

# Redesigning a plastic shredder

Every day an incredible amount of plastic waste is being dumped throughout the world, resulting in floating waste-islands and mountains of trash. To help alleviate the problem, Dave Hakkens started a non-profit project called Precious Plastic. It is a series of machines designed to shred plastic waste and remold it into new creative products. The shredding machine of this series was further developed in a master thesis project.

The Division of Product Development at Lund University was planning to build the machines of the Precious Plastic series so that students can use them creatively in their product development projects and courses. To start off, the first machine to be built was naturally the shredder, as the others were all based on different ways of melting plastic shreds into new products.



Figure 1. The shredding machine.

One of the major challenges with the project was the cost. As it was not a prioritized project the build had to be done with minimum costs

possible. Along the way, notes were made of different problems inherent to the design. These were later to be improved upon in a redeveloped design idea. The most critical of these problems arose during assembly of the actual shredder block, as seen in Figure 2.

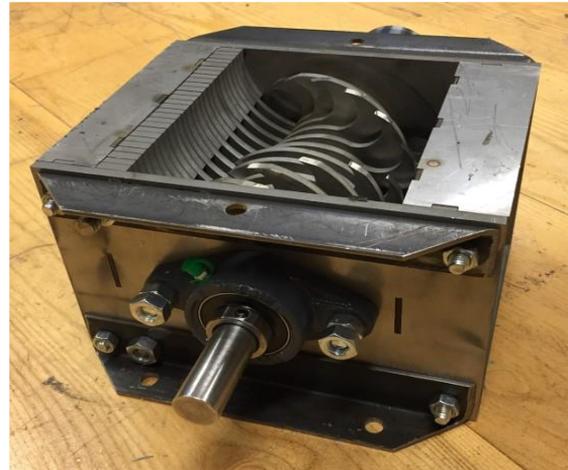


Figure 2. The shredder block as designed by Precious Plastic.

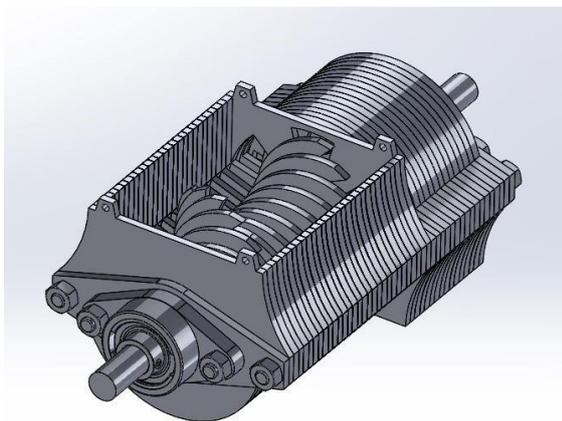
Fitting all the different parts together and making sure that the knives did not grind against the housing turned out to be highly dependent on the precision of the machine cutting the parts.

Some minor design changes were made to the design during construction. The most significant was in regard to the framework so that a motor and gearbox solution that was modular could be accommodated, as can be seen in Figure 3.



*Figure 3. Modular power unit.*

To come to grips with the problems concerning the housing of the knives a new design was eventually conceived. The idea revolved around mounting the entire housing on two threaded rods. To increase the processing speed of the machine, the conclusion was made that more teeth needed to be added to each knife. However, that could make the material skip on top of the knives rather than be shredded. To prevent this, the infeed was separated from the outfeed, where more teeth was preferable. The resulting design idea can be seen in Figure 4.



*Figure 4. Final design idea.*