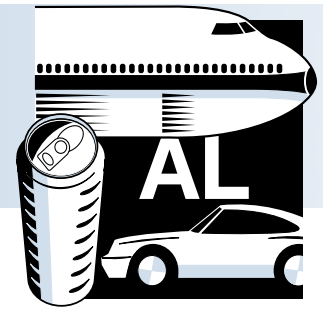


# ALUMINUM

## Project Fact Sheet



## INNOVATIVE VERTICAL FLOATATION MELTER (VFM) AND SCRAP DRYER

### BENEFITS

- demonstrated VFM thermal efficiency of 58% which is a potential annual U.S. savings of over seventeen trillion Btus
- reduction in metal loss, yielding an additional 125,000 tons of aluminum each year
- reduction in NO<sub>x</sub>, SO<sub>x</sub>, CO, and volatile organic compound (VOC) emissions
- thermal efficiency over 75% with the combined use of VFM and IDEX™, potential savings of 22 trillion Btus annually in the U.S.

### APPLICATIONS

The VFM design is versatile. It can decoat aluminum, melt aluminum that has been previously decoated, or simultaneously decoat and melt scrap aluminum. It can be easily integrated with the IDEX™ system for additional thermal efficiencies. The VFM design can be used in steel and glass recycling.

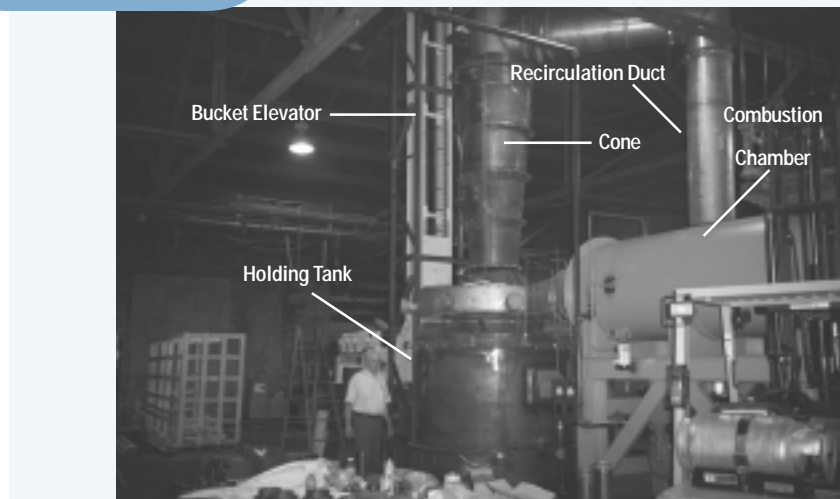
### VFM PROVIDES A SIGNIFICANTLY CLEANER AND MORE EFFICIENT ALTERNATIVE FOR PROCESSING SCRAP

A pilot scale unit capable of processing 1,000 pounds per hour of aluminum has been designed, constructed and successfully tested. Pilot operations have demonstrated a thermal efficiency (the ratio of heat going into scrap aluminum to that of the total energy used) of more than 2.5 times that of a conventional furnace, lower emissions and improved metal recovery (dross reduced by more than half). This project has now entered the planning, site preparation and field-testing phase that will demonstrate the VFM's commercial use.

Recycled aluminum accounts for more than one third of the total U.S. aluminum supply. Aluminum recycling results in significant energy savings, lower emissions and an increase in metal yield. Typically, aluminum scrap is cleaned/decoated and then melted in gas reverberatory furnaces which have low thermal efficiencies (20%) and generate substantial emissions. The vertical floatation melter is an innovative design which decoats, preheats and melts in one operation. The pilot demonstrated design provides a thermal efficiency of 58%. Not only is energy saved, but also the emissions are significantly reduced and more metal is recovered. The design provides a higher metal yield (dross reduction) because of lower gas temperature, lower residence time, lower oxygen content and no direct flame impingement on the metal.

The VFM is a versatile design which can be integrated with indirect-fired controlled-atmosphere rotating kilns (IDEX™). This integration provides additional savings, with thermal efficiencies of over 75% in recovering aluminum scrap.

### PHOTOGRAPH OF THE VFM



The VFM represents an advanced melting process for recycled aluminum.



## Project Description

**Goal:** Develop a more efficient and cleaner emission alternative for processing aluminum scrap, that also results in an increase in metal yield.

This project has designed, built and pilot-tested an innovative vertical floatation melter for processing scrap aluminum. The VFM can decoat scrap for feeding into a conventional furnace, or the VFM can simultaneously decoat and melt scrap which is a unique accomplishment. The pilot unit can be operated at a thermal efficiency of 58% while reducing the loss of metal by one-half. The process could potentially result in increased revenue for the U.S. secondary aluminum industry of over \$400 million per year.

The design is versatile and can be integrated with an indirect-fired controlled atmosphere rotating kiln (IDEX™) thereby producing additional energy savings and further lower emissions. In the integrated process, scrap is first dried and decoated in an advanced IDEX™ decoater. This completely removes organics, such as oil, paint, and plastics. The heat content of the decoated organics supplies the thermal energy needed to operate the kiln. The decoated aluminum is then melted in a VFM.

The thermal efficiency of the integrated process is expected to be over 75 percent. The emissions of NO<sub>x</sub>, SO<sub>x</sub>, CO, and VOCs from the process have been measured to be well below the regulated allowable limits.

The VFM process also has applications in the glass and steel industries.

## Progress and Milestones

The first and second phases of this project have been completed. Decoating, melting, and simultaneous decoating and melting of scrap aluminum were accomplished. Energy use of 850 Btu/lbm was achieved at a pilot-scale throughput of 1,000 pph and metal yield was over 97% (a typical furnace uses 2,465 Btu/lbm).

The decoating testing, using beverage cans, and turnings and borings, resulted in completely removing the organics with no visible oxidation of the metal.

In the third phase, the VFM will be field-tested at a commercial host site.

## Commercialization Plan

Energy Research Company will be responsible for engineering design and support. North American commercialization rights are currently being negotiated. Stein, Atkinson Stordy will commercialize the technology in Europe. Marketing responsibilities for the Far East will be negotiated.



### PROJECT PARTNERS

Energy Research Company  
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