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Arcast Inc. offers new atomisation system for refractory and reactive metal powders

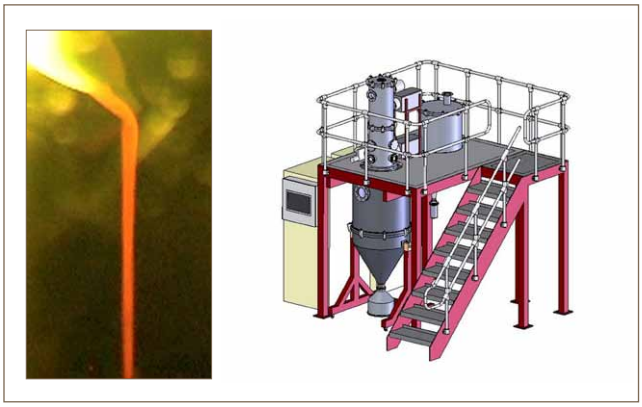
Arcast Inc., based in Oxford, Maine, USA, is introducing a new method for producing refractory and reactive metal powders and castings from elemental feedstock. The company, which produces research and production metallurgical equipment with a focus on cold crucible vacuum furnaces, is using its experience and technology to fully develop its revolutionary hybrid induction and plasma arc alloying furnace. The development is part of a National Science Foundation (NSF)/ Small Business Innovation Research (SBIR) funded research project.

The system can accommodate various forms of melt stock, from elemental powders/granules to scrap components. Arcast states that it can achieve full alloying of elemental feedstock and develop a controlled melt stream for casting or atomising. The hybrid furnace design allows full control of alloy composition. Melting can be conducted under a range of regimes, from high vacuum through to over pressure with various gases. This can help control alloy constituents with high vapour pressures. There is no trapped frozen metal skull that could cause alloy segregation, and the process is continuous so there is virtually no minimum or maximum quantity per run cycle. Moreover, the company states that the cost of capital equipment and services is minimal.

The Arcast system obviates the need to provide relatively expensive bar stock with a limited alloy selection that is required by other (ceramic free) production routes. There are no refractory ceramics that can come into contact with the melt, so there is no risk of contamination from such a source. The process can be stopped and restarted in mid process to allow a run sample to be taken and analysed to allow checks on alloy composition.

The focus of the project is to produce titanium-based shape memory alloys with refractory metal constituents and also refractory metals and intermetallics. Although this is the principal focus of the current project, the furnace is capable of producing a wide range of metal alloys from titanium to tungsten. The target for this technology is to offer a direct production route for novel alloys or those that are not commonly available. The intention is to help bridge the gap between laboratory research and pilot scale production, giving a route to market for all the promising alloys developed in research establishments and university laboratories.

The atomising options are either 'free-fall' type, high velocity gas jet or centrifugal (spinning disk or cup). Arcast states that its initial focus is on gas atomisation because of the greater demand for this product. A realistic target median particle size (D_{50}) of 100 µm for most alloys can be expected. This will produce a good fraction of the finer particle sizes suitable for MIM powders. Oversized product can always be reprocessed if this cannot be used. Because the Arcast furnace achieves full homogeneity in the melt, there is little need to mix powders in a subsequent process in order to achieve desired properties in the pressed or sintered material.



Arcast Inc. titanium alloy melt stream from a cold crucible, with a typical Arcast atomiser arrangement

Over the next year or two, the company states that it will be looking to improve the median particle size of its 'as atomised' powders. In particular, it will be exploring the application of 'close-coupled' gas atomisation. The consumption of electricity while producing titanium-based alloys is around 1.5 kWh/kg of powder. This, combined with the most economical feedstock, offers a very cost-effective finished product.

In the coming year, Arcast Inc. will offer toll-based, in-house production of powders and castings and will also sell licensed equipment for castings and powder production. Options will be available with hot gas (for greater atomisation efficiency) and gas recovery systems, where this may be economically desirable. A range of system sizes will be available to meet customers' performance requirements and budgetary constraints.

www.arcastinc.com

Powder Metallurgy thesis competition launched

The European Powder Metallurgy Association (EPMA) has launched its 2012 Powder Metallurgy (PM) Competition for theses in both Diploma (Masters) and Doctorate (PhD) levels. The aim of the competition is to develop an interest in and to promote powder metallurgy among young scientists at European academic establishments, and to encourage research at under-graduate and post-graduate levels.

In order to be accepted, the subject of the thesis must be capable of being classified under the topic 'Powder Metallurgy'. The thesis must have been officially accepted or approved by the applicant's teaching establishment during the 2009/2010, 2010/2011 or 2011/2012 academic years. Applicants must be graduates of a European university. The entry deadline is May 4 2012. Winners will be awarded their prizes at the opening Plenary Session of the Euro PM2012 Congress & Exhibition in Basel, Switzerland on Monday, September 17 2012.

Each winner will receive a cheque for €750 for the Diploma/Masters category and €1000 for the Doctorate/PhD category. Höganäs AB is once again sponsoring the competition prizes. Winners will have the opportunity of having their work published in the journal "Powder Metallurgy", and both winners will have free registration to the Euro PM2012 Congress and Exhibition.

www.epma.com/thesiscompetition