

BIOWASTE-COMPOSTING PROCESS

LINE COMPOSTING SYSTEM BioFIX

WE GET THE BEST OUT

SYSTEM BioFIX

The BioFIX system processes biodegradable waste in an automated and dynamic process to recycle it into a high-quality compost or produce landfill material complying with the legal requirements, laid down in the various directives.

Thanks to its modular design, different biological waste can be treated separately. Starting with two bins, an expansion of the number of bins is possible. Even the length of the bins is flexible. Normally, a length of approx. 48 m is used. Plants of up to 50,000 Mg/a and more can be implemented.

DELIVERY OF WASTE

Vehicles delivering waste are weighed, and the waste types, - quantities and - origins are recorded. Thereafter the vehicles are offloaded. Private and low-volume waste may be delivered to separate containers provided in specially designated areas, e.g. amenity sites.



THE BIOWASTE COMPOSTING PROCESS BIOFIX OF SUTCO® RECYCLING TECHNOLOGY

The biowaste composting process, known as BioFIX from Sutco, is implemented at the biowaste treatment plant. The facility handles separately collected biowaste and green waste as illustrated in the attached process diagram.

Waste is received in the flat bunker within the delivery hall, designed to accommodate up to two maximum daily deliveries. This setup provides ample space for wheel loader operations and unloading from waste collection vehicles, even when the organic and green waste is stacked to its maximum capacity. A preliminary visual inspection of the incoming waste is conducted in the flat bunker to identify and remove impurities. Waste batches with high levels of contaminants or impurities are rejected at this stage.

A wheel loader operates within the delivery area to either stack the waste in the delivery hall or transfer it to a speed-controllable scraper conveyor equipped with a bunker attachment. The waste then moves to an incline conveyor specifically for biowaste, followed by transport to a screening drum dedicated to biowaste.

The material passing through the screen is directed by conveyor belts to the Sutco mix shredder. Meanwhile,

the overflow from the screen drum is directed to a discharge belt for screen residue and then conveyed to a sorting belt. At the sorting platform, manual sorting takes place to remove contaminants and impurities, which are then collected in designated containers. The sorted material is subsequently fed into the mix shredder.

Pre-shredded green waste is introduced into an additional conveyor using a shovel loader. Inside the mix shredder, the screen overflow, devoid of contaminants and impurities, is combined with organic residues from fine processing and green waste. This combination produces a structurally rich, shredded composting material.

Beneath the mix shredder, the composting material is transferred from a discharge conveyor belt onto an ascending belt leading to the infeed system. An overbelt magnetic separator is situated on the discharge belt to extract ferrous parts from the waste stream, directing them to a separate collection container. Finally, the composting material from the mix shredder is moved to the discharge belt of the waste processing system, which then feeds into the input belt of the composting hall.



BioFIX DYNAMIC LINE COMPOSTING

The BioFIX composting bin reactors for intensive composting are built in a single-nave hall. Four double bins in modular designs are there for the throughput volume of the biological treatment plant. Each composting bin is divided into four composting sections and equipped with a slatted concrete tile floor which is used to aerate the composting material and to discharge the condensate and leachate water. The individual composting bins are served by one BioFIX turning machine and a travel carriage.

From the slewable feeding conveyor the waste material is transferred to the bin charging system with its charging bridge and the reversible and movable charging belt conveyor.

This conveyor automatically throws the waste material into the first section fields of each selected bin. The waste material remains in the fields under forced suction ventilation until the BioFIX turning machine turns it after approx. 2 to 3 days according to the required degree of composting. The bio-waste material is turned seven times and so moves to the end of the bin.



The BioFIX turning machine starts from the discharge traversing system and moves to the waste material on the top of bin walls via rails.

The loosening roller of the Biofix turning machine is lowered just above the aeration floor and scrapes into the composting material.

The material is loosened, crushed, homogenised and transferred to an inclined chain conveyor. The chain conveyor transports the composting material to a slewable chute. This chute discharges the composting material without compacting it. Using a load-controlled drive the BioFIX turning machine moves through the waste material. Once it arrives at its front, the material has been turned to the rear by approx. 5.5 m on an average. Thus, the charging area of the bay is free and can be filled with fresh composting material. The chain conveyor and the loosening roller are swung upwards and the BioFIX turning machine moves backwards onto the discharge traversing system. During the next turning process the composting material lying one behind the other is turned to

the rear in the same way. If the compost is on the end of the bin, the compost of the first 5.0 – 6.0 m is dumped to the rear onto conveyors in the discharge traversing system and brought to the compost collecting conveyor. This conveyor transfers the compost to the composting hall discharge conveyor which transports it to the post treatment. The discharge traversing system is also designed to move the BioFIX turning machine to the front of the selected bins.

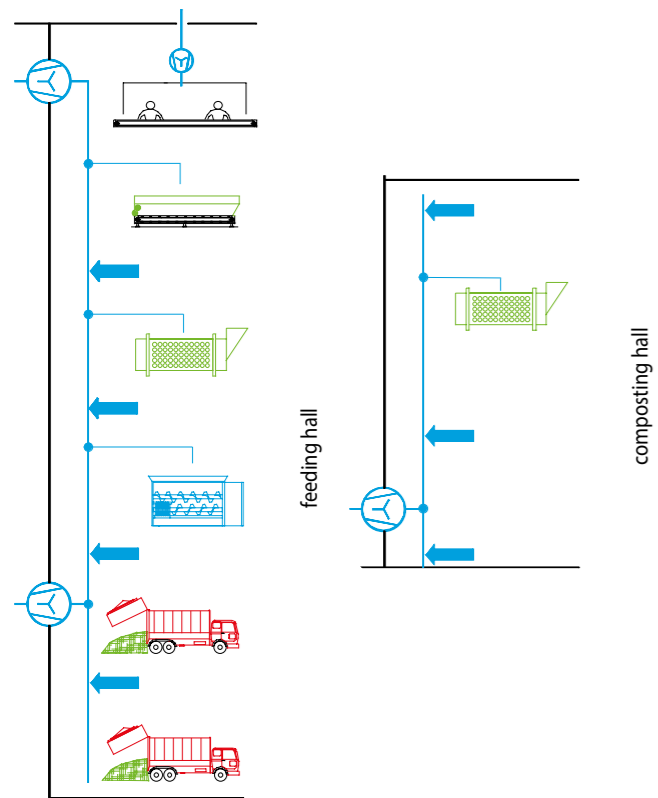


AERATION & EXHAUST AIR CLEANING

The aeration equipment as well as the exhaust air treatment are housed in a separate operational unit in the ventilation centre. The plant areas are extracted according to the legal provisions, using several changes of air. The exhaust air of the delivery and treatment hall is conducted into the composting hall so that as little exhaust air as possible escapes into the environment from the plant.

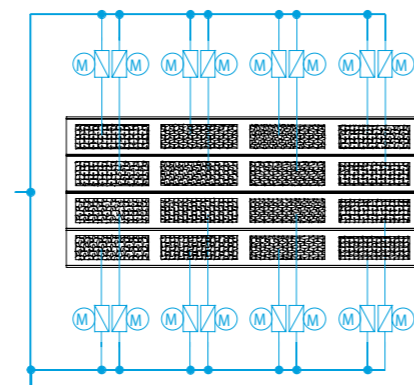
DELIVERY/TREATMENT HALL

The delivery and treatment hall use a central hall extraction unit and miscellaneous source extraction units. A radial fan in the treatment hall is used to deliver the exhaust air from the delivery and treatment hall during times when waste is stored in the delivery hall. A multiple change of air is ensured in the hall. The air supply to the delivery and treatment hall equalling the volume of the sucked off exhaust air volume is ensured by aeration rates openings.



SORTING PLATFORM

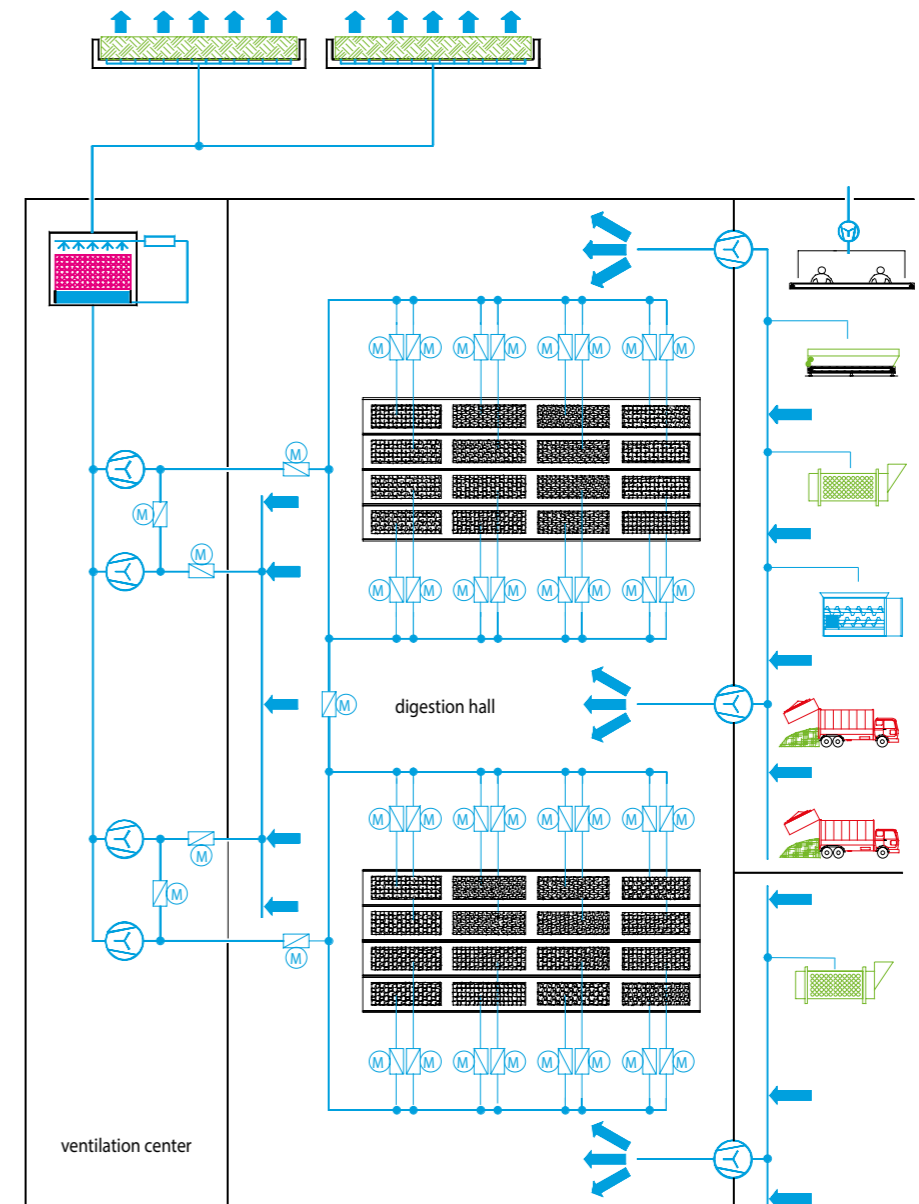
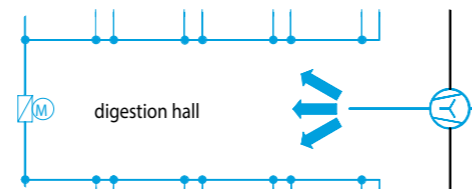
The sorting platform is aerated, using a fan and an air conditioner. Thus, it is ensured that the air speed on the sorting platform is 0.2 m/sec and the personnel has not to face the blow of air. The exhaust air is conducted to the delivery and treatment hall.



COMPOSTING HALL

The extraction of exhaust air in the composting hall is achieved through the downflow aeration in the composting bins and the extraction system within the hall. Venting to the composting bins is controlled as a function of the biological process, i.e. odour generated during the biological decomposition and CO₂ is continuously extracted.

The hall air extraction below the ceiling ensures a multiple air change rate in the composting hall in combination with the bin air suction. Supply air is delivered by a fan from the delivery and treatment hall or via over pressure louvre from the outside. A defined vacuum in the hall is ensured by a pressure control in connection with a speed control of the extraction air-fans in the hall.



COMPOSTING

To achieve maximum decomposition rates in the bio-waste material, best environmental conditions must be created for micro-organisms. To this effect, sufficient oxygen must be provided for the material to be composted among other things. Therefore, the aeration system is designed to adjust the optimum conditions in each section of the bin. During the individual composting phases the waste material is supplied with 6m³ air/m³ composting material/h on an average during the composting time. The waste material is aerated by downflow suction, and the venting process is controlled by a computer.

The aeration of the composting bins by downflow suction is via individually selectable aeration fields. The composting material lies on the ventilation tile provided with aeration openings apertures or slots. In the floor below these tiles the bin exhaust air as well as the

condensate and leachate water are collected. The bin exhaust air is delivered to the deodorizer, using headers and distributors. This is done by frequency-controlled radial fans.

Since this process water is collected together with the exhaust air, the aeration floors are provided with an individually adjusted longitudinal and cross slope. The headers and distributors of each aeration section are collected and the exhaust air is delivered to the ventilation centre. In each of the headers and distributors the air-temperature is measured to serve as a control factor. The volume flow for each aeration section can be separately controlled via motor-controlled flaps as a function in order to achieve the necessary temperature. The aeration lines have a defined slope to allow collection of the condensate water.

EXHAUST AIR CONDITIONING

Both the exhaust air flows from the composting hall and the composting bins are delivered into an air humidifier in the ventilation centre. The exhaust air is conditioned in the air humidifier by which the required humidity of the air is adjusted to 96%.



EXHAUST AIR DEODORIZATION, BIOLOGICAL FILTER

The biofilter consisting of several segments and installed in a closed hall is fed from the air humidifier. The exhaust air is delivered to the biological filter, using headers and distributors. To maintain the function of the biofilter, the filter material is changed periodically after 2 or 3 years. For such a change the filter aeration floor has a static capacity sufficient for lightweight wheel loaders.

may be used. The suitable aeration floor and the careful insertion of the filter material ensure a uniform flow through the filter bed. The biofilter material is charged to the aeration fields up to a level of approx. 1,5 m. While the exhaust air flows through this filter material, the required deodorization is made. The clean air above the biofilter is collected and can escape through an exhaust air stack.

In the exhaust air duct before the biofilter the temperature and the humidity of the air stream from the composting hall and composting bins as well as the pressure loss of the biofilter are measured and recorded again. In the biofilter the air flows through a filter material containing micro-organisms. As biofilter material, compost, fibrous peat, granulate of special clay or bark



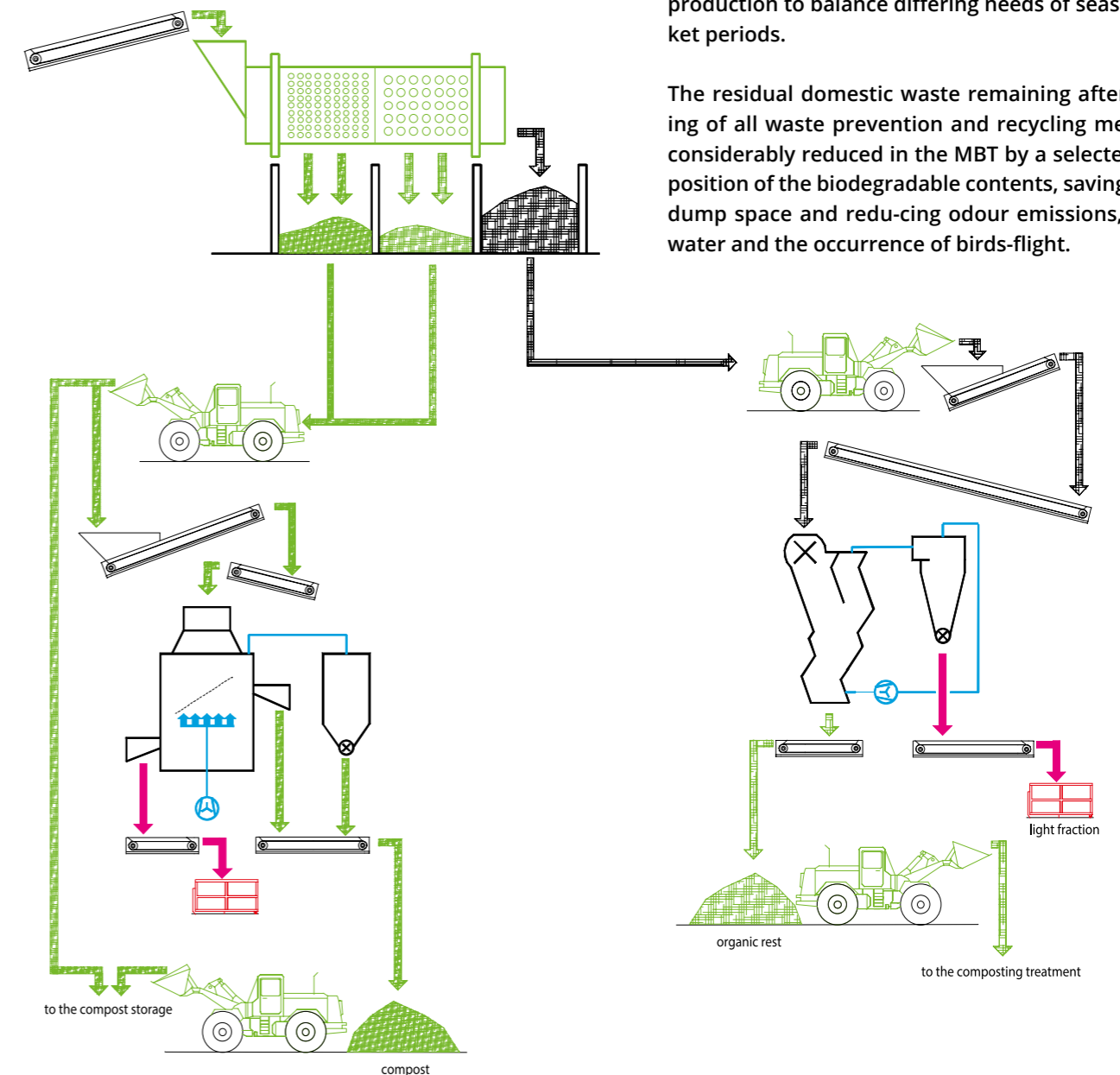
COMPOST TREATMENT & COMPOST STORAGE

The discharge conveyor from the composting hall feeds mature compost to the cocking-liver shaft flip flow screen. Depending on the marketing requirements, the compost is screened to the desired grain sizes, e.g. 15/25 mm. Screening residuals are thrown into a container and can either be returned to the composting process or must be landfilled after checking them for contaminations.

The screened compost can be sold or temporarily stored in the compost storage, without any further treatment.

In addition, special compost may be produced. To this effect, the screened compost fractions are fed online to the hard material separator destoner. After a separation of the compost and the rejects ("stones") special compost is discharged from the hard material separator destoner. Using the discharge belt, the rejects are dumped to a container and must be disposed of. After the treatment the compost of the different composting degrees and the qualities are marketed or temporarily stored in a sheltered compost storage. The compost storage has a storing capacity of a 6-month compost production to balance differing needs of seasonal market periods.

The residual domestic waste remaining after employing of all waste prevention and recycling measures is considerably reduced in the MBT by a selected decomposition of the biodegradable contents, saving valuable dump space and reducing odour emissions, leachate water and the occurrence of birds-flight.



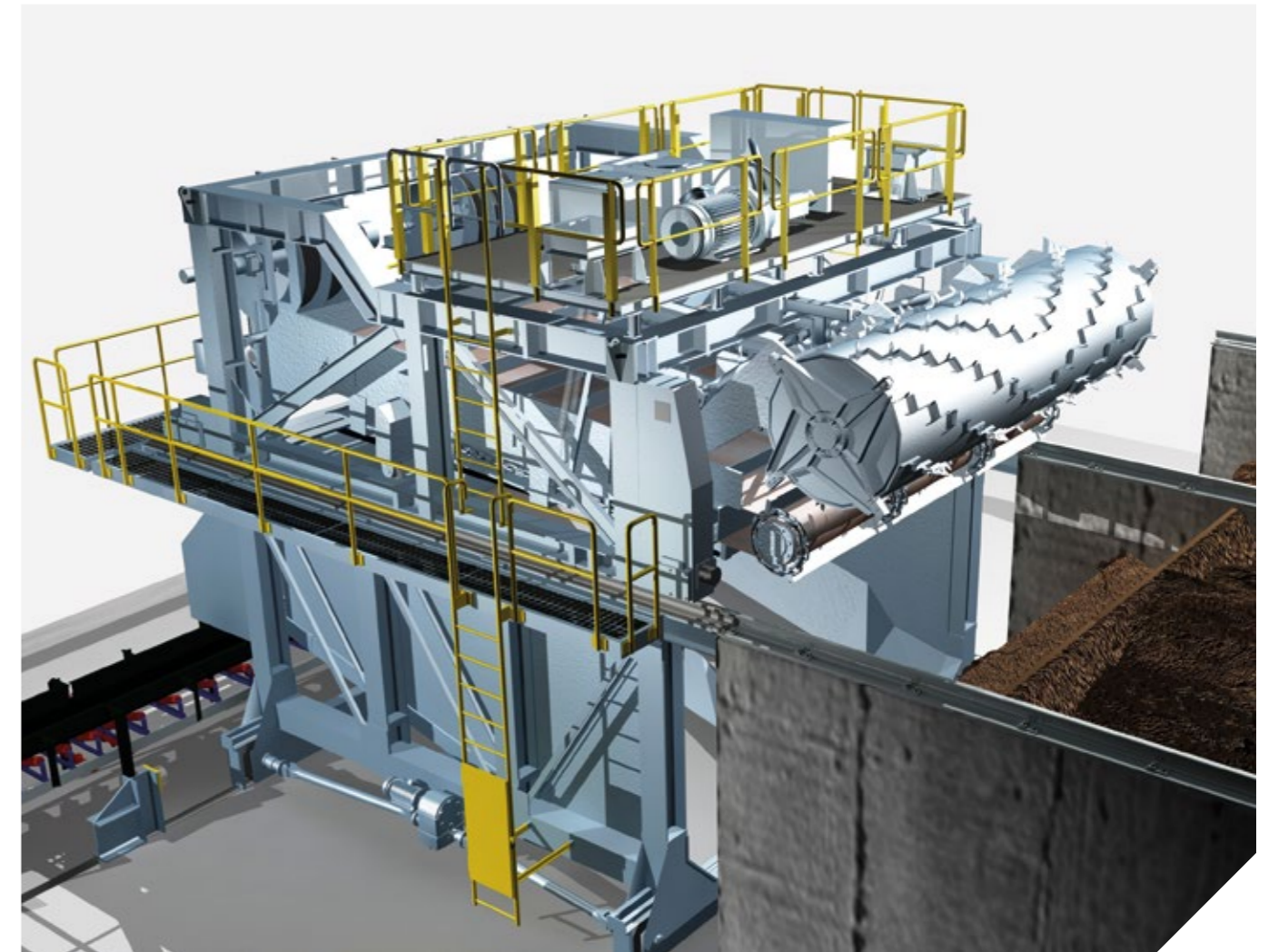
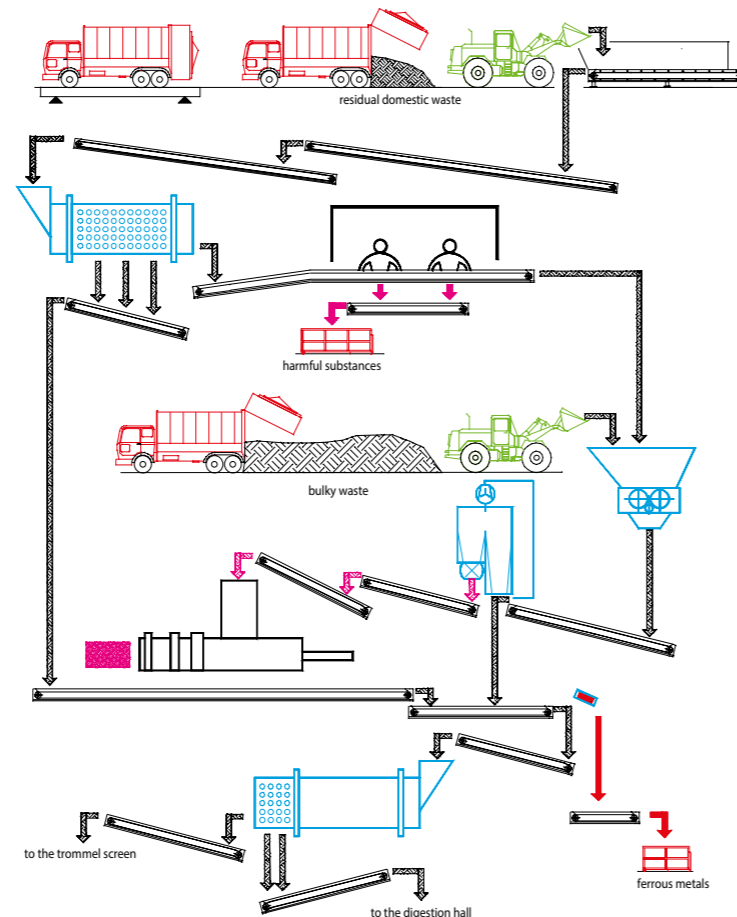
TREATMENT OF RESIDUAL DOMESTIC WASTE

BioFIX

Using wheel loaders, the delivered residual waste is conveyed to a feeding conveyor and from there into a trommel screen with a screening sector of 80 mm. The screen overflow 80 mm is conveyed through a sorting station where hazardous and reject material is sorted, and is then fed to a crusher.

Bulky domestic and commercial waste is directly fed into the crusher. The crushed material is passed to the air separator where a high calorific light fraction is separated as refuse derived fuel (RDF). This is pressed to form bales and designed for a thermal/energetic use. Together with the through material 80 mm of the trommel screen the heavy fraction passes a magnetic separator and is conveyed to homogenization trommel screen.

In this trommel screen the material is prepared for the biological stabilization by homogenization, and a fraction 140 mm is screened. The screen overflow is returned to the crusher, and the through material is charged to the composting area.



STABILIZATION OF THE WASTE

During the stabilization of residual waste the same Bio-FIX bin composting process is used as for the composting of biological waste. While high-quality compost is produced in the biological waste composting process, the stabilization of residual domestic waste is designed to decompose the biodegradable contents as far as possible to considerably reduce odour and leachate water emissions in the landfill and to lower its volume.

The pretreated waste is treated in the Sutco BioFIX bin composting process similarly to the biological waste composting process. When the material is turned by the BioFIX turning machine, the composting material and the parts which cannot be digested are fur-

ther reduced in size, resulting in an additional reduction of volume in addition to the loss by evaporation during composting. At the end of the composting period the waste material may optionally be dried by superfluous aeration. The largely stabilized material discharged from the dynamic bay composting process is discharged into containers and transported to the landfill to be built into it. For the air treatment during the MBT-process similar applications are used as for the bio-waste composting process, i.e. the exhaust air of the delivery and treatment hall is collected and supplied to the composting hall. The exhaust air from the bays and the composting hall is conditioned in an air humidifier, passed through the biological filter and discharged to the atmosphere via a stack.



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