

Plasma Gas Atomizer for Refractory Metal Alloys in High-Temperature Applications and Harsh Environments

Aamir Abid, Matt Stone, Geof Dusky, Bryce D'Alba
Retech Systems LLC
Buffalo, NY

ABSTRACT:

There is an increase in demand for refractory metal alloy powders using additive manufacturing modalities. To improve the overall efficiency of gas turbines, high-quality refractory metal alloy powders are required in pilot or production scale quantities. High-temperature alloys are also required to solve corrosion and thermal stability challenges in renewable energy applications. Current powder production methods are not suitable to produce such powder as the process requires an engineered feedstock such as rod or wire. Many alloy systems of interest are either too brittle to form rod/wire (for example, refractory high entropy alloys) or have a complex chemistry that is not commercially available. Retech has developed an atomization system that provides a larger production capacity for a range of metal and alloy powders utilizing Plasma Arc Melting (PAM) in combination with gas atomization. Plasma melting allows for the introduction of a broad range of feed materials including revert without incurring the additional cost of processing feed to wire or bar forms. With this flexibility of feed materials, recycling high-value materials becomes an economically viable option. The powders produced on the Plasma Atomizer are spherical with minimal satelliting and low internal porosity. Refractory metal alloy Particle Size Distribution (PSD), morphology, and chemistry will be presented in this study.