Recycling Massivit 3D Materials

Introduction – Understanding Thermoplastics & Thermosets

Plastics are divided into two main groups: thermoplastics and thermosets.

1. A **thermoplastic** is a plastic polymer material that softens when it reaches a specific elevated temperature and solidifies upon cooling. Thermoplastic materials weaken rapidly under increased temperature, yielding a viscous liquid or melt. In this liquidous state, thermoplastics may be reshaped and are typically used to produce parts using various polymer-processing techniques such as injection molding, extrusion, or 3D printing.
2. A **thermoset** – thermosetting polymer, resin, or plastic – is a viscous, liquid prepolymer that hardens irreversibly when cured. Curing is induced by heat or UV radiation. Thermosets are generally stronger than thermoplastics due to their three-dimensional network of bonds (crosslinking). They are also better suited to high-temperature applications as they do not melt when heated.

Recycling Thermosetting Polymers

Once a thermoset has been cured, chemical bonds form that change the basic nature of the material and prevent it from melting. These chemical bonds are stronger than those found in thermoplastics and cannot easily be recycled or broken down after use.

The existing, technically viable recycling methods that can be used to dispose of thermosetting plastics comprise of mechanical, thermal and solvent routes. **Mechanical recycling** includes grinding and milling, and then using the material as a filler in new composite products. For example, old tires can be used as fillers in certain types of concrete. In a similar way, Dimengel scrap material or waste models can be used as fillers for new plastic production, or even as fillers for asphalt or concrete.

Sustainability with Massivit 3D Materials & Containers

Sustainability with Massivit 3D relates to 3 aspects:

1. **Handling of Raw materials**

The printing materials, in their raw state, are considered dangerous goods and should be handled and disposed of as such. However, this type of handling and disposal is not normally required as the material is packed in sealed pails and is consumed entirely by the printer. In case disposal is required. It is recommended to first solidify the resin by exposing it to UV light using a dedicated flash-light or direct sun-light. **The solidified polymer is considered non-dangerous**.

2. **Handling of Cured Materials**

The solidified plastic is considered **normal office waste** and can be handled and disposed of in the same manner as many other regular plastic wastes. It can be disposed of using regular disposal bins or recycling bins for code #7 plastics (" other") alongside other types of plastic waste.

3. Handling of Pails

The pails that contain Massivit 3D printing materials are made of **recyclable thermoplastic materials** (Polypropylene / PP / code #5 plastics) and can be treated according to local regulations for such materials. In case of material residue in the pail, simply expose the inner surface of the pail to sun-light and remove the material once cured.

Massivit 3D Printing - Other Sustainability Related Benefits

- Massivit 3D printers produce **hollow objects** with almost no need for support structures, meaning that a significantly lower volume of raw materials is used and there is **far less material waste generated**.
- The reuse of Massivit 3D cured gel is **energy efficient** as there is no need for high levels of energy to be applied (unlike the process required for thermoplastics recycling).
- Unlike biodegradable materials, the cured Dimengel material has no negative influence (such as soil pollution or ground water pollution) on the environment.
- Being an Additive Manufacturing technology, Massivit 3D's Gel Dispensing Printing provides other inherent environmental benefits, due to the fact that it almost solely makes use of necessary material, thus reducing waste, waste disposal costs and any associated carbon footprint. In addition, printing on demand, on time and on premises reduces the carbon footprint.

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