SHREDDING

Input materials	Pre-condition/Pre-treatment	Operation & maintenance needs	Objectives / Key features	Key technical parameters
Suitable plastic waste: – Solid plastic (HDPE, PS, PP) **Unsuitable plastic waste:** – Soft plastic	Clean and dry plastic	Regular maintenance required	Process of breaking down plastic into smaller pieces for further processing or selling	Voltage: 380V AMP: 5.8A Nominal power: 1.5kW min Output speed: +/- 70 r/min [1]
Outputs / products	**Technical complexity**	**Maturity level**	**Educational aspect**	
Shredded plastic	Higher-level skill required for appropriate design & construction of infrastructure Lower-level skill required for O&M	Proven technologies	**Topics:** Plastic litter reduction; Consumption **Practical exercises:** -	

Plastic shredding is the process of breaking down large plastic into small flakes by motorized mechanical means. The obtained shredded plastic can either be used for further processing onsite or be sold with a higher market value.

Cleaned and sorted plastic according to plastic type, and potentially color, are shredded separately to create homogenous plastic flakes of defined size. The size of the shredded plastic depends on the requirement for further plastic processing. While large flakes of 0 to 30mm are good to use in sheetpress, 0 to 7mm flakes is need for extruders.

Applicability: Shredding plastic is a process that can be used up to industrial scale. Yet, the design and infrastructure presented here is aimed towards small-scale application (e.g. at communities or neighborhoods level).

Design considerations: Shredders can either be built from scratch or purchased from the Precious Plastic bazar. Higher-level skill is required for appropriate design & construction. Link to blueprints for shredder construction are available in the references [1].

Materials needed: The shredder is composed of a hopper, a shredding box and mesh. Electrical components needed are a motor (approx.. 2.2kW geared down to 70 rpm), LED indicator and common household power cable.

Technical operation & maintenance: While shredding, blades should be regularly checked and plastic pushed down towards the blades. When finished working with the shredder, it is recommended to label and store the shredded plastic for further use [1].

When changing the type of plastic used, the mesh should be first removed and the little shredded flakes in the machine brushed away. Optionally pressured air or vacuum cleaner can be used to blow them away.

Health and safety: Shredder blades are sharp so hands must never be used to push the plastic towards the blades. Wearing any loose clothing, jewelry or having long untied hair should be avoided as they can get caught in moving parts. Power should always be switched off for maintenance.

Costs: Material cost is around 500 USD. Shredder prices on Precious Plastic bazar is around ~3000 USD. The price can decrease if built locally.

Social, legal and environmental considerations: Microplastic might be released to the environment due to the shredding process.

Strengths and weaknesses:

- ⊕ Important first step of most plastic recycling processes
- ⊕ Effective way to granulate plastic and reduce volume for storage
- ⊕ Relatively cheap
- ⊖ Higher-level skills are needed to construct the equipment from scratch

> References and further reading

1. Precious Plastic, Build a Shredder Machine, 2022.

Precious Plastic – Shredder starter kit