

SGM SOLUTION FOR UPGRADING ALUMINUM SCRAP

CUSTOMERS' BENEFITS:

Smelters

- Significantly increase the use of scrap versus primary aluminum as feed charge
- Optimize furnace yield
- Reduce slag production

Scrap operators

- Valorise the high value 1xxx, 5xxx and 6xxx aluminum in the scrap which is otherwise valorised at a lower price by those buying scrap for producing cast products



	XRT TECHNOLOGY	XRF-T TECHNOLOGY	LIBS TECHNOLOGY
FUNCTION	Sorting aluminum by detecting its atomic density.	- Sorting aluminum by density and analyzing its chemical composition - Sorting of individual Heavy NF Metals.	Sorting aluminum by identifying its elemental chemical composition through the spectral analysis of material vaporized by a laser pulse.
TYPICAL APPLICATIONS	- Sorting of Light Metals from Heavy NF Metals. - Sorting of Light Alu Alloys (1xxx, 5xxx, 6xxx) from Heavy Alu Alloys (2xxx, 3xxx, 4xxx, 7xxx).	- Sorting of low and high-density alloyed aluminum fractions. - Further recovery of thick pieces of Light Aluminum (1xxx, 5xxx, 6xxx) from the Heavy Fraction of an XRT.	Sorting of specific aluminum alloys (e.g. 6060, 6061, 6082) or specific alloy series (1xxx, 3xxx, 5xxx, 6xxx).
DETECTION METHOD	Dual Energy X-ray Transmission.	Dual Energy X-ray Transmission combined with Fluorescence.	Laser Induced Breakdown Spectroscopy.
SORTING CRITERIA	Atomic density.	Atomic density and chemical composition.	Chemical composition.
BENEFITS	High-volume and high-quality processing. Long-proven technology.	Recovers aluminum fractions that would otherwise be discarded, increasing recycling rates and minimizing material losses.	High-volume and finest possible level of detail, distinguishing elements like magnesium, silicon, copper, or zinc.
SYNERGIES WITH OTHER TECHNOLOGIES	Core step in aluminum sorting, enhanced by other technologies.	After XRT pre-treatment.	Next-level sorting after XRT pre-treatment



- 70 Years in business
- 9 Fully owned subsidiaries
- 2 Manufacturing and repair facilities



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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 most of the countries SGM disposes of partnerships with agents with a long and proven track record in SGM products and technologies.



The BEST SOLUTION is often a combination of BEST TECHNOLOGIES!

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SGM SOLUTION FOR UPGRADING ALUMINUM SCRAP

Specifically for smelters making 6000 series billets for extrusion and 5000 series sheet ingots for rolling



Aluminium Recycling

Aluminum recycling plays a crucial role in sustainability, requiring only 5% of the energy used for primary production and significantly cutting CO₂ emissions. However, achieving higher recycling rates is challenging due to the diversity of aluminum alloys, contamination in post-consumer scrap, and the limited availability of high-purity material. To meet future targets, advanced separation technologies are essential for improving recovery efficiency and maintaining quality.

SGM offers either stand-alone sorters or complete solutions including engineering, structures, conveyors, screens, sorters (ferrous, ECS, X-ray, LIBS) and control panels.

The SGM complete solution starts after the reduction and screening processes of the aluminum scrap with a size fraction around 20-130 mm (3/4" – 5") and includes magnetic ferrous separation, eddy current, X-ray and LIBS (Laser Induced Breakdown Spectroscopy).

The SGM solutions maximize recovery rates, purity, and operational efficiency. The result is a main stream of scrap aluminum with Zn, Cu, Mn, Si and Fe reduced by a multiple of times.

With **aluminum profile** scrap, Zn can pass from the typical 0,16-0,25% down to 0,03-0,05%.

With **taint tabor**, Zn can pass from the typical 0,5% down to 0,10-0,15% and in the case of tense, it can pass from the typical 5-6% down to 1-2%.

One key element of the SGM X-ray solution is the use of a **primary X-ray transmission** (XRT) sorter that can be followed by a **a secondary X-ray sorter combining the transmission and fluorescence technologies in one single analysis**.

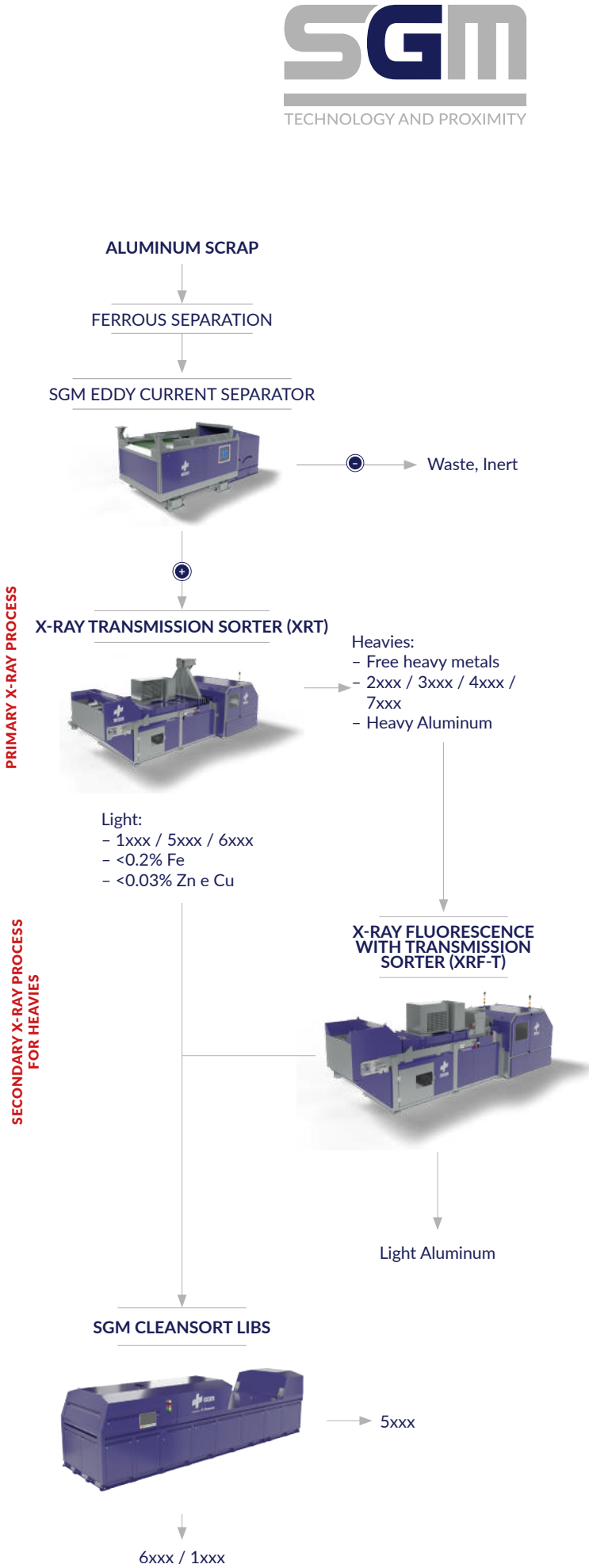
The **primary X-ray transmission** sorter is set to the maximum sensitivity in order to guarantee that the light stream of the sorter contains less than 0,2% Fe and less than 0.03% both Zn and Cu resulting in scrap being suitable for smelters making 6000 series billets for extrusion and 5000 series sheet ingots for rolling

A **secondary X-ray sorter (XRF-T)** can be used on the heavy stream (heavy metals + 2xxx + 3xxx + 4xxx + 7xxxx) of the primary X-ray sorter to further recover additional light aluminum pieces (1xxx, 6xxx and 5xxx) that, because of their large mass (thickness), are often seen as heavies by the primary XRT .

After the primary XRT working on Zorba or taint tabor, light fraction is further processed on a LIBS sorter to reduce Si to below 0,5-0,45%.

After the primary XRT working on profiles, the light fraction is further processed on a LIBS sorter for the separation of the 6060 from 6063 as well as the separation of the 6010 from 6016.

NB: The percentages may vary depending on application, material specific weight and metal content in material.



SGM sorting technologies for aluminum processing

Primary X-ray sorter

X-RAY TRANSMISSION (XRT)

The X-ray Transmission is a through beam technology taking advantage of the penetrating form of the X-ray high-energy electromagnetic radiations.

This technology sorts aluminum based on atomic density, making it ideal for:

- Separating light metals from heavy non-ferrous metals.
- Distinguishing light aluminum alloys (1xxx, 5xxx, 6xxx + AlSi alloys) from heavier alloys (2xxx, 3xxx, 4xxx, 7xxx).

XRT technology provides high-volume processing and proven reliability in industrial applications.

Secondary X-ray sorter

X-RAY FLUORESCENCE COMBINED WITH TRANSMISSION (XRF-T)

This combined technology provides density and chemical composition analysis to refine aluminum sorting further. It is particularly useful for:

- Recovering thick pieces of light aluminum from previously sorted heavy fractions.
- Sorting low- and high-density alloyed aluminum fractions.

XRF-T technology integrates X-ray transmission and fluorescence, allowing recyclers to recover aluminum that would otherwise be discarded, increasing overall recycling rates and minimizing material losses.

The X-ray fluorescence technology is a surface technology that sees heavy metals and is transparent to light metals regardless of their thickness.

Coming off a shredder some pieces of light aluminum scrap can easily become dense and massive to the point that, because of their mass and thickness, a first (primary) XRT often sees them as heavies.

Using the SGM XRF-T as the secondary X-ray sorter, those massive pieces will be seen as light aluminum by the fluorescence and be further sorted and valorised as such.



SGM LIBS: Laser Induced Breakdown Spectroscopy

For this LIBS technology SGM represents on certain markets the German company Cleansort

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.

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 (> 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.

