

'Six-way sorting' heralds the future of metals recycling

The latest technology innovation from Sense2Sort features 'six-way sorting' whereby the user can choose his or her sensor technology and sort up to six fractions in one pass cost-efficiently and within a small footprint. The sensor technologies that can be applied are: LIBS, XRF, induction, CCD, NIR and combinations thereof. The company's technology experts will determine which sensor technologies are required for the specific sorting task.

Sense2Sort (S2S) has focused on cost-efficiency to make technologies affordable, simple to operate and service, and of the most enduring quality. Following the introduction of X-ray fluorescence (XRF) and laser induced breakdown spectroscopy (LIBS) technologies with the traditional slide sorter for standard applications, a new machine design now allows a higher throughput and six sorted streams in one run. Any sensor technology can be implemented and combined to achieve the required sorting results. Sense2Sort has named the new development the S2S 6-Sense.

Sensor-based sorting technologies have come a long way in recent years with the introduction of automated spectroscopy technologies. XRF and LIBS have unleashed the capability to identify the molecular composition of all metal alloys such that even light metal sorting is no longer an issue. But what about cost-efficiency?

The development and implementation of automated spectroscopy technologies is expensive and throughput capacities often require a larger plant set-up. Automated spectroscopy technologies such as XRF and LIBS are truly an investment for the future as they offer sorting process improvements to an extent previously unknown; outcomes can be determined and set by the operator himself while material mixes can be sorted more efficiently and sold at higher profits. At the same time, processing and material handling are downsized and cost savings are considerable.



Sense2Sort 6-Sense machine technology.

LIBS and XRF

LIBS is a laser pulse that instantly heats a small volume of matter to several thousand degrees Centigrade when focused on a surface for a few nanoseconds. As it cools, this laser-heated matter returns the absorbed energy by various means, such as visible and invisible electromagnetic waves. Using an optical system, this natural light emission is collected and routed to a spectrometer that separates the various colours onto a detector. From there, it becomes standard spectroscopic characterisation whereby the concentration of each element in the sample is a function of the intensity of its respective spectral lines. The advantage with LIBS is that it can measure any element in the periodic table and can work on unprepared samples, specifically inline such as in recycling sorting processes.

XRF is the emission of characteristic 'secondary' (or fluorescent) X-rays from a material that has been excited by bombardment with high-energy X-rays. In order to excite

the atoms, a source of radiation is required with sufficient energy to expel tightly-held inner electrons. In energy dispersive analysis, the fluorescent X-rays emitted by the material sample are directed into a solid-state detector. Various types of detector can be used such as PIN diode, Si(Li), Ge(Li), Silicon Drift Detector or EDXRF detector, all of which share the same detection principle: an incoming X-ray photon ionises a large number of detector atoms, with the amount of charge produced being proportional to the energy of the incoming photon. The charge is then collected and the process repeats itself for the next photon. The spectrum is then built up by dividing the energy spectrum into discrete bins and counting the number of pulses registered within each energy bin.

Features of the S2S 6-Sense

The S2S 6-Sense is built in several modules, mounted on a rail system, so it can be opened easily by pushing the service button.

By actuating the button, each module will automatically move sideways so that maintenance, cleaning or even changing parts can be easily achieved with minimal downtime.

The machine's three main modules start with the singulation and transport module - a conveying system built to present the infeed material according to machine requirements for best possible detection and separation. This is followed by the sensor module where various sensors can be installed for the required application; a special 360° illumination and optical sensor feature allows detection of every single material part in a 3D scan, guaranteeing minimal failures and maximum detection reliability. At the end of the machine, the ejection module separates the material stream into five ejection outlets and a single accept stream using compressed air. Material output and separation are fully configurable and customised.

The robust, standard stainless steel design of the S2S 6-Sense guarantees a long lifespan while its IP65 protection allows wet cleaning. Its large touch-screen and sophisticated sorting software facilitate set-up of the machine and customised pre-installed sorting programs can be chosen to operate on different user levels. The machine's design allows customers to start on a small scale and easily expand their installation as required in the future. The production line can be extended and the sensor technology can be adapted as needed.

S2S: technology standard-bearers

Raw material prices are increasing once again. The aluminium industry is claiming a reduction in its CO2 output and energy costs by using more recycled aluminium,

something which is being promoted by the automotive industry too. The recycling industry must invest in sophisticated and high-standard sorting plants to keep pace with such developments.

The metal recycling industries have looked for improved sorting solutions over recent years and machinery suppliers like S2S have been constantly striving to achieve what might seem to be the impossible. S2S stands for trendsetting and innovation: our sensor-based sorting technology is forward-looking and future-orientated to meet our customers' developing requirements.

Although some technology suppliers claim LIBS is for the future and is insufficiently developed at present, we regard this as a major misunderstanding. We are proud to apply the most advanced LIBS sensor technology available today, which is clearly in advance of other options.

We consider XRT to be an old technology while XRF does not allow sufficient sortation of any light metal, nor can it create melt-ready material packages. Both XRF and LIBS, however, are the key to closed-loop recycling of any metal and alloy. The industry now has access to the technologies for which it has been waiting; after maintaining the same level for a long time, sorting technologies have made a huge leap forward in terms of sortation precision and high material throughputs at a reasonable price.

LIBS technology is ready to be applied today. Secondary aluminium recyclers or any other light metal recyclers and production facilities can now customise their processes to achieve new heights of profitability.

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



Multiple S2S 6-Sense sorters on a production line.

HIGHLIGHTS

Company	Sense2Sort Toratecnica, S.L.
Expertise	Materials sorting technologies
Product	The S2S 6-Sense, which separates up to six fractions in one pass using LIBS, XRF, induction, CCD, NIR and combinations thereof

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 development.

Sense2Sort has been a relentless innovator and its aim is the perfect closing of the recycling loop using latest material identification methods. Sense2Sort's experts consult on new and existing concepts for plant improvement and sorting optimisation, as well as for the highest profitability for their customers. The company's classic product offering is based on common sorting technologies such as CCD, NIR, induction and colour, as well as combinations thereof. Whole turnkey plants can be supplied and plants engineered.

www.sense2sort.com

SENSE2SORT 6-SENSE MACHINE DESIGN SORTING FEATURES:

- Application example: Automotive scrap
Sensor: LIBS
Sorted fractions in one pass: 6xxx/6xxx2/5xxx/Fe/rest
- Application example: Taint Tabor
Sensor: LIBS
Sorted fractions in one pass: 3xxx/5xxx/6xxx/Foundry/Non-Al/rest
- Application example: Zorba
Sensor: XRF
Sorted fractions in one pass: Zn/Cu/Stainless Steel/Al-7xxx/rest
- Application example: C&D
Sensor: NIR/IS
Sorted fractions in one pass: minerals/wood/plastics/metals/rest
- Application example: MSW
Sensor: NIR/RGB 360°
Sorted fractions in one pass: Tetra/PE/PET/PP/PVC/rest
- Application example: Minerals
Sensor: RGB/Monochrome 360°
Sorted fractions in one pass: impurities/dark fraction/grey fraction/white fraction/ rest