Redwave introduces next generation of metal sorting technology

In the metal recycling industry, companies are increasingly challenged to not only improve the efficiency of their processes but also to raise the quality and purity of the sorted materials to new heights. Redwave, Eggersdorf bei Graz, Austria, said it has achieved a milestone for the metal recycling industry with its latest generation of X-ray fluorescence (XRF) sorting machines.

By integrating spectral analysis technology into its XRF sorting system, the company said it is unlocking new opportunities for metal recycling, particularly in aluminum recovery. This system enhancement enables the processing of a wide range of material streams, including zorba, e-scrap, used beverage cans, incinerator bottom ash and mixed metal fractions, while ensuring the accurate identification of aluminum alloys with high purity and quality.

Redwave XRF sorting machines have long been successfully used for separating aluminum and heavy metals such as copper, zinc, brass and lead. Until now, aluminum could only be separated based on accompanying elements like copper or zinc, making the precise identification and sorting of various aluminum alloys challenging, Redwave said, adding that these technological limitations are now a thing of the past.

By combining spectral analysis with XRF technology in one Redwave sorting system, a broader spectrum of material composition can now be analyzed. Not only are individual element signals (peak-based analysis) detected, but the entire spectrum is utilized to enable significantly more precise alloy separation. The system is equally effective with materials that have contaminated surfaces, making it suitable for nearly all materials

"This advancement opens up entirely new possibilities in aluminum separation and significantly improves material purity and recycling quality," Redwave said.

The integration of Redwave spectral analysis into the XRF sorting system offers a multitude of benefits for companies in the metal recycling sector, including:

- maximized material purity and value creation. Improved material quality through the concentration of aluminum alloys such as 6060/6063 or the sorting of aluminium series 1xxx–7xxx increases market value and opens access to highly lucrative markets. These include the growing demand for primary aluminum and specialized alloys, particularly in the automotive industry. Recycling companies can now deliver premium materials to high-value buyers, maximizing their value creation;
- reduction of contaminants. Spectral analysis enables the detection of contaminants often found in aluminum streams, such as plastic, rubber or wood. These unwanted materials are removed in a single step, resulting in cleaner end products and reduced reprocessing costs;
- increased flexibility and cost-efficiency. A key advantage of the new Redwave XRF sorting system is its flexibility. One machine is sufficient to meet a wide range of sorting requirements. With a single machine, companies can separate heavy metals, stainless steel alloys and aluminum alloys. This efficiency reduces the need for multiple machines and associated operating costs while also accelerating processing speed. Businesses can optimize their entire

Recycling trends for 2025

BY VOLKER REHRMANN
Executive Vice President and Head of Tomra Recycling

This year promises to be a transformative year for the recycling industry. Here are the key trends to watch in material sorting and recycling:

DEEP LEARNING

Deep learning will continue to shape the recycling industry in 2025. This subset of artificial intelligence (AI) achieved significant milestones in sorting last year, such as high-accuracy sorting of opaque white packaging, textiles and foils from PET as well as high-throughput, high-purity used beverage can aluminum recovery.

Deep learning is poised to tackle increasingly complex sorting tasks and expand into new segments, such as metal sorting, unlocking new levels of efficiency and sustainability in the recycling industry.

Traditional systems, which remain critical due to decades of refinement, focus on sorting by material type (near-infrared (NIR) sensors) or color (visible imaging sensors (VIS)). Deep learning's value lies in object recognition using full-color cameras, which recognize the types of objects based on shape, size and dimensions. Systems like Tomra's GAIN-next use deep learning to mimic human vision and can be precisely trained to automate sorting challenges previously undertaken manually.

REAL-TIME MONITORING

In 2025, advanced AI and cloud technologies will be increasingly utilized for waste analysis, enhancing transparency in sorting facilities. Platforms like Tomra Insight collect data directly from sorting systems, while tools like PolyPerception's waste analyzer use cameras for real-time waste monitoring and classification at key sorting points.

Digital twins of sorting lines allow detailed object tracking and analysis. These systems enable operators and recyclers to make data-driven decisions to improve output quality, prevent material loss and preempt potential disruptions. The benefits include enhanced efficiency and compliance with regulatory standards.

PACKAGING WASTE REGULATION

The European Packaging and Packaging Waste Regulation (PPWR) will be a critical focus in 2025 due to its far-reaching impact on the industry. With the 2030 target of 70% recyclability for all packaging looming, companies must urgently adapt to strict requirements for recyclability and robust infrastructure. The PPWR mandates that plastic packaging must

contain a minimum of 10% to 35% recycled content by 2030 depending on the type of plastic and its intended use, with higher targets set for 2040.

These targets will drive innovations in eco-design and recycling technologies, including advanced mechanical recycling and chemical recycling. The PPWR provides the industry with planning certainty and encourages investment, particularly in recycled content demand for plastics, potentially helping to stabilize prices for recycled materials. Positive developments in this regard may emerge as early as this year.

DECARBONIZATION IN ALUMINUM RECYCLING

Decarbonization will remain a priority in 2025, particularly in the aluminum sector. Many large companies are committed to net-zero targets, driving demand for recycled aluminum and high-quality feedstock. Using recycled aluminum yields significant CO_2 savings compared to other materials.

Achieving "green" aluminum requires increased aluminum sorting and greater granularity, such as separating aluminum alloys (1xxx, 3xxx, 5xxx or 6xxx series) into high-purity fractions. Laser-induced breakdown spectroscopy technology remains groundbreaking in this area and Tomra plans to install several Autosort Pulse systems globally in 2025.

LESSER-KNOWN MATERIAL STREAMS

While recycling plastics, organic waste and aluminum is well-established, the recycling of other material streams is still in its infancy and will gain attention in 2025. For example, wood sorting technologies now enable the production of recycled materials matching the quality of virgin raw materials.

Processed and unprocessed wood can be separated and medium-density fiberboard recovered efficiently. This year could see these solutions implemented on an industrial scale.

Similarly, advancements in textile recycling are poised to showcase what's technologically feasible, paving the way for larger-scale adoption.

recycling workflow, achieving higher productivity with lower energy consumption;

- future-proof design. The Redwave XRF technology's ability to adapt to new material requirements and market changes provides long-term investment security. By analyzing the entire spectrum, the system is equipped to handle new materials and challenges, ensuring flexibility to meet future recycling demands; and
- competitive advantage and higher margins. Companies that extend their capabilities from conventional heavy metal sorting to the sorting of aluminum alloys can achieve "primary aluminum" specifications, strengthening their market position and securing higher margins.

"The future of metal recycling holds tremendous opportunities, particularly driven by the increasing demand for recycled aluminum in the automotive, construction and electronics industries," Redwave said. "Sustainability initiatives and mounting pressure to reduce CO_2 footprints are putting recycled materials in the spotlight. Additionally, the recycling of IBA [incinerator bottom ash], which contains valuable metals, is gaining importance as many of these materials have previously been underutilized."

Visit redwave.com.

Tomra, Gerhard Lang partner in aluminum alloy sorting

Gerhard Lang Recycling GmbH, Gaggenau, Germany, has made history by becoming one of the first companies globally to implement Tomra Recycling's Autosort Pulse system for the precision sorting of aluminum alloy stamping scrap generated from automotive production, Tomra said.

The company installed an Autosort Pulse unit in early 2024 at its metal sorting plant in southwestern Germany as part of a research project funded by the German Federal Ministry for Economic Affairs and Climate Action.

The project is an ambitious initiative aimed at closing the loop on aluminum scrap generated in automotive production. Tomra, Gerhard Lang, Pforzheim University of Applied Sciences and engineers from Jeanvré Engineers, Braunschweig, Germany, have teamed up for the project to prove that aluminum production scrap can be effectively sorted and transformed into high-quality secondary aluminum. The consortium is using Tomra's dynamic laser-induced plasma spectroscopy (Dynamic LIBS) technology.

The plant's infeed material consists of stamping scrap—the excess metal material that is removed during the metal stamping process—generated during the production of car parts and panels. While highly efficient, the stamping process inevitably generates significant amounts of scrap, with an estimated 30% to 50% of the material being discarded. The aluminum scrap comprises a mixture of 5xxx (high-magnesium) and 6xxx (low-magnesium) aluminum wrought alloys that are employed in different components within automotive production.

Upon arrival at Gerhard Lang's metal sorting plant, the material is shredded before undergoing a multistage magnetic separation process to remove the ferrous metals. In a next step, the non-ferrous material is then fed into the Autosort Pulse for advanced sorting.

Prior to the installation of the Autosort Pulse unit, the Gerhard Lang team sold the mixed material to aluminum manufacturers immediately after the shredding process as there was no efficient solution on the market to separate the high- and low-magnesium aluminum alloys. With the Autosort Pulse now in place, and thanks to Tomra's

Dynamic LIBS technology, these alloys are sorted into different products, allowing Gerhard Lang to produce exceptionally high purity 5xxx and 6xxx aluminum scrap.

Given the alloys' identical appearance and density, traditional sorting methods are ineffective, Tomra said. However, the Autosort Pulse separation process is based on the precise analysis of the elemental composition of each material and on highly advanced dynamic laser detection, making it capable of distinguishing between alloys.

Additionally, object singulation allows the Autosort Pulse to accurately identify and separate even overlapping and adjacent materials, maximizing yield and efficiency in the sorting process. Its 3D object scanning feature recognizes the shape, height and position of the object and identifies the ideal shooting point for the Dynamic LIBS laser. This laser offers two focus modes—multi-point where the laser shoots in a line across the sample, and single-point where the laser drills down into a specific spot, providing ideal detection conditions. The latter, developed by Tomra, has demonstrated superior performance in tests, Tomra said.

Another key benefit of Autosort Pulse is its ability to minimize contamination and subsequently enhance the value and marketability of the recycled materials, the company said. The system's precision sorting reduces the risk of cross-contamination, safeguarding the integrity of the recycled materials and ensuring that they are suitable for their intended applications.

Gerhard Lang consulted with Tomra's metals experts prior to investing in the plant's new aluminum sorting process. The project's development spanned several years, with initial discussions beginning around 2018.

"With the integration of Autosort Pulse, we are able to process a throughput of around four to seven tons per hour and achieve exceptionally high purity levels, exceeding 95 percent and potentially reaching 97 percent," said Maximilian Lang, managing director at Gerhard Lang. "As a result, our material is suitable for use in the production of aluminum without downgrading. We can now sell the recovered materials to leading aluminum manufacturers and recyclers for direct integration into the production of new aluminum alloys. What's more, we are considering the potential to explore additional applications for other aluminum alloys."

Frank van de Winkel, market strategy

manager—metal at Tomra, said, "With the European Union's commitment to climate neutrality by 2050, as outlined in the Green Deal, and the specific target of a 55 percent reduction in greenhouse gas emissions by 2030 under the 'Fit for 55' initiative, there has never been a more crucial time to explore ways of making the aluminum supply chain more sustainable."

Visit tomra.com.

SMH partners with Komatsu dealer

SMH Group, Concord, North Carolina, a national distributor for Atlas and Mantsinen material handlers, announced a new dealer partnership with Komatsu Company Stores East. The strategic collaboration aims to enhance the availability and support of high-quality material handling equipment across the U.S. East Coast, SMH said.

Komatsu Company Stores East operates across 11 branches in five states, including Delaware, Maryland, New Jersey, New York and Pennsylvania.

"We are excited to add such a major dealer to the network," said Tim Hyland, vice president of SMH Group. "This partnership expands our reach and better serves customers across various industries. "

Komatsu Company Stores East leverages Komatsu's global service and distribution network while providing local solutions and expertise, SMH said.

"We are pleased to partner with the SMH Group and offer Atlas and Mantsinen material handlers to our customers," said Mike Kubas, president. "This extensive product line is known for its reliability and performance in demanding applications, and we believe it will be an excellent solution for many of our customers."

SMH Group now has a network of eight dealers in 21 states that offer specialized equipment solutions from Atlas and Mantsinen for port operations, recycling, scrap metal, demolition, waste management, logging and several other industries.

The German-engineered Atlas material handlers range in size from the 44,000-pound Atlas 200 MH to the 125,000-pound Atlas 520 MH. The Finnish-made Mantsinen material handlers pick up where Atlas leaves off. The Mantsinen 60 is 160,000 pounds and the Mantsinen 300 is one of the largest machines of its kind in the world at more than 900,000 pounds, with a reach of more than 130 feet.

Visit smhgroup-us.com. /