satellite components and aviation customers, that'll determine what our cash consumption is going to be, so we're going to have to strike a balance between the cash generating projects or demands for cash from the others.

Well, if you're going to build 100 machines for a million dollars, you could be raising quite a lot of money from the market at some point?

Yeah, it's going to be a balance. Some things, we can support with debt funding, some things we can, as you say, go to the market for. Some things, we may actually licence out to somebody else. So, say for argument's sake, Fletcher's decides, "You know what, we like this technology so much, we're going to be the ones who are the manufacturers and we'll buy 100 machines from you for a million dollars," then that's not a cash demand on us because that's self-funding. Then, basically, we would have some sort of agreement where we got a royalty for the technology that we've patented and sell machines.

What about you, Barrie, you spent a long time at the CSIRO and then you went to Monash, where I think you were running the Monash Centre for Additive Manufacturing, and then you went off into real estate for nine years?

The real estate play was a hobby that I had – I basically bought some American real estate after having lived in the US for a while.

Oh, I see, that wasn't a separate business in some way?

Yeah, that was kind of a side business activity, I just formed the company to do those real estate transactions, but I wound that up a few years ago.

I see, right. I just wondered if you learnt anything there that you can put into practice now?

Yeah, don't trust the American rental market is what I learnt. [Laughs]

[Laughs] Fair enough. You just slipped from running the MCAM at Monash into running Amaero?

Yeah, I took on the role as the Platform Manager for the Monash Centre for Additive Manufacturing in 2015 and then in 2016, I was appointed as the Interim CEO of Amaero and then became the permanent CEO of Amaero in late-2016.

Tell us about the relationship or the thing with Innovyz, is it? Innovyz Institute?

Innovyz is Stuart Douglas's company, Stuart and Brett Jackson. They created Innovyz basically to take pre-market technology from universities or national labs and then bolt a commercial engine onto them to prepare them for either listing or capital raising through private equity. They've actually been quite successful with the investments and projects that they've taken on, companies like KTIG, Titomic – which was another successful listing – Amaero… And that's what they do, they basically take these early stage technologies and mature them and bolt the commercial engine on that's going to provide the basis for growth. They're a very interesting business, based in South Australia, but now with global footprints in the US as well.

Very interesting business and when I was at CSIRO, we would've loved to have had an organisation like Innovyz around to work with us on commercialising some of the new processes and intellectual property that CSIRO was generating. That's who Innovyz is and what they do and Stuart Douglas, who was a co-founder of Innovyz, is an Executive Director for Amaero and looks after strategy and growth.

And also, quite a lot of the company, 19 per cent or so of the shares?

It wouldn't be quite that high, but I think Innovyz would own something of the order of 10 per cent of the stock. Monash University is right up there, probably about 9 per cent, something like that.

I'm looking at my Refinitiv ownership thing and it says, "Douglas Stuart, 18.7 per cent; Monash, 15.7 per cent…" so maybe that's wrong?

Yeah, I'd say it's wrong, I'd say it's not counting all of the shares. The total issued is just over $200 million, I think it's 203 million total issued shares.

In that case, yeah, Stuart Douglas is about 10 per cent.

Yeah, about that, yeah.

It's always good to know who owns the shares.

Yeah.

Well, that's great, we ran a bit over, but it was very, very interesting, Barrie, thank you so much.

Thanks, Alan.

That was Barrie Finnin, the CEO of Amaero International.