

**Fast X-Ray Sorting for Recycling Light Metals:
A Low Cost High Throughput In-Line X-Ray Fluorescence Scrap Metal Sorter**

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Once automobiles have reached their end of life, they are sent to scrap yards where the entire automobile is shredded into small size scrap pieces and then separated into different size fractions, between one and five inches. After shredding of the automobile into scrap pieces, the recycling process begins. Current methods for recycling in the US include separation of Zorba and Twitch fractions. Zorba is composed of non-ferrous metals, plastic, wood, rock and glass. The twitch fraction is currently the highest level of separation performed in the US for light metals and consists of many different aluminum alloys, including both cast and wrought aluminum alloys, which are expensive and difficult to separate.

Most of the U.S. Zorba is shipped overseas, typically to China or India. Their low cost of labor is cost effective at hand sorting different aluminum grades and other metals. Currently, neither the US labor market, nor existing technologies can match this. After the scrap is sorted into different grades, it is melted to manufacture new products overseas. Only a small fraction of this metal returns to the US as finished products, forcing domestic manufacturers of light metal to use primary alloys. The embedded energy in scrap metal currently being shipped overseas is approximately 0.3 quads, and domestic recycling of these metals would recover the exported energy cost.

Cost effective sorting and recycling of the different alloys could dramatically reduce the cost of light metals and lower the environmental impact. To be commercially attractive the sortation of aluminum alloys should be able to achieve a rate of 10 pieces of scrap per second, and the sorting should cost less than 2 cents per pound of accurately sorted material.

To overcome the challenges associated with recycling aluminum alloys present in automotive scrap streams, UHV has developed a low cost high throughput in-line x-ray fluorescence scrap metal sorter. This instrument was designed for sorting pre-and post-consumer aluminum scrap alloys in addition to sorting twitch, Zorba, other metals and materials. The speed of the sorting along with the low cost of the instrument allow commercial feasibility of recycling aluminum alloys in the US which are generated from automotive scrap streams. In this paper, the design of the sorter, throughput calculations and the sorting results for various scrap streams from the work to date on this XRF technology will be presented.

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