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November 7, 2024

To whom it may concern

This letter is being provided in support of the sole source purchase of an Arcast 200 Arc melter equipped with various unique features which are only available on tis particular brand and model of Arc Melter. The Arc Melter is a manufacturing instrument capable of producing ingots and powders of unique chemical composition for the purpose of materials and metallurgical research.

The Arcast 200, in particular, is the only research scale arc melter that combines three necessary casting features in the same system, saving significant resources while providing unique capabilities. The bottom center suction and continuous casting, are two different casting methods which rely on the high vacuum turbo pump and bottom center opening. The free-fall horizaontal gas atomizer which operates with a separate roughing vacuum pump in the same unit, is typically a feature only available as a "stand alone" melting system. The presence of all 3 on one provides unique advantage the Arcast 200.

The ability to produce continuous or suction cast ingots is necessary to support the research of Drs. Eason, Stagon, Netto and their collaborators at other institutions who, in recent years have produced numerous highly cited papers in the subjects of casting quality on mechanical behavior of aluminum alloys used in critical automotive and aerospace applications.

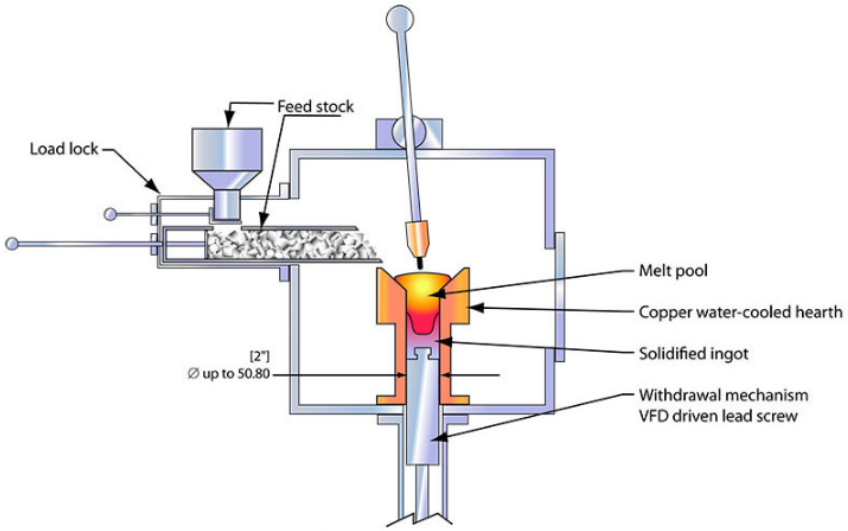

Figure 1. Schematic depiction of the bottom continuous casting arrangement in the Arcast 200 arc melter. Note the bottom orifice feed path for the continuously cast ingot.

Typical arc melters only provide small ingots or "buttons" (typically less than 100 grams) that, while useful in the study of thermodynamic phase diagrams, or nanoscale property assessment, do not provide samples large enough to produce macroscopic test samples for industrially relevant uniaxial strength and fatigue samples, like those required in the work of Eason and collaborators from other institutions. In addition to the continuous casting capability, the same bottom port in the Arcast 200 has been configured in the quoted instrument to be used for suction casting. Suction casting or vacuum casting is an unusual feature for a research scale arc melter, again making this instrument highly unique. This capability supports the research if Eason, Stagon, Netto and external collaborators in their investigations into the role of pore formation in various alloy system. By drawing molten metal upward into a mold using suction or vacuum, the effects of downspout and riser turbulence are eliminated. This process is widely used in industry, but rarely available in academic research laboratories making the ability to support industrial research in the advanced manufacturing program at UNF more likely to receive industry-based funding and high TRL funding from federal agencies.

Figure 2. Examples of scution (vaccuum) cast samples obtained in an Arcast 200 arc melter.

Finally, and possible most importantly, the ability to produce powders by means of research scale arc melting is a relatively new capability in the field. These instruments are typically "stand alone" units configured for the sole purpose of powder production. Combining this feature and its different

vacuum requirements with previously mentioned techniques is likely the most beneficial and unique capability of the Arcast 200. The horizontal gas atomizer provides the capability of production metal alloy powders of entirely customizable composition. No longer will UNF researchers be limited to commercially available alloys. Research for Simsiriwong, Bevill, Stagon, Eason Schonning and Netto have all been limited to commercially available precursors and powders prior to the potential acquisition of this instrument.

Figure 3. The Arcast 200 arc melter equipped with the Free Fall Horizontal Gas Atomizer option. The large stainless-steel chamber on the right is specifically for catching the powder as it is ejected from the atomizer.

In summary, the combination of three highly unique capabilities (continuous casting, suction casting and spray atomization) in this one instrument make it unique among research scale arc-melters. This alone justifies a sole source purchase. The number of faculty directly supported by this instrument have been laid out in this letter. It should be stated that the capabilities of this melter would also support numerous UNF researchers in engineering, chemistry, physics and biology if they so chose

to collaborate with materials science faculty in the developmental research in their current disciplines. With the only manufacturing degree in the state of Florida, UNF should be compelled to purchase this instrument for the ways it will augment teaching alone. The research benefits for all the faculty described represent a new strategic direction for applied research in materials science and advanced manufacturing.

Sincerely,

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