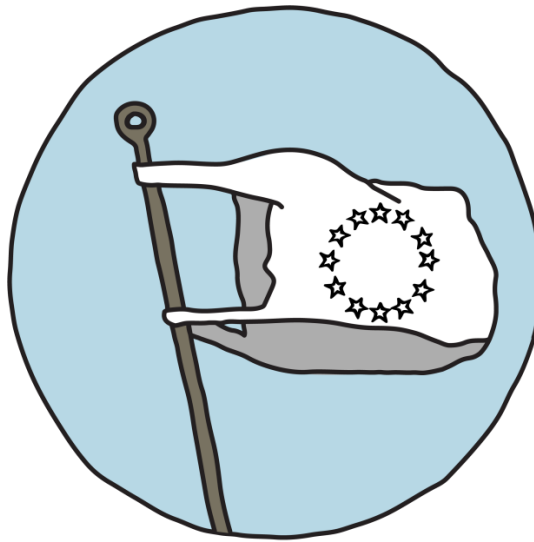


“PRECIOUS PLASTIC”

Erasmus+ Youth in Action
2018-2-PT02-KA105-005287



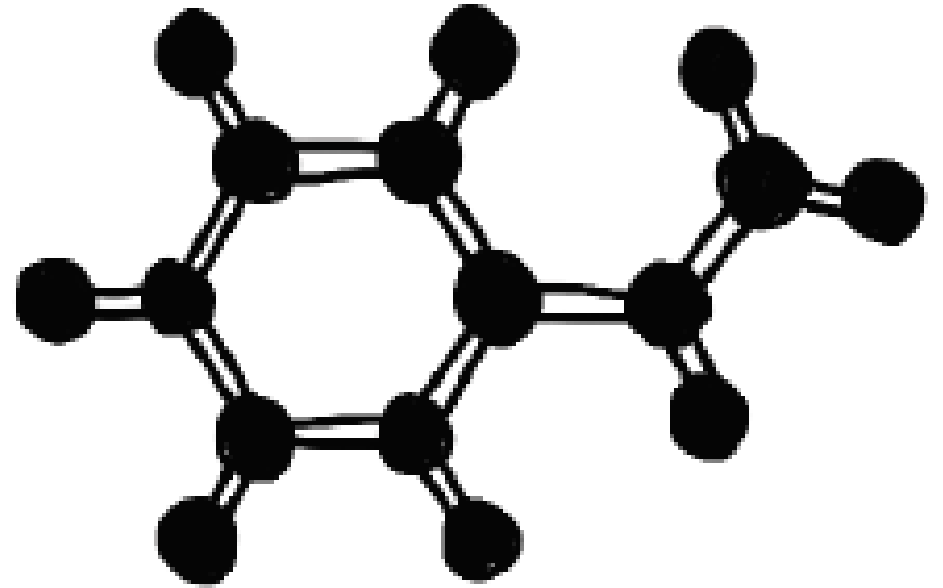


Do you know your plastic?



Plastics are polymers

- There are thousands of different types of plastic – different polymers
- Each polymer presents specific properties and mechanical characteristics
- Its important to collect and sort out plastic according to their different families of polymers



- Plastic was only invented 150 years ago
- It completely changed the manufacturing industry
- Its a cheap, reliable, transformable material
- It presents challenges but also it prevented the depletion of ivory and wood resources in the start of the XXth century

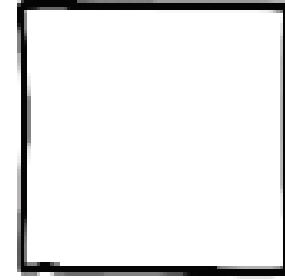


Two main families of plastics



THERMO PLASTIC

- Highly recyclable
- Aesthetically-superior finishes
- High-impact resistance
- Remolding/reshaping capabilities
- Eco-friendly manufacturing
- Generally more expensive than thermoset
- Can melt if heated



THERMO SET

- More resistant to high temperatures
- Highly flexible design
- Excellent aesthetic appearance
- High levels of dimensional stability
- Cost-effective
- Cannot be recycled
- Cannot be remolded or reshaped

Recycling Symbols 101





PET (polyethylene terephthalate)

- This is a very strong plastic that can be easily recognised for its transparent look. All beverage bottles containing your favourite sodas are PET. This plastic is a bit more complex to work with, we advise to start with other plastics.





HDPE (high-density polyethylene)

- This plastic is often used for food or drink containers. Items made from this plastic include containers for milk, motor oil, shampoos, soap bottles, detergents, and bleaches. This plastic works very well with Precious Plastic.





PVC (polyvinyl chloride)

- This is toxic and we do not work with it. PVC is most commonly found in plumbing pipes and releases chloride when heated up. Do not use with Precious Plastic.





LDPE (low-density polyethylene)

- Plastic wrap, sandwich bags, squeezable bottles, and plastic grocery bags all are made from LDPE. Usually, LDPE is not recycled from the industry but works rather good with Precious Plastic.





PP (polypropylene)

- This is one of the most commonly available plastic on the market. This type of plastic is strong and can usually withstand higher temperatures. it is consistently used for products that get in contact with food and drink (Tupperware, yoghurt boxes, syrup bottles etc..). PP works very well with Precious Plastic.





PS (polystyrene)

- PS is most commonly known as Styrofoam. PS can be recycled, but not efficiently; recycling it takes a lot of energy. Disposable coffee cups, plastic food boxes, plastic cutlery and packing foam are made from PS. Very good to work with Precious Plastic.





Other (Mix)

- This code is used to identify other types of plastic that are not defined by the other six codes. ABS, Acrylic or Polycarbonate are included in this category and can be more difficult to recycle. Precious Plastic can work with some of this.



SAFETY WARNING!

- **Never use PVC or Vynil** (Triangle 3) with the precious machines – it will produce poisonous fumes!
- Try not to use MIX (triangle 7) if you are not sure what type of plastic it is – other polymers can be highly toxic
- The same advice for plastic that doesn't possess the recycling symbol and/or you don't know which type of plastic it is





PLASTIC RECYCLING
WORKSPACE

PRECIOUS PLASTIC MOVEMENT

- Precious Plastic started in 2013 by Dave Hakkens and is now a global community of hundreds of people working towards a solution to plastic pollution.
- Knowledge, tools and techniques are shared online, for free
- Please visit <https://preciousplastic.com> for more information



PRECIOUS
PLASTIC



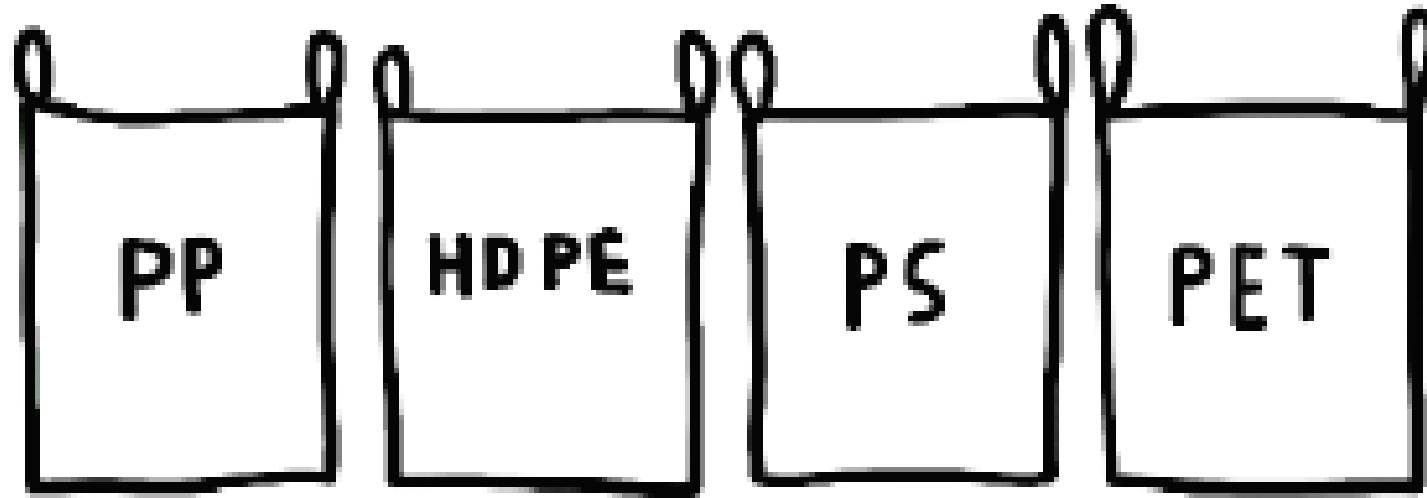
ATTENZIONE
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PRECIOUS PLASTIC PROCESS

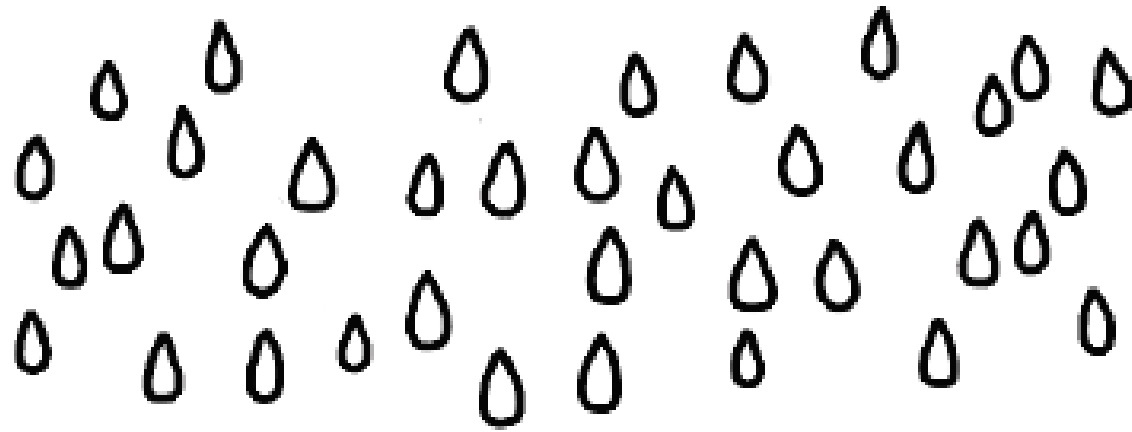
Create a collection point



Separate according to the main types of
plastic



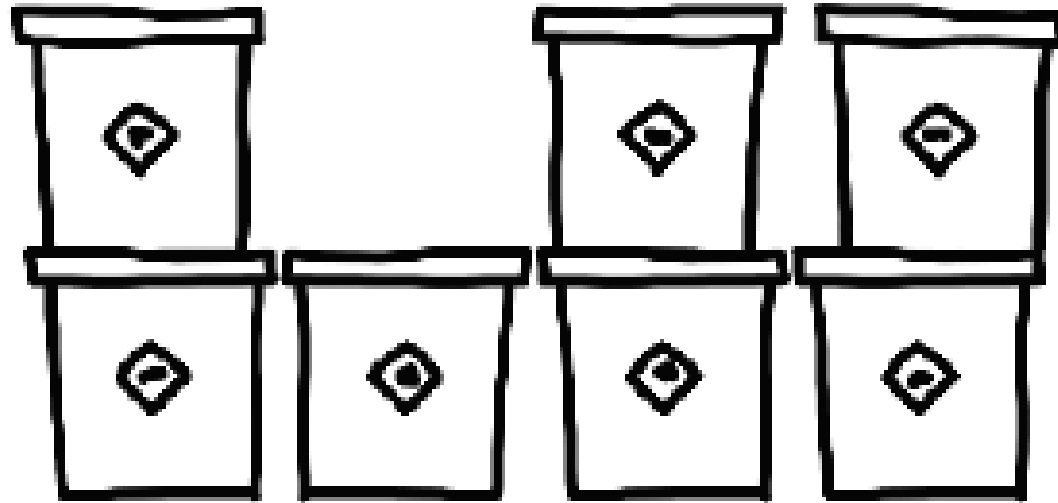
Wash and clean the plastic. You may have to cut the PET bottles in half before shredding



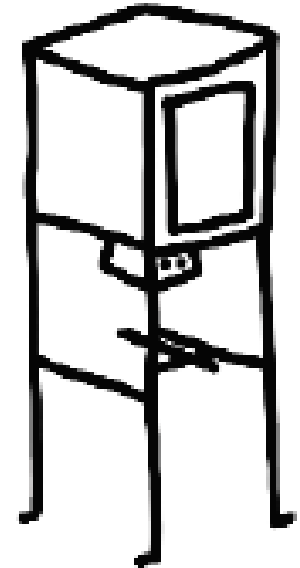
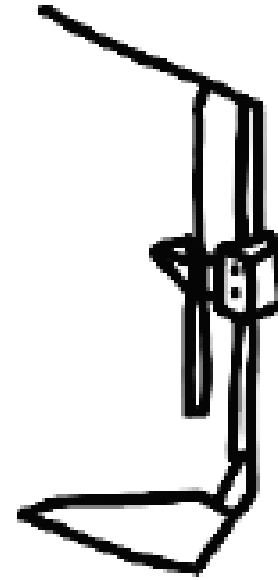
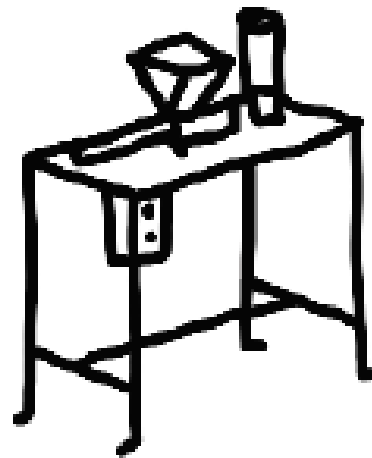
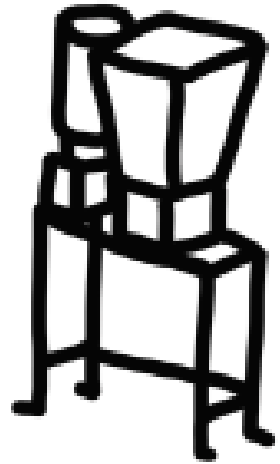
Shred the plastic according to its type – don't mix different types of plastic



Store the plastic flakes in individual and closed containers. Add a label with the corresponding type of plastic



Select the machine of your choice to produce the objects – dont forget to select the right temperature



Selecting the right temperature
Please note that these are indicative values –
you can experiment what works better

Type	Barrel	Nozzle	Time
PP (5)	180°	200°	20 – 30 mnts
HDPE (2)	190°	210°	20 – 30 mnts
PS (6)	220°	240°	20 – 30 mnts
PET (1)	270°	290°	30 – 40 mnts

SOME PHOTOS OF MACHINE BUILDING AND
OPERATING









HDPE



HDPE



HDPE



HDPE



HDPE



HDPE



HDPE



HDPE

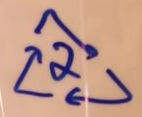
HDPE



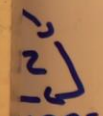
HDPE



HDPE



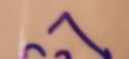
HDPE



HDPE



HDPE





Coca-Cola
SABOR ORIGINAL

CSI

Coca-Cola

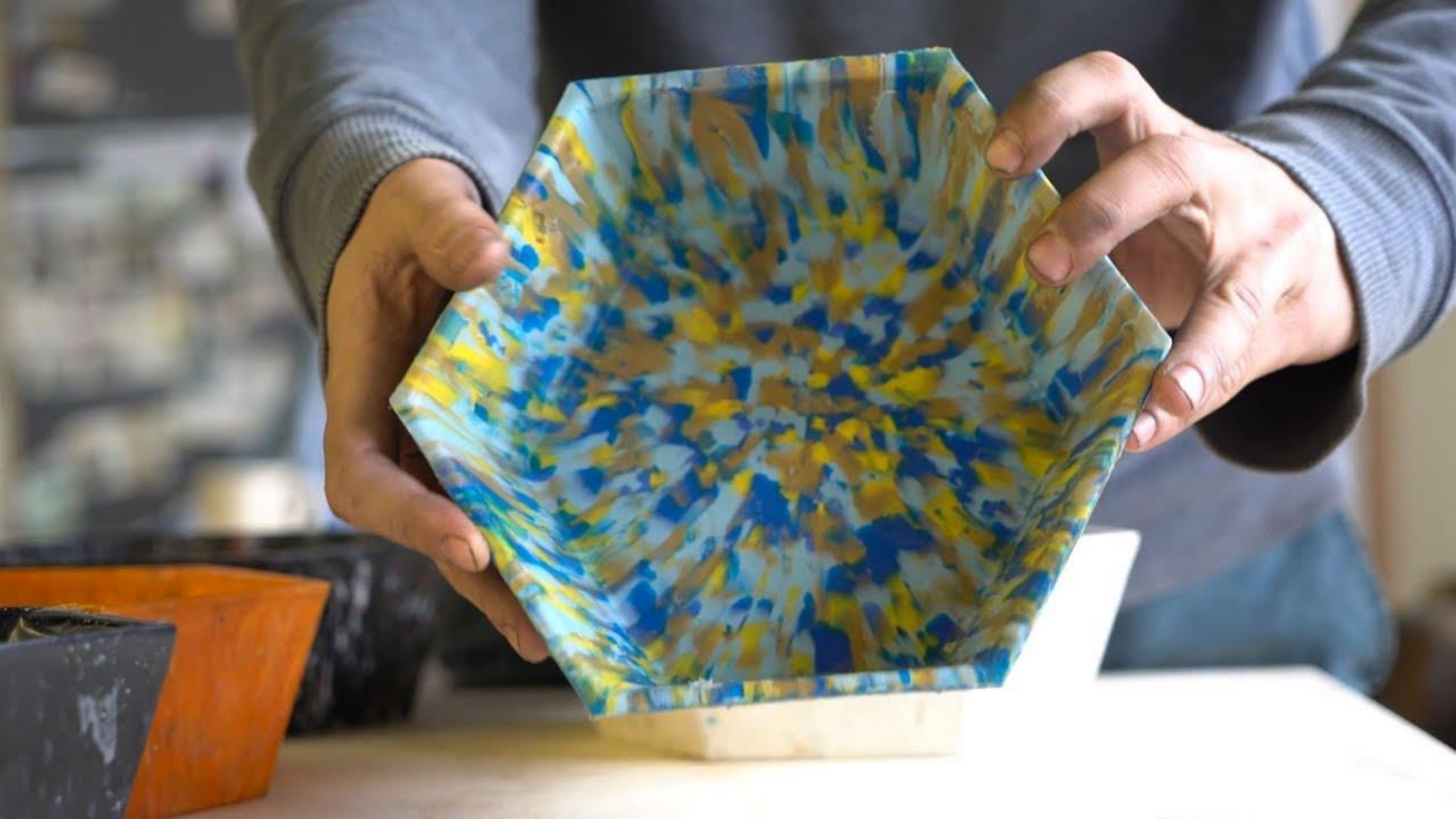
Coca-Cola

Coca-Cola

Coca-Cola

Coca-Cola

Coca-Cola











MACHINE BUILDING AND OPERATION

- You may find all the information for building machines in the precious plastic website - <https://preciousplastic.com/en/machines.html>
- Download the Precious Plastic kit for technical drawings, bill of material, and other material - <https://preciousplastic.com/en/videos/download.html>
- We advice you to make the Version 2 of the machines, but a new version will be released on January 7th 2020
- We now share some additional advices regarding the making of the machines, taken from our experience in making and working with them
- We advice you to reuse material, visit junkyards and contribute during the building of the machines for a more sustainable world



Shredder Machine

The shredder is the backbone of Precious Plastic. Plastic waste is shredded into flakes which will be used in the other machines to create new things. You can select the output size of these flakes by changing the sieve inside the machine to create different patterns and processes.



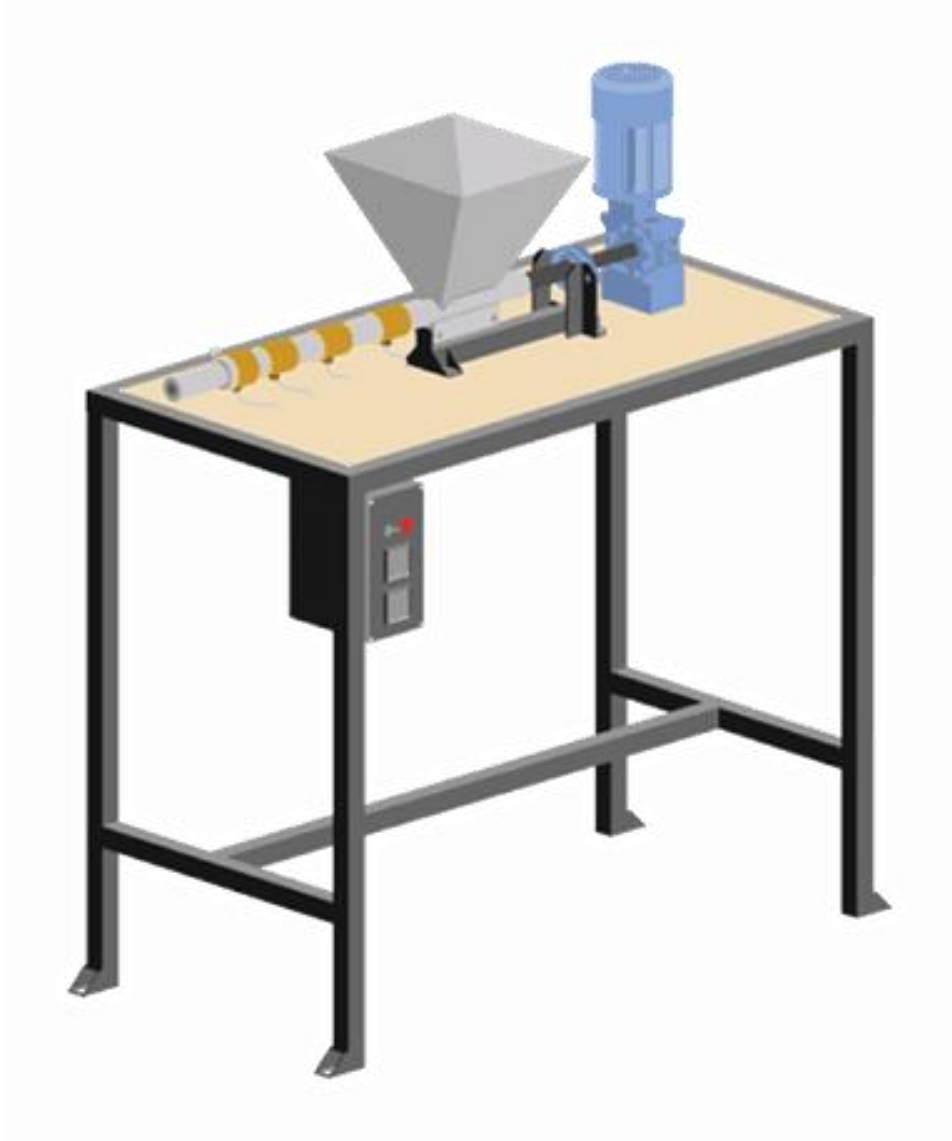
BUILDING TIPS!

- Get a motor with at least 2hp (1.5Kw) with an output of 50 -70 RPM
- Single phase motors are an advantage if you want to operate the machine in different places
- Dont use the coupling system of the Precious Plastic kit master – Jaw couplings work better and are more reliable
- Make your shredder box in stainless steel to prevent rusting



OPERATING TIPS!

- Gather and separate the plastic you want to shred.
- Separate in colours.
- Check if the mesh is installed with the sufficient space from blades.
- Don't forget to use protective gear – goggles, gloves, and ear protection
- Turn on the machine.
- Put small quantities of plastic and don't let it accumulate
- Store the shredded plastic.
- Clean the machine before changing types of plastic



Extrusion machine

Extrusion is a continuous process where plastic flakes are inserted into the hopper and extruded into a line of plastic. These lines can be used to make new raw materials such as 3d printing filament, make granulated plastic, spun around a mold, or used in your own new and creative ways.

This technique nicely blends differently coloured plastics together and outputs an homogeneous and smooth colour.



BUILDING TIPS!

- Get a motor with at least 375watts power and an output of 50 -70 RPM
- Dont use the coupling system of the Precious Plastic kit master – Jaw couplings work better and are more reliable
- Add a heat isolating material around the barrel to prevent accidental burns
- Try to get a screw with 600mm in diameter
- In the future consider upgrading to a pro extruder (+3HP motor and compression screw)



OPERATING TIPS!

- Don't forget to use protective gear – googles and gloves
- Heat the machine to the desired temperature – nozzle should be at least 10 degrees hotter than the barrel
- Wait 20 minutes to have the plastic melted
- Add desired plastic in the hopper.
- Turn on the motor.
- The material that comes out of the machine for the first 2 minutes is to clean the machine from old plastics from previous sessions - the machine is now ready for production
- PP and HDPE are more suitable to the extruder, we don't advice using PET



Injection machine

Plastic flakes are heated and injected into a mold. It's a relatively quick process which is well suited for creating small and very precise objects repeatedly. You can make the molds completely yourself by using CNC mills or lathes, or by simply welding them. The output colour is often unpredictable when mixing colours in the barrel allowing for surprising patterns that can add to the beauty of your products.



BUILDING TIPS!

- Make sure to get a barrel without inner stitches
- There shouldn't be any space between the inside bar and the barrel
- Add a base to the injector where you can step on and prevent it from falling over while injecting
- Add a heat isolating material around the barrel to prevent accidental burns



OPERATING TIPS!

- Don't forget to use protective gear – goggles and gloves
- Turn the machine on and set the temperature to 20° more than the desired temperature.
- Make sure the lever is completely at its lowest position.
- Wait for at least 20 minutes.
- Turn the temperature down and fill the barrel with the desired plastic.
- Wait another 15 minutes for the plastic to melt, the first batch of plastic is more to rinse the machine and to get rid of plastics from previous sessions.
- Press the first batch of plastic out of the machine.



Compression machine

The compression machine consists of an electric kitchen oven to heat the plastic and a carjack to apply pressure to the mould. The process is generally slower than the other machines but it allows for bigger objects to be crafted. Well suited for making more solid objects, the oven itself is also a great machine for prototyping and making plastic tests with. When mixing different coloured plastic, the compression machine gives a specific flake-like look to plastic that can be used to your advantage



BUILDING TIPS!

- Build the upgrade v2.1 for this machine – Its better to compress it outside the oven
- Choose an electric oven that has two heating bands
- Dont forget to isolate the inside of the oven to make it safe and efficient
- Reinforce the area for the compression, the carjack puts a lot of force into the structure



OPERATING TIPS!

- Don't forget to use protective gear – goggles and gloves
- Weight the required amount of material for your mould + 20%.
- Fill the mould with material.
- Put the upper part of the mould on the plastic.
- Put the mould in the oven.
- Leave it for 15 minutes.
- Turn the mould 180° in the oven.
- Leave it for another 15 minutes.
- Compress the mould.
- Take the mould out of the oven.
- Put clamps on the mould to keep the pressure.
- Place another mould in the oven.

EXAMPLES OF PRODUCTS MADE FROM THE
PRECIOUS PLASTIC COMMUNITY

FOR MORE PLEASE VISIT THE PRECIOUS
PLASTIC BAZAR -

<https://bazar.preciousplastic.com/>









For more information please visit our website

<http://preciousplastic.pt/>

