Recycling International

How BHS-Sonthofen boosts output at French e-scrap recycler

Shredding for value

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BHS-Sonthofen increases output and working conditions with recycling turnkey line for e-scrap in France

Shredding for value

Most people use electronic devices without giving much thought to the end of their lives. Envie, a French specialist in the recycling of electrical and electronic scrap, focuses on safety and sustainability. To do so, the company has two technological aces up its sleeve: a primary shredder (VSR) and a Rotorshredder (RS) from BHS-Sonthofen.

During the construction and assembly phase, the BHS Rotorshredder (type RS) can be seen in the background inside its noise protection housing.

Computers, irons, or countless items of kitchen equipment usually end up at the local household waste disposal site. Unlike other domestic or organic waste, such devices are not merely incinerated or go to landfill. Legislative directives on the treatment of waste of electrical and electronic equipment (WEEE) call for effective and sustainable treatment. Recovering electronical devices is the key to reaching that ambitious aim, resulting in many recycling companies expanding their portfolios and capacities.

This is the case for Envie: the company based in Portet-sur-Garonne in southern France covers every of sustainable WEEE treatment, from collecting to repairing, recycling, and reselling electronic devices. Envie, part of the French Derichebourg recycling group, operates a comprehensive recycling line for electronic devices, including sorting and decontamination stations, as well as shredding equipment.

E-scrap stocks at Envie in Portet-sur-Garonne near Toulouse.

MODERNISING A PLANT

The original line had been used extensively and could only process up to two tonnes of material per hour. Realising the need to boost output, Envie seized the opportunity not just to reconstruct what it had, but to surpass its previous set-up. 'WEEE is notoriously complex and challenging to recycle,' says Franck Zeitoun, CEO of Envie. 'We saw a chance to increase our capacity, working conditions and the quality of the shredded material using updated technology.'

In addition, e-waste often contains potentially harmful substances such as heavy metals like mercury which make recycling potentially hazardous. Envie therefore envisaged a modern turnkey line that would do more than process larger quantities of WEEE and recover more residual materials, especially metals. It would also offer its workforce an optimised working environment.

THE RIGHT PARTNER

While the goals were quickly set, a pressing question remained: who could be a technological partner? Envie needed state-of-the-art tearing and shredding equipment that would process greater quantities of WEEE than before but without compromising on easy maintenance and economical operations. In early 2021, together with the Derichebourg Group, Envie wanted to know what support potential suppliers could offer and conducted a comparative study between a selected few. Once it had narrowed down the number of possible providers, Envie carried out grinding tests with typical devices such as computers or printers.

After several runs and loads of shredded material, it quickly became clear that the BHS-Sonthofen pre-shredders and shredders provided the best results in terms of material quality, wear and capacity. 'Rather than just focusing on costs, we wanted to know if the equipment would allow us to keep up with present-day WEEE recycling and maintain flexible operations,' Zeitoun explains. 'BHS-Sonthofen ticked all the boxes.'

Based on outstanding results, Envie chose BHS-Sonthofen, and its long-standing French sales partner Ressor, to integrate a primary shredder (VSR) and a Rotorshredder (RS) into its recycling line - a first in the company's history. 'Envie reached out to us because our technology and capabilities in WEEE recycling met their expectations,' recalls Andrea Garbarini, CEO of Ressor. 'The quality of the shredded material and the processing capacity of both machines left a lasting impression. The VSR and RS allow Envie to process six tonnes of small domestic appliances per hour, tripling its previous output.'

But what actually tipped the scales in

ABOUT BHS RECYCLING TECHNOLOGY

The division offers innovative process solutions, system concepts and a wide range of machines and processes for the recycling industry worldwide. The comprehensive portfolio includes technologies for shredding and processing, classification, separation, and sorting technology as well as modern control solutions. For the effective treatment of valuable and metal-containing residues, processes for metal recovery and industrial waste are readily available. Electrical and electronic scrap, automotive shredder residue (ASR), incinerator bottom ash, MBT, ferrous and non-ferrous slags can all be efficiently and economically processed with BHS solutions. It is an international leader in the production-scale recycling of lithium-ion batteries. It also provides extensive after-sales services.

At the first stage, contaminants such as batteries, capacitors, cables, toner cartridges, display screens, circuit boards or solid parts are dismantled and processed during manual pre-sorting.

favour of BHS-Sonthofen was not solely the modern processing equipment. 'We were also keen on having well-versed partners in plant engineering, as well as in equipment that would keep operational and maintenance costs at a minimum,' Zeitoun explains. In May 2021 the three companies fused Envie's process knowledge from over 30 years in France's recycling industry with the plant engineering expertise of BHS-Sonthofen and Ressor to build a unique line.

SOPHISTICATED DESIGN

Envie chose a modular setup comprising a main tearing and shredding line, located indoors, as well as an external feed hopper and additional separate indoor area for collecting plastic fractions. It opted for this design for both safety and efficiency reasons because electronic devices often contain components such as batteries that pose a fire hazard during shredding. Should a fire ever occur, Envie wanted to contain it within a confined space.

The new line comprises an external feed hopper, three soundproofed, heated, and air-conditioned sorting and depollution cabins, a VSR and a RS. There are also several conveyor belts, an overband magnet, screens, an eddy current separator, fire detection and protection devices, as well as a common de-dusting unit for added safety. BHS provided the full control unit for the entire line and fully automated the WEEE recycling plant, allowing Envie to treat the WEEE input material and generate several output fractions. These include different kinds of metal in high purity, plastics, PCBs, cables, small motors, and other components. The new set-up helps Envie transform input materials into high value products.

Zeitoun explains that a higher metal recovery rate and purity were key targets. '11% of our shredded output consisted of mixed fractions, including precious metals, that we couldn't retrieve. Thanks to the RS from BHS-Sonthofen, we have reduced that share to less than one per cent. We now achieve much cleaner fractions and can recover most of the metal, which we sell to partners for further processing.'

Large quantities of WEEE are first sorted manually by Envie employees to prepare for pre-shredding in the VSR. In a new and spacious decontamination unit, devices are disassembled to remove any components that are either unfit for shredding or are hazardous, such as batteries, capacitors, cables, toner or TV screens. The material is then transferred on conveyor belts to be ripped and shredded by the VSR. This helps staff to access valuable components in a second sorting stage.

Important quantities of large objects and elastic materials can easily be processed in the VSR. It discharges the shredded material onto a conveyor belt which transfers the material to an overband magnet generating a mag-

After the second stage in sorting Cabin 2, pre-sorted non-ferrous and ferrous materials are fed from the overbelt magnet to the enclosed BHS Rotorshredder for selective shredding and disintegration.

netic fraction destined for the RS feed. The non-magnetic fraction is conveyed to a double-deck screen which creates three more fractions. Two are initially transferred to a second sorting chamber for further processing before the material reaches the RS.

CONTINUOUS DEVELOPMENT

The RS plays a crucial role in improving the quality of Envie's output material, especially when it comes to recovered metal. BHS-Sonthofen has refined this process over many years for various metal-containing waste and residual materials. As a result, it is now recovering ready-for-sale metal fractions. Some of the most used feed materials include e-scrap, light metal scrap, ferrous and non-ferrous slags, incinerator bottom ash and shredder residues from vehicle recycling. As part of its portfolio, BHS-Sonthofen has adapted its patented RS specifically for fractions with a larger number of individual parts.

A major asset of the RS lies in its capability to shred and break down recyclables, residuals and composites containing metal. The shredding tools subject the infeed material to intensive impact and shear forces, resulting in selective disintegration. Material composites are efficiently separated without producing a lot of fines, resulting in finely sorted fractions. 'Overall, the RS achieves an economically optimised treatment for a variety of materials, and thus a high-quality output, in line with Envie's recycling targets, says Garbarini.

The shredder's slotted grid has also been significantly enhanced with an optimised arrangement of the openings. This makes the machine more wear-resistant and easier to maintain, important characteristics Envie was looking for. A second optimisation concerns the impurities slide. BHS-Sonthofen has adapted this component so that the RS can discharge impurities more smoothly through a larger gap, adding to the quality of the shredded material. Once the shredded mixed fractions exit the RS, an overbelt magnet helps to separate the metal from the non-metallic components. 'The RS is a game-changer as it allows us to reach the purity levels we were aiming for,' Zeitoun maintains.

After the third and final sorting stage, zorba is readily available. Zorba is shredded aluminium which may contain lead, zinc, stainless steel, iron, brass, copper or nickel.

POSITIVE BALANCE SHEET

The new line, which has been operating successfully since January 2023, is not solely based on state-of-the art equipment. 'In our case, the technological craftmanship and know-how of BHS-Sonthofen, paired with the recycling process knowledge of Ressor, perfectly complemented each other and went well beyond our expectations,' the CEO recalls. 'Both partners deployed on-site experts who planned and implemented the ambitious line project within the timeframe we were hoping for, despite a few minor hurd-les.'

The installation is impressive. Envie recently evaluated the line's economic performance and it boasted excellent results. 'The recycling line has met our expectations regarding capacity, material quality and ease of use,' Zeitoun concludes. 'With this setup, we are confident of meeting the challenges of a growing WEEE market.'

ABOUT BHS-SONTHOFEN

BHS-Sonthofen is an owner-operated group of companies specialising in machinery and plant engineering with headquarters in Sonthofen, Germany. In keeping with its mission of 'transforming materials into value', it offers innovative process solutions, technologies and consulting services in process technology, building materials machinery and recycling technology. Its experts in mechanical and thermal process technology with a focus on filtration, drying, mixing, crushing and recycling, form the basis for its success. The group of companies includes BHS-Sonthofen and nine subsidiaries, employing around 600 people at four production sites worldwide. In 2022, it generated sales of more than EUR 155 million with an export share of over 80%.

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