PRODUCT

CATALOG

2019 - 2023

Interreg North-West Europe TRANSFORM-CE

European Regional Development Fund

A collection of recycled plastic products created throughout the TRANSFORM-CE project

Introduction

TRANSFORM-CE is an international research project about the uptake of recycled single use plastic (SUP) feedstock. A core part of this project is to provide in-depth business support to businesses willing to use recycled plastic materials in (new) products. In line with the technologies of the pilot plants from the TRANSFORM-CE project, cases will represent either Intrusion-Extrusion Moulding (IEM) technology or Additive Manufacturing (AM) technology.

Products

Throughout the TRANSFORM-CE project and business support cases, several products have been (re)designed. These products will be showcased in this document.

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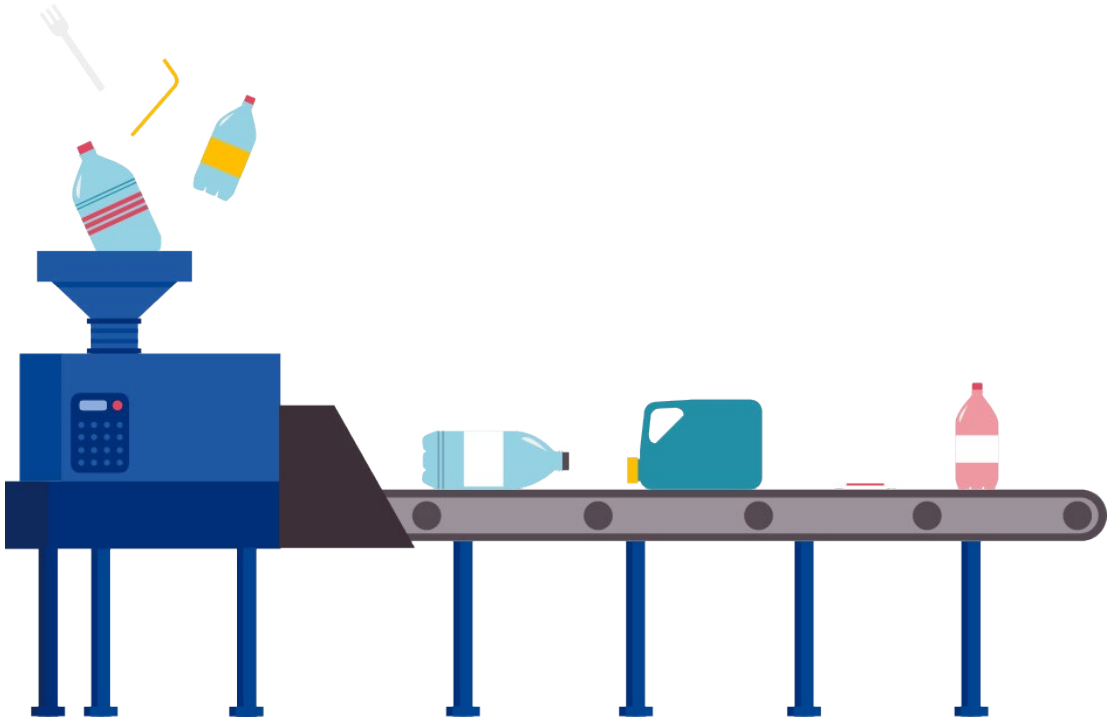
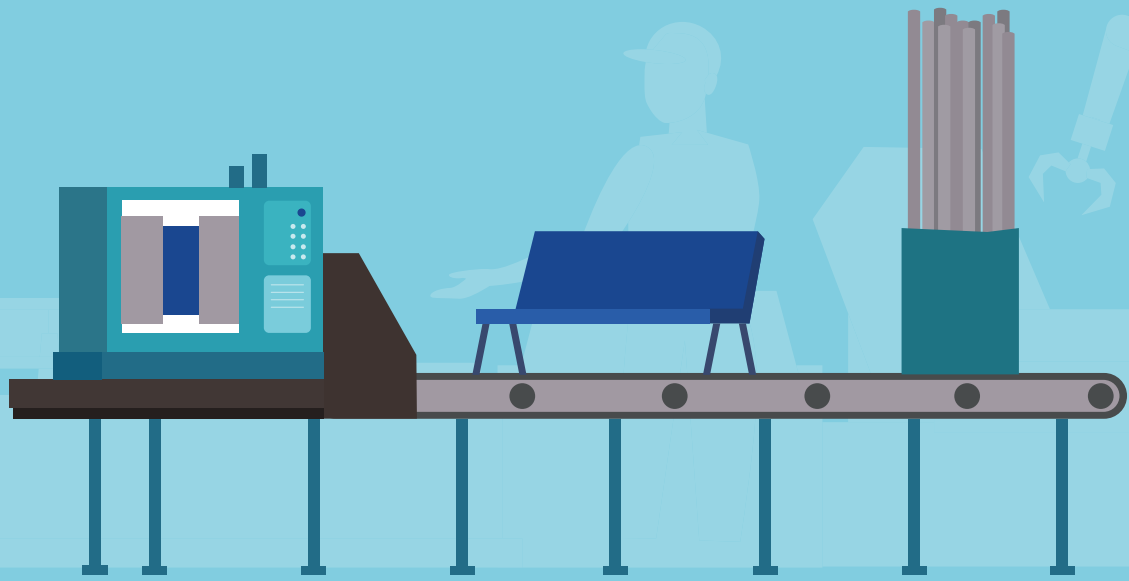


This research has been conducted as part of the TRANSFORM-CE project. More information about the project can be found on: **www.nweurope.eu/transform-ce**. TRANSFORM-CE is supported by the Interreg North West Europe programme as part of the European Regional Development Fund (ERDF).

Intrusion Extrusion Moulding (IEM)

With intrusion-extrusion moulding (IEM), low-value plastic waste is converted into new products. The batch of mixed plastic waste is agglomerated (grinding foils to form plastic 'chunks'), melted and extruded into a hot plastic clay, which is then pressed into a mould to form new products. The products created with IEM are specifically used for thick-walled objects in outdoor spaces. They are thus heavy, solid products, saving a lot of material from incineration or landfill.

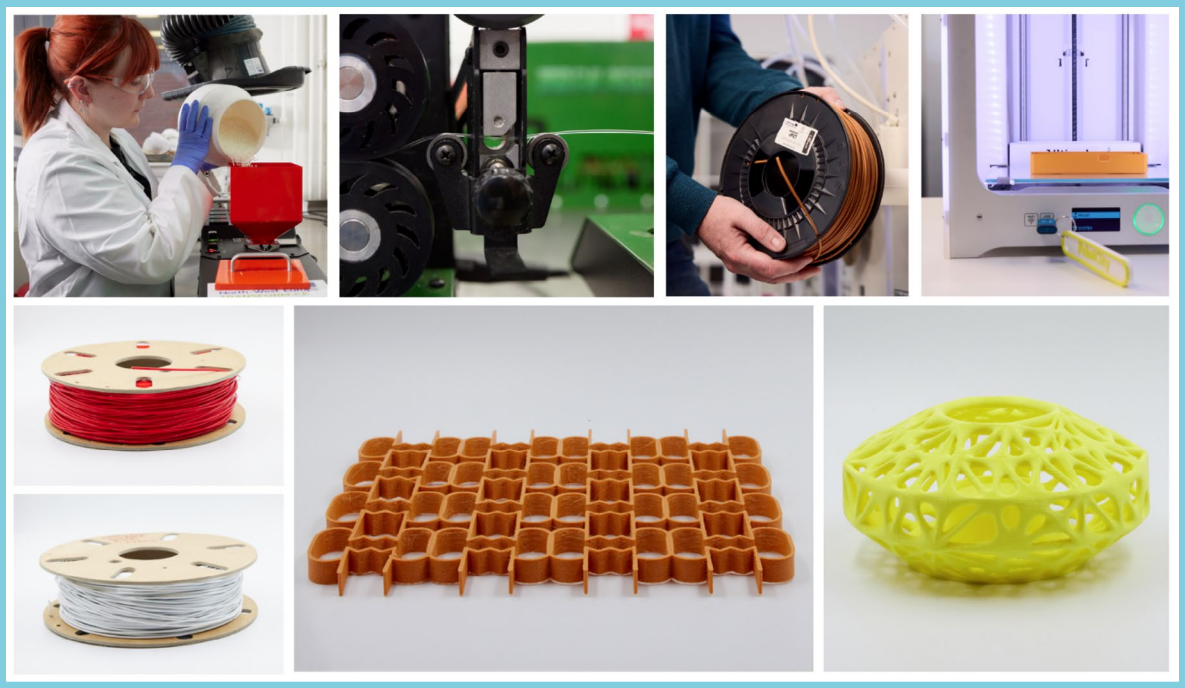
The Green Plastic Factory uses IEM technology to make products that will last 40 years. At end-of-use, products can be returned to the factory, shredded and formed into new products, with the possibility of recycling products up to ten times. Excess material from the production process is also re-used in the next production cycle.

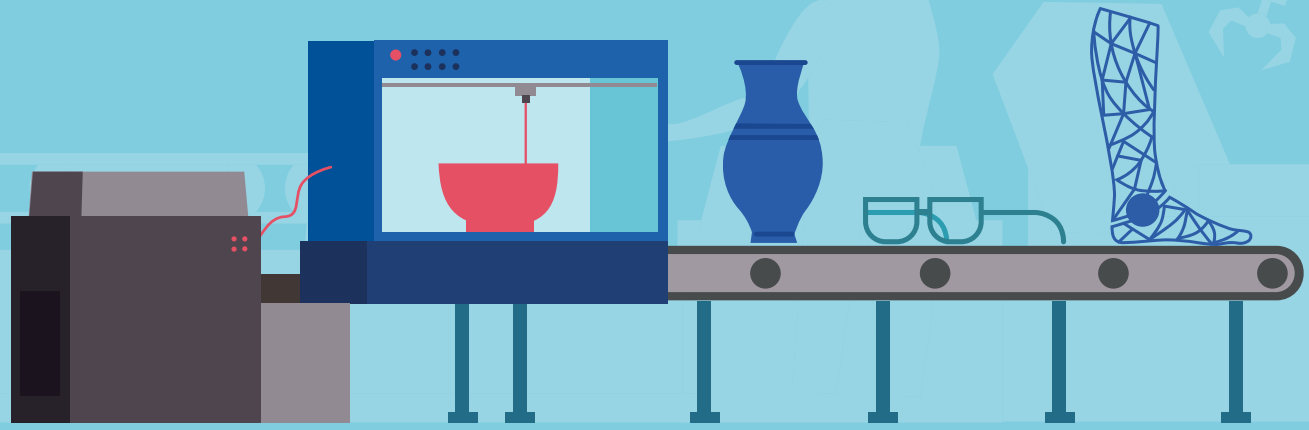


Additive Manufacturing (AM)

Additive manufacturing (AM), also known as 3D printing, is a process in which materials are built up layer by layer to create an object. The process starts with designing a three-dimensional (3D) object using computer aided design (CAD) software. The digital 3D design is then divided into many two-dimensional (2D) layers using slicing software. These layers are then sent to a 3D printer, instructing it where to lay down material in order to build up the finished object, one layer at a time.

A filament (long strand of material) is used to build up these layers. In this project, filaments are created from recycled plastic. In the AM facilities, sorted plastic waste is shredded, melted and extruded into long strands, which are then winded around a spool. The spools can be loaded onto a 3D printer to create new products. Misprints or products at end-of-use can also be reprocessed into new filament.





Used materials: Low quality plastic waste (eventually island waste)

Used Technology: IEM

Created for: Searious Business

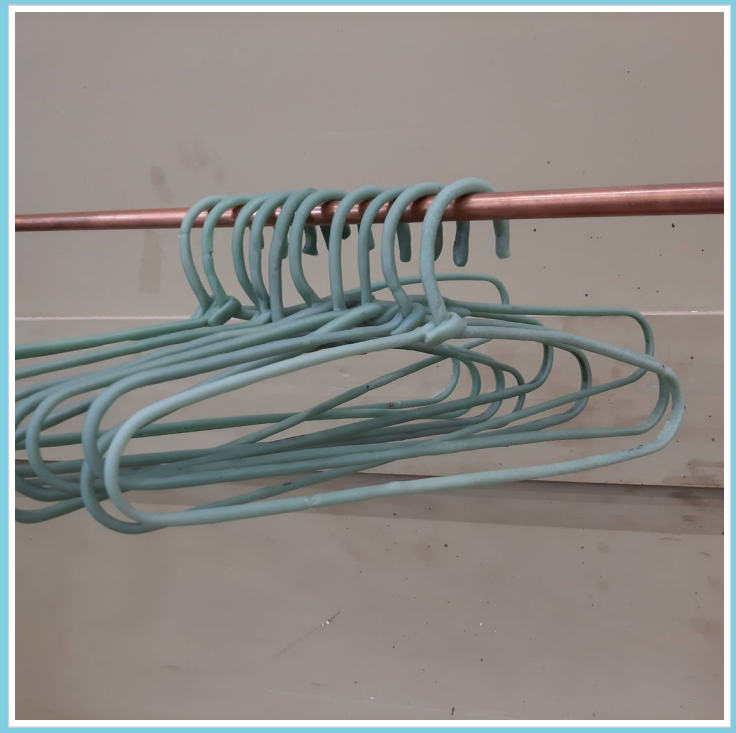
BEACH BENCH

A circular beach or park bench to be manufactured locally from plastic waste collected on pacific and carribean islands has been designed. The bench is modular, easy to (dis)assemble, durable, recycable and has been designed in a way that it can be produced with the IEM technology, locally and with local waste. The technology enables a local use of the mixed plastic waste that would otherwise be thrown in landfills or incinerated.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: n/a



COAT HANGER

Coathangers produced in a new way with a low cost DIY extruder. The manufacturing method is guiding a flow of molten plastic direct form the extruder along a laser cutted wooden mould. More experience and craftmenship gives better results.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: n/a

PLASTIC HOUSE

In the Netherlands, there are huge shortages of building materials and a lot of housing is needed. With the vision that waste plastic can also be used as a building material, Save Plastics teamed up with engineer C. Tadema to take on the challenge of building a plastic house. Using large plastic blocks made in the green plastic fabirke, a house was built at the Floriade Expo 2022 in Almere using these waste plastics as a base.

Used materials: Recycled PLA filament

Used Technology: AM

Created for: Reflower

FLOWER ARRANGE-MENT INSERT

The re-designed product is an arragement tool for artifical flowers in a vase. Some tests were done to find a replacement for the unsustainable oase material that is being used at the moment. The goal was to 3D print a design with recycled PLA filament. The 3D file is just a 'simple' cylinder, but there are some slicing settings to create a special infill which gives the right functionality.

Used materials: Recycled PLA filament

Used Technology: AM

Created for: Badger Energy

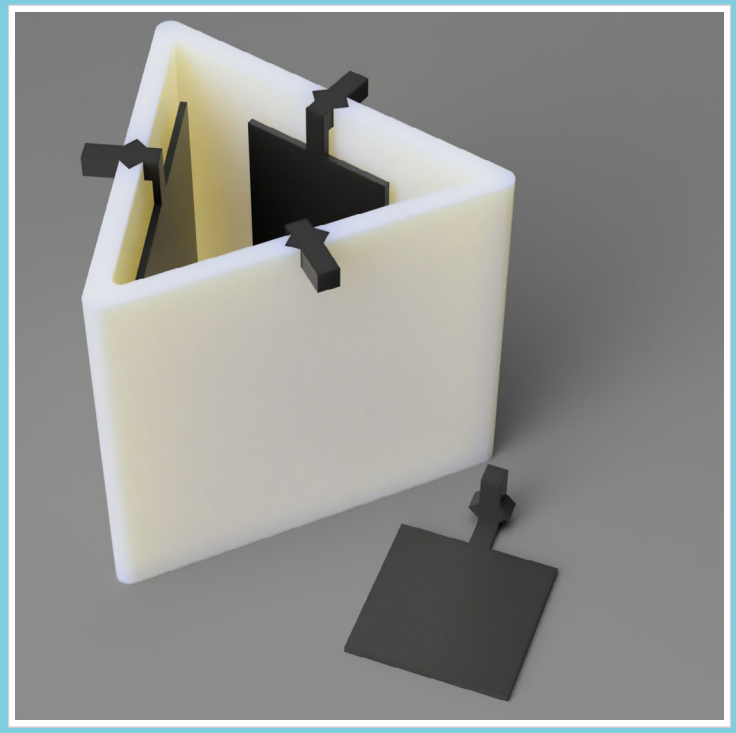
EV CHARGER FACE PLATE

Badger Energy Ltd supply and fit self-contained EV chargers, which include an EV charging unit and a clip-on fascia. Currently the charger and fascia are both manufactured in China, using virgin plastics (assumed ABS). In the future, Badger Energy Ltd would like to have the fasciaís manufactured locally (Manchester or UK) using recycled plastic, which they believe will create a key USP. They would also like to redesign the fascia so that can be retrofitted onto the existing charging point. The support provided through TRANSFORM-CE has centred around the plastic fascia of their existing EV charging point, which was rede-signed and optimised for mass manufacture.

Used materials: Recycled PLA filament with additives

Used Technology: AM

Created for: Aquacheck



LEAD IN WATER SENSOR

Building on the smart meter technology, Aquacheck Engineering Ltd wish to develop sensors that can monitor levels of lead present in water. Traditional methods of sampling water can be limited (and expensive) due to the time and expertise required, resulting in disparate sampling across networks. Aquacheck Engineering Ltd would like to develop a simple sensor that could be used with little/no training, with readings provided via an app. As this could negate the time and expertise required by traditional methods, Aquacheck Engineering Ltd hope to significantly reduce the cost of each sample, meaning that more samples can be undertaken in the same time frame. This saturation of samples across a water compa-niesí network could help identified hotspots, from which water companies are be able to focus their remedial/replacement works. The supported offered through TRANSFORM CE was to develop an easy-to-use mechanism by which concentrations of lead could be measured in-situ.

Used materials: Recycled PET and PLA

Used Technology: AM

Created for: ICC GmbH

FLOWER POTS

With part of the financial means generated by the sale of the products in Germany, ICC GmbH supports its African partner in Uganda in the set-up of their own business in the field of plastics recycling. Thus, ICC and their partner are jointly creating jobs and perspectives for people at eye level. Especially in countries where waste separation is low or almost non-existent, the production of filaments (as done through TRANSFORM-CE) makes a significant contribution to the circular economy and create added value. The products printed with the Filaments from TRANSFORM-CE are Flower Pots and Bookmarks and some simple jewelry.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: Nedal

MAST TILE

More and more electric cars are seen on our roads these days. Because of this, more charging poles are required. When a new charging pole is placed in the sidewalk, a tile is required to finish the street neatly, allow the charging post to connect neatly and ensure no weeds grow along the post. This circular charging post tile was developed together with Nedal aluminium by Save Plastics.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: Municipality of Doetinchem/BUHA

PAVEMENT TILES

Municipalities have increasing problems with their plastic waste. There are also challenges with paving in many inner cities. Doetinchem municipality has piloted a circular paving clinker made from waste plastics.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: Dailycabin

FACADE PANELS

Facade panel made of waste plastics can be used to clad a facade. This not only protects the facade from weather influences but also provides a high-quality appearance. Daily cabin uses the facade panels from the green plastic factory to build tiny houses and holiday homes.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: n/a

TREE POLE

A pole to support young trees in the growing process against wind and other damage. These poles are usually made from wood which can easily be replaced by recyclable IEM materials.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: n/a

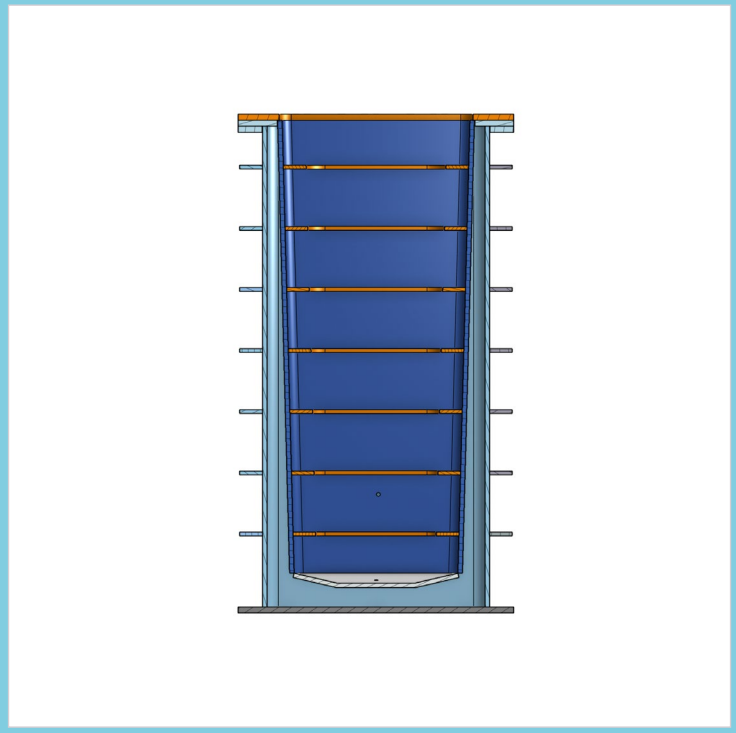
GREEN WALL

To green inner cities and thereby cool them down, Save Lodge can build green walls with stackable flower boxes that can be placed against a faÁade or serve as a yard barrier. These bins are made in the green plastic factory.

Used materials: Low quality plastic waste

Used Technology: IEM

Created for: 20302050



RAIN BARREL

A circular rainbarrel made with the IEM technology has been designed. The rainbarrel is supposed to be used on the sidewalk at residential housing. The IEM technology enables the use of mixed plastics and innovative techniques have been used to bend the plates produced with the IEM technology.

Used materials: Recycled PLA filament

Used Technology: AM

Created for: 3DPW

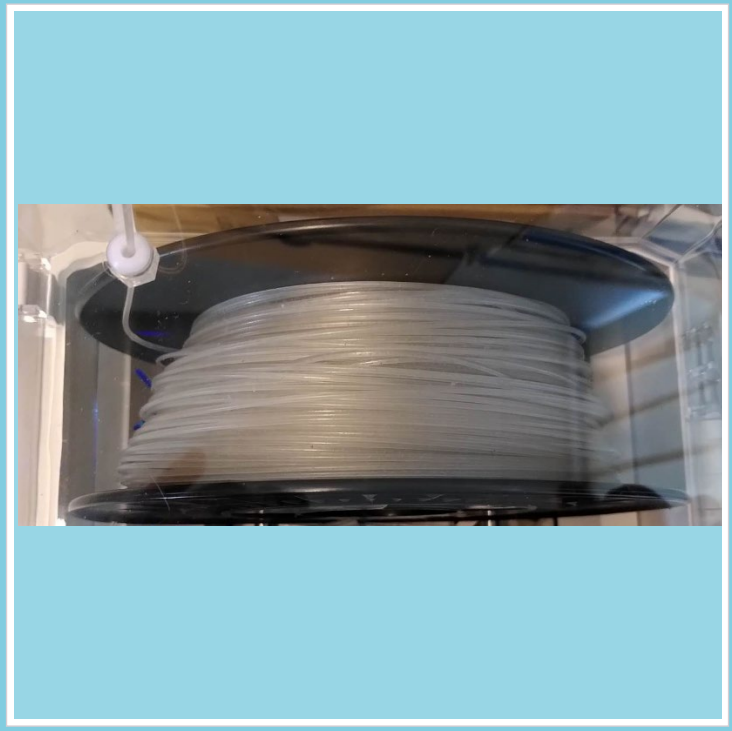
PLA FILAMENT

3DPW limited provides a tailored service that collects and recycles FFF (fused filament fabrication) 3D printing waste from various customers ranging from dedicated 3D printing service providers to schools, universities, and other organisations. The resultant recycled pelletised material is then sold onto manufacturers and injection moulding firms as a sustainable feedstock. Whilst the use of the recycled pelletised material does improve the circularity of secondary manufacturing system (which takes it up as feedstock), it does not contribute to closing the loop on the initial 3D printing system, which is reliant on input filament sourced from other value chains. To close the loop, 3DPW limited wanted to explore the idea of turning the 3D printed waste back into 3D printing filament, thus potentially recirculating the materials within the same system.

Used materials: Recycled PMMA filament from show-room glass lenses

Used Technology: AM

Created for: Re-vert



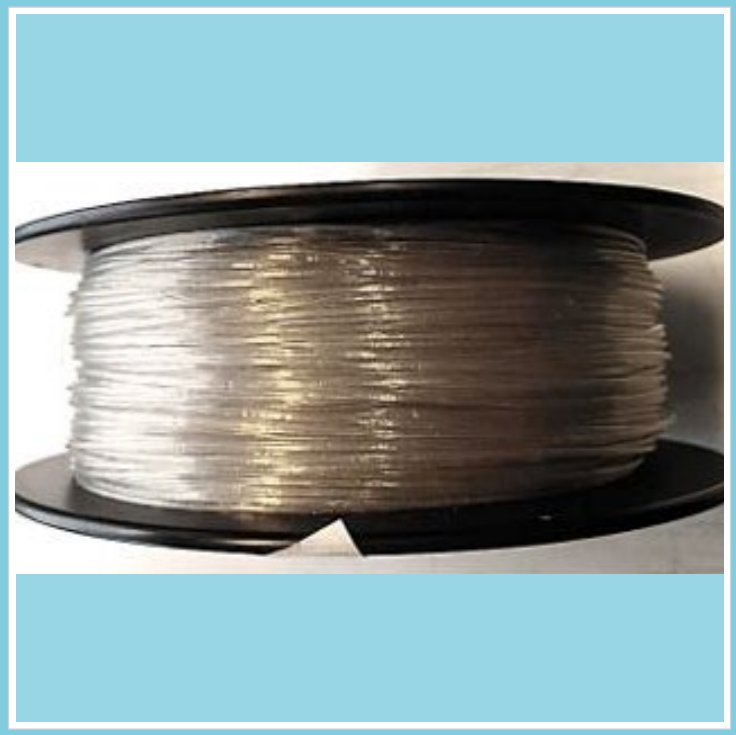
RPMMA FILAMENT

Printable recycled polymethylmethacrylate filament, manufactured from shredded PMMA show-room glasses lenses, first recycled PMMA filament on the market.

Used materials: Recycled PET filament from punnets for reptile's food

Used Technology: AM

Created for: Archireel



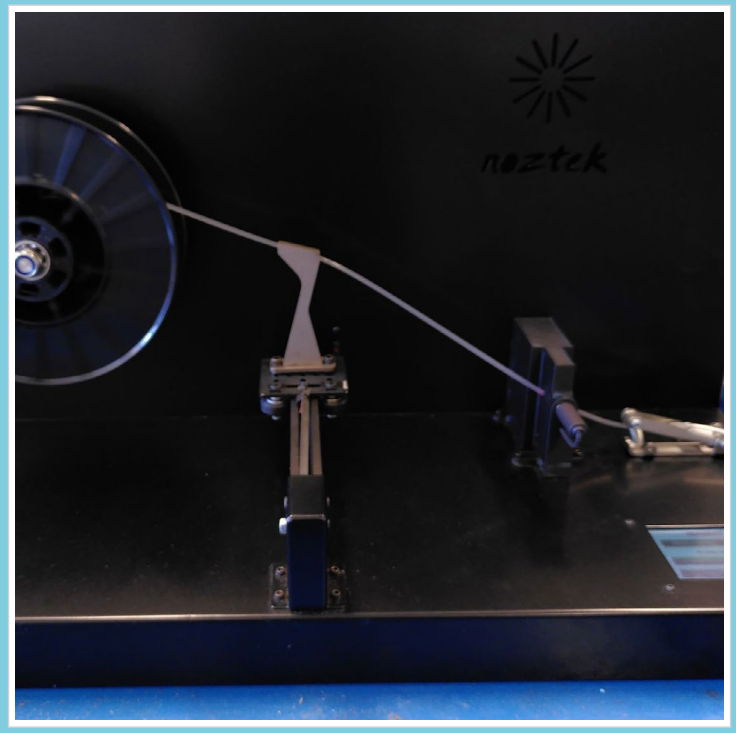
RPET FILAMENT

Printable transparent recycled polyethylene terephthalate fliament, manufactured from washed and shredded punnets for reptile's food.

Used materials: Recycled PP filament from non compliant PP orthosis

Used Technology: AM

Created for: Spentys



RPP FILAMENT

Printable recycled polypropylene filament whose properties are as interesting as the virgin one, manufactured from shredded non compliant orthosis in polypropylene from Spentys.

About the project

The problems associated with plastic waste and in particular its adverse impacts on the environment are gaining importance and attention in politics, economics, science and the media. Although plastic is widely used and millions of plastic products are manufactured each year, only 30% of total plastic waste is collected for recycling. Since demand for plastic is expected to increase in the coming years, whilst resources are further depleted, it is important to utilise plastic waste in a resourceful way.

TRANSFORM-CE aims to convert single-use plastic waste into valuable new products. The project intends to divert an estimated 2,580 tonnes of plastic between 2020 and 2023. A pilot plant has been set up (NL) and two facilities are established (UK and BE). The plant and facilities will make use of two innovative technologies – intrusion-extrusion moulding (IEM) and additive manufacturing (AM) – to turn plastic waste into recycled feedstock and new products.

Moreover, the project will help to increase the adoption of technology and uptake of recycled feedstock by businesses. This will be promoted through research into the current and future supply of single-use plastic waste from municipal sources, technical information on the materials and recycling processes, and circular business models. In-depth support will also be provided to a range of businesses across North-West Europe, whilst the insights generated through TRANSFORM-CE will be consolidated into an EU Plastic Circular Economy Roadmap to provide wider businesses with the 'know-how' necessary to replicate and up-scale the developed solutions.

Lead partner organisation

Manchester Metropolitan University

Partner organisations

Materia Nova

Social Environmental and Economic Solutions (SOENECS) Ltd

Gemeente Almere

Save Plastics

Technische Universiteit Delft

Hogeschool Utrecht

Hochschule Trier Umwelt-Campus Birkenfeld Institut für angewandtes Stoffstrommanagement (IfaS)

bCircular GmbH

Countries

UK | BE | NL | DE

Timeline

2019-2023

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European Regional Development Fund

www.nweurope.eu/transform-ce