

Recycling System

PROCESS DESCRIPTION

The process begins on the tipping floor. Material is Fed onto the Variable Speed Controlled Tipping Table, As the Material Advances on the Tipping Table a Leveling Roller with Trapezoidal Teeth rotates above and in the opposite direction of the Material Flow. The Leveler is variable height adjustable and variable speed controlled. The top of the flow is peeled back while the lower portion of the stream advances under the roller. This action provides a uniform even feed to the Bag Breaker.

The Bag Breaker is a high speed flail cylinder that tears open the bags, spreading the contents onto the variable speed controlled Sorting Table. Hand Separation occurs on the table of various recyclables including, PET, and HDPE. These recyclables are deposited by hand into containers. After the sorted material advances past the sorters, it enters the Magnetic Separation Module.



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In the Magnetic Separation Module material is fed over a series of belts with magnetic head pulleys. These magnet rollers capture the ferrous metals and drop them onto a lower magnetic conveying belt along with some paper that is trapped between the magnetic roller and the ferrous metal. The metal that was dropped onto the lower magnetic separation belt is again magnetically removed from the tramp paper and dropped into a ferrous metals discharge conveyor while that paper is propelled by an air knife into the Air Classifier in feed belt. The metal that was discharged is further processed by a metal gleaner that removes any remaining paper and grit. On the separator line the material that advances has pasted the Magnetic Separator and the remaining is fed into the Air Classifier.



In the Air Classifier Module, material is sorted by an air knife. The heavier material drops into the Heavy Fractions discharge conveyor. This material consists of organics, shoes, wood, and heavy non-ferrous metals. These are hand sorted to remove non compatibles, the remaining combustibles are returned down stream of the Eddy Current Separator (ECS).

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The lighter material consisting of paper, plastic and aluminum is fed onto the Eddy Current Conveyor. Under the belt is an ECS or Eddy Current Separator. Aluminum that is fed across the Rare Earth ECS Rotor is propelled by powerful fields generated by the rare earth magnets into a collecting discharge conveyor where it exits the module and deposits the aluminum into a container.

The residual material consisting of mainly of paper and plastic drops onto the conveyor belt to the manual sorting station



Recycling System

Plant composition

The plant consists of the following lines:

L1 - Receiving and processing MSW (recovery of iron and aluminum)

L2 - Oxidation of Organic Waste from MSW

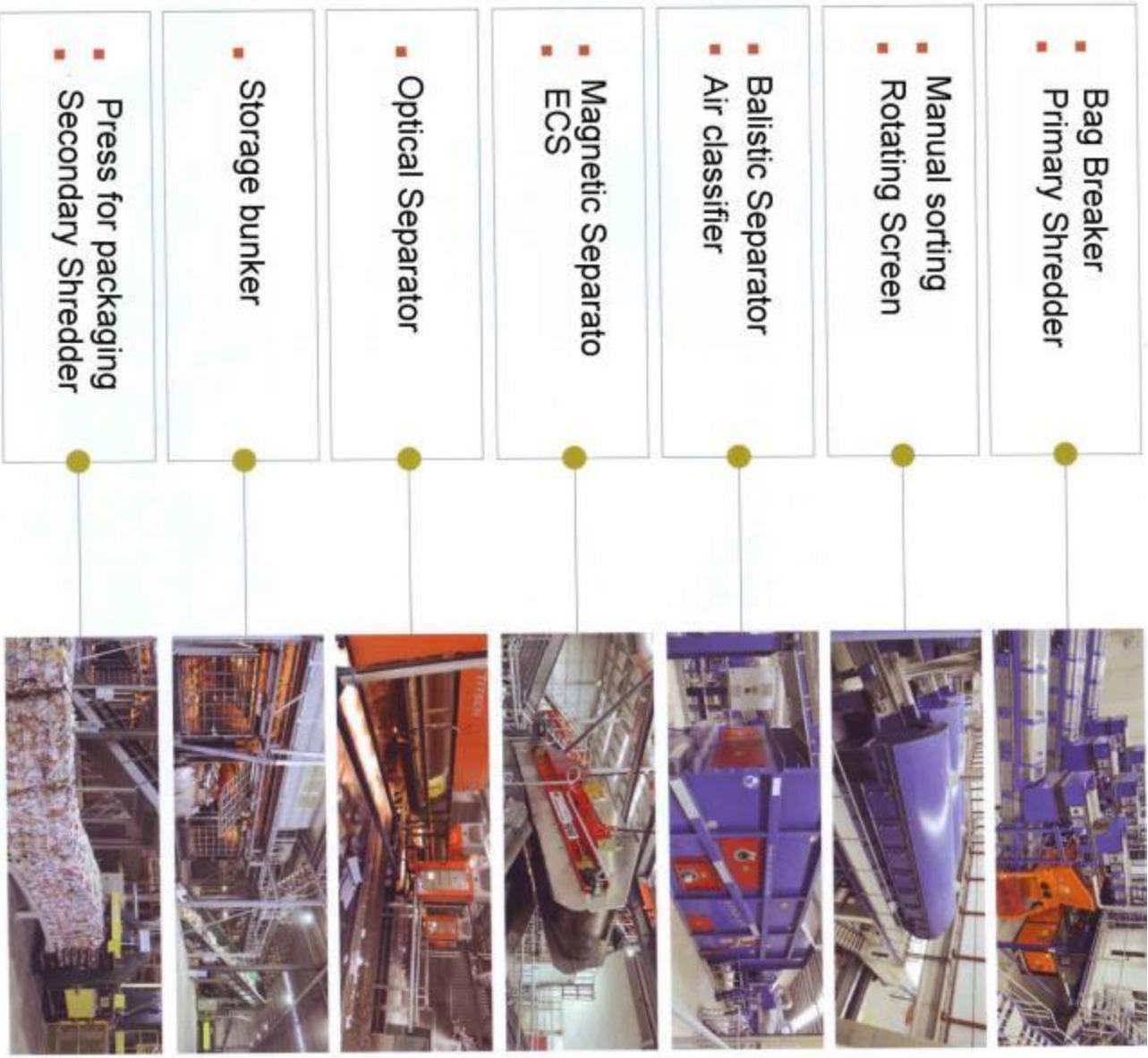
L3 - Manual Sorting (recovery of plastic, paper and glass)

The line L1, in its final configuration, is composed of two flows preset modular waste with a potential of between 15-20 t and h each of the two upstream processing activities.

The line L1, that work on two shifts of 6.00 hours each, can get to treat approximately 500-600 t/d (20 tons/h), it also allows the recovery of ferrous and non-ferrous material (mainly aluminum and band tin).

The line L2, provides for the stabilization of the organic fraction for the production of second quality compost.

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Description of the different units forming the plant.

Line L1

Acceptance Units - reception

The waste transported by special vehicles arriving to the system and is subjected to the control of weighing system, the quantity delivered by means of the weighing system is located nearby to the plant.

The handling of the waste within the reception will take place with the aid of a wheel loader and an excavator equipped with a grapple that allow, in addition to the two feed hoppers underground, to avoid the same power supply of waste side to successive stages of processing, as well as to pay particular attention to those games or utilities waste from areas that, based on the experience gained by the operator, present greater problems than the acceptance procedure established.

In the receiving internal relative to the line in question, the organic waste in coming to the system can be stored for not more than 3 days of production, to limit the production of leachates and avoid the beginning of the natural processes of fermentation. Normally these materials, if you do not have any particular problems of correspondence with the acceptance procedure, are discharged directly into the feed hopper of the line that can accept them.

The surface area available for receiving incoming waste to the line L1 is approximately 850 square meters more than sufficient to ensure an adequate "lung" and room for maneuver. In fact, having assumed a maximum stay time in that area of 3 days, it follows that, placed a maximum height of the heaps of waste stored 3 meters.

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The solution of the floor drain is preferred to discharge into the pit for hygiene reasons. In fact this solution, contrary to the classic pit of receipt, allows at the end of each day to cleaning and disinfection of the entire area.

The entire portion of the main building, dedicated to the operations of receipt of the organic fraction, is placed in a strong vacuum and the intake air is routed to the treatment system and odor removal. The entire reception area inside the shed is paved and drained.

Waste supply

The units is equipped with two hoppers load with capacity of about 80 cubic meters each, made of carbon steel sheets with a thickness of 5 mm and housed in a special compartment made of reinforced LSC deep about 1.80 m that are loaded by wheel loader or with vehicle equipped with grapple .

The volumes of the two hoppers have been identified to allow the operator time to good margins of the accommodation and the accumulation of waste in the areas of discharge or to make business trips.

On the bottom of each hopper is disposed a power supply to metal plates which has the task of picking the refusal to start it and to the subsequent treatment stages.

On the shores of each tape is placed a special type of comb dozer reciprocating movement which has the task of regulating the supply of the waste stream, and then to cause a leveling layer of the waste on the conveyor.

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Manufacturing process Units

The two shredders bag opener nature of MSW materials arrive undifferentiated ; function of shredders is , therefore, to facilitate the screening process and the next , at the same time , to produce the first loss process through the loss of moisture contained in the waste .

The material is triturated, first, subjected to a first magnetic separation that allows the recovery of the ferrous fraction and, subsequently, to a first sifting with oversize diameter 80 mm ..

The oversize is subjected to a further magnetic separation, with recovery of ferrous material, and an eddy current separation for the recovery of the fraction of aluminum and tinplate.

The undersize is sent to a further sieving with oversize diameter of 40 mm: the oversize of this sifting is brought back to the previous over screen while the undersize, consisting essentially of the organic fraction, the inert fraction of small diameter and light fraction, is subjected to the following treatments in succession:

- magnetic separation with recovery of ferrous material;
- gravimetric separation (ballistic separator)
- air classification and eddy current separation for recovery of aluminum;

in order to obtain a residual organic fraction to be sent to accelerated oxidation (line L2).

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Line L2

Description of the Units

In line L2 the bio waste fraction will be stabilized (organic fraction from municipal solid waste) through an aerobic process of accelerated oxidation.

The line L2 is positioned in a shed contiguous to the previous, kept in depression controlled.

Process of accelerated oxidation

Particular attention has been paid to the design of the section in the choice of accelerated fermentation and industrial equipment most suitable and most technologically advanced for the particular use.

The plant system adopted can be defined as "dynamic ventilated trench", in which are combined the movements of biomass being the bio-stabilization and the forced ventilation from the floor of the lanes.

The overturning of the material is secured by a machine compost turners that proceeds on rails arranged on the uprights of the trench.

The movement is of extreme importance in the treatment of the organic substance bio-oxidation; in effect, given the high initial moisture, the materials in processing tend to compact excessively during the first 3 weeks of the process.

The ventilation of the mass is ensured by the use of blowers. To optimize the supply of oxygen is provided for the division of the trenches in lanes, each of which can be invoked in a quantity of air injected at the same time different from that in the other, this allows you to ventilate the biomass to the optimal extent beyond the state of evolution in which is located along the reactor.

The system "trench " adopted ensures the complete automation of the step of biotransformation , and the " confinement " and the possibility of control of the materials in the process compared to other systems that use machines compost turners in equipped areas (possibility of mixing between them of materials stored at different times).

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The bio-oxidation reactor is housed inside a shed, completely closed thereby allowing accurate control of the atmosphere of the confined space.

The distribution of the material before the trench is provided a conveyor belt with tripper, arranged longitudinally. Said strip is in turn fed by conveyor from the processing department of the line L1. A compost turners, provides for the handling periodic (a complete overturning of the wards every day) of the material possessed, moving the pile of each lane of 2.0 m per day and moving successively from one trench to the next and back , once turned over the eight trenches , the first and so on.

The machine compost turners are constituted by a bridge crane which proceeds on rails arranged on the uprights of the trench.

The cumulus turning during each run pushes the product forward. The return stroke is the case without handling, with the car in an elevated position. The front of the gantry crane is equipped with a milling roller of the width of the trench.

The cutter operates scraping the material from the bottom of the trench. This is poured on an inclined conveyor which discharges the back of the wagon turner as these moves along the trench. The machine is complete with turning carriage sliding on rails used for loading and displacement of the machine itself by a trench adjacent to the other.

The cart is completing with electrical and cable reel for the power supply to the machine compost turners.

Each module of the reactor is equipped with a system of air insufflation consists of perforated pipes embedded in the floor of the shed.

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Two ventilation units feed the insufflation systems consist of two perforated tubes for each trench. The module bio-stabilization is divided into independent sectors in which the insufflation of air can be adjusted in a different way (according to the actual operating needs) and is a function of the amount of oxygen present in the heap; because the material in this stabilization has different needs as they carry out biological reactions .

It will be installed a heaps humidification system. Also in this case the system is sectioned according to homogeneous sectors to better adapt to different conditions of maturity.

In the network of humidification is possible to send both the leachate collected in the area of transfer / processing waste and that of oxidation , that water taken from wells or industrial type .

The card machines are given the technical characteristics and the main dimensions of the section of oxidation.

Maturation Section

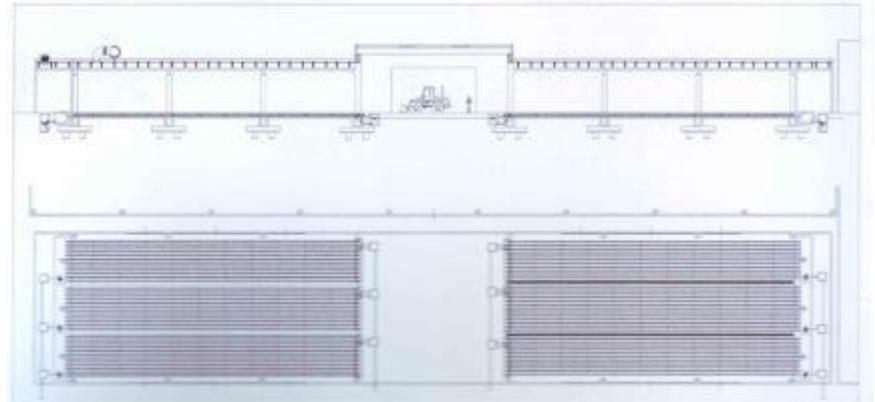
The material exiting the stabilization is started at the ripening stage in heap under a roof.

During this period, the complete stabilization of the product and occur as the main reactions of synthesis of organic compounds that lead to the formation of the compost of the second quality. The stabilization of the organic substance is capable of proceeding independently in biological conditions without forced ventilation systems.

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The Hague maturation is completely covered by a roof: in this way you will not have wastewater coming from precipitations on heaps. During the final phase of stabilization may be a loss of weight of the material due to the completion of the oxidative reactions and to further evaporation of water, estimated in the order of 10-15%.

The distribution of the compost second quality in this area takes place by means of a wheel loader that allows the creation of a uniform layer of material. During the vesting period of the material stored in heaps of average height of 2.4 m, is turned over with compost turners periodically, to prevent it from occurring again putrefactive anaerobic processes in the mass of soil improver. The useful area to be made available is approximately 5,000 m², even considering the necessary room for maneuver.



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Line L3: manual sorting

Downstream of the main screening, there is provided a manual sorting station. This station consists of a deck in metallic carpentry in which the workstations are provided, on opposite sides of the conveyor belt selection, suitable to accommodate operators, intended to operate on the latter to separate from the waste plastic, paper and glass and any non-recyclable waste materials.

The tape of selection, similar to that of power, will have a reduced operating speed (about 4 meters per minute) to allow operators to proceed to the manual selection of the materials.

The tape will be positioned approximately one meter from the floor deck in such a way as to give the easy removal of materials.

Upon completion of the structure there will be a stairway to the work plan and a protective railing height appropriate to the current regulations placed along the perimeter of the machining plane.

At the workstations will be used by the operator of the outlet channels for the assignment of the selected material (paper / cardboard) into the container.

In the spaces between the spacing of the columns of the deck will be placed containers for the collection of the selected material.

At the section of this manual sorting is a system for the extraction of any bags present in the waste to be selected.

Along the tape, downstream of the sorting station, there is provided an electromagnetic separator useful to shoot from waste ferrous metals that will be deposited in a special container.

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Downstream of the iron separator there is a pickup station of the lighter fractions (plastic and aluminum, in particular). This station comprises a suction duct that extends from the conveyor belt and flows tangentially into the upper portion of a cyclone abatement.

On the tape, downstream of the intake duct is, at this point, this only glassy material that is deposited in the container.

Non-ferrous metals and plastics from the cyclone come, however, via a conveyor belt to an eddy-current device that facilitates the separation of non-ferrous metals, mainly aluminum, from other waste. These metals are then collected in a special container.

The plastic, however, after being conveyed on a further conveyor belt, reaches the press used also for the packaging of the paper.



Recycling System

Manual sorting station



Ballistic Separator



Technical Description

Using the ballistic separator, a continuous stream of municipal waste - either separated waste or demolition waste - can be sorted into different fractions with different physical properties:

- **light and flat** fraction (flat materials), such as paper, fabrics, films
- **heavy** and 'rolling'-shaped fraction (rolling materials), such as tins, plastic bottles, stones, metals
- **fine** fraction, such as small parts and dust normally designated as waste, which, where so required, can be separated into a further 2 fractions

The machine is composed of a series of parallel blades moving in an orbital pattern, which are arranged so that they are tilted by approx. 5/15° to the horizontal. The speed of rotation of the blades huris the different fractions of the waste off on different trajectories.

Light fractions tend to head towards the top end of the blades whilst the heavy fraction tends to 'roll' towards their lower end.

During this process, the material is also shaken continuously and consequently the dust and 'fines' are screened through the perforated surface of the blades,

whose aperture size is chosen based on the desired size of the end waste.

In addition to the features described, which are common to all commercially available machines, the standard version of the SBA ballistic separator has 3 additional devices to further boost the already high separating efficiency:

- **bank of blower fans at the rear**, with variable speed, which blast the light fraction along quicker, and hence increase throughput
- **variable blade tilt**, adjusted either manually or automatically, so that their angle of incidence can be altered quickly when the material being processed changes. Note that in our machine, only the set of blades is tilted, whilst the actual machine housing and the hoppers underneath do not move. This means that there is no escaping dust, which is inevitable with other systems
- **greater blade length**, which means the material stays on them longer, and hence, for the same hourly throughput, screening is improved



Fans

Technical Description

Our dust vacuum systems usually feature *medium / high* -pressure fans with backward-bladed impellers, which are more efficient, in order to minimize energy consumption.

Where possible, the fans are installed downstream from the bag filter, so that dust or pieces of material contained in the stream of air are not sent through them.

Hence we can supply *medium* and *high* -pressure fans, designed for suction or delivery applications.

Belt drive or coupled *directly* to the motor.

A fan should always be chosen based on the theoretical pressure difference required, multiplied by a suitable multiplication factor:



Keeping the **sound level** down is usually a major concern, and this is achieved preferably by using larger fans with a lower rpm.

Options

- Antivibration mounts
- Compensator on delivery side and suction side
- Soundproofing housing

Use: *used in conjunction with our self-cleaning filters, they can simply extract dust from workplaces, or separate the air and product in pneumatic conveyors.*

Metal Slat Conveyors

Technical Description

- Modular construction using sturdy welded metal bars
- module 6000 mm or less
- High-resistance chains to standard DIN 8165
- Replaceable chain running guides
- Chains **fully inspectable** along entire length due to easily removed metal mesh guards
- SEW / Bontiglioli Riduttori drive system with swinging mount

Use: sorting plants, conveying waste with high specific weight, feeding balers or shredders.



Screws Conveyors

Technical Description

The dust removal screws, required to discharge dust when the size of the bag filter mean direct discharge into a rotary valve is out of the question, usually have a 'V'-shaped part flanged directly onto the dust collection hopper, while the remaining section is 'V'-shaped or 'tubular'.

Screw diameter, pitch and thickness clearly all depend on the quantity, nature and particle size of the dust. Where possible, we avoid installing intermediate supports, which can be hard to service if they come into contact with the product.

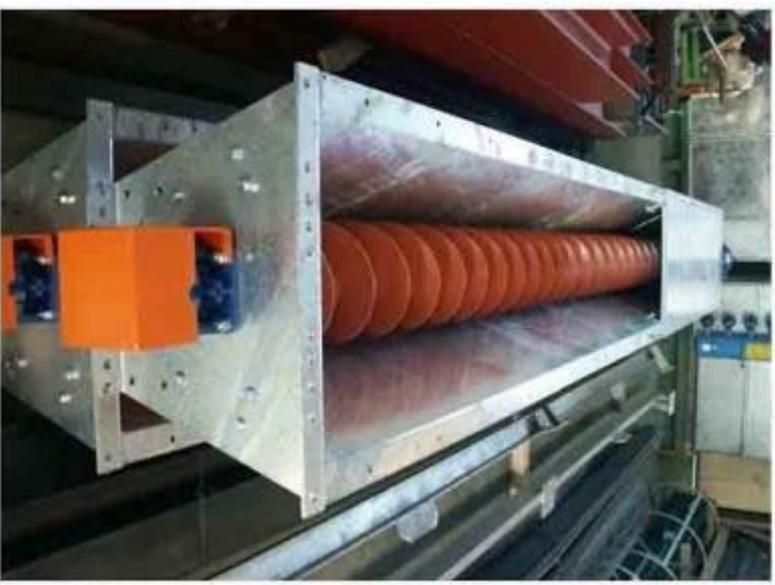
The conveyor is driven by a gearbox keyed directly onto the screw shaft.

The product discharge flange is usually coupled with a rotary valve.

Options

- Rotation control
- Inspection hatch on discharge
- Screw with dual feed direction for discharging in the middle instead of at the end
- Version with two or multiple screws for dust that tends to compact

Use: *To convey filtered dust to a collection container.*



Chain - Belt Conveyors

Technical Description

- Modular construction using sturdy welded metal bars
- Module 6000 mm or less
- High-resistance chains to standard DIN 8165
- Replaceable chain running guides
- Belt EP 400/3 4+2 oilproof rubber
- Chains **fully inspectable** along entire length due to easily removed *metal mesh* guards
- SEW / Bonfiglioli Riduttori drive system with swinging mount

Use: conveying waste, feeding balers or shredders.

