



Micks Rant on Plastic - March 2022

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Exploring the use of recycled plastic in our digital fabrication maker space.

“Nothing is truly recycled until it re-enters the market as a recycled-content product and someone buys it.” [REDcycle](#)

Disclaimer 1 I'm not a material scientist, an economist or industrial designer. I'm just a guy that has a job encouraging members of the community to be creative and try some new ways to make stuff. Everything i'm writing here i know from conversations i've had at work or from googling things while i wait to go back to work after a flood. So it probably not worth a pinch of _____. But maybe it can start the conversation. 😊

Disclaimer 2 plastics cool cause its *plastic* (adj) but plastic also sucks... HARD! to misquote Dr Peter “every bit of plastic we've ever made is going to be around for thousands of years” or something. So we shouldnt be making any more and maybe we shouldn't be encouraging people to use it. But its here now and for the foreseeable humans are going to keep producing it. So we better find a less harmful way to live with it for now.

Background

At the beginning of 2022 Daniel and I discussed making an assessment of our options in this plastics area and what a renewed Recycled Plastic project might look like, whether we should move beyond the Precious Plastics model... or whether the use of recycle plastics in the Fabrication Lab was even worth pursuing at all anymore.

Since these discussions the Fabrication Lab has been flooded **again** (!!!), and the little bit of tangible progress we've made in this field over the last few years (our plastic grinder and injection moulding machine) are now scrap. However, the recent flood has given AC and the State Library's Fabrication Lab an opportunity to refocus as we recover. The plastic recycling project also presents some interesting potential as a key focus for a renewed digital fabrication focused maker space.

As such the rant below is: 1. a review of our major learnings in the field so far 2. an analysis of opportunities and priorities that could inform our work in this field and 3. some prompts for how we could proceed.

Part 1 - Learnings from Precious Plastics over the last 4 and

a half years

In 2017 The AC team (previously The Edge team) started working, with a group of enthusiastic community members, to build The Edge of some of [The Edge version](#) of a selection of [Precious Plastics](#) machines - a series of open-source designs for domestic scale plastic recycling. Here's a great video that [Mircha Mangiacotti](#) made that showcases the building of the plastic shredding machine.

[The Edge Precious Plastics Video](#)

Much of the Precious Plastics concept made great sense to get involved with. For me personally I didn't like knowing whether the plastic waste I put in recycling was actually being reused or quietly put into land fill???😬 A suspicion that has actually been shown to be valid and is discussed in a couple of Youtube videos that have recently popped up in my feed lately [Plastic Recycling is Actually a scam](#) and [The Truth About Plastic Recycling ... It's Complicated](#)

I liked the idea of people being able to experiment with hands-on recycling and being able to take some personal responsibility for closing the loop on some of waste. I liked the idea of being part of building capacity for a local solution to the plastic problem and being part of some social change around plastics.

- There's lots of enthusiasm doing something practical about plastic waste but not a lot of practical outcomes being achieved. We've seen lots of people talking about the great ideas but a lot less people actually achieving anything. It could be that its all a bit abstract and that urban Australians have become disconnected from our waste streams as the process has been industrialised.
- To support the doers, you need reliable gear to test new ideas. Otherwise you spend all you time fixing the machines and not time using them. Our experience with 3D printing could provide a
- Some people are interested in getting the gear working others are interested in experimenting with what you can do with it. Others will break new ground in making it a viable business. These sometimes aren't the same people - so it good to be conscious that these different groups of people will be interested in engaging in different aspects of the project.

1. Tinkerers love pulling apart a machine and putting it together again.
2. Makers are only interested in the machine in terms what they can make with it.
3. Entrepreneurs are interested the products and markets they can create.

- I thought that a practical contribution to this kind of social change might outweigh some of the possible limitations and inefficiencies of this kind of small scale, local solution . It might not have been perfect, but it was an opportunity for a positive step in the right direction.
- I think the popularity of any sessions we ran and the continued interest in the precious plastic idea supports all this conceptually at least. It was our vision to build several of the machines, activate them in a series of workshops that demonstrate use cases for the equipment and then provide inductions and make these machine bookable so members of the public could use this equipment along side the existing and complimentary digital fabrication equipment already in the Fabrication Lab.

An opportunity to test this theory though has been hampered though by lack of practical progress and some unfortunate timing over the last couple of years. Initially, The Edge worked with community to

built a [grinder](#) with a DC Motor (This was chosen in order to facilitate testing the machine as a mobile, sustainable energy charged and battery operated resource).

But... the DC motor specced proved to have inadequate torque and this made the machine unreliable (it didn't have enough grunt and we kept burning out the brushes trying to make it work). We discussed replacing the DC motor with a higher torque AC one which probably would have made it more reliable.

The team also built [injection moulding](#) machine which was ready to be checked for commissioning by an electrician just before COVID 19 hit. Aside from this we didn't really have any injection moulds ready to test it with but there were plans purchase / fabricate these.

There was also the complication of user safety with the Precious Plastics machines. These machines are effectively home made and as such don't come with the safety documentation or procedures that expect from a commercially sourced machine. Its up to the builder/ users to make sure the machine design is adapted for safe use. While not insurmountable the safety of these machines was another question that needed to be addressed beyond getting the machines working and being used by the public.

THE UPSHOT

There's a enthusiastic community out there but...

- the interruption posed by the pandemic,
- slowing of momentum getting the machines working reliably and safely,
- changes in the AC team and
- the escalation of other priorities for the team recently

has all contributed to the project stalling - I can't believe it been nearly 5 years and this is why its time to assess, redirect or put the project to bed.

And to paraphrase Peter - its not so much about the machines but what you are going to do with the plastic once you have recycled it. Thats what is most interesting.

Part 2 - Analysis of opportunities and priorities

Before we dive back into this field its prudent to scan whats currently happening in the area, look at opportunities and interrogate the Role Fabrication Lab and AC program might play. This will allow us to understand our position and set priorities inform our work in the field.

Environmental Scan

This is a bit left of field but in the OH&S field there's this thing called the Hierarchy of Controls you are

supposed to use to prioritise how we try to manage risk. I thinking about the parallels between OH&S risk Control Strategies and and the Approaches being taken to dealing with the plastic problem have been helpful to me so bear with me.

First in Hierarchy of Controls is **eliminating the hazards** by getting rid of the process or the hazardous material.

Second in Hierarchy of Controls - is **substituting** with something safer, **isolate** the hazard or **reengineer** the process to control it better...

if that hasn't worked we try the

Third in Hierarchy of Controls - here you **reduce exposure** by making rules or giving people protective equipment.

We don't actually talk about it much (you don't see it on the worksafe website) but if none of that works we resort to the

Fourth strategy - to "externalise the issue" which is a nice way of saying "we paying someone else to make the problem go away. They sell the risk (by buying insurance) or pay someone else to clean up the mess. It doesn't solve the problem... we just pay to make it somebody else's problem.

Here in Australia, with plastic waste problem, we've mostly started with the **Forth Strategy**. First we buried it, leaving it to our kids, grandkids and their kids in the future to deal with... and when that got too much, we started sending it off to developing countries, for them to deal (or not deal) with it.

But in 2017 China, the largest destination for these waste plastic exports (China and Hong Kong received 72.4 % of global plastic waste imports between 1988-2016) placed restrictions on international importation of this waste.

They selfishly decided?!? that they only wanted to deal with our "premium waste" 😊.

So now industrialised countries like Australia, are are being forced to seriously consider the other 3 strategies.

Catch words like Remove, Replace, Reduce, Reuse & Recycle are all pretty much the same as our first three OH&S risk control strategies in the Hierarchy of Controls.

Remove & Replace - Entirely scrapping or finding sustainable materials and processes to replace

plastic is the ideal because it removes the problem altogether.

Cleaning up existing plastic in the environment is also a priority. We need to get rid of the plastics smothering sea life and stop the build up micro plastics entering the food web.

Reduce Using less plastic is clearly part of the solution (especially limiting single use and problematic types).

Reuse / Recycle But because, realistically the use of plastic is not going to go away quick enough, governments are slowly being forced by their electorates to intervene to ensure more plastics are recovered and reused by industry. The methods for recycling most plastics is pretty much a solved problem and a large section of the community are pretty enthusiastic about playing their part to ensure their all their recoverable waste is recycled.

But *at scale*, plastic won't really be recycled in the volumes required until we start finding financially viable ways use it. Hence the Quote at the top from [REDcycle](#) "Nothing is truly recycled until it re-enters the market as a recycled-content product and someone buys it."

But what makes people buy stuff? Why do they part with their cash?

There's a prevailing idea that its cheaper and easier for companies to use virgin plastics in the products and packaging - so that doesn't help. Consumers and business may express a preference for sustainable products made out of recycled plastic but how realistic is it for individuals and small enterprise reverse the tide of international supply chains and to have a meaningful impact in this domain?

As such governments and industry have focused investment designed to establish efficient infrastructure for recycling, to drive down the cost of utilizing recycled stock and to make it readily available for use by industry. Its an important first step because it allows us to push as much of the recovered plastic thru the recycling system as efficiently and effortlessly as possible. More about this in a moment.

Government Investment

Push & Pull

Yeh so, so far most government investment has been about improving the economy's efficiency at pushing as much plastic as possible thru the recovery and recycling process and to get rid of it. The options for reuse of the material has really only really considered the *low hanging fruit* the low value bulk uses.

"lets burn it to make energy 🌞"

"lets use it like gravel to make a road"

"lets use it like wood to make park furniture and retaining walls... Fence posts for farmers"

Most of these are a good start because it gets rid of a lot pretty quick.

But there is a whole other set of strategies that aren't being covered by what i've described here. This untapped set of strategies are what i'd call **Pull strategies**. And some of these pull strategies play into State Library and the Fabrication Labs strengths.

Push - Pull is a concept that gets used in Supply Chain management and Marketing but in this case i'm talking about the what's the impetus for the waste plastic making its way thru the recycling ecosystem.

I imagine molten plastic moving the recycling machine - Is it Government and the waste industry pushing trying to find ways to get rid of as much waste as possible or is it consumers and manufacturing pulling, a source of demand for this versatile (but problematic) material.

Part 3 What role for the State Library based Fabrication Lab

What role can we play? What opportunities can we give existing communities or new users to play an active role in this domain?

RePlastic Designers Jam - Pilot

Description

Two or Three cohorts design students from local universities work with State Library Fabrication Lab to explore digital fabrication and recycled plastic in order develop a proof of concept new product over 10 weeks.

Pilot Objectives

Primary Objective Create opportunity to engage with and support emerging designers to develop hands-on skills and gain practical experience in prototyping with digital fabrication tools and utilizing recycled plastic in new products.

Secondary Objectives 1. Provide focus for launch/ Flood_Covid recovery/ promotion of the FL and reinvigorate equipment bookings. 2. Promote cross-disciplinary and cross-institution industry collaboration. 3. Successful Pilot program to provide case for larger scale, community project and further investment in FL.

The Role for Maker spaces and Digital fabrication

Great and Grand Rumpus

Hands on Experience for emerging designers and innovators.

Do we even need to be buying machine to participate

Links

NFP Sector, Peak Bodies & Industry

Precious Plastics overview

Redcycle

Replas pricelist

Plastic Forest

Plastic Recycling Australia <https://www.waster.com.au/recycling-facts-australia>

<https://www.bulletpoint.com.au/recycling-modernisation-fund/>

Australian Plastic Stats form 2021

<https://www.smart.unsw.edu.au/>

Remade in Australia – Independent student initiative formed to encourage industry to change to sustainable packaging - not to be confused with Commonwealth Government “Initiative” of the same name

Commonwealth Media Release from PM this week

<https://www.pm.gov.au/media/plastic-recycling-solutions-right-australia>

CSIRO - overview of their current plastics research

Department of Agriculture, Water and the Environment - Waste Management

AWE - National Product Stewardship Investment Fund - NPSIF

AWE - NPSIF Grant Recipients

AWE - Recycled Content in use Case studies

https://www.cefc.com.au/media/aa4j2zj3/cefc_investmentinsightsrecycling.pdf

Clean Energy Finance Corporation CEFC - Recycling Modernisation Investment Fund

CEFC - Report on Market Drives in the Resource Recovery

CEFC - PET case Study

<https://www.awe.gov.au/remadeinaustralia> – Website launched Dec 2021, part of a “awareness campaign” to “help Australians understand why it is important to recycle” and presenting existing Commonwealth Government plans including • 2018 National Waste Policy and 2019 National Waste Policy Action plan • 2021 Funding for Recycling Modernisation (All funding already allocated in 2021)

Queensland State Development - Queensland Government priorities - Resource Recovery

QSD- Resource Recovery Roadmap RRR

QldSD - RRR Industry Development Program