TIP Project Brief – 090165/10H009

Manufacturing
Building U.S. Strategic Metals Competitiveness Through Integration of Advanced Sensor Technologies

Develop and scale-up to commercial levels a suite of novel, optoelectronic inspection technologies to accurately identify and sort aerospace metals such as titanium and nickel/cobalt superalloys at ultra-high speeds so they can be recycled more cost effectively and also to enhance melting capacity for existing furnaces by measuring composition in-situ, in real time.

Sponsor: wTe Corporation
Bedford, MA

- Project Performance Period: 2/1/2010 - 1/31/2014
- Total project (est.): $11,532 K
- Requested TIP funds: $5,670 K

This joint research venture led by wTe Corporation together with National Recovery Technologies, Inc., and Energy Research Co., is working to combine and scale up a suite of technologies to build an efficient, integrated recycling system for high-value alloy scrap in the aerospace industry. The aerospace industry is one of the nation's most advanced and successful manufacturing sectors. It also has an extraordinarily high scrap rate because high-performance jet engines, airframes, and similar aerospace products require extremely tough and tight quality control. According to industry statistics, out of the 949 million pounds of raw materials consumed by the aerospace industry in 2008, only about 19 percent actually makes it into an aircraft. This project focuses on recycling two high-performance specialty alloys used by the aerospace industry, titanium-based alloys and the nickel- or cobalt-based "superalloys." These are extremely high-performance and costly alloys, but the scrap often cannot be reused in aerospace applications either because it is too expensive to recycle given current practices or because it is too contaminated to recycle as the original high-grade alloy. As a result it must be downgraded to inferior product uses and applications. The joint venture team is scaling up a group of novel optical technologies to first, automate the sorting of scrap metal at high speeds and volumes, sorting each piece by composition, and second, provide real-time, continuous analysis of the composition of molten metal in high-temperature alloy furnaces to allow furnace operators to make changes to the melt while it is being processed. The novel technologies, based on optical and x-ray spectroscopy, would both significantly refine the waste metal stream and enable alloy producers to accommodate changing scrap metal input and furnace conditions to produce precise alloy chemistries. Such tight control of alloy chemistry not only would enable the production of better alloys but also would reduce production time and eliminate "bad heats," saving energy and raw materials. If successful, the project would lessen U.S. dependence on supplies of strategic virgin metals recovered at primary refineries from ore (most of which are purchased abroad), and enable substantial energy savings from use of scrap rather than ore and virgin metals. There would also be greatly reduced emissions because secondary smelting consumes much less energy than primary production followed by remelting.

For project information:
M. Scott Mellon, (781) 275-6400
msmwte@aol.com

Active Project Members

- Energy Research Company (Staten Island, NY)
  [Original, Active JV Member]
- National Recovery Technology, Inc. (Nashville, TN)
  [Original, Active JV Member]
- wTe Corporation (Bedford , MA)
  [Original, Active JV Member]