Waste-to-Fuel Conversion with Advanced Separation and Treatment Technologies

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Waste Treatment Overview

Waste Collection System

Material Recovery Facility

Solid Refuse Fuel Production Facility

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Incineration to Energy



History of Waste Collection



Start Waste Collection in the US : since 1965 Start Recycling in the US : since 1998



Waste Collection Method : Source Segregation



Countries : W. Europe, Japan, Korea and others Advantage : High Efficiency and Customized Treatment ⇒ good for SRF and MRF Disadvantage : High Transportation and Treatment Costs and Big Fleet

Waste Collection Method : Commingled Collection



Mixed Collection, and Total Treatment and Separation



(UK, Australia, Spain, China, Italy, Singapore and others)

Advantage : Small Fleet and Low Collection Cost Disadvantage : Low Separation Efficiency and Purity



iTainer IoT Container collection system

iTainers are IoT-based Automatic compacting containers linked by wireless internet to management server, iTainer weighs waste and charges cost. Operator monitors and maintains iTainers remotely.

Advantages and Benefits

- Less collection workers and trucks by 80%
- No new waste collection bag
- Less traffic burden to social system and CO₂ emission



Cost Reduction

- c Collecting fully loaded containers only
- Compacting the fluffy waste bags upto 80%
- c Easy to hookup type container



- C No waste dispersion, No odor, No vermin
- No waste bag breakup by animals

Model and Application iTainer-W - Municipal Solid Waste iTainer-B - Food Waste iTainer-R - Recycle Waste Residential area Market



Apartment complex





*i*Tainer-W Part Names





iTainer-B Concept



iTainer-R Concept



netbin SMART Fill level monitoring sensor

netbin provides timely warnings when they are full, permitting optimized route planning for collections which reduces the waste collection costs by 30–40%. It notices fire and flip over.

Advantages and Benefits

S Cost Reduction



- Fuel Saving and Reduced Fleet size
- Reduced wear and servicing on collection trucks
- Fully utilize the work forces
- c Empty only the bins needed emptying
- Optimized the collection routes
- C Increase the capacity in rapid fill areas
- c Analyze existing collection routes against actual fill level
- C Gather the data for new collection improvement scheme
- Monitor and Report
- C Identify trends in bin behaviors



netbin Concept



Ecopro C Waste Collection Management System

Ecopro C is waste collection management system for all collection machines (iTainer, iUnderground, netbin, Bigbelly and Nature Store) communicating with machines through internet for fill level sensing, status checking and remote maintenance.



Ecopro C Concept





ACI 재활용품 선별처리 계통도 버전4 ACI MRF(Material Recovery Facility) Ver.4



Precess Flow : 1. Bag Splitting Machine



Bag Splitter

AC

- To Split open the bags Fitted with the rotating knives
- Whole Loader feeds the bunker
- Splitter and Continuous Feeding

Precess Flow : 2. Bulky Material Handpick





Handpicking Station for Bulky Materials

- Hand Picking the Long or/and Bulky Materials
- To screen the bulky materials for the following machines → to Increase the sorting efficiency
- Worker Friendly Sorting Station with Colored Chute and Wood Finish
- Air Conditioned Work Station and Air Cleaning System Equipped

Precess Flow : 3. Air Ballistic Separator



Air Ballistic Separator

- Principle : Combination of Air Shifter and Ballistic Screen
- Enabling the Serial Sorting System (Heavy/Mid Heavy/Light/Inerts/Dust)

• Presorting in Five Categories

- ✤ 1 : Heavy Glass, Ceramic, Metal...
- ✤ 2 : Mid Heavy Plastics Bottles
- ✤ 3 : Light Film and Paper
- ✤ 4 : Inerts Food, Broken Glass, Sands..
- ✤ 5 : Dust from Cyclone or Bag Filter

Precess Flow : 5. Heavy Material Sorting





Glass Bottle Handpick / Gas Can Piercing

- Hand Sorting the Glass Bottles by Color (Brown, Green, Clear)
- Lift to transport the Glass Bottle Boxes
- Magnetic Belt to sort the Gas Can

AC

Piercing Gas Can to remove the remaining gas
 -> Gas Explosion and Fire Prevention

Precess Flow : 6. Fe/NFe Sorting & Baling



AC

Magnetic Belt

- Permanent Magnetic Belt no Electricity
- Sorting the Ferrous Material

Eddy Current

- With the Eddy Current
- Sorting Non Ferrous Metals mostly Aluminum Cans

Precess Flow : 7. NIR Sorting Machines



Optical Sorting Machine with NIR

- The Scanner reads the Reflected NIR
 - \rightarrow Recognize the Materials
 - \rightarrow Blowing the selected material
- Can record the new materials and easy to change the sorting materials

Precess Flow : 8. Storage Bunker and Balers



AC

Plastic Baler

- Baling the plastics by material (PET, PP, PS, PE) after storing them in the bunkers
- At the high level, the storage conveyor takes out the material to the baler



SRF Production Process

생활폐기물 전처리 및 폐기물 고형연료 생산시설 MBT (Mechanical Biological Treatment)



ACI Chemicals Asia Inc.

Pre Shredder with Hook Knives



Coverage

- Household Waste
- Large Waste
- Wooden Waste
- Bed sheets, Blankets, Clothes
- Commercial Waste
- Biomass & Green Waste

Equipment Technical Specifications

Item	Description
Throughput	20 ton/hr
No. of Shafts	Twin-shaft
Size	Cutting Table : 2,000(W) X 3,144(L) Overall : 2,300(W) X 4,072(L) Power Pack : 450(W) X 1,980(L)
No. of Knives	12
Distance X	60mm
Grain Size	<150mm (>90%)
Power Consumption	180kW X 2Sets = 360kW
Features & Advantages	

- 2-axis asynchronous bi-directional cutting method
- Handling long & elastic material like rubber band.
- Sustainable operation by hard facing
- knife openings, it ejects sand, small stones etc.
 automatically. And this makes knife's lifetime longer and has economical effects.

Disc Screen



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Item	Description
Throughput	30~50 ton/hr
Power Consumption	3.0kW
Shaft No.	8/10/12/14/16/18
Power Supply	380~400V, 50/60Hz
Dimension	1220 X 4400 X 2400 1620 X 4400 X 2400

Coverage

- Glass & Plastic
- Paper & Film
- Sand & Soil
- Bulky Waste
- Landfill Excavation Waste
- Size sorting of Recycling sorting facility
- Mixed size sorting of MSW & Industrial waste

Features & Advantages

AC

- Screening with Various sizes of Disc
- Screening of organic waste
- Sorting impurities and other waste
- Minimize Clogging with High Moisture Content
- Interchangeable Disc depending on sorting purpose



Equipment Technical Specifications

Air Shifter



Equipment Technical Specifications

Item	Description
Throughput	12 ton/hr
Power Consumption	26.5kW
Dimension	3,680 (W) X 13,350(L) X 4,303(H)
Power Supply	380V / 3ø
Туре	internal Air Circulation type

Coverage

 High-density: plastic containers, Non-ferrous, cans and glass bottles, porcelain etc.

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• Low-density: combustibles like paper, plastic film and etc.

- Screening with Air Blowing
- Effective screening of High density waste
- Internal Air circulation type /no dust emissions



FineShredder



Coverage

- Household Waste
- Paper & Paper Board
- All kinds of plastics
- Industrial & Commercial Waste
- Rubber & Tires
- Fabric & Clothing
- Wires & Computer Scrap

Equipment Technical Specifications

Item	Description
Throughput	9~33 ton/hr
No. of Shafts	Twin-shaft
Shaft length & Diameter	2014 X 665
No. of Knives	Up to 216 (X2)
Shaft speed	70~180 rpm
Grain Size	10~100mm
Power Consumption	200kW X 2Sets

Features & Advantages

- various materials shredding (like tough & smooth together)
- Hydraulic maintenance flap/door makes maintenance easier

(Knife & Screen replacement / cleaning dirt)

- Application of safety clutch prevents damaging rotor
- Electrical safety control



Magnetic Separator



\sum	Equipment	Technical	Specifications	

ltem	Description
Throughput	0.2ton/hr
Power Consumption	1.5kW
Dimension	W700 X L900 X H220
Power Supply	380V
Туре	Permanent magnet type

Coverage

- Household Waste
- Construction Waste
- Industrial Waste

- Permanent magnet
- Sorting metal(Fe) kinds in MRF & MBT
- Excellent Separation Efficiency
- Easy to maintain





Balers



Equipment Technical Specifications

Item	Description
Throughput	12ton/hr
Power Consumption	82kW
Dimension	W2,250 X L12,000 X H5,500
Power Supply	380V
Туре	PP Automatic binding format

Coverage

- Paper & card boards
- Plastic Film
- Steel and Aluminum cans
- Recyclables and Organics
- Waste from MRF

- Baler (5 line PP Softband-twine knotting method)
- Hardox plate in waste material contact, durable& lifetime secured
- High compressive forces shows great performance and easier to store/transfer bales.
- Plastic twine-knotting method saves more cost
- Plastic twine-knotting method secures working area
- Saving operational costs compared to power handling capacity
- Bale specifications: 110 X variable X 75cm



Wrapping Machine



Equipment Technical Specifications

ltem	Description
Throughput	15ton/hr
Power Consumption	25kW
Dimension	W3,700 X L13,000 X H3,300
Power Supply	380V
Туре	Auto transfer & Wrapping method

Coverage

- Storing wastes before SRF, MBT, incineration
- for long-distance transportation of bulk materials
- leachate generation material
- retention of physical properties

- Wrapping time : 60sec/1bale
- Lowest oxygen permeability
- 3 wrapping programs depending on type of waste.
- Movement controller for checking bale length
- Belt type EP500 has great durability and minimize damage to bale

SRF Drum Dryer



Minimized Over Drying

AC

Pelletizer for SRF



AC

- Easy to Control the Gap between Die and Ring
- Hydraulic Breaking System for Foreign Materials
- **Twin V-Belt**
- Automatic Stoppage for overload
- Centralized Greasing System

2mm



Biomass Fuels

FOOD & AGRI











GREENHOUSE

BIOMASS & SRF FUELS

WOOD



RENEWABLES





FOOD & AGRI (PALM OIL)



The empty fruit bunches (EFB) are either recycled in the plantation or used as fuel for other energy plants like for a palm oil refinery, where a chemical process also demands for steam and power. The challenge has always been to provide a stable and reliable energy source during the processing of each batch of oil. Be it using oil palm waste like empty fruit bunches as fuel for energy production or even palm kernel cake, VYNCKE has the proven experience and know-how to help you meet this challenge.



FOOD & AGRI (GREENHOUSE)



Given the upward trend in both price and worldwide demand for a finite supply of fossil fuel, coupled with concerns about global climate change, many greenhouse farmers are switching to renewable energy. VYNCKE offers heating systems adapted to a wide range of biomass fuels. The possibility of equipping our boilers with CO2 capture systems, which allow carbon dioxide to be utilized for greenhouse grown vegetable crops, is a well appreciated extra feature



RENEWABLES (SRF)



Producing pellets is an energy demanding process, where the biggest proportion is used for drying. Single-pass drum dryers utilize flue gases from our waste fired combustion systems, while belt dryers are steam heated or hot water heated and can be used in combination with cogeneration. To help you meet this challenge in a cost-effective way, with maintained high reliablility and availability, VYNCKE offers a wide range of fuel flexible biomass energy solutions.



