Superior sorting technologies create win-win scenario

*Sense2Sort
LIBS-Sense
illustration*

Automated spectroscopy is driving recycling and scrap sorting, helping to achieve historically-advanced levels of material recovery and reuse. Incorporation of X-ray fluorescence, laser induced breakdown spectroscopy and Terahertz imaging into modern sensor-sorter scrap processing lines is seen as key to closing the materials loop to the benefit of all parties involved.

Real-time sorting and separation of scrap and waste materials have made a huge step forward. Today, it is possible to identify accurately and at high speed the discrete chemical characteristics of a material. This means that components of the waste stream can either be further reduced to the best possible specific reuse purity or effectively sorted to the point of turning typically landfilled or burned waste into reusable feedstock material.

On the metal recycling part, this is possible with XRF and LIBS technology. On the plastics/polymer side this is possible with Terahertz imaging technology. The benefit to the supplier is the higher prices paid for more finely sorted scrap while the advantage to the user is easier processing of the incoming scrap. And the benefit to the world at large is a reduction in landfilling and smaller carbon footprints for the producers using this material.

State-of-the-art sorting

The metal recycling business is heavily affected by transboundary regulations and economic conditions in the global scrap market. Recyclers are required to achieve ever-higher recycling rates while producing increasingly specific material for their buyers. Sense-2Sort X-ray fluorescence (XRF) and laser induced breakdown spectroscopy (LIBS) sorting technologies represent massive strides forward in real-time scrap material identification and mark the start of a new era for scrap.

Sense2Sort has introduced XRF- and LIBS-based machine technologies that fully solve bulk sorting by identification of elemental properties of material pieces measuring from 3 mm in size.
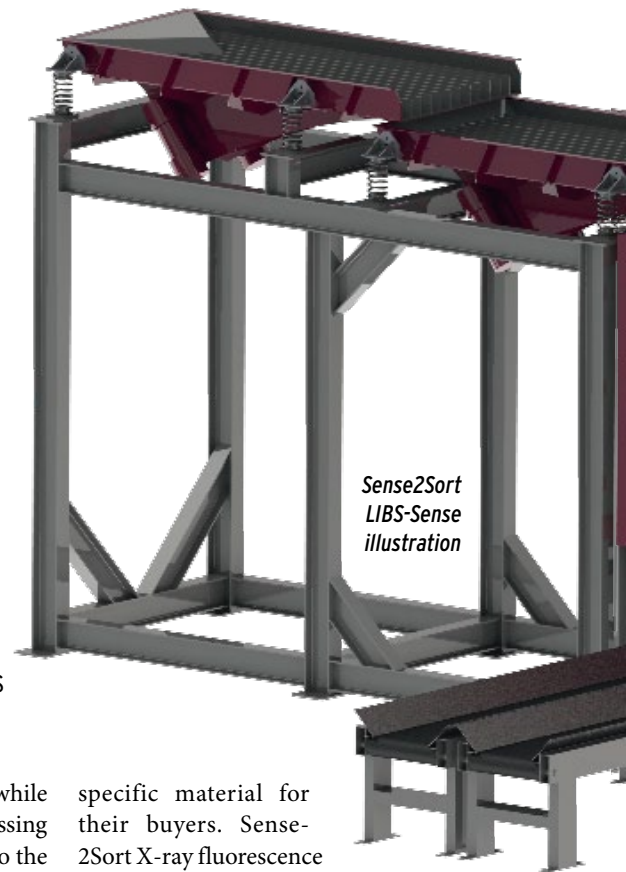

METAL IDENTIFICATION THROUGH XRF AND LIBS ELEMENTAL COMPOSITION ANALYSIS

Highest-quality sorting opportunities for aluminium:
- Extraction of scrap magnesium from mixed aluminium scrap;
- Accurate separation of aluminium scrap by wrought and cast;
- Sorting of aluminium scrap based on minor alloying constituents, such as Zn, Mn, Mg, Cu, Ni and Fe;
- Creation of melt-ready packages from common infeed stock such as Zorba and Twitch;
- Sorting of production scrap alloys such as 5xxxx and 6xxxx;
- Input material from 3 mm in size.

S2S LIBS-Sense for light and heavy metal sorting
- XRF for heavy metal sorting.
- LIBS for any metal alloy sorting.

Computer Analyzed Spectrum
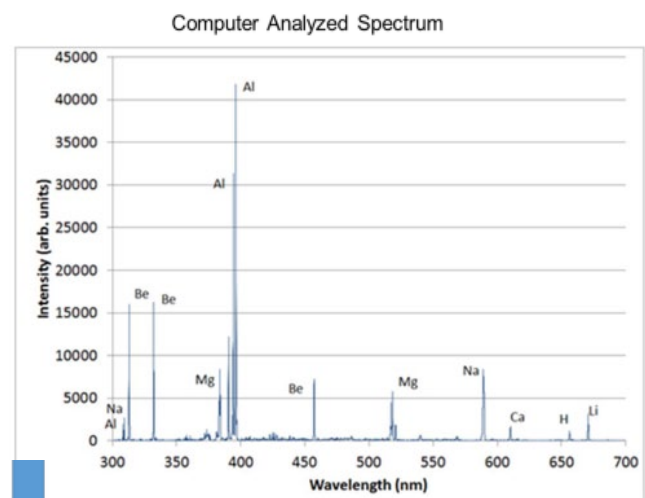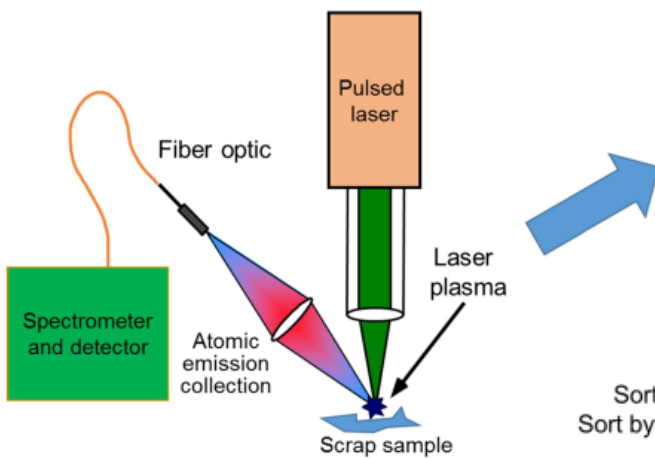
Sort by Base Element
Sort by Type (Wrought/Cast)
Sort by Alloy

*Basic schematic of a
scrap-sorting LIBS system.*

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Closing the loop in secondary aluminium recycling

This means that all metals and alloys can be determined to the highest qualities and sorting can be set according to a customer's specific requirements. For their part, secondary aluminium smelters are opting to buy lower-cost scrap and process it into melt-ready packages. This 'greener' process approach not only makes their raw material supply more predictable but also increases the margin on their final product. Construction material, beverage containers and, most recently, the explosive growth in aluminium usage in vehicle manufacturing are the driving forces behind this approach.

Continuous innovations

For more than 25 years, Sense2Sort alliance partners Toratecnica, S.L. (Europe) and Austin AI, Inc. (USA) have built and serviced sensor-based sorting machinery for recycling applications all over the world. Their classic product offering is based on common sorting technologies such as CCD, NIR, Induction, Colour, XRT and combinations thereof. Starting with XRF, the world's first commercial online metal sorting system was delivered back in 2001, since when installations have followed in Asia, North America and Europe. Whole turnkey plants can be supplied and plants engineered.

Sense2Sort has been a continuous innovator and its aim is the perfect closing of the recycling loop using latest material identification methods. Using their deep know-how and experience, Sense2Sort's experts consult on new and existing concepts for plant improvement and sorting perfection, achieving the highest process profitability for their customers.

PROJECT HIGHLIGHTS

Company
Sense2Sort - Toratecnica & Austin AI

S2S-XRF-Sense (X-Ray Fluorescence)
S2S-XRF machines for upgrading Zorba value by separating zinc, copper, zinc, and SS from scrap aluminum mix.

Further applications are meatball extraction (copper from ferrous shred); Zurik sorting (PCB's, SS, Cu, Al); remove ceramic (high temp) glass and Pb glass from cullet; extract pressure treated wood from C&D material

S2S LIBS-Sense (Laser Induced Breakdown Spectoscropy)
S2S-LIBS machines for Second Aluminum Smelters are used to improve incoming scrap lots to extract poisons like Mg, or produce a class of specific material. Examples are:

- Extraction of scrap Mg metal from Twitch to reduce the need to chlorinate
- Separation of Cast Scrap Al from Wrought Scrap Al to reduce the need to adjust for the Si content
- Sortation of specific alloys used in the Automotive Industry, such as 5000 and 6000 series material
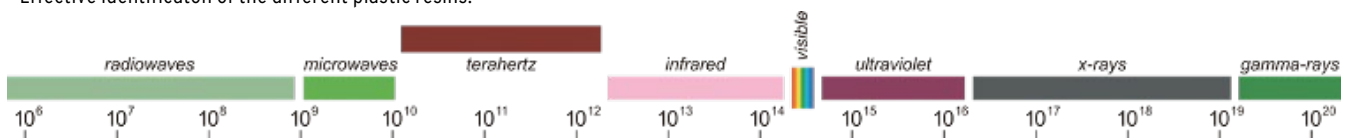
Other applications are
- Ore and Mineral Sorting: Screen incoming feed stock for high value ore and analyze process material on contaminants and purity

S2S Tera-Sense (Terahertz)
S2S Tera-Sense machines sort waste plastics by specific content, such as ABS, PA, HIPS, PP, PE, PET, PVC, etc. This is possible also wtih black colored plastics.

Black magic sorting revolution for plastics scrap with Terahertz imaging

Using Terahertz-based sorting technology, the Sense2Sort alliance introduces plastic/polymer scrap processing whereby, for the first time, black plastics are no longer an issue.

Its revolutionary sorting equipment is able to identify and analyse the true composition of every single particle and sort it according to its chemistry. Scrap streams that have commonly been landfilled or burned can now be automatically processed with specific high-value resources recovered and reused for high economic returns.

HIGH-QUALITY SORTING OF SHREDDED PLASTIC SCRAP

- Sorting of plastics into specific components such as ABS, PA, HIPS, PP, PE, PET and PVC;
- Recovery of black plastic resins from electronic waste, municipal/industrial recycling streams and automotive shredder residue;
- Sorting of black plastic resins or composites;
- Effective identificaton of the different plastic resins.

| radiowaves | | | microwaves | | terahertz | | infrared | | visible | ultraviolet | | x-rays | | | gamma-rays |

10^6 10^7 10^8 10^9 10^{10} 10^{11} 10^{12} 10^{13} 10^{14} 10^{15} 10^{16} 10^{17} 10^{18} 10^{19} 10^{20}

The teraherz gap: 40 GHz to 4 THz or 1.33 cm^1 to 133 cm^1 or 75 mm to 75 μm