



FOOD ENERGY EFFICIENT

EURONEO FOOD ENERGY AND RECYCLE PVT. LTD.

TEXTILE RECYCLING



www.euroenergynrecycle.com



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Responsibility



The textile industry should be aware of its responsibility

> 92 million tons

of textile waste are produced annually

< 1%

is recycled into new clothing



1 truckload of textiles goes to landfill or incineration every second

Up to 35%

of all microplastics released into the environment can be traced back to textile products



Clothing accounts for approx. 10% of greenhouse gas emissions



"Fast fashion" is responsible for 20% of global wastewater

Source: McKinsey & Company market study July 2022



Mapping of Textile Waste Value Chain in India

TEXTILES

Key Insights from the Report

70.73 Lakh Tonnes/Annum

Total textile waste generated*

- 42% Pre - Consumer
- 58% Post-Consumer

\$3.5 Billion

Market value of the textile recycling sector by 2030

~70%+ recovery rate

95% of pre-consumer waste recovered
55% of post-consumer waste recovered

1 Lakh new green jobs

projected by 2030
In textile recycling and circular solutions



Panipat emerging as a Global Hub for Mechanical Textile Recycling

~40-45 Lakh livelihoods sustained

predominantly women from marginalised communities engaged in informal recovery networks

*Data estimated by the report

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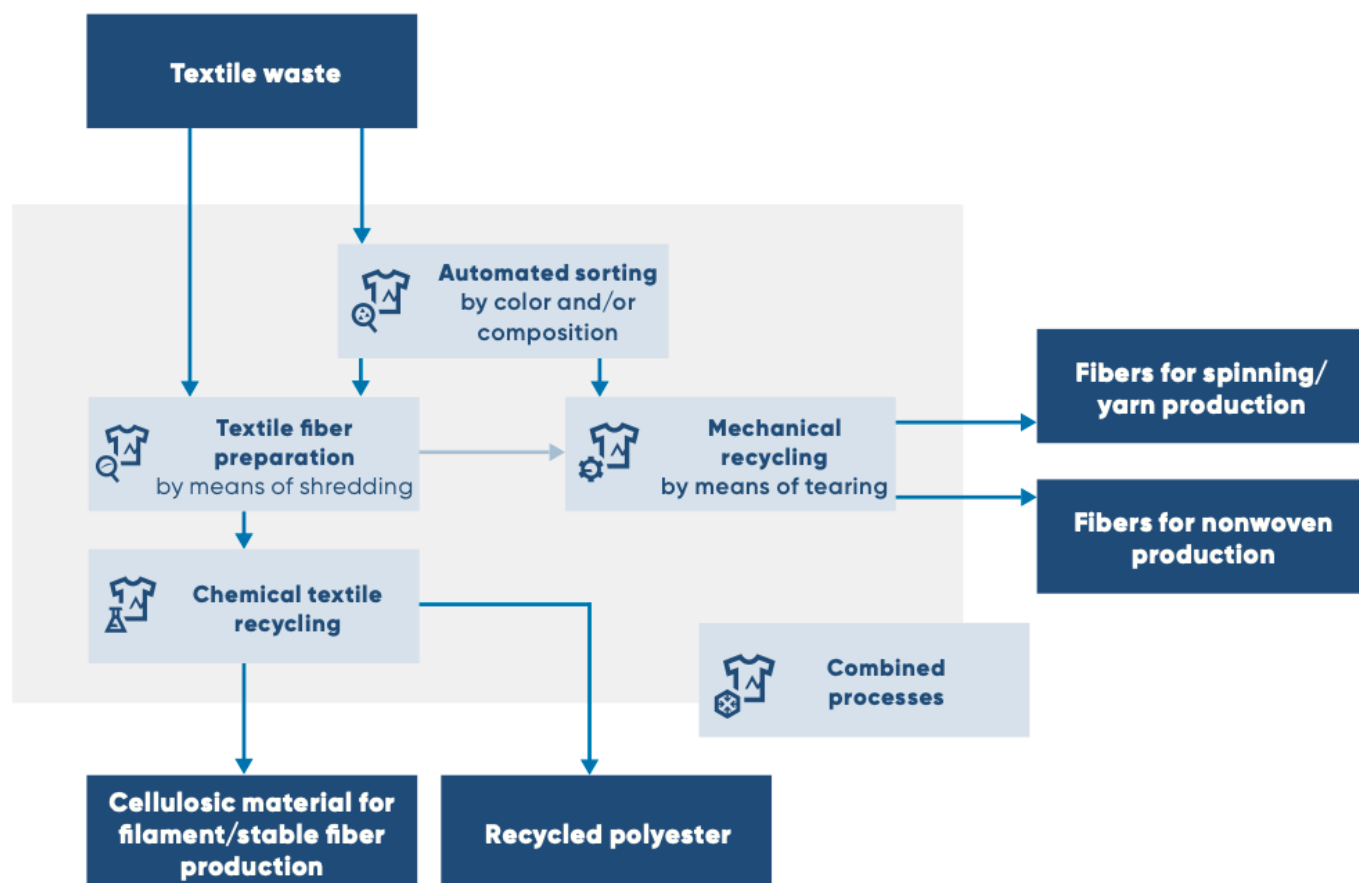
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Our Methods



Processing of textile waste for production of new yarn/textiles and nonwoven products



AUTOMATED TEXTILE SORTING

The sorting of textile waste is one of the most important pillars in optimizing the quality of recycled fibers. Innovative and automated sorting allows to separate clothes, depending on the nature of fibers and/or colors.



TEXTILE FIBER PREPARATION

The preparation of textile waste by means of shredding lays the foundation for the subsequent textile recycling processes, whether they are based on mechanical, chemical, combined, or another customer-specific treatment.



MECHANICAL RECYCLING

Mechanical recycling by means of tearing can be used for almost all types of pre-/post-consumer waste textiles with the aim of maintaining the nature of the original fibers.



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Our Methods



CHEMICAL RECYCLING

Chemical recycling of textile waste is a vital, emerging business area. It is the piece of the puzzle that completes the picture of textile-to-textile circularity.



COMBINED PROCESSES

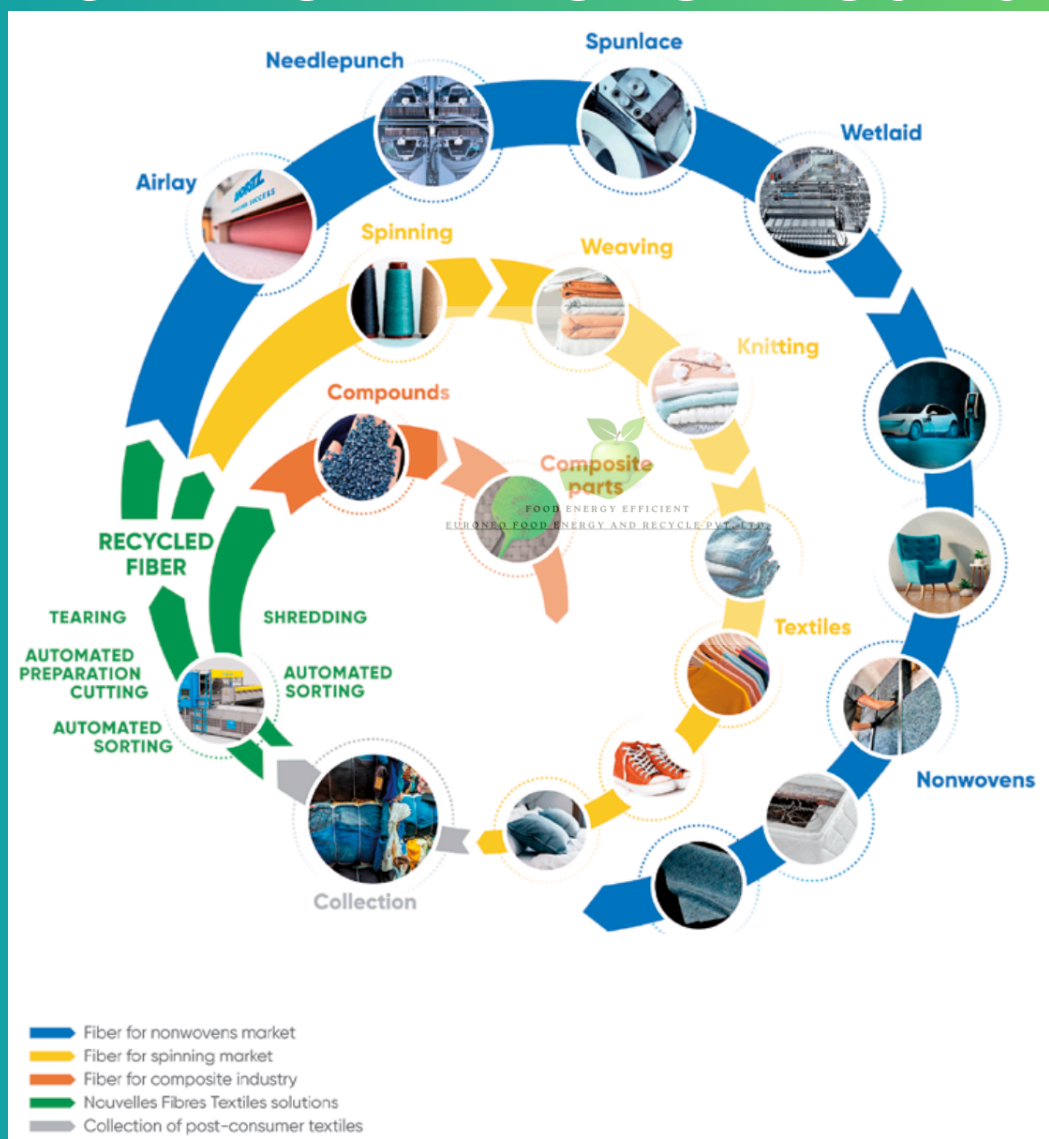
Combinations of mechanical, thermal and chemical process steps are also possible depending on customer and market needs.



NONWOVEN PROCESSES FOR RECYCLED FIBERS

The transformation of recycled textile fibers into technical nonwoven felts is one of the key methods for recycling textiles into new products and for creating value.

One-Stop-Shop For Textile Circularity





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Sorting

Overcoming Textile Recycling Challenges

While textile recycling is not a new concept in the industry, the primary hurdle has been automating the sorting process. This task is particularly challenging due to the diverse range of materials, colors, and sizes involved.

Euroneo Fibres Textiles has taken on this significant challenge but required assistance. This is where a partner with extensive expertise in textile recycling and the construction of complete manufacturing lines stepped in, collaborating with a specialized provider of waste sorting machines.

We then contributed our in-depth knowledge of technology and complete systems for textile recycling and production. Together, Euroneo and its advanced, purpose-built machines for textile sorting completed the loop. "We have successfully brought the plant online in a short period."

The First Step in a Long Journey

The newly established automated textile sorting and recycling plant marks the initial step in a journey aimed at collecting, sorting, and recycling millions of tons of discarded textiles for the creation of new products in the future.

As a testament to the promising opportunities that lie ahead, Euroneo Fibres Textiles has already begun laying the groundwork for a full-scale recovered textile preparation facility, which is expected to have an annual capacity of approximately 25,000 tons of post-consumer textile waste in the near future.

> "This line represents the first significant milestone in a long journey. In India, with tightening regulations and an increased collection rate of 60% for all textiles produced, there are currently around 240,000 tons of textiles available for recycling. In three years, this number is projected to rise to 300,000 tons. Consequently, we will require at least 12 additional high-capacity sorting and recycling lines to meet the growing demand."



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Shorting

A Unique Supplier Addressing the Entire Value Chain

With extensive expertise in textile recycling and nonwoven processing, ****Euroneo**** serves as the perfect partner for industrial projects that encompass the entire textile value chain, from waste management to the final product. Through collaboration with ****Euroneo****, we have enhanced our capabilities by offering automated sorting solutions that bridge gaps in the process, fostering a virtuous ecosystem for textile recycling.

PUTTING ENGINEERING EXCELLENCE INTO ACTION WITH

- Material flow engineering
- Material preparation: cutting or shredding
- Distribution of textile materials to ensure smooth operation of optical sorters
- Hard points removal
- Efficiency and purity
- Baling
- Air filtration
- Production monitoring
- Project management

massive volumes of recycled fibers and serve various markets such as bedding, furniture, automotive, building industries and many more.



Fully engineered solution





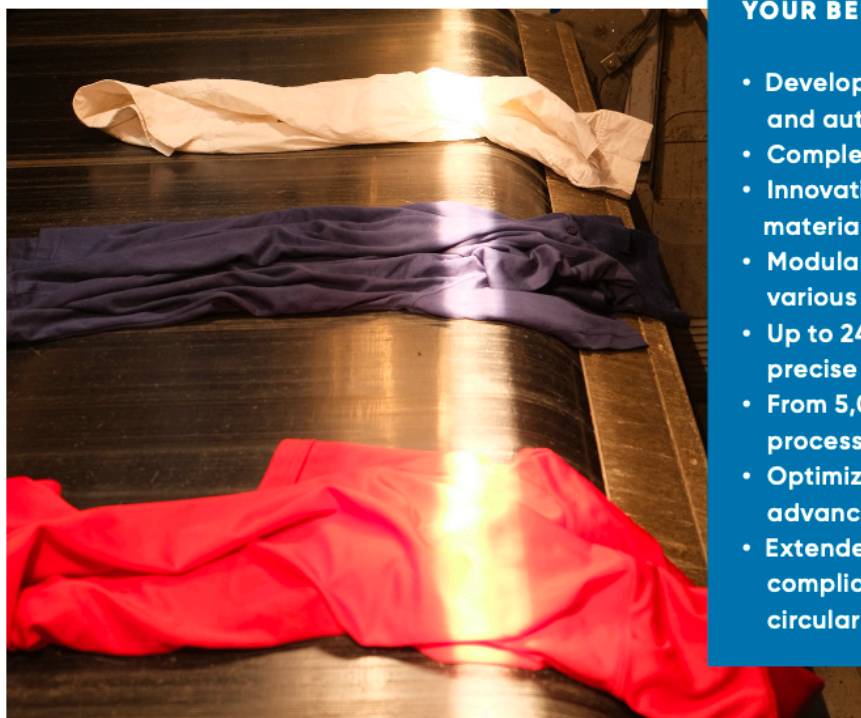
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Shorting

ADVANCED TEXTILE SORTING SOLUTION



YOUR BENEFITS

- Developed by experts in textile processing and automated sorting
- Complementarity with manual sorting
- Innovative feed preparation for enhanced material flow and sorting accuracy
- Modular configuration, scalable to fit various operational sizes
- Up to 24 textile outputs streams for precise multi-criteria sorting
- From 5,000 to 10,000 t/y of textile processing
- Optimized CAPEX for facilities requiring advanced, high-output capabilities
- Extended Producer Responsibility (EPR)-compliant and ready to support textile circularity frameworks



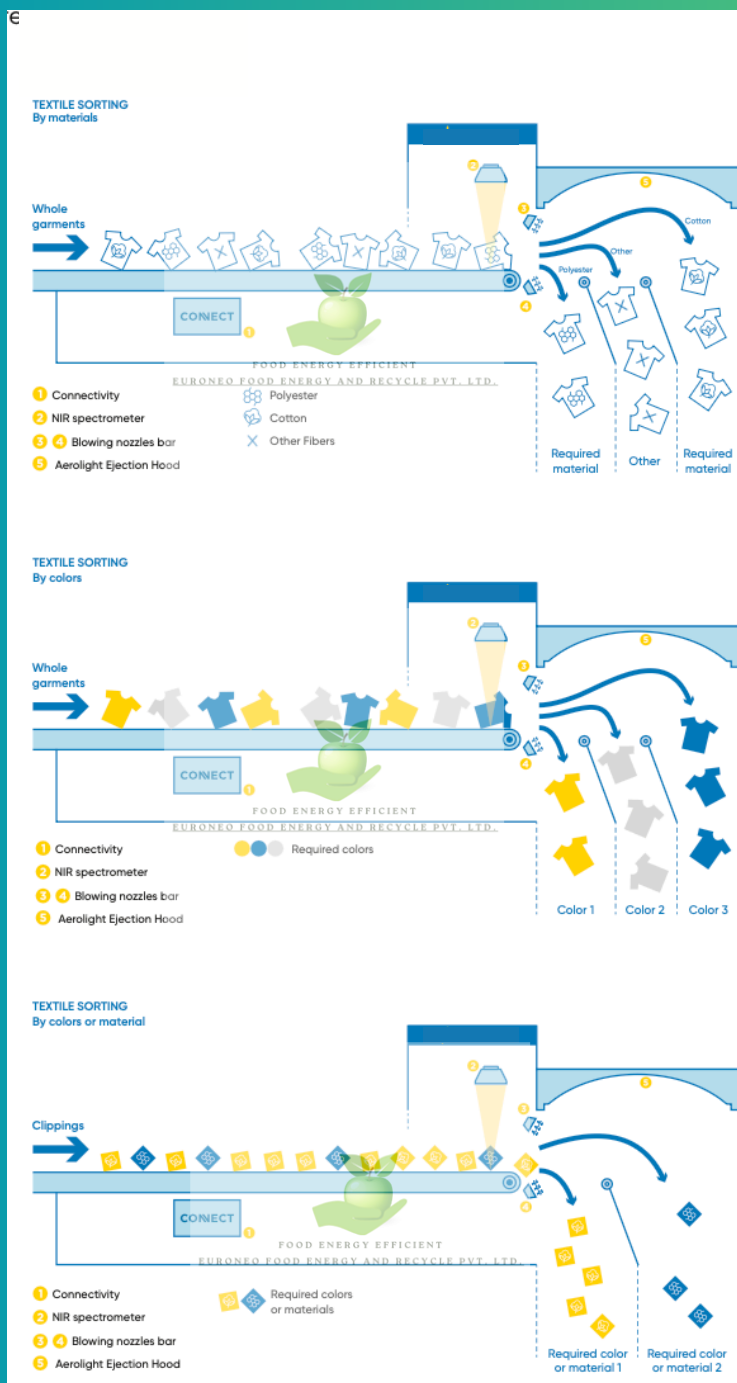
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Shorting

HIGH CAPACITY SORTING SOLUTION



Mistral+ CONNECT sorting line in operation

YOUR BENEFITS

- Innovative feed preparation for optimized material stream and performance
- High sorting accuracy for a premium, high-quality recovery
- Modular design to adapt to various facility sizes and layouts
- Large volumes: from 10,000 to 100,000 t/y of textile
- Proven process expertise backed by decades of experience



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Mechanical Recycling

MECHANICAL RECYCLING BY TEARING

Mechanical recycling is a technology based on a specific tearing process that allows a very gentle and progressive opening of the cut and prepared textile waste to obtain a high quality fiber in terms of length and strength.

This allows post-industrial and/or pre- and post-consumer textile waste to be transformed back into raw materials that can be used to produce fibers for spinning or for the nonwovens market.

INPUT

- Pre-and post-industrial textile waste
- Post-consumer textile waste (clothing)
- Special materials like carpets
- Nonwoven waste made of natural and synthetic fabrics



Textile waste



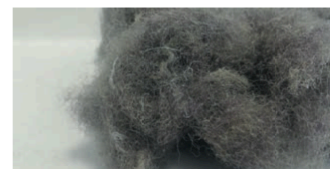
Carpet waste

OUTPUT

- Regenerated, clean textile fibers
- Dust waste
- Heavy and metal parts, such as bale wire, buttons, zippers, rivets, ornaments and more



Output material



Output material



RECYCLING PROCESS ON THE BASIS OF MECHANICAL RECYCLING

Processing of textile waste for production of nonwoven products and yarn.





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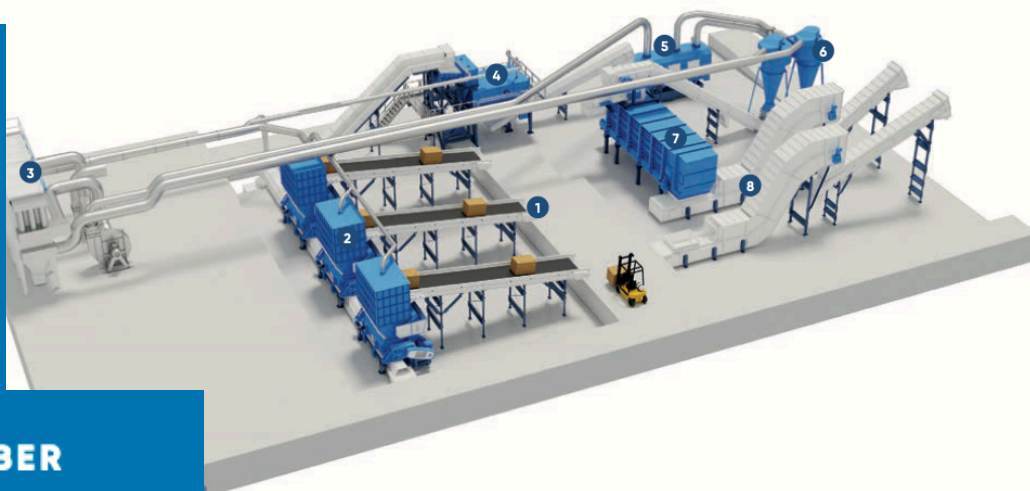
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Mechanical Recycling

SHREDDING PROCESS

Shredding refers to the mechanical process of material size reduction by cutting. The input material such as pre- and post-consumer textile waste, is put into the material feed and then cut into small pieces. The outcome is a cleaned textile in the required size. During the process, heavy parts like metal, buttons and zippers are removed.



TEXTILE FIBER PREPARATION

Example of a textile fiber preparation line

- 1 Material feed 2 ADuro shredder 3 Aspiration system 4 Metal separation 5 Heavy particle separation 6 Pneumatic transport system 7 Bunker system 8 Dosing system

INPUT

- Pre- and post-consumer textile waste from industry, commerce and households.
- Natural and synthetic fabrics used in clothing and linens, and special streams such as carpets and technical textiles.



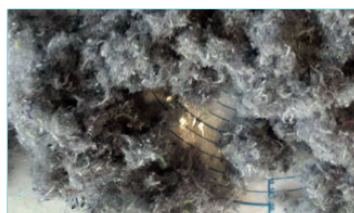
Textile waste



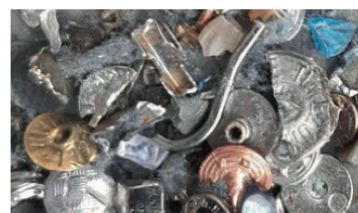
Carpets

OUTPUT

- Cleaned textile, size on demand
- Heavy and metal parts, such as bale wire, buttons, zippers, rivets, ornaments and more



Fine-ground output material



Impurities from denim

YOUR BENEFITS

- Perfectly suited to various downstream processes such as mechanical or chemical recycling, combined or customer-specific
- Capable of handling large volumes of up to 200 t per day
- Trouble-free processing of challenging feed material, like denim
- Optimized shredding of feed material to the defined particle size applying different shredder types and cutting systems
- Tailor-made separation of shredded textiles and heavy items (e.g. zippers and buttons) for high purity of output material



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Mechanical Recycling



Cotton soft waste recycling

Customized process: We offer cotton waste opening and cleaning lines for blowroom waste equipped with a modular design also for high production capacity and fiber yield. We also provide cleaning lines for gin notes, linters, and more. Potential applications include respinning, security paper, cardboard, tooth paste, and other cellulosic fiber applications.



Gin notes



Pre-cleaned



Cleaned open fiber



Post-consumer waste for respinning

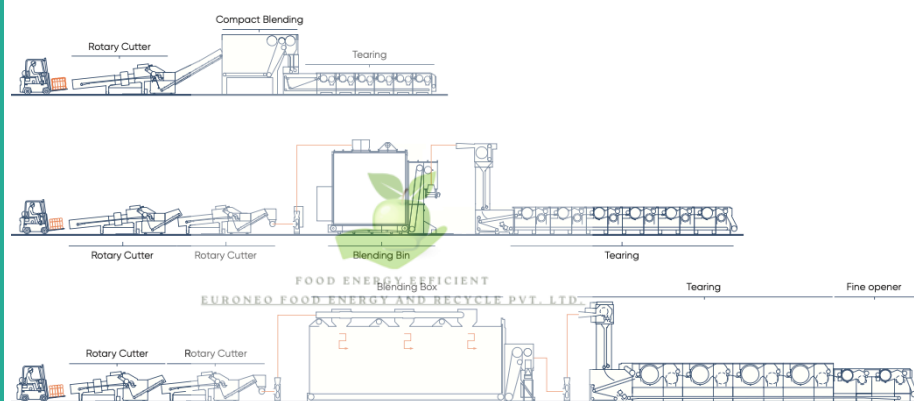
YOUR BENEFITS

- High fiber length and strength
- Low machinery footprint
- High output capacity

Post-industrial waste for respinning

Maximized fiber quality: Thanks to a gentle and progressive opening, our lines are able to process industrial waste for respinning purposes by offering a high-quality fiber in terms of length with low neps and unopened yarn contents.

We can achieve a high production output for spinning up to 1,000 kg/h*. Line examples are shown below.



*Depending on input, raw material quality, and type of yarn to be made.



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Mechanical Recycling

Post-industrial waste for nonwovens

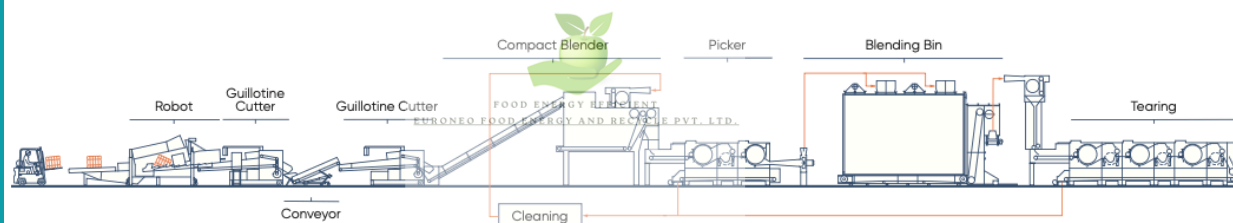
YOUR BENEFITS

- Gentle and progressive opening to maximize fiber quality
- Fiber length
- Low neps content
- Low unopened yarn content
- High production outputs for spinning, up to 1,000 kg/h

Post-consumer waste for nonwovens

YOUR BENEFITS

- User-friendly operation
- Tailor-made automated solutions to remove non-textile parts (hard points)





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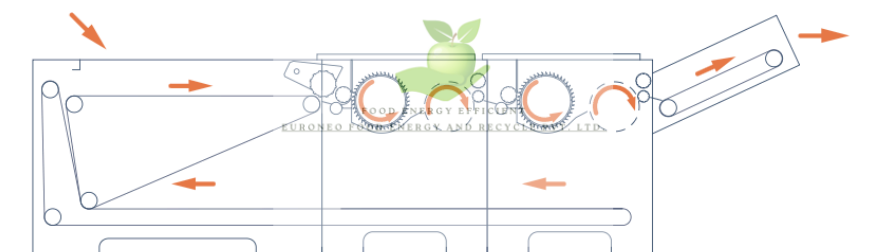
Mechanical Recycling

Cadette tearing machine

A tearing machine for in-house recycling: The ANDRITZ Cadette tearing machine has been specially designed for in-house recycling at technical and R&D centers.

The machine is designed to recycle spinning, weaving, knitting, and drylaid nonwoven wastes.

The Cadette machine can process all types of textiles raw materials, thanks to its opening cylinder of 350 mm.



OUR PORTFOLIO:

Type of opener	Cadette	Exel	Jumbo
Working width	0.5 to 1 m	1 to 2 m	1.5 to 2 m
Capacity	50 to 150 kg/h*	100 to 1,500 kg/h*	700 to 3,000 kg/h*
Accessories	- Sharpener - Fiber lubrication	- Sharpener - Fiber lubrication	- Sharpener - Fiber lubrication
Options		Beater rollers cleaning device	Beater rollers cleaning device

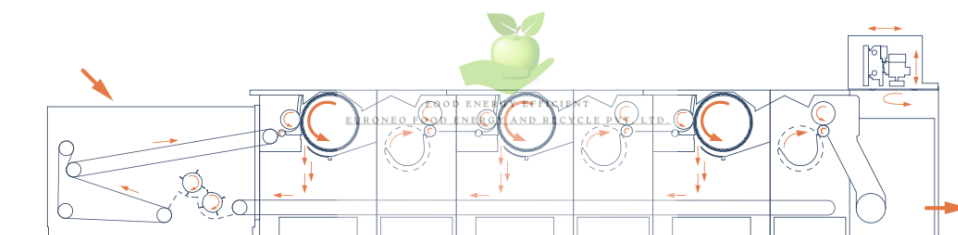
*For nonwoven applications and depending on raw material quality.
For respinning applications, please contact us.

Exel tearing machine

A medium-range machine: The tearing machine is a medium-range machine specially adapted for spinning quality and equipped with a 600 mm diameter opening cylinder.

Designed for the recycling of all hard textile waste for optimized fiber quality, the Exel machine can be equipped with one to seven opening sections with

a working width of up to 2 m. The Exel module has adjustable setting while running in order to provide more flexibility during production.





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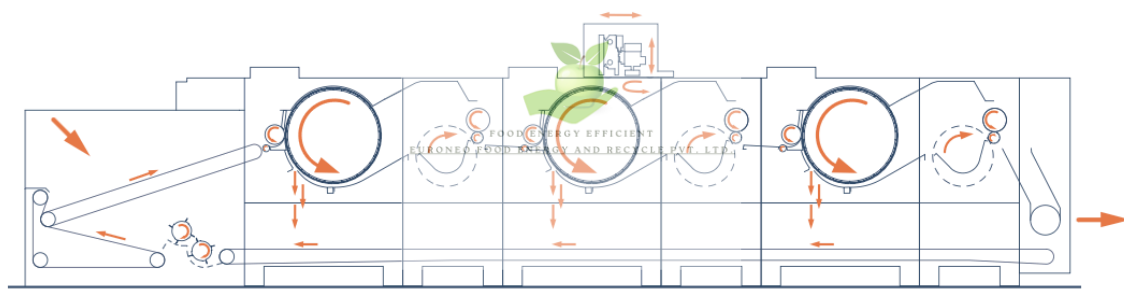
Mechanical Recycling

Jumbo tearing machine

State-of-the-art machine for high-production capacity: The Jumbo tearing machine has been specially designed to process all types of textile waste. This machine can be equipped with one to seven opening sections with a working width of 1.5 to 2 m.

This machine is available can be combined with Exel fine opener modules for a better fiber opening. The Jumbo machine has adjustable settings while running

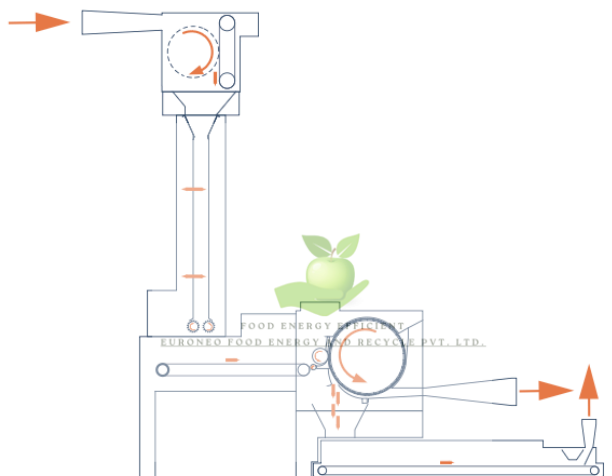
in order to provide more flexibility during production. adjustable setting while running in order to provide more flexibility during production.



Picker shredder

For ideal pre-opening and cleaning: The picker shredder machine is specially designed for old rugs, carpets, and moulding wastes.

On the picker, we can adjust settings while the machine is running.





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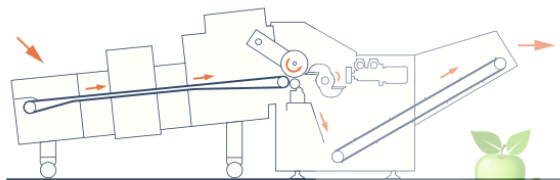
Mechanical Recycling

Cutting system

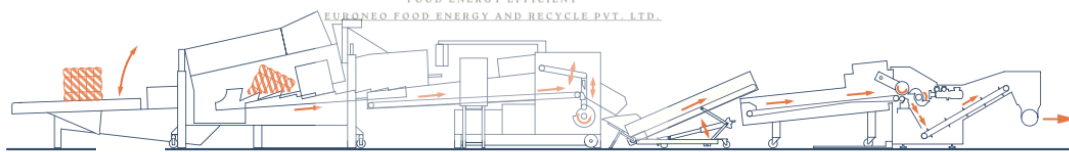
For an accurate and flexible cutting process: Our solutions range from simple systems with one or two rotary cutters to complete cutting plants.

The Starcut rotary cutter is equipped with a cutting head with two or four flying knives and a feeding conveyor rolling out of the machine for easy access.

This machine is also equipped with a built-in sharpener. We also optionally provide a metal detector and a dedusting system for the cutting head.



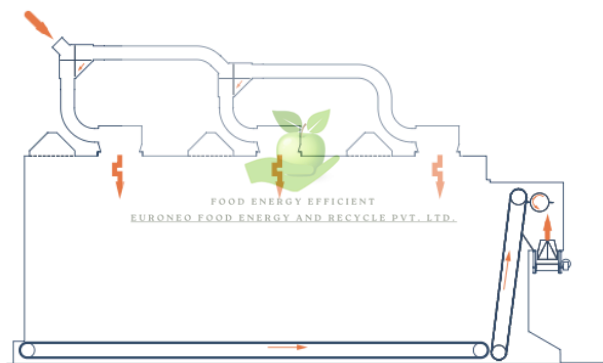
Starcut rotary cutter



Robot feeder, CT60 and Starcut rotary cutter

Blending box

Guaranteeing blend homogeneity: In order to ensure long-term blend consistency, we provide a wide range of blending boxes with a working width of 3 to 3.9 m and a storage capacity of 35 to 300 m³.





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Mechanical Recycling

Controls and accessories

METAL DETECTION

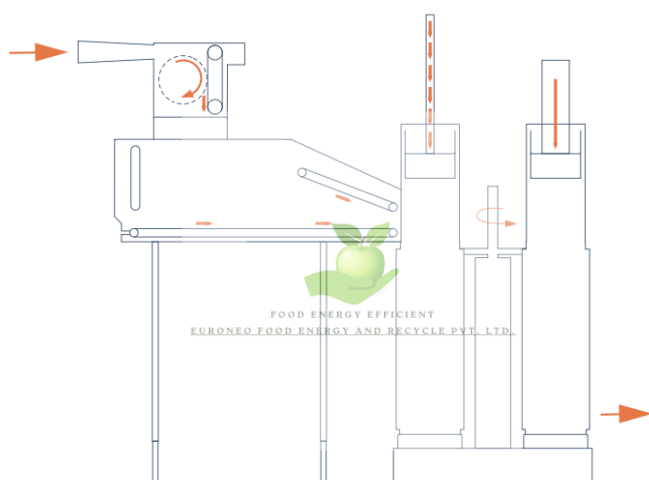
Our tearing lines are also available with a highly sensitive metal detection device and automatic rejection of contaminated materials, which can be combined with fire detection system. The metal detector ensures the total absence of metallic material in the raw material.

FIBER LUBRICATION SYSTEM

The lubrication of the fibers is based on a compact system with a reserve tank, dosing pump, and atomizers. The lubrication helps prevent static electricity during textile waste recycling, thus reducing damage and improving fiber characteristics.

BALING SYSTEM

We offer a full range of fiber baling systems, from single and double boxes with a pressure of 100 up to 200 tons.





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Chemical Recycling



CHEMICAL RECYCLING

CHEMICAL RECYCLING PROCESS

Chemical recycling is the process of recycling textile waste (e.g. cotton and polycotton) back into its raw fiber material form. The results can be used to produce new textiles using the same techniques as for virgin material. Because chemically recycled fibers are like virgin fibers, a recycled pair of worn-out jeans, for example, can be upcycled into another piece of clothing just as sturdy and comfortable.

The specifics vary depending on the technology used, but the basic process remains the same: Textile waste (without contaminants like zippers and buttons) is treated in a chemical process which removes dyes and materials that cannot be recycled. The material is modified so that it can be turned into strong fibers ready for textile production.

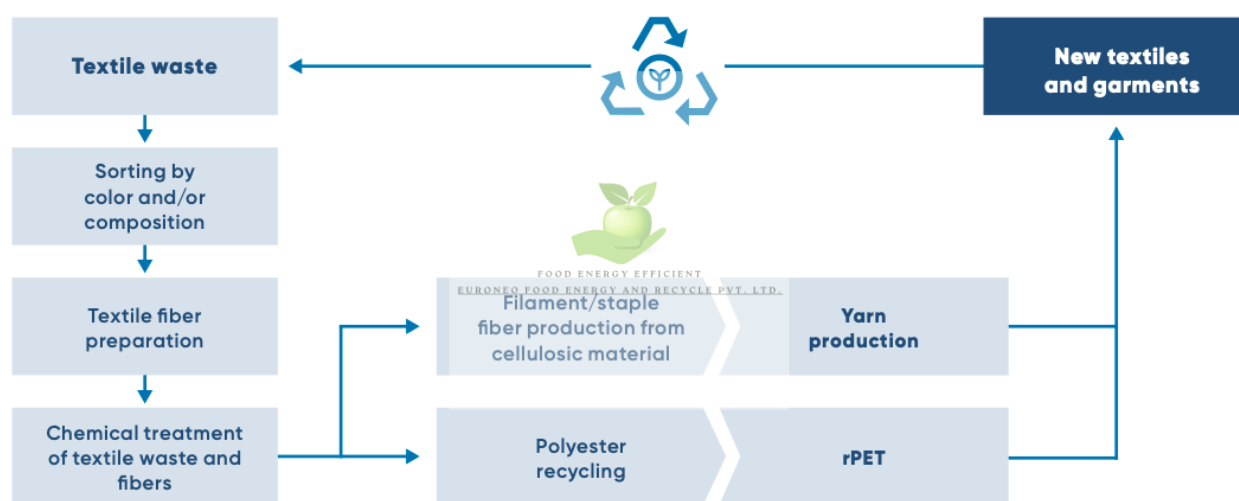
Embrace Innovation in Chemical Recycling

Chemical recycling of textile waste represents a crucial and emerging sector in business. It plays an essential role in achieving textile-to-textile circularity. This process is often referred to as circular recycling, as it ensures that recycled waste completes a full cycle—from raw materials to textiles, then to textile waste, and back to raw materials.



RECYCLING PROCESS ON THE BASIS OF CHEMICAL RECYCLING

Processing of textile waste for the production of textiles of the same or even higher quality.





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NONWOVEN PROCESSES FOR RECYCLED FIBERS

NONWOVEN END USES INCLUDING RECYCLED FIBERS

- Bedding, mattresses
- Furniture fillings
- Carpet and carpet underlays
- Horticultural materials
- Insulation
- Automotive applications
- Building and construction
- Filtration
- Wipes
- and many more



Chemical Recycling

Transform textiles into new nonwovens

The transformation of recycled textile fibers into technical nonwoven felts is one of the key methods for recycling textiles into new products.

It represents approx. 20% of all textile applications in annual tonnage.

We offers complete nonwoven production lines to process recycled fibers from textile waste

AIRLAY

Complete production lines with needlepunching, thermobonding and/or other bonding processes for applications like building, construction, automotive, mattresses and more.

NEEDLEPUNCH

Complete production lines with needlepunch bonding for applications like building, construction, automotive, carpets and more.

SPUNLACE

Complete production lines with hydroentanglement bonding for applications like household wipes.

WETLACE CP (CARDED-PULP)

Complete production lines with drylaid and wetlaid forming and hydroentanglement bonding for applications like technical wipes. Recycled fibers can be used within the carded/drylaid layer.





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Combined Recycling

Serving the Recycling Sector and R&D Facilities

Our services cater to customers in the recycling sector as well as R&D facilities, providing them with access to the expertise and knowledge of our recycling specialists. We offer sorting trials using our first industrial-sized line dedicated to textile sorting, which utilizes a closed-loop process.

Importance of Textile Waste Sorting

Sorting textile waste is crucial for enhancing the quality of recycled fibers. Our center spans 3000 square meters and features the innovative Euroneo product line, capable of handling primary and secondary shredding, fine granulation, and dismantling composite materials. This setup allows for trials across a wide variety of waste streams and comprehensive recycling process simulations. Customers can test with their own materials or utilize materials provided by us.

Advanced Technology for Efficient Sorting

Euronwo Fibres Textiles is equipped with cutting-edge Euroneo technology, which enables the separation of clothing based on fiber types and colors. During this process, hard elements can be eliminated, resulting in a material that is ready for mechanical recycling, whether through tearing or chemical processing.

Mechanical Recycling Technical Center

Our technical center, located in Pune, India, is fully equipped to process all types of textile or nonwoven waste through tearing. We handle a range of materials, from industrial textiles and automotive to furniture, building insulation, nonwovens, and both pre- and post-consumer waste. Our goal is to provide our customers with expert technical and eco-friendly solutions.

CUSTOMER TRIALS

- Individual machine demonstrations with different materials and operating parameters
- Demonstration of recycling processes
- Proof of capacity and output quality of processed materials
- Basic sample analysis
- Preparation of raw materials for further testing

RESEARCH & DEVELOPMENT

- Processing of new materials and development of new recycling solutions
- Testing of new machine settings and configurations for different applications
- Optimization of recycling machines
- Testing of new prototypes
- Networking with other test centers and laboratories

YOUR BENEFITS OF OUR SERVICE APPROACH

- Decades of experience with textile recycling machines and plants
- Global expertise, local contacts
- Replacement parts
- Wear components
- Rebuilds and retrofits
- Field services, audits, inspections
- Shutdown and start-up assistance
- Service agreements/contracts
- Operator/maintenance training



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Contact Us



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