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Clean TeQ, Airbus Group & KBM Affilips Partnership to Develop further the Supply Chain for Aluminium-Scandium Alloys for 3D Printing

Clean TeQ Holdings Limited (**ASX: CLQ**) is pleased to announce it has entered a collaboration agreement with Airbus Group Innovations for the treatment and recycling of their proprietary Scalmalloy[®] aluminium-magnesium-scandium (AlMgSc) powder, used in additive manufacturing (3D printing) of aerospace components.

Airbus Group Innovations (**AGI**) is Airbus' global network of research and technology centres for future aerospace challenges. AGI is taking care of development, qualification and commercialisation of Scalmalloy[®], a patented 3D printing aluminium-scandium powder & direct manufacturing concept used in the production of high strength components for Airbus' fleet of aircraft.



Figure 1: APWorks, a subsidiary of Airbus Group, has developed the Light Rider - a 3D printed Scalmalloy[®] (aluminium-magnesium-scandium alloy) electric motorbike which, weighing in at just 35 kg, is about 30% lighter than most conventional e-motorcycles. The Light Rider is capable of going from 0 to 80 km per hour in seconds and can travel close to 60 km between charges

The Scalmalloy[®] direct manufacturing approach provides robust solutions for aluminium alloys when high specific strength, enhanced functionality and exceptional high corrosion resistance – combined with 3-D design freedom – are desired. Compared to all other aluminium alloys currently used in selective laser melting (a typical 3D printing process), Scalmalloy[®] offers

outstanding mechanical strength values in combination with high level corrosion resistance, allowing the material's use without protective coatings.

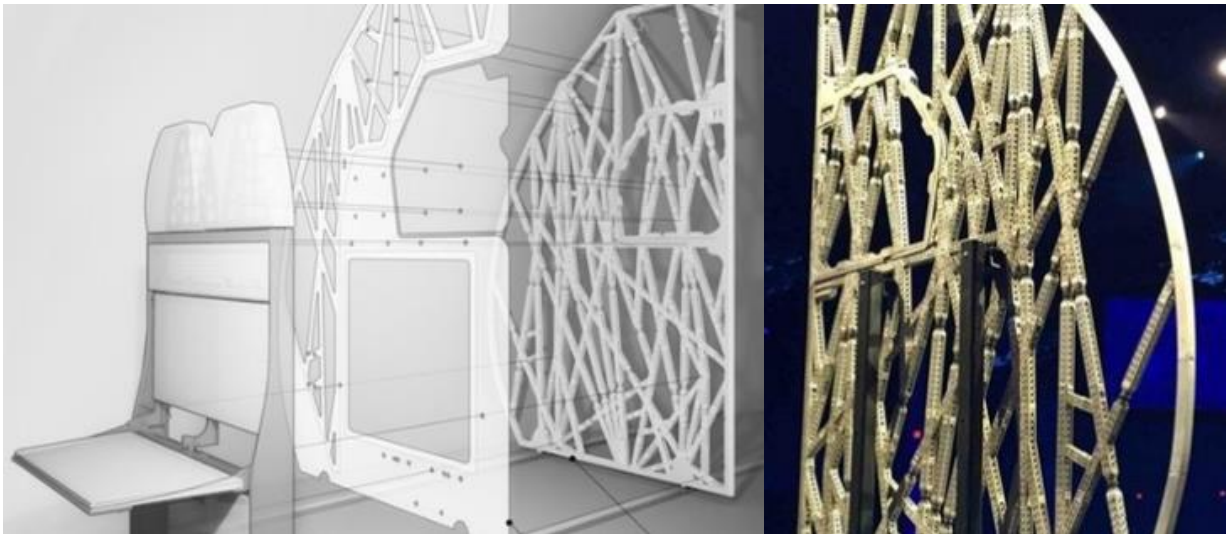


Figure 2: 3D printed partition using Scalmalloy® AlMgSc powder

As published by Airbus Group¹, through its collaboration with APWorks² (wholly owned subsidiary of Airbus Group commercialising 3D printing technology) and Autodesk³, Airbus is developing a 3D printed bionic designed structure for use in lightweight aircraft partitions. This represents one of many potential applications where Scalmalloy® may be used in aerospace and other industries.

A key element in the creation of the new bionic partition is the rapid evolution in generative design. This capitalises on the power of cloud computing to generate thousands of design alternatives that meet specific goals and constraints. Generative design can explore new solutions that even experienced designers might not have considered, while improving design quality and performance. Because the designs are nearly impossible to manufacture using traditional methods, additive manufacturing techniques like 3D printing are critical to generative design's success.

The process of making 3D printing material involves the use of gas atomisation to convert the alloys into powders. The gas atomisation process inevitably produces some particles which are too fine or too coarse to be used in 3D printing. Currently, these undersize and oversize materials, containing highly valuable aluminium-scandium material, are being sent to waste, increasing the cost of the powder.

Scandium can be recovered through the processing system proposed at Syerston and recycled back into the supply chain, thus reducing the unit cost of production. The flow sheet proposed for the mine can extract and recover scandium at a fraction of the cost of purchasing new scandium. Lowering the cost of Scalmalloy® is important to promote its adoption for a wider range of applications in the aerospace industry.

¹ <http://www.airbusgroup.com/int/en/story-overview/Pioneering-bionic-3D-printing.html>

² <http://www.apworks.de/en> For more information on Clean TeQ's collaboration with AP Works, please see the ASX announcement dated 10 March 2015.

³ <http://www.autodesk.com/>

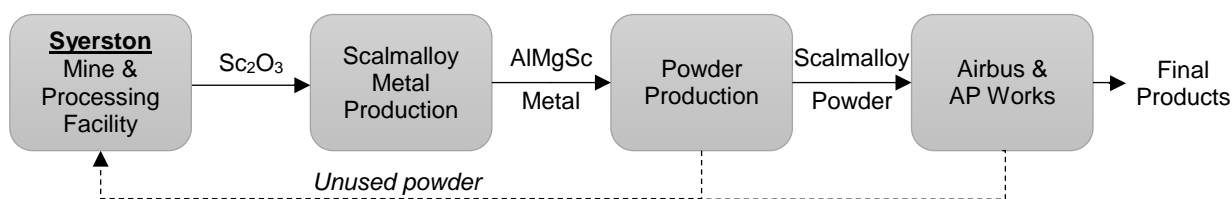


Figure 3: Functional and integrated scandium supply chain

In a first test campaign, approximately 1 tonne of Scalmalloy[®] undersize powder will be processed at ALS Metallurgy in Perth (the location of Clean TeQ’s pilot plant) with purification being carried out at Clean TeQ’s facilities in Melbourne. Purified scandium oxide will then be returned to KBM Affilips, who will convert it into Scalmalloy[®] master alloy for re-use in Airbus’ and AP Work’s facilities in Germany.

Clean TeQ Executive General Manager – Sales & Marketing, John Carr, commented, *“Clean TeQ has demonstrated that Syerston has the ability to produce scandium at a sustainably low price and at volumes which will be required for the global transport industry. The collaboration with Airbus Group Innovations and KBM Affilips is another avenue through which we are seeking to access the Airbus Group’s scandium supply chain. It also paves the way for future adoption of aluminium-scandium alloys on a much broader scale.”*

Airbus Group Innovations Senior Expert Welding & Additive Manufacturing, Frank Palm, commented, *“Scalmalloy’s unique properties makes it one of the most exciting materials for additive manufacturing in aerospace and other industries. While its functional benefits are widely understood, the ability to significantly reduce the cost of production through recycling of the scandium with Clean TeQ allows us to think about new applications throughout the aircraft. We are happy to support Clean TeQ and KBM Affilips to build a functional supply chain for aluminium-scandium alloys into the aerospace industry.”*

KBM Affilips Area Manager, Henk van der Laan commented, *“KBM Affilips has long believed that aluminium-scandium alloys will play a key role in the next generation of lightweighting solutions for the global transport sector. The partners in this collaboration are all intent on making scandium-containing materials affordable for widespread adoption. The emergence of a large-scale, low-cost supply source like Clean TeQ’s Syerston Project is a key part of realising that objective.”*

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About Clean TeQ Holdings Limited (ASX: CLQ) – Based in Melbourne, Clean TeQ, using its proprietary Clean-iX[®] continuous ion exchange technology, is a leader in metals recovery and industrial water treatment. For more information about Clean TeQ please visit the Company’s website at www.cleanteq.com.

About the Syerston Project – Clean TeQ is the 100% owner of the Syerston Project, located in New South Wales. The Syerston Project is one of the largest and highest grade scandium deposits in the world and one of the highest grade and largest cobalt deposit outside of Africa.

About Airbus Group - Airbus Group is a global leader in aeronautics, space and related services. In 2015, the Group – comprising Airbus, Airbus Defence and Space and Airbus Helicopters – generated revenues of € 64.5 billion and employed a workforce of around 136,600.

About KBM Affilips – KBM Affilips is the marketing and sales organisation for a wide range of specialised master alloys manufactured by its production companies KBM Master Alloys in The Netherlands and Affilips in Belgium, both founded in the early 1960's. KBM Affilips is the world's largest manufacturer of non-ferrous master alloys delivering well over 40.000 tonnes of products to 80 different countries. KBM Affilips has built an excellent reputation in the field of aluminium, copper, nickel, cobalt and zinc based master alloys. These master alloys are used in the manufacture of a wide range of metal products, including aluminium aircraft sheet, special steels and super alloys for aircraft engines, products for aerospace applications, nuclear reactors and other demanding applications. KBM Affilips has established a reputation as an innovator and cost leader in the production of highly specialised Aluminium based master alloys such as the full range of Aluminium-Titanium-Boron grain refiners, Aluminium-Boron, Aluminium-Strontium and Aluminium-Scandium master alloys. With more than 50 years of experience KBM Affilips presents itself as a financially solid as well as global partner for a wide range of industries. Today KBM Affilips and its affiliates are part of the ROBA Group of companies, which has been active in the metal industry for over 75 years and is based in The Netherlands. For more information please visit the company's website at www.kbmaffilips.com.

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