

SOP Number PPM_001

SOP Title Shredder Machine Operation

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1. PURPOSE

The purpose of this document is to detail the standard operating procedure for the PPMUC Shredder Machine v1.0 in accordance to safe handling of the machine.

2. INTRODUCTION

The Shredder Machine v1.0 developed by the Precious Plastic Monash University Chapter is intended for use as part of the integrated plastic recycling system. It has been designed for assembly and use on the integrated pallet.

This document will provide detailed instructions on the general assembly, operation and maintenance of the Shredder Machine v1.0. Adherence to the following procedures will ensure that the machine is safe for operators to use with minimal risk of injury.

3. SCOPE

This document covers the intended standard operation of the machine including assembly, set-up, product manufacturing, cleaning, maintenance and storage.

This document does not cover intentional misuses of the Shredder Machine.

This document does not cover modifications made to future versions of the machine.

4. DEFINITIONS

PPE: Personal Protective Equipment

5. RESPONSIBILITIES

PERSON IN CHARGE OF MACHINE Responsibilities

- **Assembly:** assembling machine components including sieve, blades, spacers, fixed knives, shaft, bearings, shredder box, hopper, motor, couplings, bushes, and plunger.
- **Set up:** PPE, plastic selection, selection of the required sieve.
- **Product manufacturing:** loading of plastic, turning on of the machine, inserting the plastic selected, removal of product.
- **Cleaning:** removal of residual plastic from shredder box, and removal of residual plastic from the hopper.
- **General maintenance:** ensure the components are well assembled (no loose components), check the motor is working smooth and with the least level of noise possible (compare with test before manufacturing).
- **Storage:** removal and storage of sieves, and the plunger.

Operator Responsibilities

- **Set up:** PPE, plastic selection, selection of the required sieve.
- **Product manufacturing:** loading of plastic, turning on of the machine, inserting the plastic selected, removal of product.
- **Cleaning:** removal of residual plastic from shredder box, and removal of residual plastic from the hopper.

Minimum of two operators or one operator and PERSON IN CHARGE OF MACHINE are required for manufacturing.

6. SPECIFIC PROCEDURE

6.1 Initial Assembly or Complete Re-assembly

Motor assembly

1. Insert the motor shaft into the hole besides the motor box.
2. Assemble the specific bush on the motor shaft.
3. Assemble the specific half of the coupling on assembly of **Step 1**.

Cutting part assembly

4. Insert a spacer onto the shaft.
5. Insert a blade onto the shaft.
6. Repeat **Steps 3** and **4** until the shaft is filled, finishing with a spacer; the blades are marked with stripes to follow an order(1, 2 and 3), 12 blades and 13 spacers in a V formation.

Fixed knives assembly

7. Place a fixed knife for the spacers.
8. Place a fixed knife for the blades, beside the fixed knife from **Step 7**.
9. Repeat **Steps 7** and **8** until there are the same number of fixed knives than the spacer and blades from **Step 6**.
10. Secure the knives inserting the metal rods into the holes.

Fixed knives plate assembly

11. Place the mount plate top into one of the mount plate side, by taking care all the borders click.
12. Place the other mout plate side, by taking care all the borders click.
13. Place the mount plate bottom on the assembly from **Step 12**, by taking care all the borders click.

14. Place the mount plate on the assembly from **Step 13**, by taking care all the borders click.

Viewing panel plate assembly

15. Place the viewing panel top into one of the viewing panel side plate, by taking care all the borders click.
16. Place the other viewing panel side plate, by taking care all the borders click.
17. Place the viewing panel bottom on the assembly from **Step 16**, by taking care all the borders click.
18. Place the viewing panel main plate on the assembly from **Step 17**, by taking care all the borders click.
19. Place the acrylic viewing panel on the viewing panel main plate, by inserting bolts in the holes.

Free side and motor side plates assembly

20. Place the angle bracket top on the bearing plate motor side, and secure it with bolts and nuts.
21. Repeat **Steps 20** and **21** for the free side.

Shredder box assembly

22. Insert one of the ends of the shaft in the hole on the free side plate, being sure the points of the blades are opposite to the assembler and the plate is on the left side.
23. Secure the shaft inserting a bearing unit.
24. Place the fixed knives assembly on the fixed knives plate.
25. Place the assembly from **Step 25** on the assembly from **Step 24**, being careful on match the spacers and blades with the corresponding fixed knives.
26. Place the motor side plate on the assembly from **Step 26**, inserting the end of the shaft in the hole of the plate.
27. Place the viewing panel plate on the assembly from **Step 27**.
28. Secure the shaft inserting the other bearing unit.
29. Assemble the specific bush on the shredder shaft.
30. Assemble the specific half of the coupling on assembly of **Step 30**.

Hopper assembly

31. Place the hopper front plate on the hopper metal case, and secure it with bolts and a nuts on each side.
32. Place the hopper right side plate on the hopper metal case, and secure it with bolts and a nuts on each side.

33. Place the hopper back plate on the hopper metal case, and secure it with bolts and a nuts on each side.
34. Place the hopper left plate on the hopper metal case, and secure it with bolts and a nuts on each side..
35. Place the tee brackets under the plates, and secure them with bolts and nuts.

6.2 General Assembly

1. Place the assembly from **Section 6.1 Step 36** on the assembly from **Section 6.1 Step 31**.
2. Secure the tee brackets onto the assembly from **Section 6.1 Step 31** with bolts and nuts.
3. Place the assembly from **Section 6.1 Step 3** besides the assembly from **Step 2**, fit the two parts of the coupling to match.
4. Place the plunger inside the hopper machine.

6.3 Set-up

Manufacturing with old version sieve

1. Ensure machine is OFF.
2. Remove the bearing unit from the free side plate.
3. Remove the free side plate.
4. Place the required sieve inside the shredder box.
5. Secure the sieve with bolts and nuts on the motor side plate of the shredder box.
6. Place the free side plate and the bearing unit.
7. Secure the sieve with bolts and nuts on the free side plate of the shredder box.

Manufacturing with new version sieve

1. Ensure machine is OFF.
2. Place the required sieve into the hole in the free side plate of the shredder box.
3. Secure the sieve with a bolt and a nut on the motor side plate of the shredder box.

6.4 Product Manufacturing

1. Wear protective glasses prior using the machine.
2. Turn on machine.
3. Select the required plastic type.
4. Place the plastic waste into the hopper.
5. Push the plastic towards the blades with the plunger.
6. Wait until the majority of the plastic is turned into small pieces.
7. Collect the product into containers, and label them depending on the classification of different types of plastic.

6.5 Cleaning

Cleaning with old version sieve

1. Ensure machine is OFF and disconnected from the mains power prior to removal of any components.
2. Remove the plunger from hopper.
3. Remove plastic stuck in the sides of the hopper.
4. Remove the bolts and nuts from the free side plate and the motor side plate
5. Remove the bearing unit from the free side plate and the free side plate.
6. Remove the sieve from the shredder box.
7. Remove the plastic stuck inside the shredder box.
8. Place the free side plate and the bearing unit.

Cleaning with new version sieve

1. Ensure machine is OFF and disconnected from the mains power prior to removal of any components.
2. Remove the plunger from hopper.
3. Remove the plastic stuck in the sides of the hopper.
4. Remove the bolt and nut on the motor side off the sieve.
5. Remove sieve using the handle.
6. Remove the bolts and nuts from the viewing panel, and the viewing panel from the shredder box.
7. Remove the plastic stuck inside the shredder box.
8. Place the viewing panel on the shredder box and secure it using bolts and nuts.

6.6 Storage

1. All sieves should be stored in a dry environment when not in use.
2. The plunger, should be stored in a protective sleeve.
3. All components should be stable or securely stored to prevent damage or injury to environment and persons when in storage.

6.7 General Maintenance

1. Keep motor shaft lubricated.
2. Ensure the machine is clear of plastic following each use.
3. Ensure all metal components are covered in protective film when transported, and renew it regularly.

7. REFERENCES

Storage Drawers- Labelling of storage containers

8. CHANGE HISTORY

SOP no.	Effective Date	Significant Changes	Previous SOP no.
1	5/07/18	Initial version	N/A
2	12/08/18	Hopper change material, and shape.	1