

ASX Release

25 June 2020

## **International Patent for Amaero’s new High Performance Aluminium alloy enters National Phase (Final Phase) of Approval**

### **Highlights:**

- **International patent application for Amaero’s high performance, High Operating Temperature (HOT) Aluminium alloy, “Amaero HOT Al”, enters final stage of approval, with three out of four stages of patent application already completed.**
- **“Amaero HOT Al” is a new high-performance aluminium alloy, with scandium and manganese alloying additions, resulting in 3D printed parts that can be directly aged (age hardening heat treatment), to yield superior strength and durability at high operating temperature.**
- **Amaero has applied for broad patent coverage in nations strategic to the global aviation, defence, space supply chain and sports equipment sectors.**
- **Aluminium-scandium alloys have significant applications in the aerospace and sports equipment industries, which includes the manufacture of tennis rackets, baseball bats, bicycle frames and multiple other applications, which rely on high performance materials.**
- **Developed by Monash University, Amaero has exclusive global commercial licence rights to the patented alloy.**
- **The development and patent application aligns with Amaero’s long-term strategy of expanding its offering through the commercialisation of metal alloys developed by research partners. This is the second patented alloy and powder that Amaero holds exclusive global commercial license rights to.**

Amaero International Limited (“**Amaero**”) (the “**Company**”) (**ASX:3DA**), a leader in metal additive manufacturing, is pleased to provide an update on the Company’s patent applications for its high performance aluminium alloy “Amaero HOT Al”, as the Company has applied for broad international patent coverage, for the new heat treatable aluminium alloy, which has entered its final approval stage, the national phase of the Patent Co-operation Treaty (“PCT”).

The PCT is an international treaty with more than 150 Contracting States, allowing patent protection for an invention simultaneously in a large number of countries by filing a single “international” patent application, instead of filing several separate national or regional patent applications. The granting of patents remains under the control of the national or regional patent offices in what is called the “national phase”<sup>1</sup>, which Amaero HOT Al has now entered.

**Amaero CEO, Barrie Finnin, commented:** “There has been a significant amount of work completed over more than half a century to improve the heat tolerance of aluminium alloys, to allow them to withstand higher operating temperatures without degradation of mechanical properties. Today, we have a solution through the Company’s newly developed Aluminium-scandium alloy, Amaero HOT Al.”

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<sup>1</sup> <https://www.wipo.int/pct/en/faqs/faqs.html>

## Process for Filing a Patent under the Patent Co-operation Treaty



Aluminium alloys are not generally selected for applications above 160°C, as they are prone to soften and over-age over a period of time, hence for many applications, heavier materials such as steels or titanium alloys are selected to provide the necessary hot strength despite the trade-off in weight.

Amaero HOT Al, Amaero's new high performance aluminium alloy with scandium, is a heat treatable version, providing a higher increment of tensile strength per atomic percent than any other alloying element when added to aluminium. Amaero HOT Al is stable up to temperatures of 260°C for prolonged periods and can be directly aged (age hardening heat treatment) after 3D printing, to yield superior strength and durability.

As the third most abundant element in the earth's crust, aluminium weighs only one-third of steel (2.7 g/cm<sup>3</sup>), hence aluminium alloyed components are suitable for use in the aerospace industry, including welded gas tanks, structures for dashboard panels and compartments, as well as large stamped and welded structures.

Aluminium–scandium alloys (Al-Sc alloys) were discovered and patented in 1971 in the United States, and have been used in aviation, aerospace, nuclear reactors, heat exchangers and satellite components. In recent years they have also found applications in sports equipment, including baseball bats and tennis rackets, bicycle frames and tent poles etc. American firearms company Smith & Wesson manufacture revolvers predominantly using Al-Sc alloys.

The aviation industry supports \$2.7 trillion in world economic activity (3.6% of global gross domestic product)<sup>2</sup>, with the global aerospace and defence market estimated to be valued at US\$1600 billion in the year 2025, growing at a CAGR of 3.5% in the period 2019 to 2025.<sup>3</sup>

The global sports equipment market size is anticipated to grow to US\$90 billion by 2026, at a CAGR of 4.4% from 2018 - 2026.<sup>4</sup> The North American market represented over 35.5% of the total market size. It should be noted that the market data provided does not relate to apparel, and only includes ball over net games, ball games, fitness/strength equipment, athletic training equipment, and others.

The alloy was developed by researchers at Monash University, Australia's largest university, with which Amaero collaborates for the development of additive manufacturing technology.

Amaero has exclusive global commercial license rights to the patented alloy, and it will form an important part of the Company's offering to its aviation, defence, space and sports equipment clients in the future.

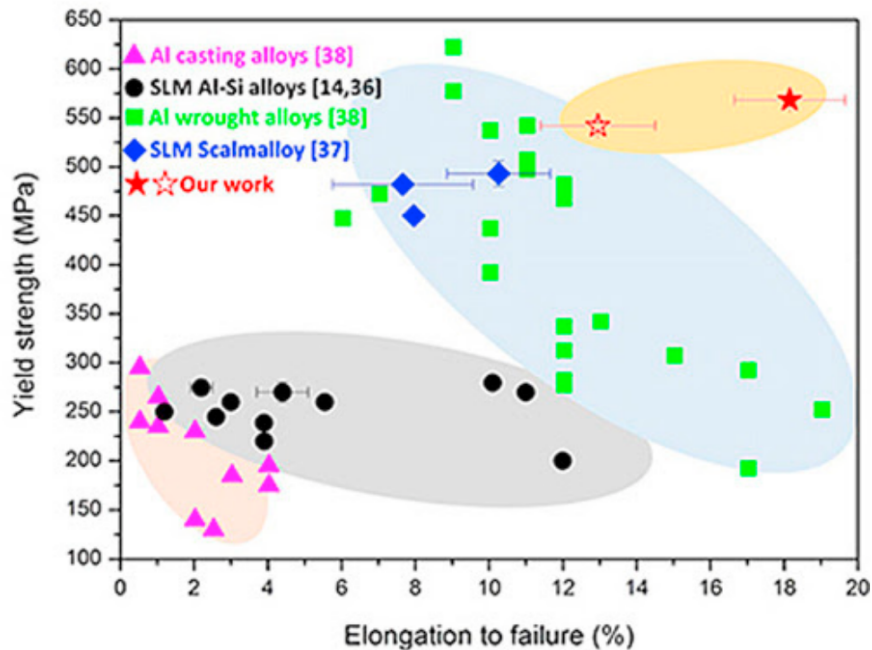
The development and patent application aligns with Amaero's long-term strategy of expanding its offering through the commercialisation of metal alloys developed by research partners. In addition to additive manufacturing, the alloy can also be processed using a number of conventional methods for high volume manufacturing including extrusion, forging and casting.

Amaero HOT Al is the second high performance alloy developed by Monash University licensed to Amaero that has entered the national phase.

<sup>2</sup> <https://aviationbenefits.org/economic-growth/adding-value-to-the-economy/>

<sup>3</sup> <https://www.prnewswire.com/news-releases/global-1600-bn-aerospace--defence-market-outlook-to-2025-boom-in-commercial-aircrafts-surge-in-global-airline-traffic-rise-in-military-expenditure-300930703.html>

<sup>4</sup> <https://www.acumenresearchandconsulting.com/sports-equipment-market>



**Figure 1 - The performance of Amaero HOT Al compared to alternate aluminium alloys.**

This ASX release is approved by the Board of Amaero International Ltd.

**For Further Information, please contact:**

**Barrie Finnin**

*CEO*

Amaero International Limited  
 info@amaero.com.au

**Jane Morgan**

*Investor and Media Relations*

+61 (0) 405 555 618  
 jm@janemorganmanagement.com.au

**Zack McLennan**

*Defence Industry Media*

+ 61 (0) 434 996 461  
 zmclennan@lunik.com.au

About Amaero International Limited:

Amaero International Limited is an Australian based company that manufactures large format complex components in metal with laser-based additive manufacturing processes, commonly known as 3D printing.

The principal activity of Amaero is the provision of end to end additive manufacturing solutions in terms of services, equipment and technology to its key clients in the Aviation Defence and Space sectors and the Tool and Die industry.

Amaero has worked with many of the world's leading manufacturers of aerospace and defence products in both an R&D and manufacturing capability and has a demonstrated ability to deliver aviation and military specification 3D printed alloy critical operation components.

Amaero was established with the support of Monash University in 2013 to take advantage of commercial opportunities identified by the Monash Centre for Additive Manufacturing (MCAM). Amaero is co-located with MCAM in Melbourne Australia. It operates two additional facilities, in Adelaide, South Australia, and El Segundo, California, USA.