Shredding & Ferrous Downstream

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

20 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.
EcoRip - Pre-Shredders

EcoShred® Compact - High efficiency Shredders

ScrapTuning® - Ferrous Downstream Upgrade

MagSpin - Magnet Drums

Air Knife - Air Sorting for cleaning of Shred and Zurik

Prime Scrap - Cleaning of Shred

EcoScan Online - X-Ray Online Scrap-Analyzer

HMS Cleaning - Cleaning of HMS

EcoShred® Vertec - Vertical Shredders
The basis for a more efficient shredder process

Processing shredder feedstock with the aid of EcoRip always makes good sense both technically and economically. The SICON EcoRip Pre-Shredder are characterized by a high output at defined particle sizes and are also especially easy to maintain. That makes the EcoRip Series the benchmark in terms of technology and efficiency when it comes to processing shredder feedstock.

The EcoRip is ideal both for pre-shredding mixed scrap with optional integrated screening step as alternative to a guillotine shear as well as for pre-shredding shredder input material prior to loading onto a shredder infeed conveyor. The SICON EcoRip can also be flexibly used as an effective stand-alone solution or can be subsequently added to an existing system.

EcoRip as upstream addition to any shredder line for the pre-shredding

- Pre-shredding of bales, auto bodies, mixed scrap – is thus also possible in smaller shredders
- Separation of inert fines with the aid of integrated screens upstream of the main shredder
- Increase in performance of main shredder (by up to 30 %) with corresponding adaptation of electronic control system of the main shredder
- Significant decrease in wear and tear of main shredder
- Prevention of explosions occurring in the main shredder, thus decrease in emissions
- The combination of EcoRip and main shredder enables SICON’s dry AirTuning® exhaust purification process
- Segmented rotor for simplified maintenance
- Power-controlled hydraulic pumps reduce the speed at high torque
Its key advantages include an improvement in the performance of the main shredder by up to 30% with increased reliability (reduced wear and tear and decrease in emissions), as well as lower energy costs with improved quality of scrap (higher density). An ideal implementation calls for the control system of the main shredder to be adapted by an expert from SICON. The advantages of the SICON EcoRip are reflected in a considerable improvement and operational efficiency of the whole shredder line. EcoRip will make your shredder process considerably more competitive.

### Input Material

<table>
<thead>
<tr>
<th>Variation</th>
<th>EcoRip Classic 200</th>
<th>EcoRip Classic 250</th>
<th>EcoRip Vario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed width [inch / mm]</td>
<td>79&quot; / 2,000</td>
<td>98&quot; / 2,500</td>
<td>47&quot; / 1,200</td>
</tr>
<tr>
<td>Input power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top rotor (slow moving) [kW/HP]</td>
<td>90 / 120</td>
<td>200 / 268</td>
<td>*</td>
</tr>
<tr>
<td>Bottom rotor (fast moving) [kW/HP]</td>
<td>250 / 335</td>
<td>2 x 250 / 2 x 335</td>
<td>*</td>
</tr>
<tr>
<td>Flipper [kW/HP]</td>
<td>22 / 30</td>
<td>22 / 30</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top rotor (adjustable) [min–1]</td>
<td>3-6</td>
<td>3-6</td>
<td>1-5</td>
</tr>
<tr>
<td>Bottom rotor (adjustable) [min-1]</td>
<td>14-20</td>
<td>14-20</td>
<td>5-12</td>
</tr>
<tr>
<td>Output [t/h]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed scrap, ELVs</td>
<td>Up to 50</td>
<td>Up to 100</td>
<td>Up to 12</td>
</tr>
<tr>
<td>Bale density &lt;0.8 t/m³ / 50 lbs/ft³</td>
<td>Up to 40</td>
<td>Up to 90</td>
<td>Up to 8</td>
</tr>
<tr>
<td>Bale density &lt;1.0 t/m³ / 62 lbs/ft³</td>
<td>Up to 30</td>
<td>Up to 80</td>
<td>Up to 6</td>
</tr>
</tbody>
</table>

* 180 kW / 240 HP installed power in total
Shredding made simple!

For many years, large-capacity shredding installations were reserved primarily to a small group of financially larger scrap processors. The advantage of the EcoShred® Compact made shredder technology also available to small to medium-sized scrap processors and automobile recyclers.

With the EcoShred® Compact, SICON relies on state-of-the-art shredder technology integrated in a modular and economically viable system. Both the technical characteristics and the low necessary infrastructure costs are both impressive.

The EcoShred® Compact is equipped with an integrated pre-shredder, which is implemented as a twin-shaft shredder system with flipper. The combination of pre-shredder and main shredder entails significant advantages.

- Scrap is ripped in the pre-shredder and afterwards directly compacted in the main shredder to an optimum
- The risk of explosions is decreased significantly
- Unshreddables do not enter the shredder, which results in an improved operational reliability
- Prevention of any peak loads in the main shredder (uniform power consumption)
- Bales can even be processed with a driving power of just 1,000 kW / 1,350 HP
Especially versatile

The EcoShred® Compact process results in a high and consistent scrap density and thus a correspondingly good material preparation – with clear advantages for the recovery of non-ferrous metals. EcoShred® Compact forms the basis for the efficient operation of a shredder system.

- Shredder with integrated EcoRip pre-shredder in one system
- High scrap density and very good material preparation by means of full box shredding
- Prevention of explosions through material preparation upstream of main shredder
- Heavy components are already identified and separated in the pre-shredder – that protects the rotor elements in the main shredder from any damage.
- Prevention of peak loads with optimum energy management system
- Fully automatic operation reduces personnel costs
- Significantly higher output by means of an intelligent system combination as conventional shredder with the same driving power
- Easy and safe access for changing wear parts with maximum operator safety
- Significant decrease in investment with regard to power supply (low voltage 400 V / 460 V instead of high voltage 6/11 kV)
- Quick and easy installation as a result of reduced requirements on infrastructure (for instance, a simple foundation slab is sufficient and no separate operations building are required)
The solution for better quality of Shredded Scrap

Every steelmaker and shredder operator is interested in generating a low-copper shredded scrap on a reliable quality basis at no additional costs. With ScrapTuning® SICON has developed a system that meets this requirement. The innovative combination of ideal separation of long elements, an optimized air sifting and meatball separation leads to a cleaner shredded scrap. SICON AirSort® separation system reliably separates debris and exposed copper strands/cables. Copper-rich fractions are separated from low-copper shredded scrap with the aid of a ballistic meatball separator. Therefore, only 25% of the otherwise usual quantity of material are supplied to a manual sorting process. The optional integration of a SICON XT-Sorter completely eliminates the need for manual sorting.

- Lower wear rate in the shredder and in the dust removal system thanks to the integrated screening of inert fraction in the EcoRip pre-shredder
- Considerable reduction in risk of explosions
- Reduced operating costs by eliminating need for scrubbers
- Reliable reduction of VOCs and PCBs as required by the regulatory authorities in coordination with the customer
- Modular system designed for later expansion to further reduce emissions – AirTuning® is a safe investment for the future
SICON ScrapTuning® can be integrated in existing systems. An offline installation is also possible and is very interesting for steel mills when it comes to improving the quality of shredded scrap. The SICON team provides individual advice and adapts the system to the specific local conditions and customer demands. SICON considers both disadvantages unacceptable in times of intense competition and cost pressure. SICON offers Shredder operators an efficient alternative in every respect: the permanent magnet SICON MagSpin. The permanent magnets for the Ferrous Downstream are available in widths of up to 2,600 mm (110") and a diameter of up to 1,600 mm (71"), suitable for every shredder size.

SICON ScrapTuning® not only has a positive effect on the quality of the Shredded Scrap, but increases at the same time the recovery of non-ferrous metals. The fact that significantly less copper is lost in the shredded scrap means that there are more non-ferrous metals available for the non-ferrous downstream. The additional amount of non-ferrous metals recovered pays for the ScrapTuning® process within a short period of time, in many cases within just a few months. Contact our specialists to obtain further information. They would be happy to prepare a business case for you!
The separated copper meatballs can be prepared using by the SICON Meatball Process (EcoShred® Vertec) and separated into clean NF-Metals and Ferrous Metals.

AirTuning® - Clean exhaust air – less emissions

Shredder emissions are an omnipresent challenge for all shredder lines. Many shredding plants hardly comply with regulatory requirements or have to restrict the range of scrap they accept because they fail to meet them. That fact fundamentally contradicts the principle of a shredding plant which is designed and made for processing mixed scrap and composite materials. Many plant operators whose facilities are operated without any exhaust air treatment, are faced with the challenge of how to integrating exhaust air treatment into existing plants and still earn a profit.

The AirTuning® process from SICON embodies a modular dry shredder dust removal system that meets all common requirements placed on dust, VOC and dioxin emissions. The combination of an EcoRip, the new SICON pre-shredder, and the controlled injection of water in the rotor chamber of the main shredder makes a scrubber unnecessary. Efficient cyclone separation with integrated explosion protection and downstream dry filter generates a constant low flow of emissions at unmatched low costs. Adjustments can be made to satisfy specific local regulatory requirements.
Best performing **Permanent Magnet Drum**

**BENEFITS**

- Alternating polarity causes ferrous material to flip around and achieve better cleaning results
- Steady and constant magnetic force across entire working width
- Side panels used as guide plates improve control over material flow
- Individually replaceable, bolted wear plates
- Separation in underflow operation mode
- Highest production quality of built in parts and machinery to ensure long lifetime and highest reliability
- No heating up of the magnet, always the same performance, no loss of nuggets during the day (like electro magnets often lose nuggets, at the end of the day)

**More profit!**

- Higher ferrous recovery (less lost nuggets!)
- Higher non-ferrous recovery
- More transfer of wire to the ASR
- Less handpicking efforts
The preferred equipment for ferrous separation by shredder operators has conventionally been the electro magnet, generally operating in an overflow mode. Today, both practices are considered to be outdated with increasing problems of copper impurities within the shredder scrap. SICON has addressed the arising issue of gradual increase of copper in shredded scrap early on; identifying the design flow in magnet drums as the underlying cause for the problem. We have adopted our equipment to perform the task more efficiently. Our efforts led to the development of the MagSpin as the best solution to tackle the task of improving quality of shredded scrap.

MagSpin is part of SICON’s unique ScrapTuning® Ferrous Downstream which reduces the OPEX of any other Downstream significantly.

### Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working width</td>
<td>55” – 110” (1400 - 2800 mm) Custom sizes available upon request.</td>
</tr>
<tr>
<td>Diameter</td>
<td>40” – 71” (1020 - 1800 mm) Custom sizes available upon request.</td>
</tr>
</tbody>
</table>

### Feature

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternating Polarity of Poles</td>
<td>Flipping effect on the Shred</td>
<td>Cleaner Shred</td>
</tr>
<tr>
<td>Consistent magnetic force across entire magnet surface</td>
<td>Full use of magnet on the complete width</td>
<td>Cleaner Shred across the entire width of magnet</td>
</tr>
<tr>
<td>Replaceable, bolted wear shells</td>
<td>Easily replaceable</td>
<td>Lower maintenance costs / lower down time</td>
</tr>
</tbody>
</table>

### Other features

- Easy maintenance, much lower OPEX than with electro magnets
- Multiple poles made of Barium Ferrite permanent magnets create an evenly distributed magnetic field
- Wear shells constructed of non magnetic, wear resistant, hard mangan steel
- Driven by gear motor
- Robustly built to demanding standards for a long lifespan
Better quality and less refining risks

AirKnife - Air Sorting for cleaning of Shred and Zurik

• AirKnife as air sorter with optional closed loop air system
• Multiple adjustment possibilities (feeding speed, air volume, belt inclination etc.)
• Low energy consumption
• Compact design, easy access to all parts
• Easy integration for plant upgrades

More profit!
• Throughput up to >200 t/h
• Separation of stainless from wire
• Separation of wire/steel fuzz from Shred

BENEFITS
The AirKnife Classifier is designed to separate Stainless Steel and other heavy metals in Zurik-Refinery plants to protect any upstream size reduction. The precise adjustment possibilities ensure a safe operation. Wire and fuzz from Shred can also be separated. The AirKnife Classifier is a perfect alternative to any Z-Box, easier to operate at lower cost.

**Working Widths:** 40” - 100” / 1,000 - 2,500 mm
Low-Copper Shredded Scrap – reliable and cost efficient

- Reduction of handpicking costs up to 75%
- Improved quality of shredder scrap by reducing copper-impurities
- Quickest amortization periods due to additional non-ferrous profits and reduced labour costs
- Easy and cost-efficient integration into any system
- Reduction of main material stream to roughly 25% for improved efficiency of sensor sorting or handpicking
- Lowest operating costs due to specifically developed heavy-duty design
SICON’s PrimeScrap is used for efficient cleaning of shredder scrap to have meatballs, non-ferrous materials or non-metal materials removed from the main material stream.

Material is introduced on a vibrating pan feeder and is transported via a chute to the conveying belt of the PrimeScrap where it is accelerated to 20 foot per second. The material is passed on to the head drum which is equipped with a magnet system where it is being ejected. All non-magnetic objects are removed from the material main stream and are delivered to a separate chute. A specific poker separator can be integrated.

<table>
<thead>
<tr>
<th>PrimeScrap</th>
<th>Working width</th>
<th>Max. Input*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20” - 100” (500 - 2,500 mm)</td>
<td>up to 200 mtph</td>
</tr>
</tbody>
</table>

* Depending on the Shred density
Online Analysis for Shredded Scrap and Non-Ferrous Metal Mixtures

The SICON EcoScan Online is a compact and affordable online analyzer, which provides a permanent online control of the shred quality.

- Permanent control of copper content in Shredder Scrap (other elements as well)
- Control of bulk density
- Individual integration into existing systems
- Smart Alarm System
- Detailed documentation system
- Data can be used for integration into a preventative maintenance program
- Data can be used for an optimized shredder automation
With the „EcoScan Mobile App“ the operator is always informed about any aspects of the analyzer:
- Remote data access available
- Smart Alarm System for unusual or critical quality deviations
- Integration into an overall data control and evaluation system

Graphic: Real-time user interface of analyzed sample
The solution for the removal of dirt and Non-Ferrous Metals from HMS - Ready for feeding into the EAF

- Significant reduction of slag (5-8 %)
- Increase of the liquid yield to 92-95 %
- Reduction of consumables
- Reduction of power consumption
- Reduction of emissions
- Recovery fraction from screened fines ready for feeding into the EAF
- SICON MagSpin - Permanent magnet with spinning effect
- 3D-Screening - 3D heavy duty screen elements
- Fully Automated System - Permanent Mass Balances, Smart Alarm System
Improving the quality of Steel Scrap is for SICON the driving force behind the Heavy Metal Scrap (HMS) preparation process. HMS is cleaned intensively and NF metals that are still present are separated. The result is a scrap quality with a considerably higher FE content and reduced NF content (specifically copper and aluminum).

A highly efficient and reliable scrap screening process with integrated metal recovery step that was specifically developed for this application enables a significant improvement in quality, while delivering additional scope of metal recovery at the same time. The innovative combination of efficient SICON screening and magnetic separation produces optimum results.

<table>
<thead>
<tr>
<th>Overall Plant Dimensions</th>
<th></th>
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<tbody>
<tr>
<td>LxWxH (approx.)</td>
<td>82 x 71 x 26 ft / 25 x 22 x 8 m</td>
</tr>
<tr>
<td>Plant capacity</td>
<td>Up to 300 t/h</td>
</tr>
</tbody>
</table>
EcoShred® Vertec - Vertical Shredders

**Achieves maximum liberation in applications such as processing of Meatballs or Electric Motors**

- Vertical shredder with throughputs of up to 15 t/h
- Individually adaptable to customer needs including feed, exhaust handling and downstream systems
- Complete preparation of metal composites (meatballs and electric motors)
- Complete recovery of properly separated copper and ferrous scrap
- Quick ROI due to low investment, obtainable high product quality and easy marketing of the products
- Sturdy welded construction - All inner parts of the machine that have direct contact with scrap are equipped with wear-resistant liners.
- Simple to maintain wear parts are easy to access and exchange
- Generously dimensioned rotor bearings for long plant life
Typical applications include

- Aluminium – Castings, profiles, UBC’s etc.
- Steelscrap – Pre-shredded steel sheets, metal drums etc.
- Meatballs
- Electric motors
- Household appliances
- Generation of nuggets/ Coolant Scrap

Standard Features

- Strong welded construction from heavy gauge, wear resistance steel plate
- Integral, annealed and CNC bored two piece chamber for quick access and simplified maintenance
- Durable, wear resistant, replaceable breakers, milling rings and chamber liners
- Oversized, spherical rotor bearings with advanced seal protection – prevents bearing damage due to product migration
- Adjustable product size control
- Replaceable wear plates in the chamber
- Stand Alone Electrical Control Panel
- Tested, Approved and Certified to the applicable CE, UL, ULC safety standards
- Frequency controlled drive (optional)
- Adjustable gap between liners and hammers (optional)

The EcoShred® Vertec is used in many applications. For example for processing pre-shredded metal scrap from twin shaft shredding systems. These machines aggressively reduce the size and densify pre-shredded material whilst liberating the various different fractions and allowing for better downstream separation. For applications like processing of meatballs or electric motors the rotor is designed to achieve a maximum of liberation.

The breakers in the upper part of the chamber smash the material until it is small enough to enter the gap between the milling rings or hammers (depending on the application) and chamber liners. Three stages of liberation and compacting create a product which is both clean and of high bulk density suitable for further separation or recycling. By adjustment of the rotor speed as well as the gap between the stator lines and hammers the machine can be precisely adjusted to the customer’s needs.
Input Material

Electric motors
Meatballs
Mixed Scrap
Metal sheets

NF (Copper, Alu)
NF (Copper, Alu)
Shredded Scrap
Coolant Scrap

Output Material

FE
FE
With the modular SICON solutions for metal processing, the EcoShred® Vertec is the ideal addition for the scrap processing sector. One example is the processing of electrical and electronic scrap: after gentle pre-crushing by the rotor shears and separation of contaminated components, further more careful processing takes place in the EcoShred® Vertec for subsequent plastic and metal separation.

The EcoShred® Vertec and modular downstream options offered by SICON now present the scrap and metal industry with a uniquely flexible processing solution.
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!