THE NEW FRONTIER IN ALUMINUM SCRAP PROCESSING

Boost the value of your aluminum scrap by efficiently segregating different light aluminum alloys (e.g., 6xxx from 5xxx, 6060 from 6082) to be sold as premium furnace-ready products.

◉ Superior Cleaning

The surface laser pre-ablation cleaning process offers better cleaning compared to multi-spot burns or multiple single-point burns.

◉ Increased Capacity

The modular configuration allows for the installation of 3 to 6 laser modules on the same sorter frame, either from day one or as your needs grow. This scalability enables capacities ranging from 5.5 to 11 tons per hour for aluminum scrap (30–120 mm | > 1¼"–4").

◉ Higher Value per Ton

Innovative data analysis and computing process offers the option to optimize the material sorting even further by creating a product that is as close as possible to the desired alloy composition. This new approach can potentially double the added value of your sorted material.

SGM
powered by ◉ Cleansort

70 Years ANNIVERSARY SGM

70 Years in business

9 Fully owned subsidiaries

2 Manufacturing and repair facilities

TEST US NOW

Test the performance of our sorters with your own material.
Our worldwide team is ready to answer your questions and collaborate with you to identify the optimal sorting solution for your needs.

SGM WORLDWIDE

Always available, near you, in your language.

The SGM business model is based on providing state-of-the-art technology products, expertise and proximity to its customers through a network of SGM Magnetics-owned subsidiaries based in Italy, Germany, the United Kingdom, Belgium, the United States, China, Mexico, India and Japan.

In all other countries we boast decades-long partnerships with agents with a long and proven track record in SGM products and technologies.

We are available to provide you with all the information you need about our products, for assistance or to plan and design the right solutions for the specific needs of your production process.

The BEST SOLUTION is often a combination of BEST TECHNOLOGIES!

SGM Magnetics SpA
Via Leno 2/D – 25028
Manerbio – Italy

CONTACT US
Tel. +39 030 9938400
info@sgmmagnetics.com

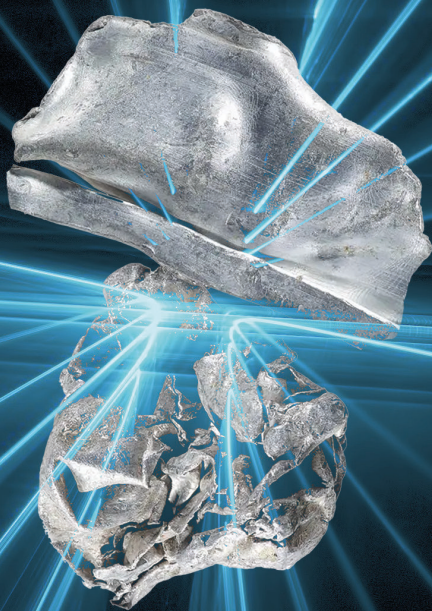**DISCOVER ALL OUR LOCATIONS ›**
www.sgmmagnetics.com

FOLLOW US

SGM LIBS* Powered by **CLEANSORT**

THE GAME CHANGER
IN LIBS METAL SORTING

*Laser Induced Breakdown Spectroscopy

THE TECHNOLOGY: LIBS
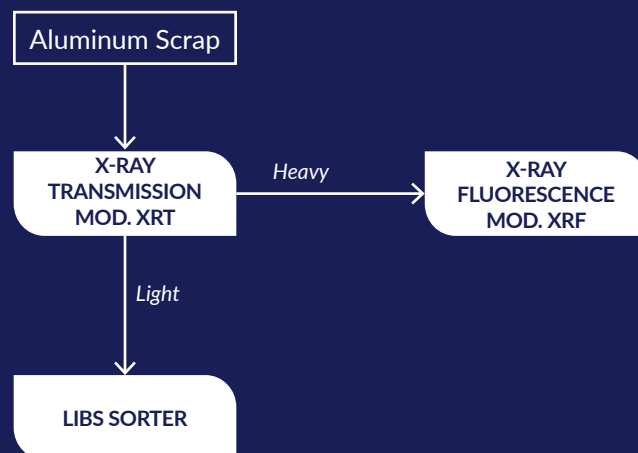## Laser Induced Breakdown Spectroscopy

SGM
TECHNOLOGY AND PROXIMITY

Laser-Induced Breakdown Spectroscopy (LIBS) is an advanced laser technology used for the analysis and identification of metal pieces in their different chemical compositions and alloys. A LIBS sorter fires a high-energy laser pulse onto the material's surface. The pulse creates a microplasma, whose emitted light characterizes the chemical composition of the metal in its different elements and is analysed by sensors performing a few milliseconds breakdown spectroscopy.

LIBS is a complementary technology to X-ray transmission, which does not perform any chemical breakdown analysis but sorts metals and metal alloys based on their different densities.

LIBS is also a complementary technology to X-ray fluorescence, which also performs a chemical breakdown analysis but presents limitations in performance on light metals like Magnesium and Aluminium alloys because of the low energy of the light they emit under the XRF source.

Although LIBS can do what XRT and XRF do, those technologies are complementary to LIBS because the capital cost of a LIBS sorter on a per-ton-per-hour capacity is quite higher than that of XRT and XRF sorters, making the cascade of those different technologies a more convenient solution.

Aluminum Scrap → X-RAY TRANSMISSION MOD. XRT — *Heavy* → X-RAY FLUORESCENCE MOD. XRF ; X-RAY TRANSMISSION MOD. XRT — *Light* → LIBS SORTER

# THE ADVANTAGES OF THE SGM-CLEANSORT LIBS SORTING TECHNOLOGY

■ The game changer

LIBS is a surface analysis technology which requires the surface of the piece to be cleaned of contaminants such as paint, dirt and oxidation to be able to perform an accurate reading.

The game-changing advantage of the SGM Cleansort LIBS sorter lies in its material cleaning process, which consists of its proprietary **laser square surface ablation** process. This advanced cleaning method ensures thorough surface preparation for every single piece by removing surface contaminants before analysis, enabling the generation of spectra that accurately reflects the material's chemical composition.
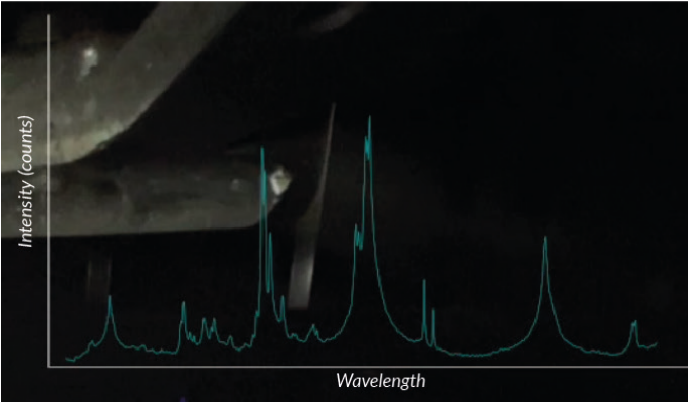
Alternative solutions consist in either performing multiple laser burning spots along each piece (*multi-spot analysis*) or performing repeated burnings on the same spot (*multiple single-point burns*) to gradually remove surface contaminants. In the first case, you hope to find at least one sufficiently clean spot, and in the second, you generate an accumulation of burning residue around the edge of the cone spot, which can interfere with the spectroscopy reading.

Those two alternatives are not suitable nor well performing as material surface cleaning solutions, especially when considering contaminants like paintings that can be 70 to 120 microns thick, as with aluminium bodies in the automotive industry.

Multi-spot analysis. *Multiple single-point burns.* *Cleansort square surface ablation.* *Watch the video.*
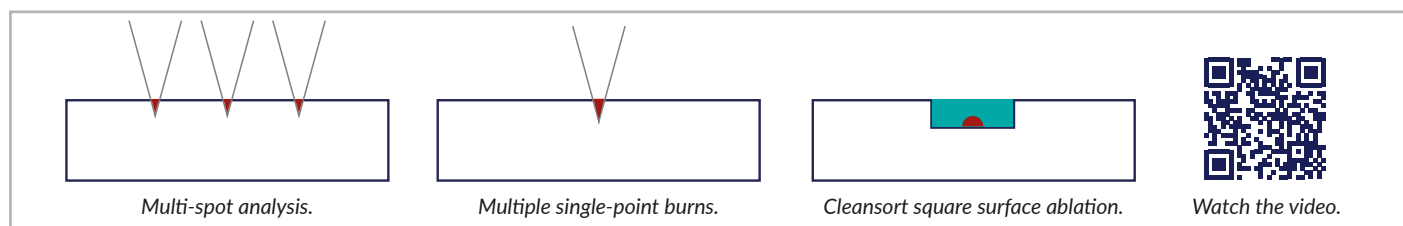
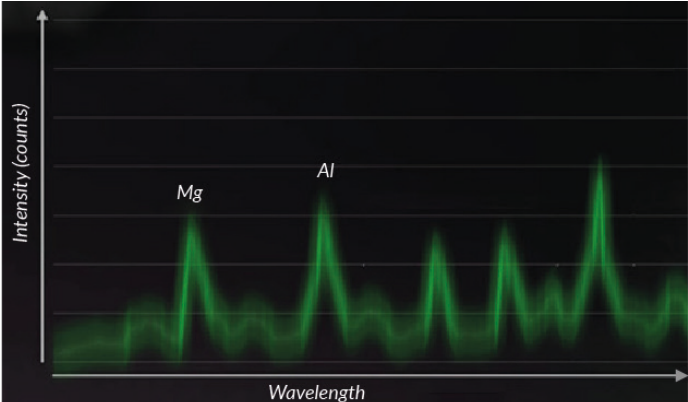## ■ True quantitative analysis vs qualitative analysis

A superior material surface cleaning process makes possible the production of **high-definition spectra** which shows accurate breakdowns of the chemical composition of every single piece and allows for doing a **quantitative analysis** of the material. Low-definition spectra that does not provide detailed chemical breakdowns of the material composition only allows for qualitative analysis where sorting is based on predefined criteria (e.g., max Si, max Mg), determining whether each individual piece meets those thresholds.

Running quantitative analysis results in disposing of quantitative information of both the eject and drop streams of the material which enables customers to make more informed decisions and optimize production, quality, and value of their aluminum scrap.

High definition spectra (SGM Cleansort LIBS).

Low definition spectra (Others).

■ Dynamic data computing process

A qualitative analysis only allows for a Yes/No static sorting decision on an **individual piece basis**. A quantitative analysis allows for taking advantage of the chemical composition of **all the pieces** processed before, while running a proprietary dynamic computing data process where the sorting decision is based on whether or not the average of the chemical composition of all these pieces fall within the threshold.

Making sorting decisions based on a **dynamic computing data process** results in higher recoveries, which can be up to 1.5–2 times what can be achieved with static sorting, as, in the end, what matters is not the single-piece sorting but the melt analysis of the complete batch.

ELEM.	Min/wt%	Max/wt%
Mg	0.3	0.8
Si	0.3	0.8
Mn	0.0	0.15
Cu	0.0	0.15

Target alloy limits

ELEM.	Piece 1	Piece 2	Piece 3	Piece 4	Piece 5	Piece 6	Ø Piece 1-5
Mg	0.6	0.6	0.2	0.6	1.2	0.6	0.64
Si	0.4	1.2	0.4	0.4	0.4	10	0.56
Mn	0.1	0.1	0.15	0.2	0.152	0.1	0.14
Cu	0.05	0.05	0.1	0.05	0.05	1	0.06

LIBS analysis wt%

With static sorting, only Piece 1 is accepted because each piece must meet all limits individually. Instead, dynamic sorting accepts all 5 pieces, since their average stays within the target alloy limits. This approach maximizes yield while ensuring compliance.

■ Versatile material analysis

The **wide measurement spectrum** of the SGM Cleansort LIBS sorter allows to easily switch between different materials. With a simple approval and calibration process, the sorter can pass from sorting non-ferrous metals to steel.

■ Modular solution and high capacity

The SGM Cleansort LIBS sorter is designed as a **modular solution**, allowing different laser ablation and reading modules to be mounted on the same frame. Configurations range **from 3 to 6 modules**, with a conveyor belt width of 720mm | 28" up to 1440mm | 56" enabling **throughput capacities between 5.5 and 11 tons per hour** for aluminum scrap in the 30 to 120 mm | 1¼"–4" size range considering an average weight per piece of 34 grams (0,075 lb).

This scalable design allows for an initial investment in a sorter with fewer modules, with the option to increase capacity over time by adding additional modules to the existing sorter frame.

STATIC AND DYNAMIC SORTING

The SGM Cleansort system offers two advanced sorting options while delivering accurate information on the chemical composition of both ejected and non-ejected fractions:

■ **Static Sorting:** This traditional method analyses each individual piece and makes a yes/no sorting decision based on whether its chemical composition meets customer specifications.

■ **Dynamic Sorting:** Thanks to our proprietary dynamic data computing process, the dynamic sorting feature evaluates the individual composition of multiple pieces at the same time and makes the sorting decision based on the average chemical analysis of those pieces. This can boost material recovery up to 1.5-2 times higher than static sorting.

By combining these two options, the SGM Cleansort LIBS sorter delivers unmatched flexibility and efficiency in scrap sorting.

SGM MODEL	No OF CLEAN2SORT MODULES	ESTIMATED TROUGHPUT (Up to)
CLS-R 720 (28")	3	5,5 t/h
CLS-R 960 (38")	4	7,0 t/h
CLS-R 1200 (48")	5	9,0 t/h
CLS-R 1440 (56")	6	11,0 t/h

Based on average weight per piece of 34 gr (0,075 lb).

MATERIAL PROCESS

Material feeding and preparation
Metal scrap is conveyed by vibrating feeder to the belt of the sorter running at up to 3 m/s.
Capacities on aluminium scrap with a size fraction of **30 to 120mm | 1¼"–4" range from 5.5 to 11tph** (based on average weigh per piece of 34 grams (0.075 lb)).

High-speed laser scanning
As the scrap moves along the conveyor, high-speed 3D laser scanners measure the surface and geometry of each piece and direct the LIBS laser on the X/Y coordinates of the piece and adjusts the auto focus to its Z-axis.

Laser cleaning and analysis
Once the X/Y/Z coordinates are set, the Cleansort module performs two key functions:

■ **Laser Pre-Ablation:** The system cleans the surface by removing contaminants, coatings, or rust, exposing the underlying material for analysis.

■ **LIBS Measurement:** The laser induces a plasma on the surface of the material. Doing the breakdown spectroscopy of the plasma, material is identified in its exact metal composition, **distinguishing** not only between metals like steel and copper but also between alloy groups, such as **5000 and 6000 series aluminum**, and even between **similar alloys like 6010 and 6016.**

Sorting and output
After analysis, the system uses advanced air pulse technology to separate material in different composition streams.
Each LIBS module analyzes an average of 15 pieces per second, resulting in 60 pieces per second for a sorter provided with 4 modules and 90 pieces per second in the case of 6 modules.