Alright stop, collaborate and listen!

We have compiled a list of both general and technical considerations that might cause some hiccups in your design or build stages. Spending more time discussing these points now will save you countless hours down the track.

Cost

The costs below are a rough guideline and still include that fact that we had design flaws along the way as with any project! The prices should give you a good indication of what might set you back and what you could possibly omit to save some money.

A number of areas for us such as Electrical ($1500 AUD) and Motors ($1900 AUD) were invested in due to safety reasons. An old motor could have been found and re-wired for a minimal cost, however, since we were taking the machine to schools and having kids as young as 3-4 years old use it, we valued their safety above all else.

Another thing to note is the fact that our machining cost was very low because we did almost all of it in-house. If outsourced, this could be an expensive venture.

Type	Cost AUD
Off The Shelf Components	2500
Raw Materials	2200
Motors	1900
Electrical	1500
Moulds	1300
Contractor	1200
Laser Cutting	600
Fasteners	300
Misc.	200
Machining	100
Safety	100

Section	Cost AUD
Integration	6300
Extruder	2400
Shredder	2000
Injector	700
Compressor	300

Time

Project Stage	Weekly Time Allocation	Duration	Headcount
Design and Development	10-20hrs	5 months	21
Manufacturing	5-10hrs	2 months	10
Testing and Validation	5-10hrs	2 months	15

Size/Ergonomics/Audience

Many features of the unit were either removed or included due to size and ergonomic reasons. Some include:

- Tabletop height
- Unit height
- Jack operation
- Injection method

Again, since the machine was being operation by people of various size, age and strength, these factors needed to be considered. Depending on your audience, where you are taking the unit and comfort level required, increased efficiency or decreased costing could be achieved through further design iterations stemming from our design.

Electrical Power

In order to be portable in Australia, the most readily available power socket is rated to 10 Amps. Our electrical design accounted for this.

Catering for this 10 Amp socket had some drawbacks. This was that for PPM to run all machines and engagement equipment at once, we need three separate electrical circuits to operate without tripping any switches.

Washing/Cleaning/Sorting/Drying

Washing, cleaning and sorting plastic is the most difficult part of the process! As explained in the integration section of the kit, these sections were omitted from the unit due to a variety of reasons.

PPM performs the pre-processing in our workshops and stores them in organised, labelled containers similar to the process Dave Hakkens' uses.

Storage

Space and storage on the unit was allocated to various uses such as moulds, engagement material, tools, electricals and PPE. If your use of the machine does not include outreach and engagement events, these storage locations could be removed and utilised for another purpose.

Safety

Safety was our number one priority first and foremost. This is reflected in our final cost in comparison to the figures Dave was able to achieve. What our design lacks in affordability for the backyard hobbyist, makes up in safety features and development.

If the unit is being used by trained operators, certain features can be reconsidered at your own discretion.

Transport

The unit was built on top of a pallet so that it could be moved easily. The mass of the unit is 450 kg, so moving it by pushing or lifting is out of the question. Transport on flat ground is very easy and affordable using a pallet jack. If you wish to put the unit on the back of a truck or car, you will need one of the following:

- Straddle Jack
- Forklift
- Ramp or hydraulic liftgate onto vehicle

Material Input

PPM has restricted our public use of certain plastics for safety reasons. The table below is a brief summary of each plastic and what might need to be considered before use.

In public for demonstrating purposes, we solely use PLA and PP due to being non-toxic, readily available, easy and consistent to work with. LDPE and HDPE are also non-toxic, however we have not been able to make consistent products using those materials, therefore we reserve them for testing and validation back at our workshop.