

# Efficient Machine Solutions for Processing Waste Wood (Used Wood, Waste Timber, Wood Chips)

## 1 Background

In Austria, waste wood recycling is governed by a federal recycling wood regulation: the Recyclingholzverordnung (announced in Austrian Federal Law Gazette II no. 160/2012). [1] Accordingly, recycling waste – which includes waste wood – must be given priority over using it as a source of energy wherever possible. [2] The regulation aims to ensure that the recycling process for suitable waste wood does not harm people or the environment, and to prevent more pollutants from entering the product cycle. In particular, the regulation stipulates limit values, sampling processes, inspection obligations, and obligations to provide evidence.

In 2018, an amendment to the Recyclingholzverordnung (announced in Austrian Federal Law Gazette II no. 178/2018) was published, affecting companies that generate waste wood in the first place, the timber industry, and waste collection centers. As of January 1, 2019, waste wood in the substance category (which can be recycled) and in the thermal category (which can be burned for fuel) must be separated by companies that initially generated it or by waste collection points for subsequent collection (sorting at source). [3] Waste wood that belongs in the substance category includes boards, posts, roof timber, Euro pallets, plywood, oriented strand board, and chipboard. Among the many examples of thermal waste wood that can be burned for fuel are windows, window frames, doors, waterproofed waste wood from outdoor applications, wood fiber insulating boards. [4] If it is not possible to separate waste wood at the place where it is generated (such as a construction site), or if doing so would incur disproportionately high costs, the wood must be separated at a sorting plant approved for the purpose.

Improved sorting at source and amended requirements are designed to achieve higher standards of recycling and cut down on the amount of waste wood that is used as fuel. [5] One of the keys to this is ensuring that various waste wood fragments are allocated as clearly as possible to whichever usage cycle is most suitable for them. [6]

## 2 Waste Wood Mechanical Processing

In order to ensure that collected waste wood is allocated to the right usage cycle, proper processing is essential. In treatment plants, waste wood undergoes visual incoming inspection and manual presorting (using a grab crane, for example), before being shredded to the right size in a process called fragmentation. Next, screening systems create grain size categories that vary according to the requirements of the application (the chipboard industry, burning, and biological treatment are some examples). Metal contaminants such as screws, nails, and staples are separated using ferrous and non-ferrous separators. The secondary fragmentation process and an additional metal separation phase increase the quality of the end product. [7]

IFE Aufbereitungstechnik focuses on the basic processes of **vibration feeding**, **classifying**, and **sorting**.

### 2.1 Waste Wood Classification Using Screening and Sorting

IFE's screening and sorting technology is the perfect choice for generating fragments that are ideal for use in a variety of waste wood chip applications. The following IFE technologies can be used for this purpose:

- Linear and circular vibrating screens
- IFE sizers
- TRISOMAT flip-flop screens
- Waste screens and VARIOMAT double-deck waste screens
- IFE-SORT fine sorting system

IFE's extensive experience in a range of industries makes it easy to pinpoint timber industry solutions that use exactly the right technology for the job and make sound financial sense.

## 2.2 Case Studies Involving Screening and Sorting Technology

### 2.2.1 TRISOMAT Flip-Flop Screen as a Wood Dust Screen



Wherever there are deposits that would clog or jam conventional screening machines, these flip-flop screens provide outstanding results at high feed rates, even with small mesh openings. In the image shown here, the feed material is made of shredded, granulated waste wood with a grain size of 0–10 mm. Wood dust with a grain size of 0–1 mm must be screened and removed; fragments that are 1–10 mm are separated via an air separator into heavy and light categories before being supplied for use in panel production. The wood dust is blown into a heating plant as fuel.

Fig. 1: Flip-flop screen for separating wood dust from granulated waste wood

### 2.2.2 TRISOMAT Flip-Flop Screen for Control Screening of Chips



The feed material is made up of sawdust (40 tph) with a maximum length of 50 mm. The TRISOMAT carries out control screening at 8 mm – any grains that are larger than that are discarded from the production process. The TRISOMAT screen's unique 3-phase vibration technology ensures that the feedstock is quickly decompacted in the feed area itself and screened efficiently in the central area; it also ensures that intensive grain size limit screening is carried out in the discharge area. Maximum acceleration forces from the mechanical tension in the screen linings, as well as overstretching of the screen openings, ensure that screening is

carried out with virtually no blockages.

Fig. 2: Flip-flop screen carrying out control screening of sawdust with a feed chute for material distribution

### 2.2.3. IFE-SORT Universal Fine Sorting System for Generating Pure Wood Fragments and Metal-Rich Fragments



The IFE-SORT is a density separator based on a fluidized bed system for dry, fine bulk materials. This air sorting table uses a combination of vibration and air technology. Heavy particles are conveyed upwards by the vibrations, whereas light particles are suspended by incoming air and flow downwards. In the image shown here, the IFE-SORT is being used to generate metal-rich and pure wood fragments made from mixed waste wood (4 tph, grain size 0–20 mm). Factors such as the impact angle, amplitude, inclination of the perforated plate insert, speeds, and frequencies can be easily adjusted both manually and electrically, allowing them to be adapted precisely to supply requirements in order to achieve the best separation results.

Fig. 3: Fine sorting system used to generate various fragments from mixed waste wood

### 2.2.4. VARIOMAT Double-Deck Waste Screen For Processing Railroad Ties

The VARIOMAT resonance system on the lower deck works in harmony with the IFE waste screen on the upper deck – modeled on a tried-and-tested design – to create a double-deck machine that is in a league of its own.



The unique structure of the resonance system makes it possible to adjust the oscillating behavior of each individual crossbeam and ensures that the system continues to perform even at steeper gradients – for blockage-free screening perfectly tailored to the task at hand.

In the image shown here, the customer is using the VARIOMAT double-deck waste screen to separate shredded railroad ties (15 tph) with an initial size of 0–50 mm. The first phase separates fragments up to 30 mm from the rest, and the second phase separates fragments up to 10 mm.

Fig. 4: Double-deck waste screen used to separate shredded railroad tie fragments

### 2.3. Separating Metal Contaminants

Metal contaminants such as ferrous or non-ferrous metals (found in items including nails, bolts, and furniture fittings) negatively affect the quality of waste wood chips. In less serious cases, they merely contribute to increased wear on the machinery. However, large foreign objects can lead to production losses.

The IFE magnetic technology product range offers a number of suitable technical processes for efficiently separating ferrous and non-ferrous contaminants:

- Overband separators
- Magnetic pulley and drum separators
- Eddy current separators
- Magnetic plates and grids

IFE customized magnet systems are used in various applications to separate metal from waste wood. The extensive expertise possessed by IFE engineers helps customers to select the solution that is best suited to their application from both a technical and a financial perspective.

### 2.4. Case Studies Involving Magnetic Technology

#### 2.4.1. Non-Ferrous Separator and Vibrating Feeder for Separating Contaminants from Wood Fragments (aluminum, brass, corner fittings, nail plates, screws, nails, and residual ferrous sheet metal plates)



The centric eddy current separator pictured here (Type INP), with a working width of 2,000 mm, separates AlCu (brass) parts and residual ferrous parts from shredded waste wood with a grain size of 0–80 mm. In the process, ferromagnetic parts present in the material flow are transported along by the conveyor belt around the eddy current separator's discharge-side guide pulley and are thus separated as an individual category of fragments. Due to the various pole numbers and the extensive period of time that the material spends in the magnetic field, a high specific feed rate is achieved. Depending on the grain size, the cleaned waste wood is

used either in chipboard production or as an energy source in a combined heat and power plant.

Fig. 5: Non-ferrous separator used to separate aluminum, brass, other non-ferrous parts, and residual ferrous parts from waste wood fragments

#### 2.4.2. Semi-Mobile Eddy Current Separator for Processing Wood Chips and Waste Wood

This application involves the semi-mobile processing of up to 120 m<sup>3</sup> of wood chips and waste wood per hour.



The integrated bunker enables material to be loaded continually using wheel loaders; the permanent magnetic overband separator cleans tramp iron; and the eddy current separator separates aluminum parts effectively from the other material. The whole unit can be moved with a crane hook, giving the customer a highly mobile application that enables wood chip to be produced as efficiently as possible.

Fig. 6: Semi-mobile eddy current separator

#### 2.4.3 Magnetic Drum Separator for Separating Iron from the Wood Chip Feed

In this application, magnetic drum separator Type TPG – which has a working width of 1,200 mm – separates larger ferrous parts originating from upstream machines (such as trough chain conveyors) so that the parts do not enter the downstream drum dryer. If they did, they would fall on the heating steam connections from a great



height and cause significant damage that could result in the dryer breaking down (30 tph wood chip quantity, grain size 0–80 mm). The broken waste timber material is surrendered to the top of the drum by means of a feeding trough and sent onward by the rotary motion of the drum. The force of the stationary magnet system draws the iron parts toward the drum body. Non-magnetic material slides away from the drum body due to gravity and centrifugal force. At the same time, magnetic material is transported to the end of the magnetic material area and away via the splitters.

Fig. 7: Magnetic drum separator with accompanying feed chute

#### 2.4.4. Ferrous/Non-Ferrous System for Cleaning Waste Wood

Shredded waste wood that originates from the elevating conveyor and has a grain size of 0–150 mm is cleaned to remove magnetic material, using a permanent magnetic separator (MPQ 1100) with a crossbelt. A feed chute then sends the waste wood, which is evenly distributed, on to a centric eddy current separator. The waste wood is cleaned to remove magnetic material a second time using an IFE eddy current separator (INP-400x1500). Aluminum, copper, and brass are also separated out. Now perfectly clean, the waste wood can go on to be reprocessed in various products.



Fig. 8: Permanent magnetic separator, feed chute, and centric eddy current separator for cleaning waste wood

IFE is the only manufacturer that offers complete solutions in the product areas of conveying, screening, and magnet technology. IFE supplies the necessary expertise for designing and dimensioning custom solutions that are capable of processing all kinds of waste wood.

**Please note that, although due care has been taken when compiling this text, no responsibility is taken for the correctness of the information within it. In addition, the author assumes no liability for the content.**

#### References:

- [1] [https://www.umweltprofis.at/kirchdorf/aktuelles/nachrichten\\_detail/n/detail/News/neuerungen\\_bei\\_der\\_trennung\\_von\\_altholz.html](https://www.umweltprofis.at/kirchdorf/aktuelles/nachrichten_detail/n/detail/News/neuerungen_bei_der_trennung_von_altholz.html)
- [2, 4, 6] Altholzsortierung (waste wood sorting) folder, published by ÖWAV (Austrian Association of Water and Refuse Management) – only available in German
- [3, 5] <https://www.wko.at/service/umwelt-energie/recyclingholzverordnung-novelle-2018.html> – only available in German
- [7] [http://www.abfallwirtschaft.steiermark.at/cms/dokumente/10127247\\_135047763/35f4992a/006a-internetversion.pdf](http://www.abfallwirtschaft.steiermark.at/cms/dokumente/10127247_135047763/35f4992a/006a-internetversion.pdf) – only available in German