Non Ferrous & (A)SR Recovery
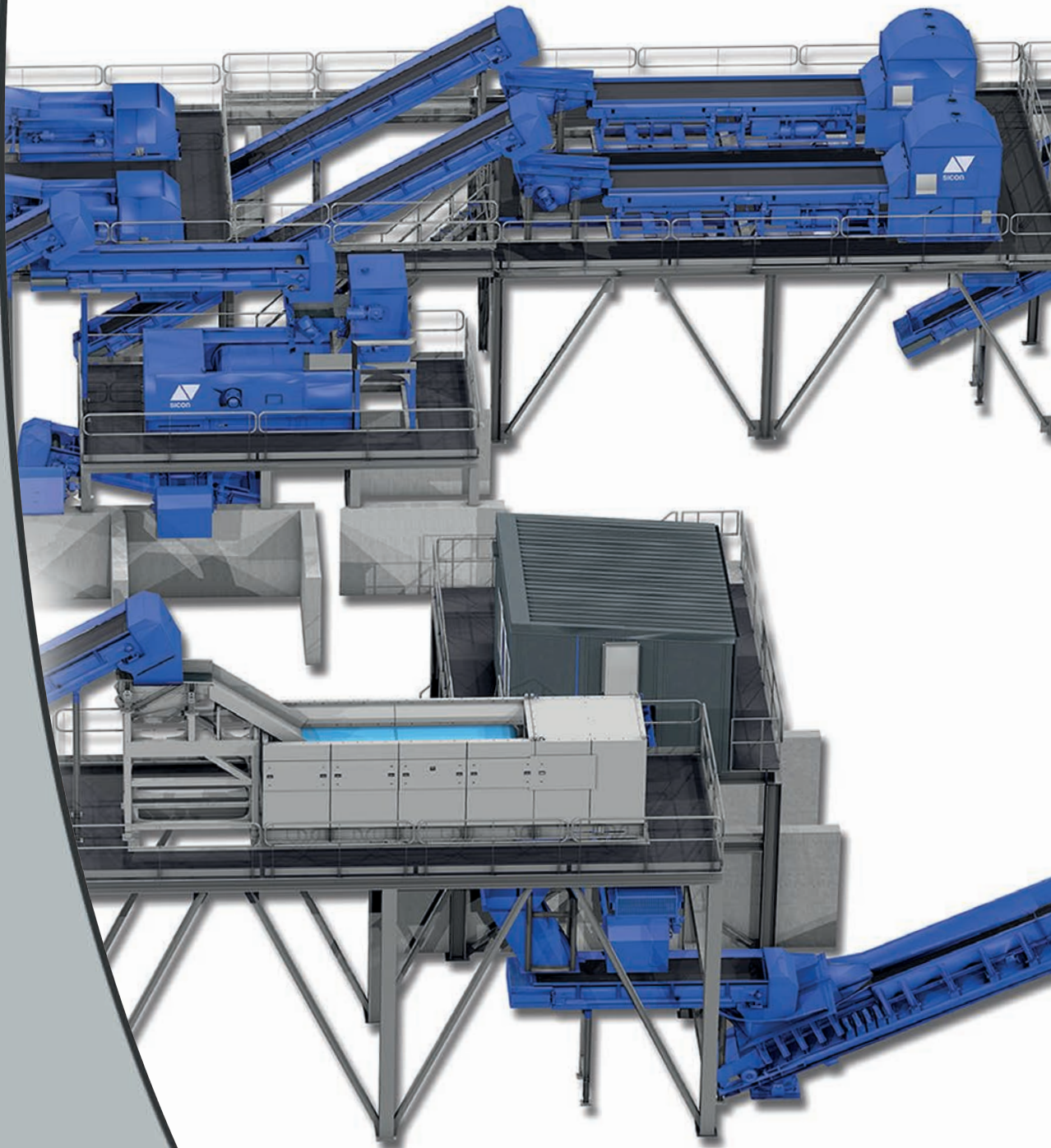
Product Overview

SICON.

SICON – Exceptionally flexible!
Extremely adaptable!
360°-view!

25 years of high-quality plant engineering – Scrap and Metal Recycling made by SICON

With two decades of experience in plant design and with a continuously growing team SICON has realized a multitude of domestic and international projects. Among serviced customers are many small- and mid-sized scrap recyclers as well as multi-national steel plants and conglomerate recycling companies.

SICON offers the right machine and best-fit system for any requirement within the scrap and metal recycling business. Furthermore, SICON offers its customers to oversee each step of a project and acts as a complete solution provider for highly-customized projects and systems. Our expertise and product portfolio ranges from single machines up to complete project planning and realization of system upgrades.

All of our machines are field-tested in our Technical Research Center (TRC), where our equipment and processes are being developed and improved continuously. Our latest development is the LIBS-based LaserSort, which is available for customer testing alongside the EcoShred® Vertec.

A perfect base

Reliable shredder residue processing starts with the **(A)SR Basic** system. A perfect match of equipment for ferrous metal separation, screening, classification, non-ferrous metal separation and FinesTuning® makes the system exceedingly efficient. Based on the interaction of these units, (A)SR Basic ensures the complete separation of NF-metals (Zorba) down to a fines fraction of less than 1 mm in diameter. (A)SR Basic is a fully automated system that can be connected directly to a shredding plant or used as stand-alone unit.

SICON also supplies individual upgrades for existing lines. If you want to improve the performance of your plant, please don't hesitate to get in touch with our experts. As all other SICON solutions, (A)SR Basic has been designed as a modular system; we can also implement the unique advantages of our technical solutions in older systems.

- Shredder residue processing in a single system (Fe metal separation, screening and classification, NF metal separation, FinesTuning®)
- Optional: Large material feed bunker for uncoupling from the actual shredding process, eliminates peak loads and ensures uniform, optimum metal separation
- Multi-stage screening/classification with SICON Screening Tower
- Optional scales for weighing input material flows and end products
- Optional AirSort® technology to optimize metal separation
- Intelligent process data logging software (weights, operating hours, problems, etc.)
- Throughputs of up to 80 mt/h possible

BENEFITS

See also the (A)SR Processing Video on our homepage!

Input material
Shredder residue (A)SR

Output material
Fine Ferrous

Output material
Coarse Ferrous

Output material
Zorba, various sizes

Output material
Residue

The first step towards advanced (A)SR recovery

(A)SR Advanced enables you to recover NF metals more effectively from shredder residue. (A)SR Advanced is the consistent extension of the Zorba fraction separation process implemented in the (A)SR Basic system. Stainless steel, copper strands, printed circuit boards and cables are comprehensively separated to produce a waste fraction that is entirely metal-free. Thanks to the SICON sensor technology in the (A)SR Advanced system, highly individual lines can be tailor-made to meet special customer requirements.

The shredder residue passes through the following stages in a fully automated process: Ferrous and non-ferrous metal separation (eddy current separation), FinesTuning, air separation, sensor-based sorting. As an optional extra, the shredder residue can be homogenized gently in the (A)SR Advanced+ system by the EcoShred® Libtec, which improves the metal recycling rate and cuts investment costs even further.

- Shredder residue is processed in a single system (Fe metal separation, screening and classification, NF metal separation, FinesTuning®, sensor-based sorting, air separation and preliminary crushing)
- Integration of SICON VariSort sorters (sensor-based sorting) for metal separation (optionally also for the removal of chlorine in cases where non-metals are also to be recycled)
- Pre-crushing by EcoShred® Libtec for gentle loosening
- Optimum preparation for later sorting by the VariSort induction separator
- Integration of AirSort® sifters to separate light-weight materials
- Treatment and processing of non-metal fractions for the production of quality-assured substitute fuel or recycling plastics (optional)

BENEFITS

See also the (A)SR Processing Video on our homepage!

Input material
(A)SR Shredder Residue

Coarse Ferrous

Fine Ferrous

Unshreddables

Zorba

Zurik

(A)SR treatment process becomes an **industrial standard**

A perfectly engineered system. Building upon the efficient (A)SR Advanced system, **(A)SR Premium** even exceeds optimum metal recycling by producing fractions sorted by different material types. (A)SR Premium is a system made for the future, which already incorporates future changes in the composition of shredder residue caused by further advances in electrification.

Where sensor-based processing systems normally reach their limits regarding a complete metal recovery (> 99% of the input flow), (A)SR Premium brings its inherent advantages into play. Instead of producing a Zurik fraction, metals (aluminum, copper, stainless steel) of the highest purity and high market value are yielded. An additional side-effect is recovery of non-metals in a quality that enables them to be reused.

- Modular system with liberation crusher and separation into fines (shredder sand), fibers, plastics

- Systematic refining of all three main fractions to achieve defined product qualities

- Metals are separated into copper, aluminum and stainless steel and are recovered in high metallurgical grades

- Unique SICON support is also available with (A)SR Premium to ensure the marketing of metals as well as non-metal fractions

BENEFITS

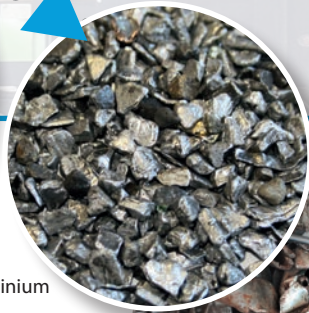**See also the (A)SR Processing Video on our homepage!**

Fine Zorba

Zorba

Input material
(A)SR Shredder Residue

Aluminium

Stainless Steel

Unshreddables

Coarse Ferrous

Shredder Sand

Fine Ferrous

Shredder Fibers

Copper

Shredder Granules

Recovery of **tiny fragments** of Ferrous and Non-Ferrous Metals from Shredder Residue

Fines and ultra fines which are generated by screening at approx. <10 mm (3/8") make up 20-40 % of the total weight of the Automotive Shredder Residue (ASR). They contain significant quantities of recoverable ferrous and non-ferrous metals. The revenue potential of ASR fines is often underestimated.

With FinesTuning®, SICON has developed a flexible system that reliably separates over 99 % of separable NF-metals contained in ASR fines.

The multi-step magnetic separator system is the first of its kind to guarantee highest metal recovery; it consists of two magnetic drums with different adjustable magnetic field strengths. The first pass generates a clean ferrous fraction. The light-magnetic dirt and fines are then removed by a second drum without any loss of stainless steel in the magnetic dirt.

Zorba   ASR Fines   Magnetic Dirt   Ferrous Metals
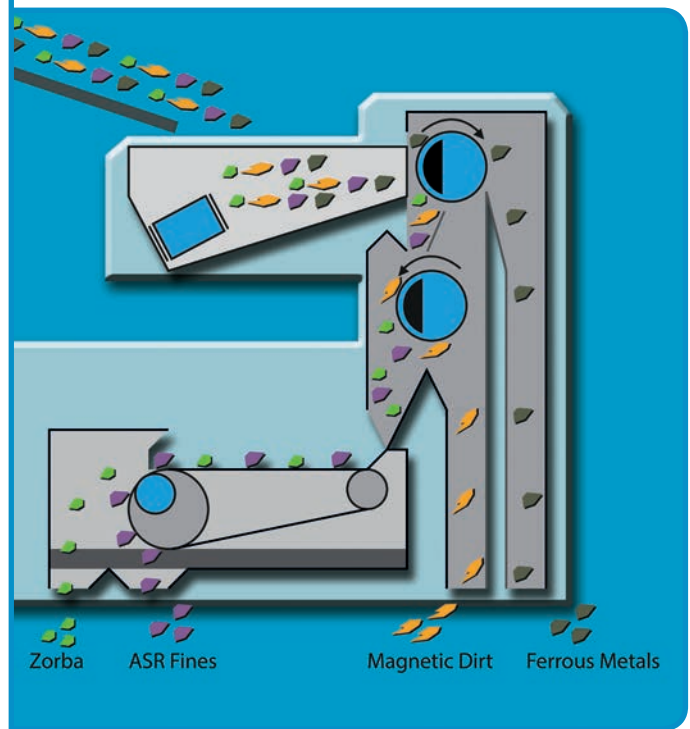
- Highest metal recovery
- Short payback period
- Space saving design concept
- Turnkey system
- Low capital investment
- Many optional features available
- Easy integration into existing plants
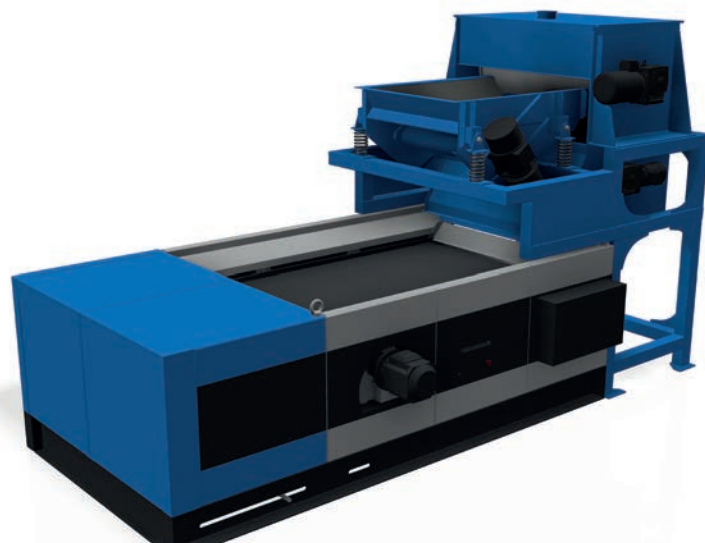
BENEFITS

This System can be extended by SICON's AirSort® Sifters and Air Tables for total metal recovery.

Tests have shown that SICON FinesTuning® leads to higher recovery rates and therefore is also recommendable as replacement for existing, less efficient systems. A very short payback period can be achieved.

The new FinesTuning® is available in widths of 500, 1,000, 1,500 and 2,000 mm (20", 40", 60", 80") and comes with various features and options such as adjustable drum speeds, belt-run-empty-technology, belt-exchange-system and many more.

Input material
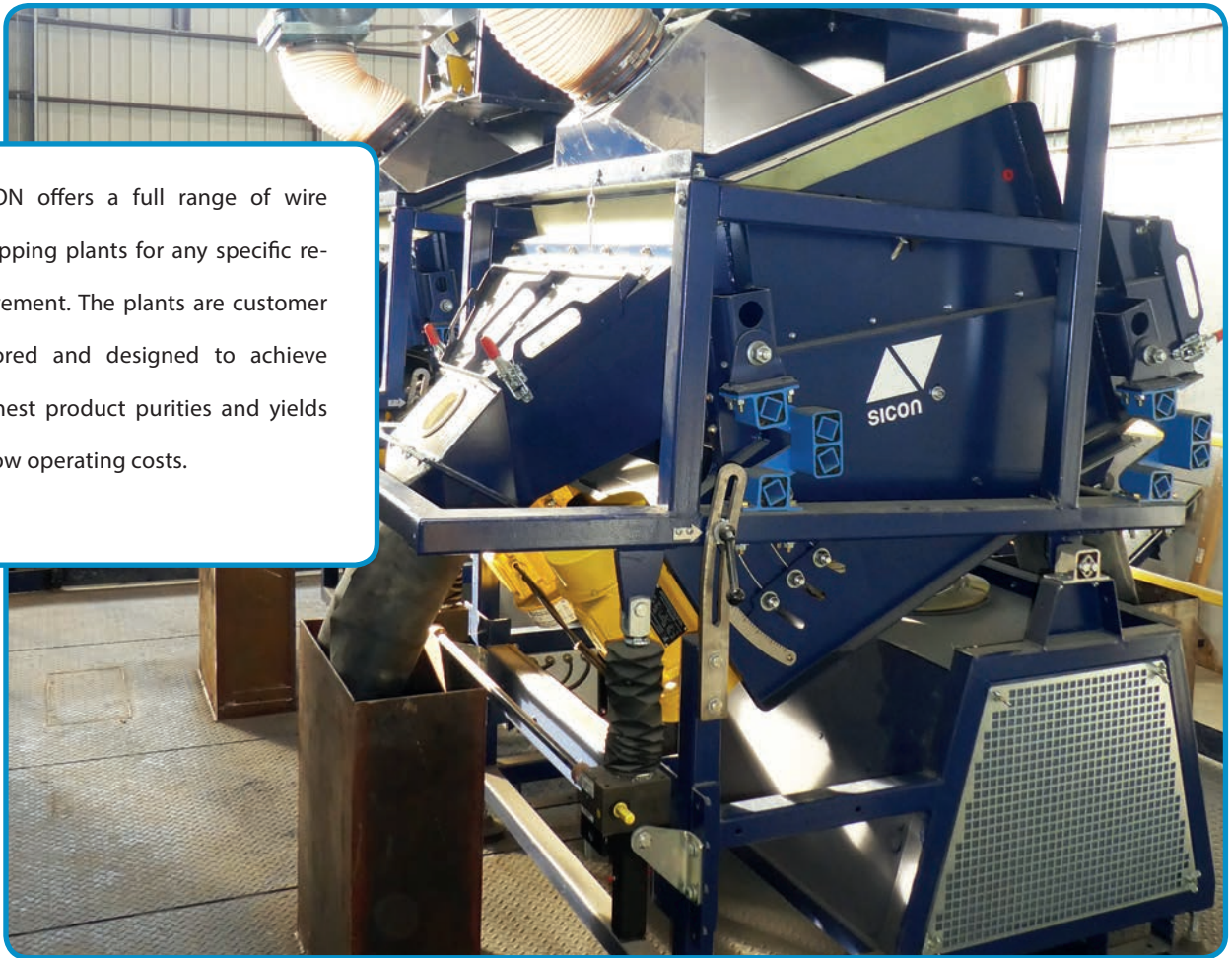(A)SR-Fines

Output material
Fe-metals

Output material
Shredder Sand, free of metals

Output material
Zorba, fines

The perfect processing of Cable Fractions

SICON offers a full range of wire chopping plants for any specific requirement. The plants are customer tailored and designed to achieve highest product purities and yields at low operating costs.

- Cascaded size reduction
- Reliable separation of foreign material prior to granulation; this prevents any risk of damage to the crushing tools
- Throughputs of between 1,000 and 10,000 kg/h (455 and 4,550 lbs/h)
- Granulators (EcoShred® Cuttec) of extremely rugged design with intensive wear protection for long service life at low operating cost
- Cost-efficient and reliable balling by EcoShred® Imtec
- Effective and complete separation of stainless steel
- Separation into pure copper and aluminum granulate

BENEFITS
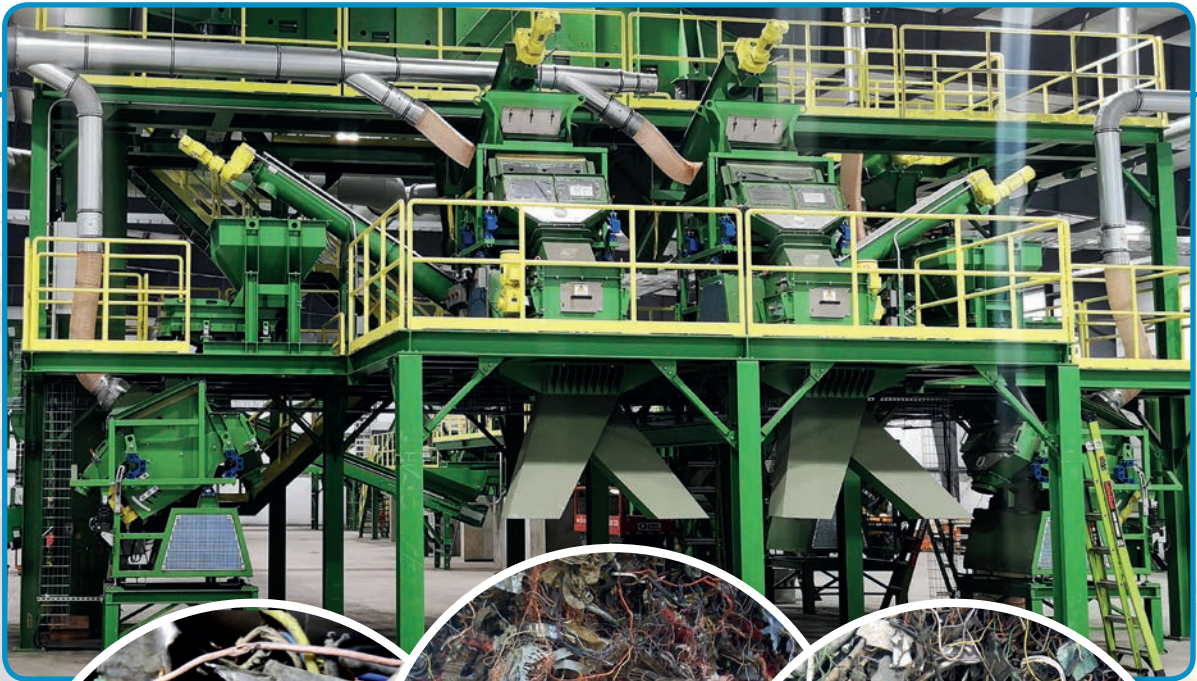
Input material
cables

or

Input material
cable-rich fraction

or

Input material
cable-rich residual fraction

Output material
Aluminium

Output material
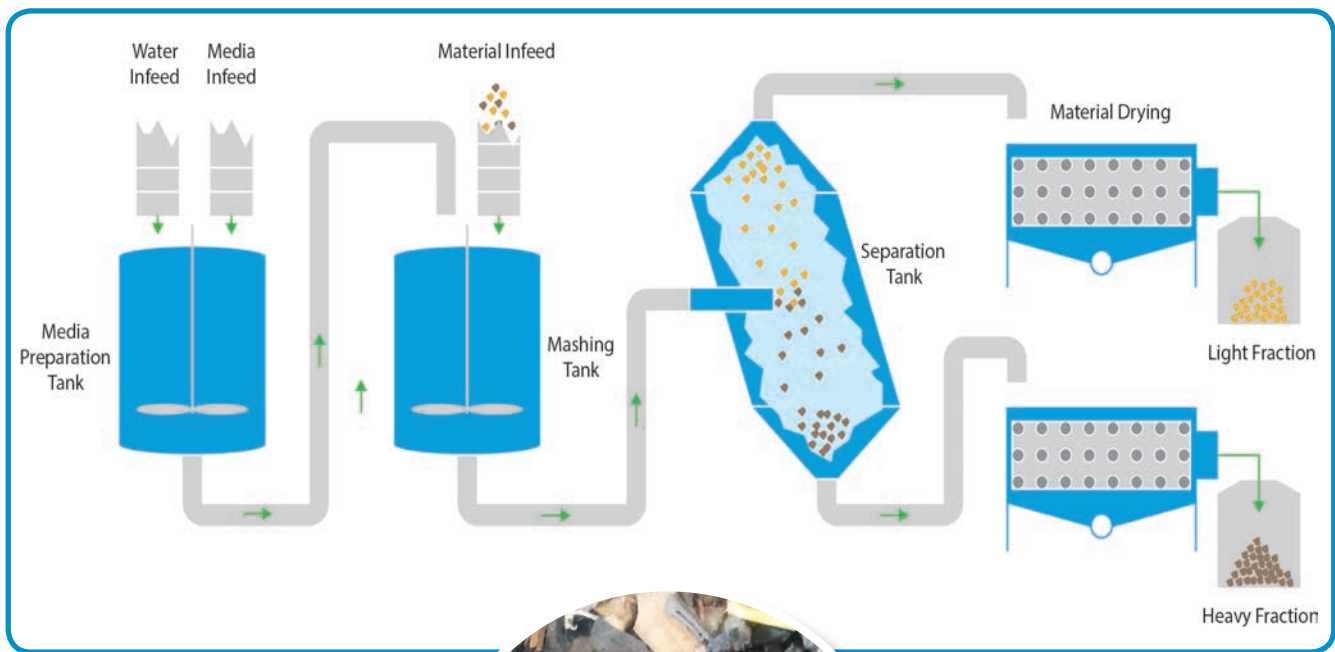Copper

Plastics Separation with a purity of >99 %

With PolyFloat®, SICON is defining new standards in the separation of plastics. 99.4 % is the new benchmark for product purity that our thoroughly innovative and yet mature system can produce. Perfectly matched processes within the system make it suitable for recycling PE/PP, ABS/PS from any source especially (A)SR and E-Scrap. Preventing the formation of harmful air bubbles, the unique lamellar separation system ensures that PolyFloat® is the best investment – for higher product purities and better product marketing opportunities.

- Maximum efficiency, fully-automated plastics separation technology in a single system with shredder, metal separation and cleaning process
- Integrated lamellar separation system (prevents formation of air bubbles)
- Recycling of PE/PP, ABS/PS and other plastic materials as well as WEEE (specific density of 0.9 to 1.4 g/cm^3) – independent of color
- Easy integration into existing plants
- Wastewater-free process
- Throughputs of up to 12 mt/h

BENEFITS

See also the PolyFloat® Video on our homepage!

Water Infeed
Media Infeed
Material Infeed
Material Drying
Media Preparation Tank
Mashing Tank
Separation Tank
Light Fraction
Heavy Fraction

Input material
Raw Granules

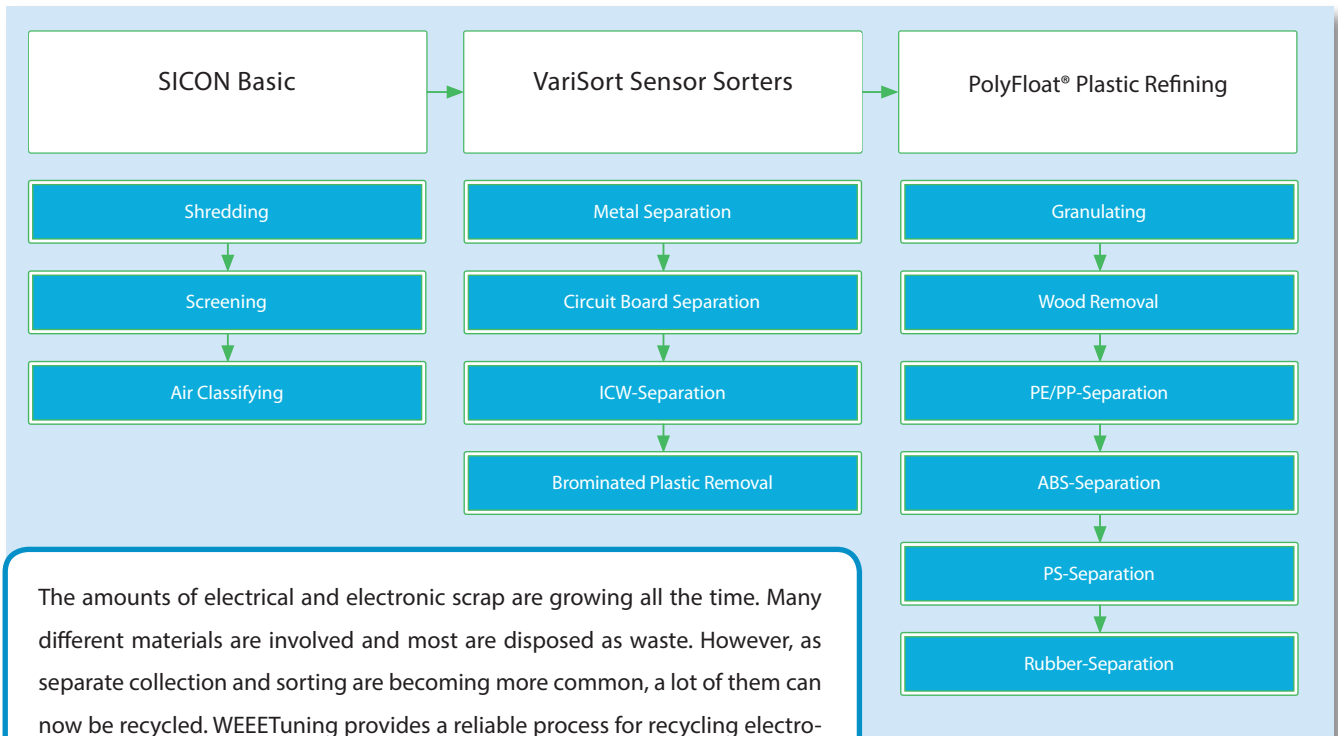**Output material**
PE

Output material
PP

Output material
PO-Compound (optional)

Output material
ABS / PS / Filled PP
(further separation possible)

Highly effective recovery of e-waste

SICON Basic	VariSort Sensor Sorters	PolyFloat® Plastic Refining
Shredding	Metal Separation	Granulating
Screening	Circuit Board Separation	Wood Removal
Air Classifying	ICW-Separation	PE/PP-Separation
	Brominated Plastic Removal	ABS-Separation
		PS-Separation
		Rubber-Separation

The amounts of electrical and electronic scrap are growing all the time. Many different materials are involved and most are disposed as waste. However, as separate collection and sorting are becoming more common, a lot of them can now be recycled. WEEETuning provides a reliable process for recycling electronic scrap in a modularly designed system that grows with your needs. WEEETuning not only separates metals such as stainless steel, copper, aluminium and printed circuit boards but also recovers plastics for recycling. The Poly-Float® process enables WEEETuning to obtain product purity levels of over 99 % with plastic materials, regardless of the color of the plastic.

- Produces polyolefin and styrene fractions in a single system with maximum purity and yield rates
- Also separates into PVC and non-PVC fractions for special recycling solutions
- Fully-automated system with intelligent and more reliable sensor and control technologies
- Integrated process water and media purification
- Total recovery of all metals
- Integration of VariSort sorters (sensor-based separation) for metal sorting (optional removal of chlorinated and brominated plastics)
- PolyFloat® plastics separation technology (product purity >99 %)

BENEFITS

Input material
Electronic waste

Output material
Stainless Steel

**Output material**
Plastics

Output material
Copper

Output material
Printed Circuit Boards

Highly accurate Z-box air classifier

Sorting materials according to density has just become more precise and flexible than ever. Developed by leading recovery specialist SICON, AirSort® not only separates fluff from ASR. It also allows precise separating of wood, foam and film from heavy particles such as metals and hard plastics. The clue is the combination of the zigzag sifter channel based on a state-of-the-arte simulation model to adapt the system to your specific needs. This allows a precise and fully automated adaptation of the air flow.

AirSort® includes a dosing feeder, a sifter channel, a cyclone separator, air locks and electronic control system. You can choose between working widths from 800 mm (30˝) to 2,000 mm (79˝). The AirSort® is available with an off-gas air system or a closed-loop system depending on the sorting task.
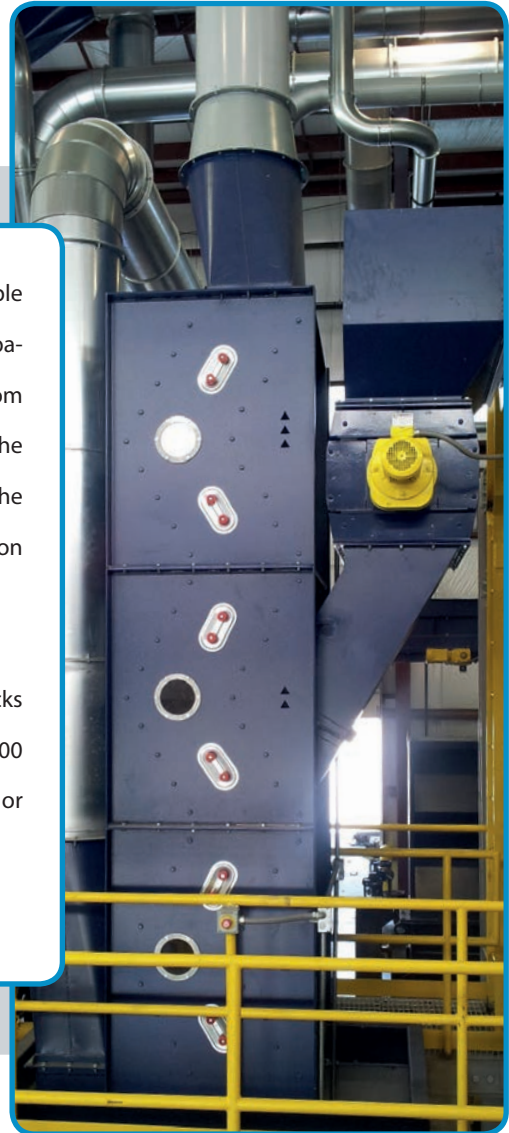
- Improved separation results through innovative sifter design

- Increased swirl and loosening of materials

- Advanced wear concept for sifter channel, cyclone separator and air locks

- No turbulence in the sifter channel

- Adjustable classifier rear wall

- Maintenance doors on the side of the classifier channel

- Closed loop or recirculation and exhaust air systems possible

BENEFITS

Your options with AirSort®

- Bolted construction / adjustment of sifter channel depth
- Wear liner plates made of HARDOX / CRACOX
- Maintenance openings on both side walls
- Magnet vibrator for sifter channel

Working Width [mm/inch]	4-Cascades	6-Cascades
800 / 30"	•	•
1,000 / 40"	•	•
1,200 / 47"	•	•
1,500 / 60"	•	•
2,000 / 79"	•	•
Basic (off-gas)	•	•
Loop (air circuit)	•	•

# The new standard among Eddy Current Separators

Eddy Currents are used for separation of non-ferrous metals such as aluminum, copper, brass from bulk materials of any kind. The separation is based upon induction of an eddy current into non-ferrous metals. Due to the strong impulse permanent magnetic field and the high rotating speed of the rotor, a separation of even the smallest particles and difficult-to-separate materials can be easily achieved with the EddyPro INP Series.

**Figure:
Separated Copper Fraction**

- Excellent separation results
- Strong and intensive impulse magnetic field
- Centric and eccentric rotor design available, working width up to 10 feet
- The rotor design is specifically adjusted to your application
- High operational safety, extreme low maintenance cost
- Idling of conveyor belt in case of voltage drop based an energetic recovery system of the magnet rotor
- Simple splitter adjustments available in single and double configurations
- Quick and easy system integration

BENEFITS

**See also the EddyPro Video on our homepage!**
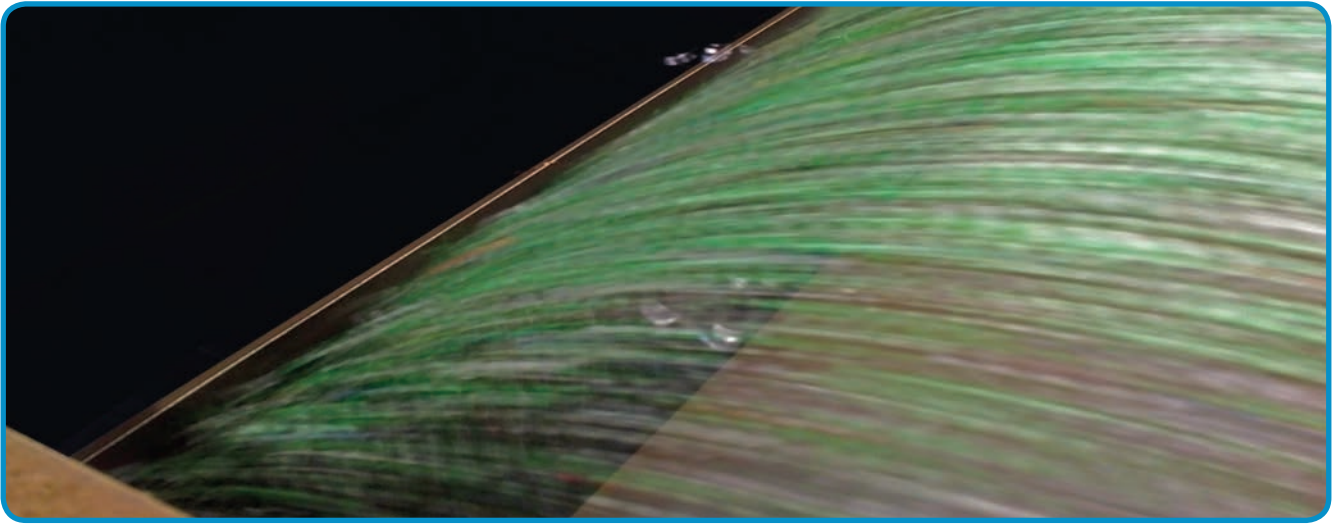
SICON has the ability to offer a new line of equipment that increases scrap yards' operating efficiency and enhances our clients' profitability. With the launch of the EddyPro INP SERIES eddy current separator to the US market, SICON has raised the standard for non-ferrous separation.

	EddyPro INP	EddyPro INPx	EddyPro INPxs
Applications	30 - 100 mm (1,2" - 3,9")	12 – 100 mm (0,5" - 3,9")	0.2 – 12 mm (0,008" - 0,5")
Rotor Design	Centric	Eccentric	Eccentric
Rotor Diameter	400 mm (16")	650 mm (26")	650 mm (26")
Pole Arrangement	10	18	36
Material	Medium-sized and coarse	Medium-sized and coarse	Fines and ultra fines
Width	500 - 3,000 mm (20" - 118")	500 - 2,000 mm (20" - 79")	500 - 2,000 mm (20" - 79")
Control	Incl. electric controls	Incl. electric controls	Incl. electric controls

Separate all your material down to its base metal alloys
Separation of Non-Ferrous Mixtures

A new era...
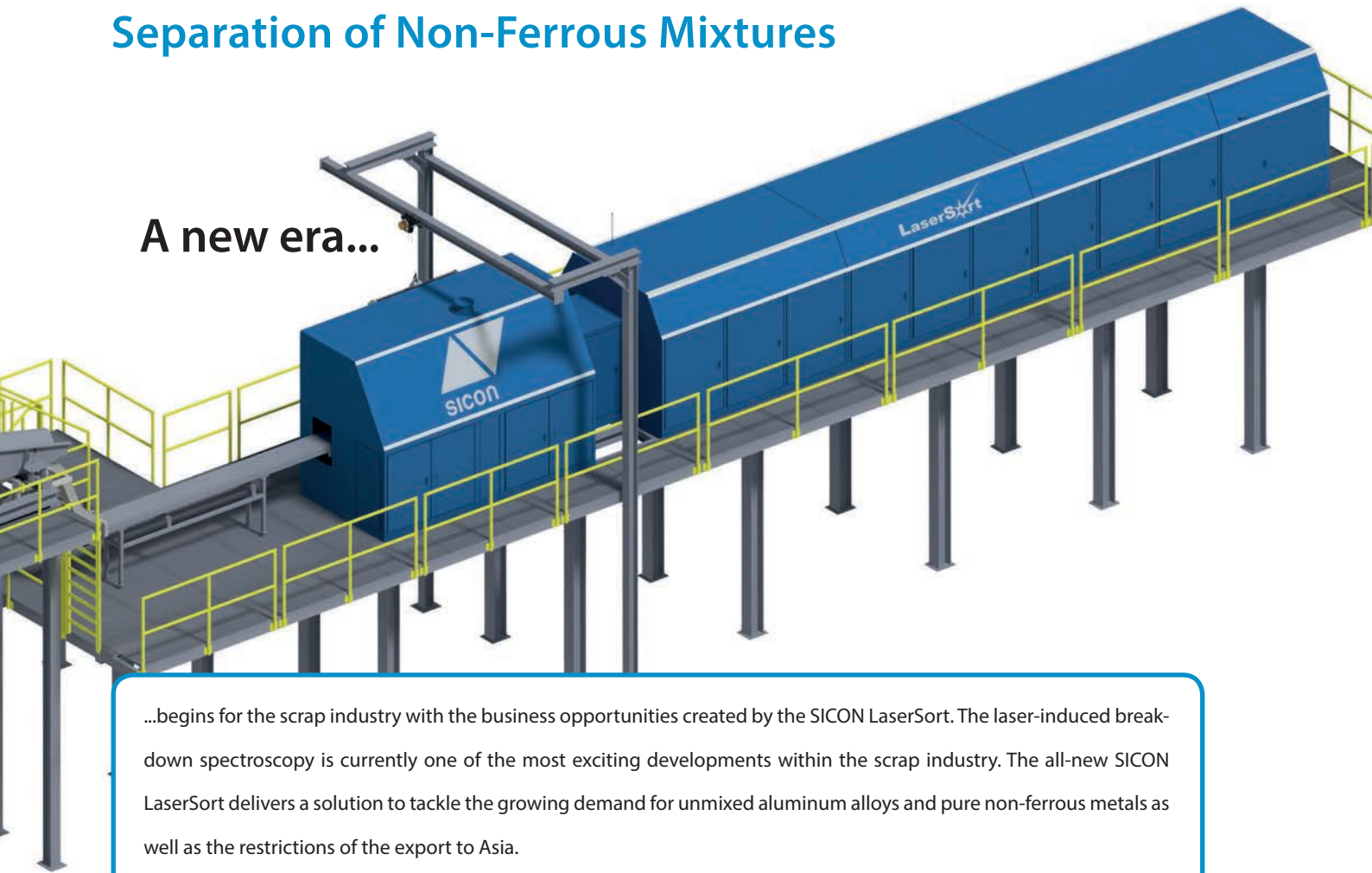
...begins for the scrap industry with the business opportunities created by the SICON LaserSort. The laser-induced break-down spectroscopy is currently one of the most exciting developments within the scrap industry. The all-new SICON LaserSort delivers a solution to tackle the growing demand for unmixed aluminum alloys and pure non-ferrous metals as well as the restrictions of the export to Asia.

• In-line separation of up to 15 different metals and alloys in one single pass

• Complete solutions including material presentation

• Supply of customized material qualities to consumers

• Direct access to metal foundries with alloy grade material

• Access to new customer base and refineries

• Precise and individual adjustment of sorting capabilities to your needs

• Throughput depending on material from 1 - 3 mt/g per line

BENEFITS

Previously, the density-based X-Ray transmission separation by the VariSort XRT was the only solution for the separation of cast and wrought aluminum alloys but was restricted by types of separable alloys. With its specific design the SICON LaserSort can separate any specific kind of metal in one single pass, including recovery of 5,000 and 6,000 aluminum alloy series.

SICON LaserSort	
Throughput	1-3 mt/h per line (depends on input material)
Grain size	25 - 120 mm (1" - 6")
Number of splits	Up to 15 fractions (modularly expandable through module construction)
Operation mode	Completely automated
Material input	Zorba, any Non-Ferrous Mixture, Aluminum, Stainless Steel
Output	Any clean alloy fraction
Integration	Offline, stand-alone, including material presentation

Schematic description of detication and selection
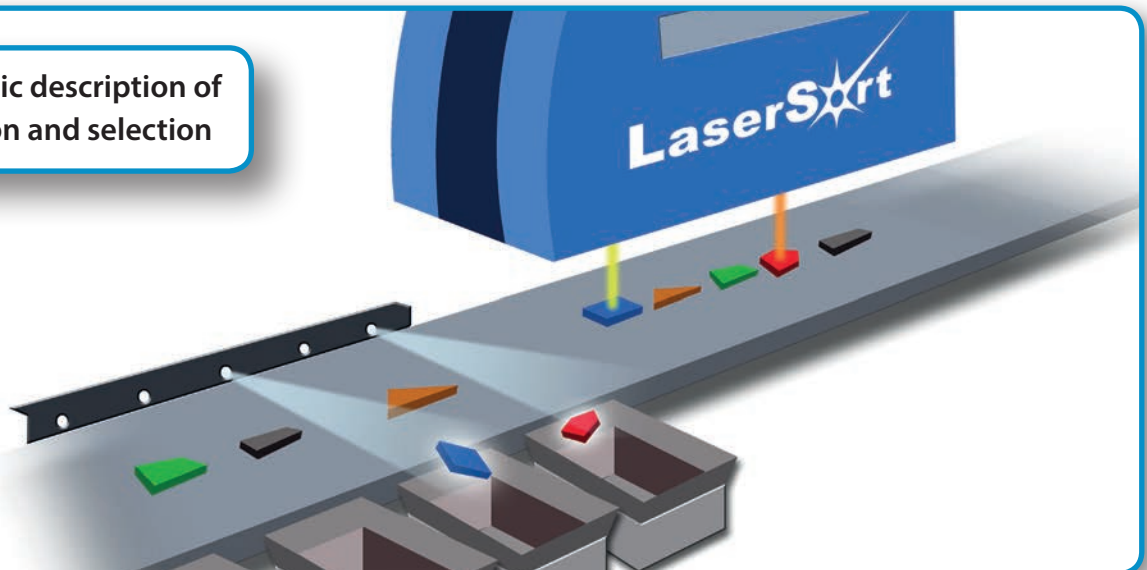
A full range of industry leading sensor sorters for the Non-Ferrous Downstream
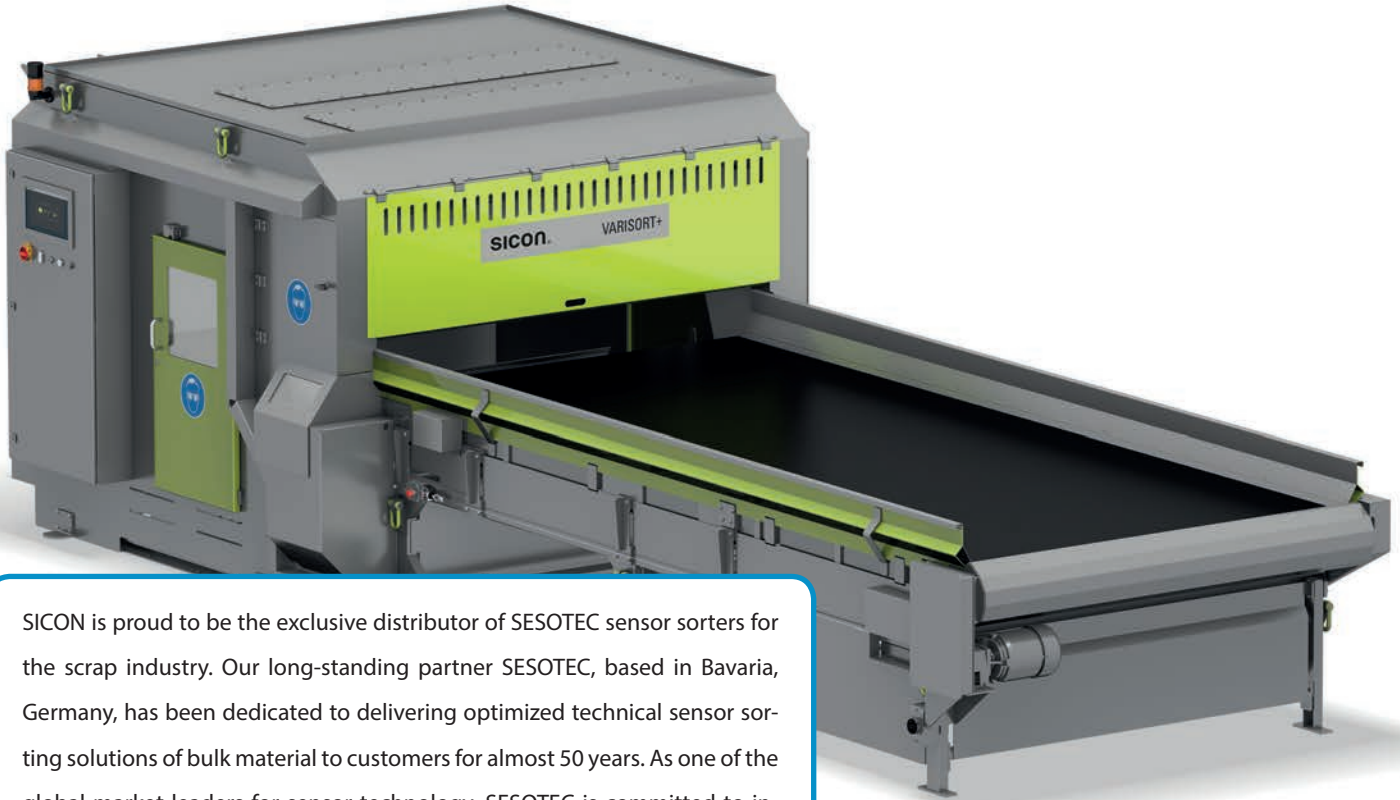
SICON is proud to be the exclusive distributor of SESOTEC sensor sorters for the scrap industry. Our long-standing partner SESOTEC, based in Bavaria, Germany, has been dedicated to delivering optimized technical sensor sorting solutions of bulk material to customers for almost 50 years. As one of the global market leaders for sensor technology, SESOTEC is committed to in-house development of new products to always ensure highest-quality for sorting results.

BENEFITS

- Fits-your-needs variable working widths: 1,000, 1,500, 2,000, 2,800 mm (40", 60", 80", 110")
- Combination of different sensor types possible
- Optional parallel sorting of multiple materials on one machine by splitting the belt into different sections
- Optional third chute and second valve bar for sorting of material streams into three fractions in one pass
- Alternative valve grids available for custom separation applications
- Roller drive shaft, easy-access maintenance doors, fully-automated self-cleaning valves, belt speed of up to 160 feet per second (4 m/s)

See also the VariSort Video on our homepage!
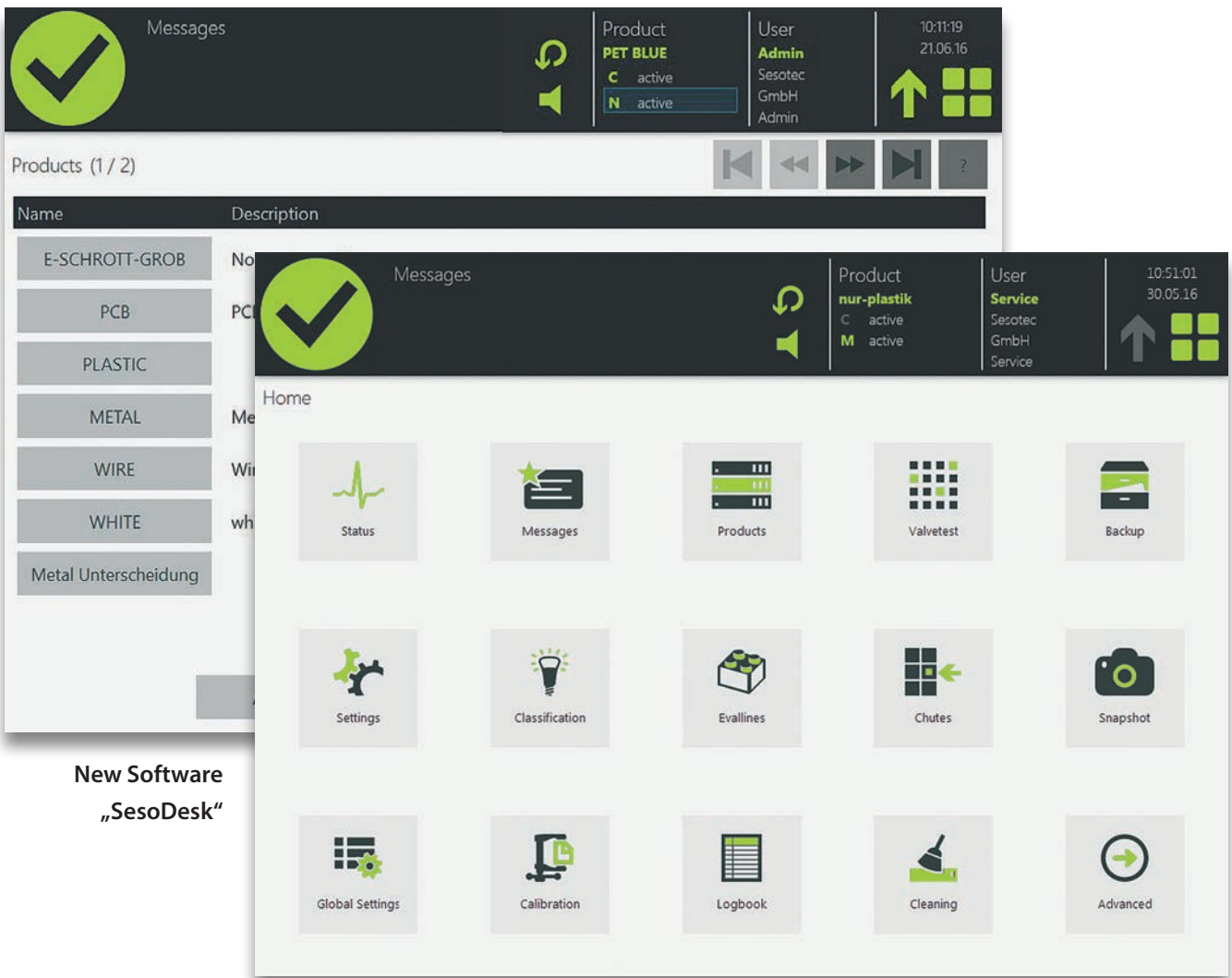
**New Software
„SesoDesk"**

VariSort - Fields of application

Application	Sensor Inductive	Camera	Inductive + Camera	XT X-Ray-Trans-mission	XRF X-Ray-Trans-mission	LS LIBS
Metal Detection	√		√		√	
Non-metal Detection			√			
Stainless Steel Detection	√		√	√	√	√
Aluminum Detection				√	√	√
Heavy Metal Detection				√	√	√
Wire Detection	√	√	√	√	√	
Circuit Board Detection		√	√	√	√	
Upgrading ZORBA		√	√	√	√	√
Separation of Copper/Brass/Bronze from Aluminum Alloys		√	√	√	√	√
Separation of Magnesium from Aluminum Alloys						√
Separation of different Aluminum Alloys						√

Wet-Separation for NF-Metals
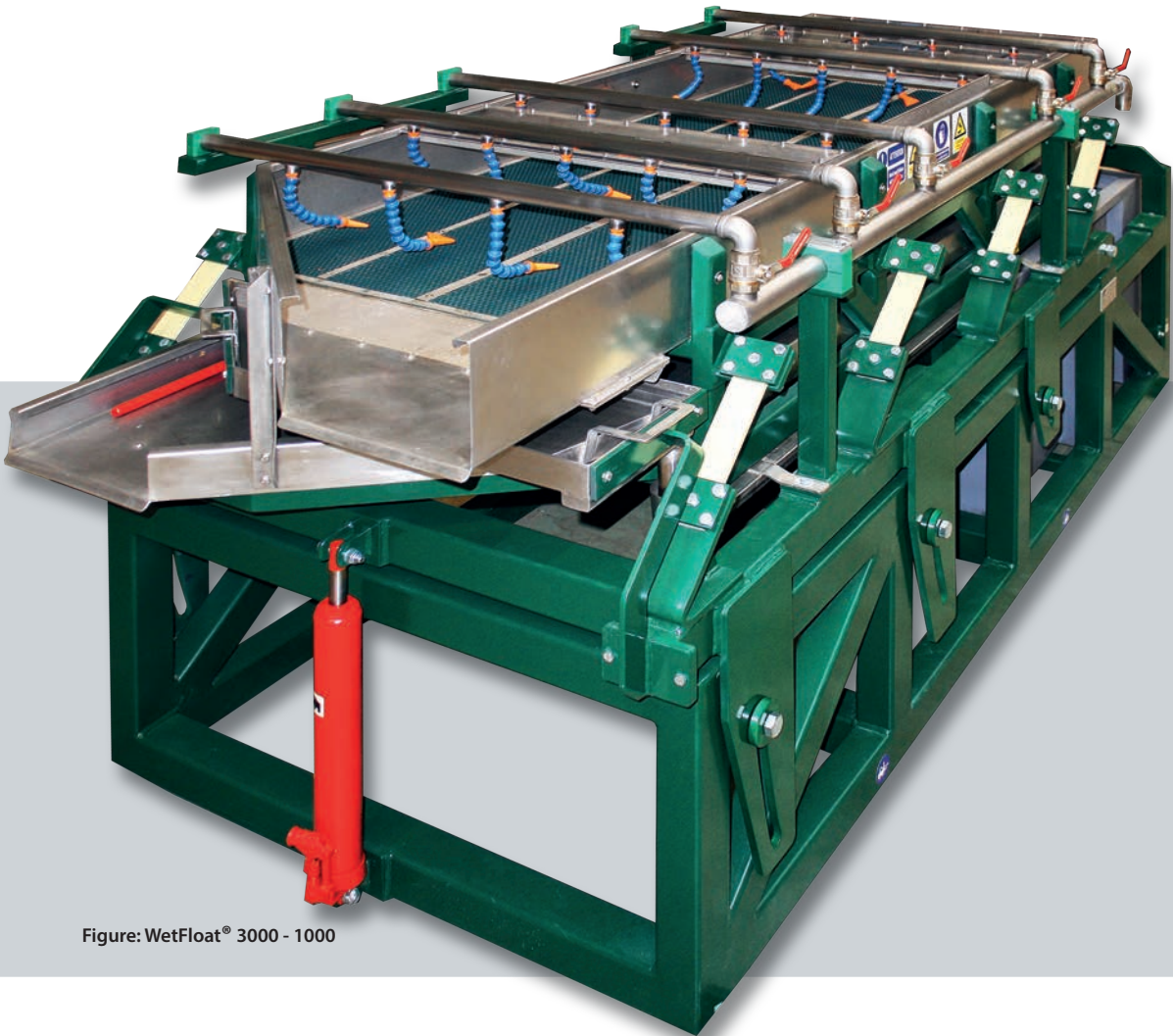
Figure: WetFloat® 3000 - 1000

- Density-based separation of multiple materials
- Metal separation from wire mixture
- Separate Copper and Aluminum into purest fractions
- Metal Recovery from E-Scrap
- Significant reduction in metal losses
- Constant product quality
- Dedusting not required
- Adjustable tilt-angle for material-specific configuration
- Low water consumption due to closed loop design

BENEFITS

See also the **WetFloat®** Video on our homepage!
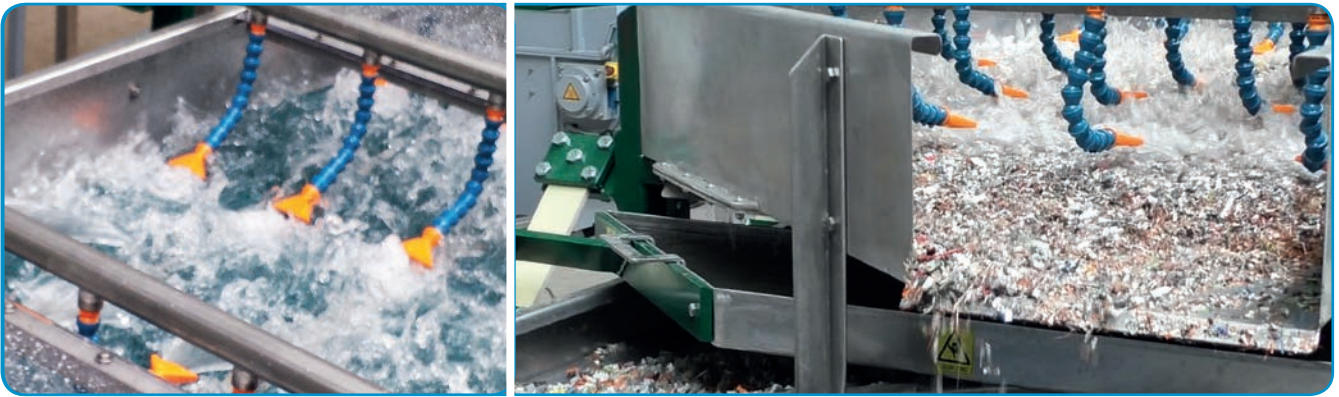
How does it work?

After granulation or similar processing steps, mixed fractions, such as non-ferrous mixtures or aluminum-copper mixed fractions, are fed onto a separation deck of the WetFloat®. A steady and continuous water supply creates a float on the deck causing light particles such as plastics to float while heavier particles such as metals descend to the bottom of the separation deck. Adjustable by the tilt of the table, the light-floating particles are conveyed towards the lower part of the WetFloat®. Simultaneously, the vibrating separation deck transports the heavy particles in the opposite direction towards the upper end of the WetFloat®. As a result the WetFloat® produces two material-pure fractions.

SICON's WetFloat® is available in three different size configurations to match your application needs best

	WetFloat® 2000 - 300	WetFloat® 2500 - 600	WetFloat® 3000 - 1000
Dimensions [mm/inch]	2,600 x 850 x 1,350 / 102 x 33 x 53	3,400 x 1,100 x 1,350 / 134 x 43 x 53	3,600 x 1,400 x 1,600 / 141 x 55 x 63
Dimensions Separation Deck [mm/inch]	2,000 x 300 / 78 x 12	2,500 x 600 / 98 x 24	3,000 x 1,000 / 118 x 39
Weight [kg/lbs]	320 / 705	750 / 1,650	1,200 / 2,650
Drive [kW/HP]	1,5 / 2	3 / 4	3 / 4
Throughput capacity [kg/h / lbs/h]	300 - 400 / 660 - 880	700 - 800 / 1,540 - 1,760	1,200 - 1,300 / 2,640 - 2,860

Your option for dry separation: SICON AirFloat

- Closed construction, no dust emissions
- Small feed hopper on top (for controlled feeding)
- Adjustable fan and vibration speed
- Easy access for maintenance
- Adjustable inclination
- Adjustable amplitude
- Optimized design for reduced extraction volume

Highest screening efficiency for perfect results in the NF-Downstream

Trisomat   Variomat
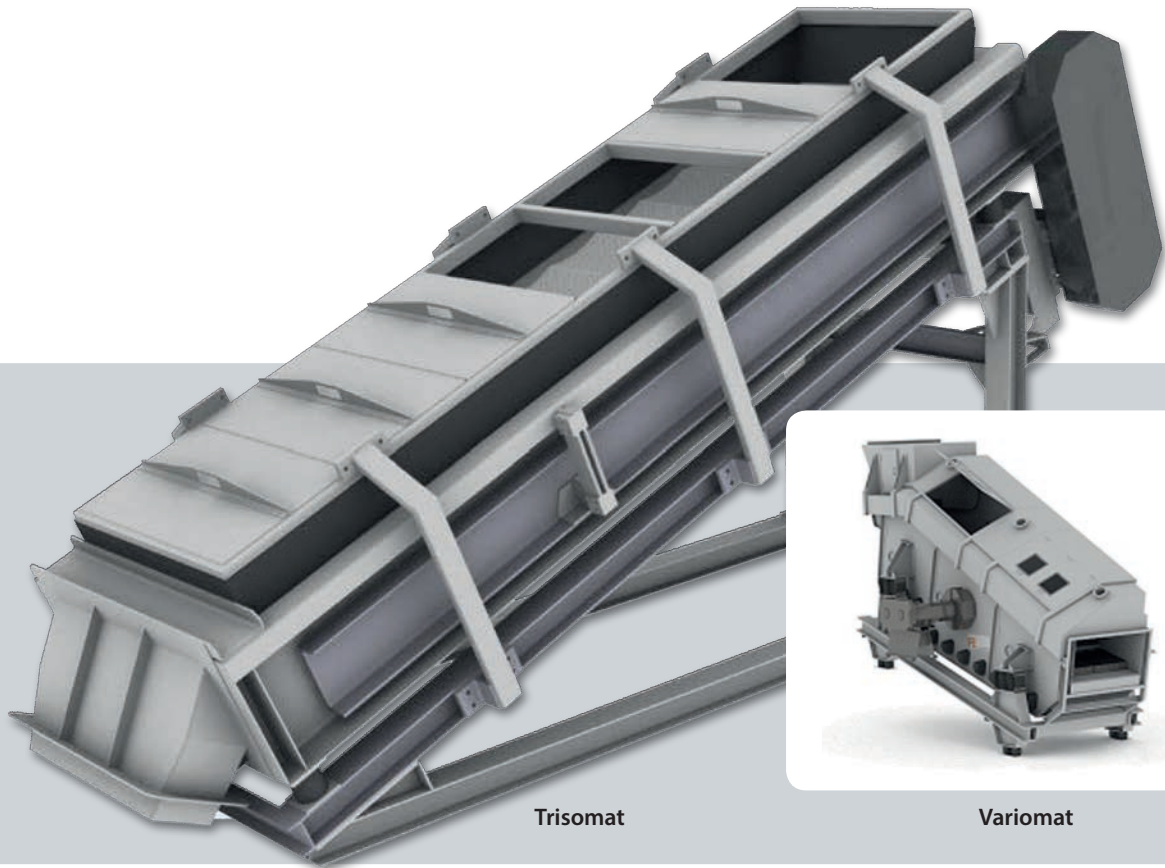
- Highest screening efficiency also for ultra fines

- Best screening results also for material below 4 mm (5/32")

- Material screening for throughput of up to 100 mt/h for Automotive-Shred-Residue

- No transmission of fines, no clogging

- Eliminates pokers

- Highly reliable operation

- Heavy-duty built for lowest maintenance requirement

- Additional features available upon request

- Easy and cost efficient integration in existing systems

BENEFITS

Pic. Trisomat

Pic. Variomat

Pic. Combi-Screen

Trisomat

Key Benefits:

- Flip-flow-screen
- Unique three-dimensional vibration movement "3-phase-oscillation"
- Highest feeding rates
- No pegging or blinding
- Lowest dynamic loads
- Safest operations

Variomat

Key Benefits:

- Combination of 3D and flip-flow-screen for 3 fractions in one pass
- Highest throughput performance
- Maximum screening results with minimal blinding
- No shut-down required for screen cleaning
- Easily adjustable selective criteria for screening
- Minimal maintenance requirements

The combi-screen is the perfect solution, if you need a space-saving screen configuration and require a high screening efficiency.

Groom non-ferrous metals for outstanding separation results

Figure: End product

- Housing with wing doors for easy intake of grinding track and rotors
- Balling due to special bounce-off construction which is adjustable and lockable from the outside by an hydraulic devise
- Specific adjustment to any processed material type
- Grinding segments are placed from the side of the machine
- Mount on the bottom side for grizzly feeder or perforated plate
- Rotor sits on twin-row heavy-duty spherical roller bearings
- Material-specific adjustable RPM
- Extremely easy maintenance

BENEFITS

The balling mill EcoShred® Imtec optimizes pre-treated material for better separation results e.g. with air tables. Pre-shredded material is smoothly balled without generating fines. The balling effect can be adjusted precisely.

Depending on the material further separation of individual components can be included by different processes. Wear parts can be replaced effortless throught the wing doors, allowing for a quick and easy exchange of any built-in parts. For a worry-free integration, SICON offers both the upstream and downstream steps for superior sorting results.

EcoShred® Imtec	
Power [kW/HP]	up to 200 / 270
Throughput [mt/h]	up to 8
Working Width [mm/inch]	up to 1,500 / 60

Service Value

Scheduled maintenance & service ensure that all equipment stays in excellent condition and prevents from unscheduled downtime. SICON offers customized maintenance & service solutions, including consultation, trouble-shooting, rotor repairs & rebuilds as well as service jobs with spare parts delivery and emergency support.

With twenty years of experience, SICON offers operators a complete one hand service solution to ensure processing operations without any surprises!

20 years of experience in metal recovery from scrap residue ☑

Customer-specific system design ☑

Reference projects & Equipment across 5 continents ☑

Customized Preventative **Maintenance & Service agreements** ☑

Guaranteed quality thru **certified management systems** ☑

System **extensions & enhancements** ☑

Leasing & Financing options available ☑

Always latest **software updates** ☑

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