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Overview

- What are Composites?
- Where does Composite Waste originate?
- Disposal Problems
- The Result Process
- Economical Advantages
- Ecological Advantages
- Conclusion

What are Composites?

Composite are multi-layered components bonded by adhesives. They are used in practically all areas today.

Below a few examples:

Panelling

FR4 Base material for PC Boards

Punch Lattice

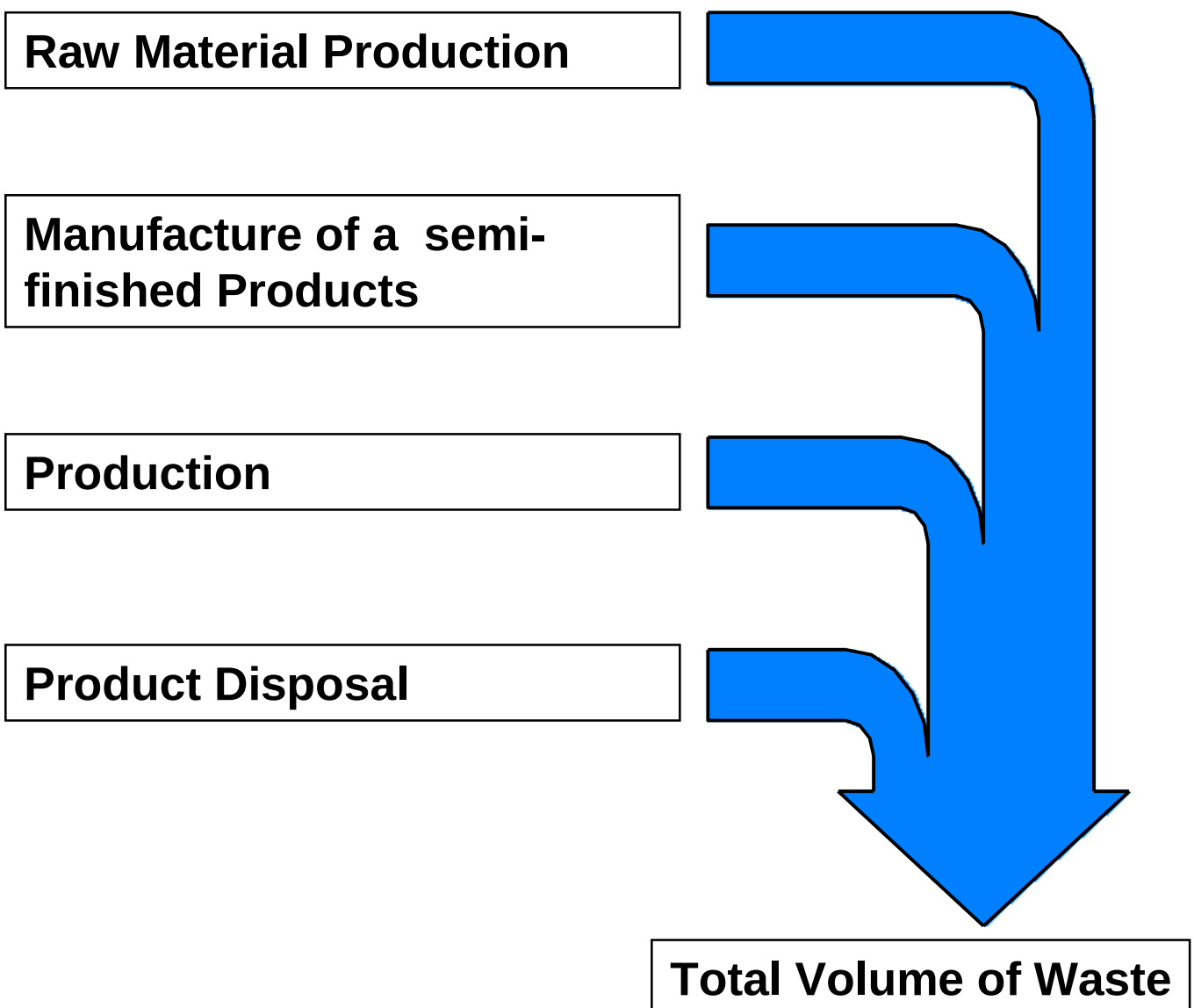
Electronic Scrap

Laminates

Alu Dross

Where does Composite Waste arise?

Composite waste arises in nearly every step in product manufacturing. Beginning with the raw material production, to manufacturing of semi-finished products, up to the production and manufacture of products and their disposal after use.



Raw Material Production

In the raw material production (smelting) of ore from metal, waste products such as dross and slag arise. Here an example of the production of aluminium from bauxite,

This composite type of residue consists of a metallic aluminium and mineral compound.

Manufacture of Semi-finished Products

In the manufacture of semi-finished products e.g. laminates (coated aluminium foil), production waste i.e. cuttings arise during the lamination process. This composite material waste consists of PE and aluminium.

Product Manufacture

In the manufacture of products e.g. printed circuit boards, cuttings of copper and glass fibre epoxy composite material waste arise.

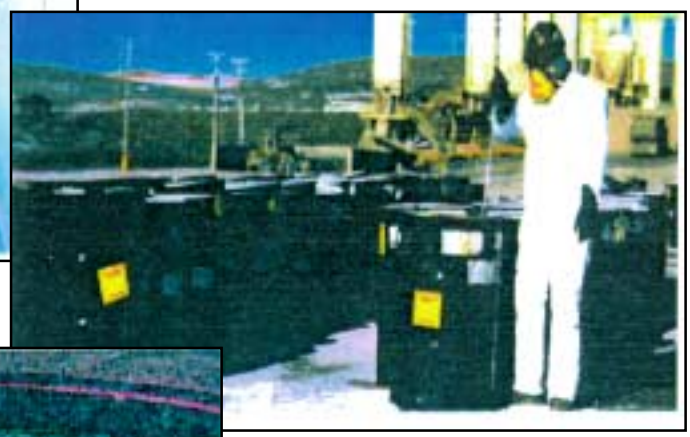
Product Disposal

At the end of its life a product such as a PC ends as electronic scrap which has to be disposed of. This scrap consists mainly of composite materials.

Disposal Problems

Composite disposal causes problems

Air Pollution



Ground Pollution

Water Pollution

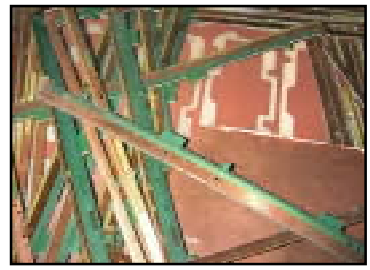
The majority of composite waste is disposed of in landfill or incinerators. With this type of conventional disposal, pollution to air, ground and water arises which has a considerable impact on the environment. At the present time, the resulting costs are not assessable. Thus, waste as a raw material source is being withheld from the economic cycle.

Result Process

With a dry mechanical process Result offers the possibility to delaminate and separate composite materials into single fractions, consequently making waste a resource for our industry.

Retrieving Material from Waste

The Result process enables industrial residue and composite waste to be delaminated and separated. The single fractions are returned to and used in the economic cycle.



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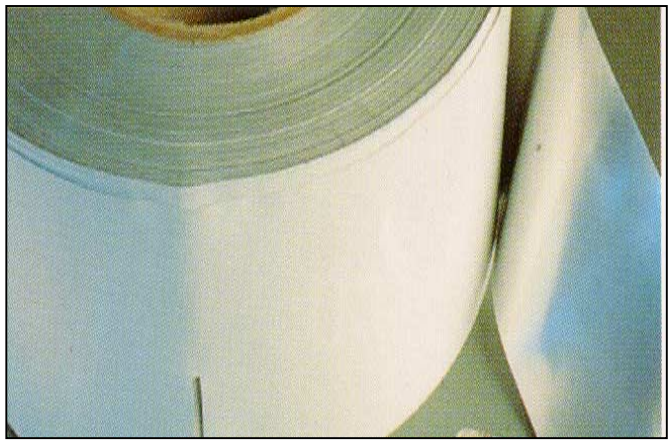
Process

Process Sequence



1. Pre-shredding

2. Delamination

3. Separation

Pre-shredding

Depending on the size and nature of the composite, a pre-shredding to a particle size of approx. 30 mm is carried out in one or more operations.

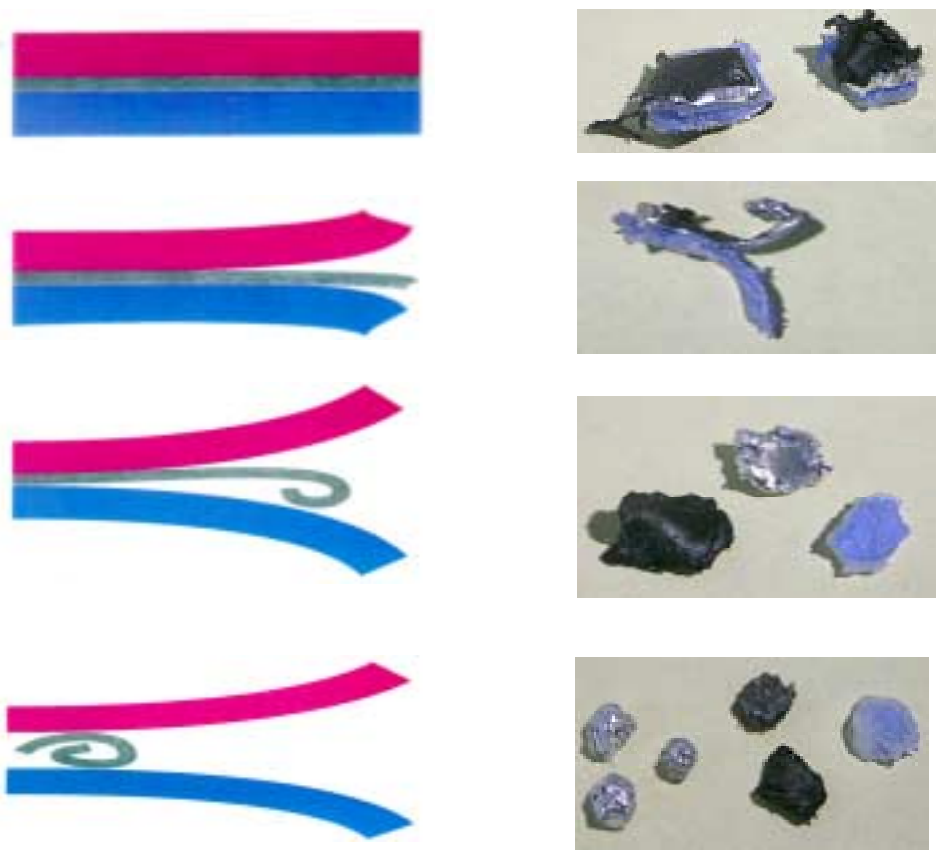
Delamination

The pre-shredded material is fed by a dosing unit to the accelerator where it is then delaminated.

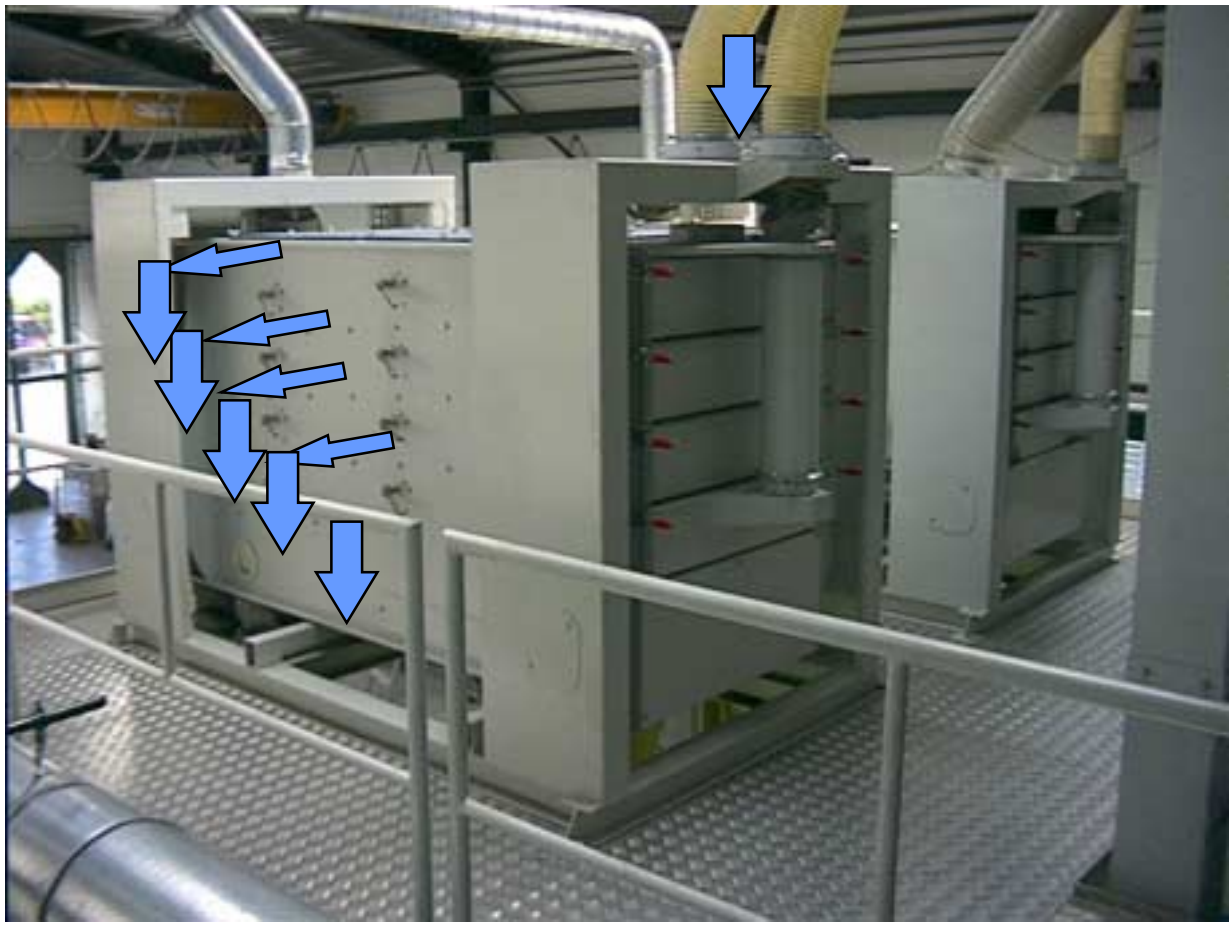
The Delamination Process

When the accelerator is operating, the rotor revolves at an extremely high speed. Air turbulences are created between the rotor tool edges and the stator tool panels which produce extremely high vortex or shear forces between the two tool interfaces.

As such, multi-layered composites are literally ripped apart along the different material phase boundaries. The process takes advantage of the different physical properties and reactions or behaviours of the various materials while in the accelerator. For example, metals deform into a globular shape, while plastics largely maintain their shape and structure (flakes).

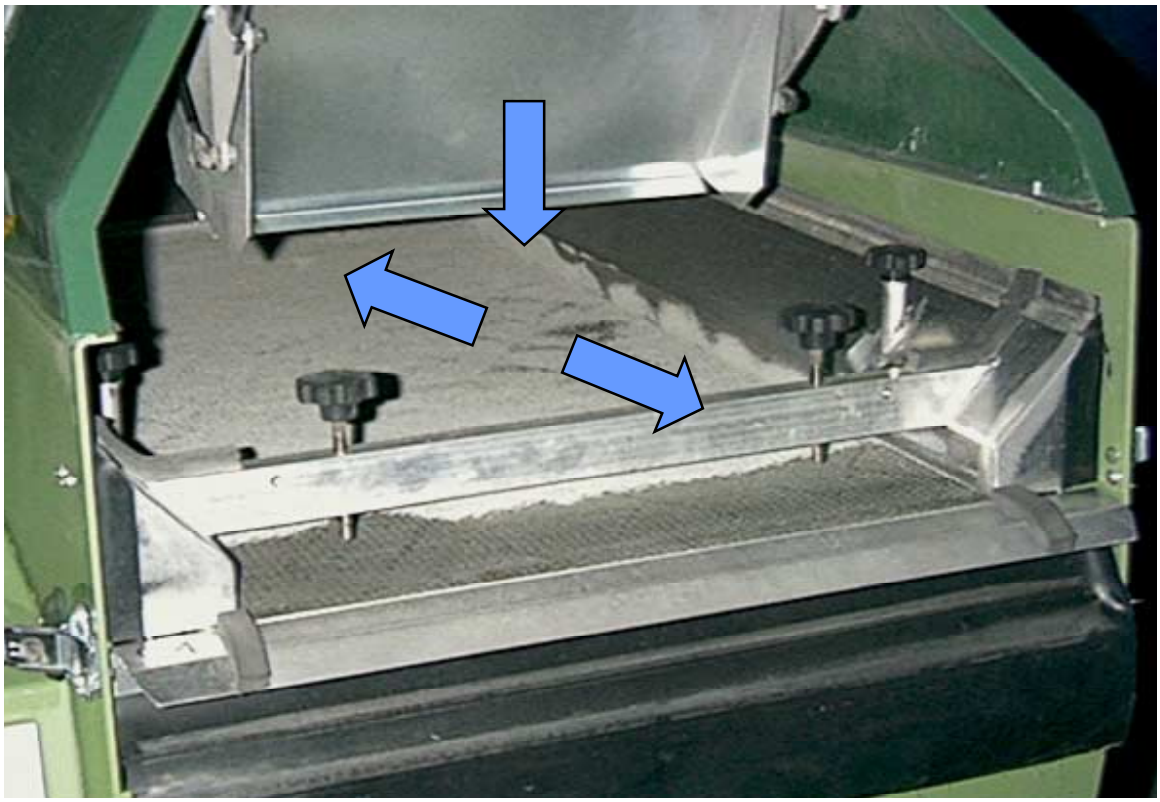


Separation by Sieving



In various sieve layers the delaminated material mix is separated according to size.

Separation with Fluidbed Separators



After sieving, the fractions are then separated into single components according to weight and structure.

Ecological Aspects

- No relevant environmental impact
- No use of fluids, gases or other additives
- No accumulation or creation of toxic substances or hazardous wastes
- Input materials maintain and preserve their original solid state during processing
- Low energy requirement

Economic Aspects

- High recovery rate of valuable substances
- High degree of purity and quality of recoverable output fractions
- High degree of flexibility to process a wide range of material
- Low labour costs achieved by high degree of process automation
- Low down-time for maintenance and service
- High energy efficiency which translates into low energy costs

Conclusion

This environmental friendly and economical process enables a multitude of composite materials to be recycled and consequently returned to the economic cycle, thus reducing the impact on the environment and resources.

Recycling Examples

Car Batteries

SLF-Shredder light

Tube Laminates

Telephones

Heating Pipes

PC Boards

Bottle Tops

Lattice

Electric Cable

Electro Scrap

Dross

Alu Composite

Car Tyres

Composite Foil

Plastic