

**MODULAR · INTEGRATED · INTELLIGENT**

The ES process opens a new era of plastic recycling.

**ES PROCESS**  
PET Bottle Recycling System



- High Efficiency
- Energy Saving
- Super Clean

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# DEDICATED TO PIONEERING PLASTIC RECYCLING SOLUTIONS

Optimal recycling process, integrated equipment configuration, and stunning washing performance secure high-quality recycled PET flakes.

**INNOVATIVE HIGH-QUALITY SUSTAINABLE**





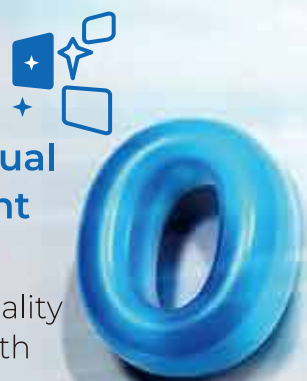
# A NEW INTERPRETATION OF THE PLASTIC RECYCLING TECHNOLOGY

A new generation of PET recycling process featuring compactness and efficiency is unveiled, by means of integrated design, as well as enhancement in performance and functions.

## High Quality

Almost zero residual washing detergent

Super-clean washing performance, good quality of rPET, suitable for both bottle-to-bottle and micro denier filament production.



## Cost-efficient

1/3 less manpower

High automation and ease of maintenance enhances production efficiency, and optimized unit energy consumption.



1/3

## Modularized

Achieve synergistic effect between functional machines as well as modules after integration.

Integrating processes seamlessly and enhancing overall efficiency.



1+1>2

## Compact

25% reduction of footprint compared with the typical process

Maximize cost savings for customers in terms of land use and factory construction for equivalent input capacities.



25%

## Sustainable

13.3% less energy consumption per ton of flakes

Inline water circulation solution minimizes the consumption of water and detergent.



13.3%



# Overview

The modular design of the ES process, mainly including 8 modules, enhances performance, reduce land requirement and production costs, well-suited for developed regions with high costs of land and labor. It boasts reasonable process design, compact equipment layout, high modularity, standardized configuration of spare parts, and pre-set pipelines, poised to reshape the landscape of global PET bottle recycling.

## Customized Intelligent Control System

Functions:

- User Management
- Intelligent Production Monitoring
- Production Data Statistics
- Data Collection
- Breakdown Precaution
- Maintenance Reminding



It guarantees safe production of **inline workers** and provides a basis for trouble shooting. Production data and trend analysis provide convenience for maintenance and contribute to intelligent and remote control of the production line.



Data on the dashboard, complete production data, and production line operation reports are fed back directly to the **management**, providing guidance for marketing & sales and strong data support for the factory's operating strategy.



## ES PROCESS

- Low Unit Operation Cost
- Low Manpower Requirement

- High Automation and Informatization
- Stunning Washing Performance
- Cost-Effective Investment
- High Yield of rPET Flakes



### Modular design

significantly reduces footprint

### Compared with the typical process

As per the same input capacity of 6 tons/hour and same configuration, the footprint is around 23% reduced

ES Process

Typical Process

### LABEL REMOVAL AND FLUSHING

De-labeling and bottle pre-washing

### INTENSIVE HOT WASHING

Soaking, preheating, intensive hot washing and impurity separation

### ENHANCED RINSING

Flotation washing and rinsing

### Applications of rPET flakes:

food-grade packaging and containers, micro denier filament, sheets / films, etc.

### Input capacity:

2000kg/h, 4000kg/h, 6000kg/h, 8000kg/h, 12000kg/h



# The key washing process and technology for quality assurance of recycled PET

## Maximizing synergistic effect

The stable flake quality meets the specifications and quality required for downstream food-grade and recycled micro denier filament applications, favored by well-known brand owners.

## 01 DE-BALING, SIEVING, AND WEIGHING MODULE

### Excellent de-baling capability, sieving step by step

The module integrates functions of conveying, de-baling, weighing, impurity removal, and screening, greatly reducing the space requirement. The chain conveyor with a large underground storage silo is convenient for forklifts to feed materials quickly. Excellent de-baling capability, real-time monitoring, continuous weighing and automatic adjustment of material feeding speed ensure that the production line runs smoothly at the rated throughput. Combined use of metal removal machine and trommel achieves simultaneous separation of oversized materials, fine impurities and bottles.

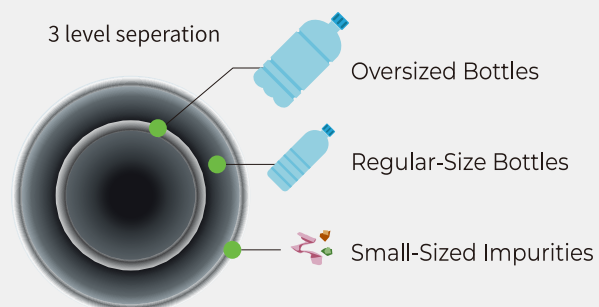
#### Bale Breaker

- The hydraulic system drives shafts to effectively loose high-density bales (up to 450kg/m<sup>3</sup>).
- When the torque exceeds the limit, the system automatically switches the direction of the shafts to prevent jamming.
- Inclined feeding design, with a maximum de-baling capacity of 12 tons/hour.
- The hydraulic system can easily open the de-baling chamber for safer and simpler Maintenance.



#### Trommel

- The caps, rings, metal, mud, sand, oversized bottles and regular size bottles are separated through multiple sieving to achieve effective multi-size and large capacity separation. (the mesh size can be customized)
- A maximum throughput of 10 tons/hour, with a missed sieving rate of <1%.



## 02 LABEL REMOVAL & FLUSHING MODULE

### Integrate label removal and bottle pre-washing

Integrate label removal and bottle pre-washing to separate labels and impurities. An inline water circulation system ensures a large flow of washing water is recycled and reused through filtration and sedimentation, realizing the separation and collection of labels and impurities. The land requirement decreases by 60%. The modular design achieves synergistic effect between functional machines after integration.



#### Label Scrapping Machine

- Remove ~95% of the labels and ~70% of the impurities on the bottle surface.
- Consumable parts are lightweight and modularized, allowing for its quick replacement.
- Unique blade design with long service life and low breakage rate.
- Excellent de-labeling ability improves the de-labeling rate of fully wrapped bottles and deformed bottles.

## 03 RINSING MACHINE

### Enhanced rinsing function ensures high-quality flakes

- The flotation and rinsing functions are integrated, and the rinsing water filtration system effectively filters out fine impurities in the rinsing water to prevent them adhering to the flakes again.
- After the surface tension of water is effectively broken, materials that sink and float can be completely separated.
- The burst of vacuum bubbles effectively removes dirt and detergent residues on the surface of the flakes.





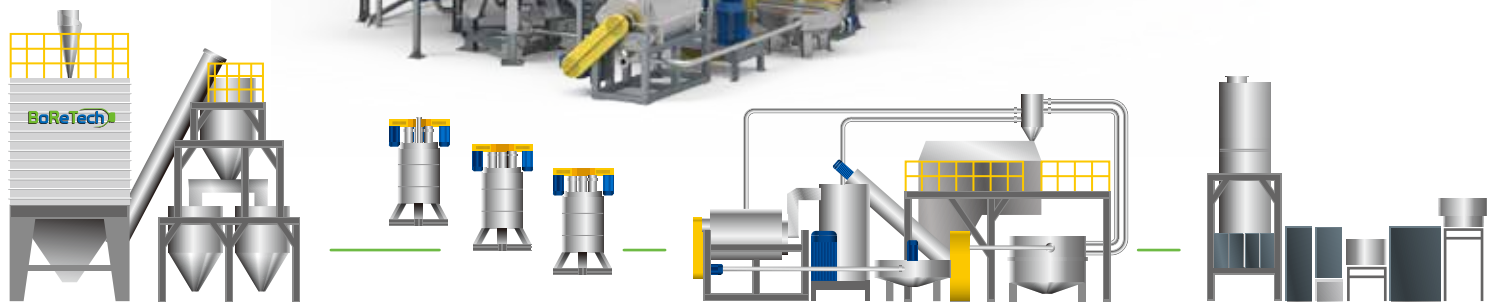
04 INTENSIVE WASHING MODULE

Intensive washing boasts super-clean washing performance

The specially designed intensive washing module enables thorough friction washing of flakes without a dead corner, enhancing impurity removal by 25% compared to the typical hot washing system.

The detergent circulation system ensures complete separation of the detergent and flakes. The detergent is recycled for reuse, thereby improving the system's washing performance and reducing detergent consumption.

- Through intensive washing, oil and adhesives on the flake surface, and impurities mixed in the flakes are effectively removed.
- Using multiple washing tanks simultaneously for flakes soaking and hot washing to achieve production flexibility.
- Pre-heating and high-speed washing with patented detergent ensures high-quality flakes.
- The detergent circulation system removes solid waste and sticky glue through fine filtration.



Intensive Hot Washing Machine

- The long residence time in the hot washing tank has a marked effect on softening adhesives on flakes.
- The patented design of the special paddle generates high-speed water flow that acts on the flakes, removing dirt and impurities, and peeling off labels and adhesives on their surface.
- The friction generated by the special mechanical design greatly improves the flake-washing effect, and the stunning washing performance improves the yield rate.

Patented product



05 DE-WATERING AND ASPIRATION

Efficient aspiration guarantees high quality, cleaning-free mesh saves manpower

Driven by the shaft of the de-watering machine, the rPET flakes reach a high-speed centrifugal state within the chamber, effectively removing water through the mesh.

The aspirator adopts the design of multiple channels working in parallel to evenly transport flakes to each independent channel. The special negative pressure air channel design and precise air pressure control make full use of the airflow to ensure that multiple air channels produce the same separation effect, and the labels and fines are suctioned to the cyclone separator for inline collection.



Mega Aspirator

- Large processing capacity, up to 8,000kg/h
- Low PET raw material loss rate(≤1%)
- Maximum separation efficiency ~99%
- Target PVC label content: <10PPM\*  
(with the BoReTech label scrapping machine applied in the process)

\*Depend on local raw material characteristics (thickness, label type)



Cleaning-Free Mesh



Cleaning-Free Centrifugal De-watering Machine

- Special structural design, the automatic rotating mesh achieves self-cleaning
- After de-watering, the water content is <1.8% (based on 3 tons/hour output)
- Replaceable paddle design reduces maintenance cost
- Improved wear resistance of the shell

# Global Projects

As a pioneering engineering service supplier dedicated to the plastic recycling industry, Boretech has a deep understanding of the characteristics of global r-PET raw materials and extensive experience in R&D, design, manufacturing, and engineering.

265 plastic recycling projects are running worldwide, recycling about 5,500,000 tons of PET bottles every year.

PROJECT CATEGORIES	QUANTITY
PET washing line	220
Fiber production line	29
PET pelletizing line, SSP	6
PET strapping line	1
HDPE/PP/PE/PA washing line	9

