PVC
Analyser

Melissa Skidmore| July 2024

PVC

- Polyvinyl chloride (PVC) is a cost-effective, versatile, light weight, durable, chemically resistant and versatile polymer.
- Applications across various sectors including windows, flooring, cables, sheeting, medical supplies, and construction.
- PVC reputation as a problematic polymer, production process, additives, contaminates other polymer streams, recyclability.
- PVC is one of the top four polymers consumed in Australia by weight.
- PVC has one of the lowest reported recovery rates, sitting at a mere 2%.

Background

Australia's National Science Agency

PVC recycling in Australia
Current status, barriers, and opportunities

February 2022

Current state of PVC recycling in Australia

Without an adequate understanding of the precise chemical formulation of the feedstock, recycling is challenging indeed.

- Most methods for uPVC currently in use that have the capability of analysing the components of PVC rely heavily on **specialised knowledge**, **equipment**, and often **libraries** of existing standards

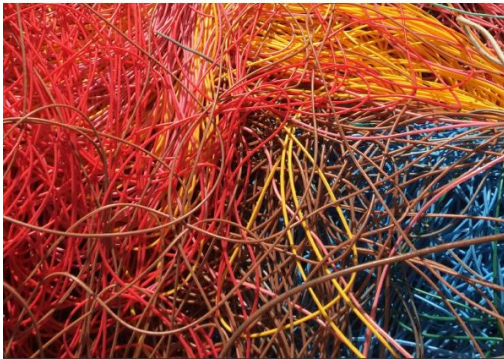- Develop a SIMPLE prototype device that will analyse the composition of PVC recyclate

How is it currently done?

- <u>Visual</u> characteristics of the output material to understand the additive present

  - shape of the material
  - presence of surface features
    - bubbles
    - roughness
  - colour
  - edge

- Adjust the processing and add additives conditions to create the desired grade
- Meets the required grade

- Could we apply AI/ machine learning?

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Analysis software

- Image analysis software was designed to analyse video of extruded recycled PVC

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- Extruder, conveyer belt, camera and computer
- Graphical user interface (GUI) developed for the image processing software.
- Development of a temperature control program that facilitated real-time adjustments to the extruder's temperature

- Manual adjustments
- Temperature control program that facilitated real-time adjustments

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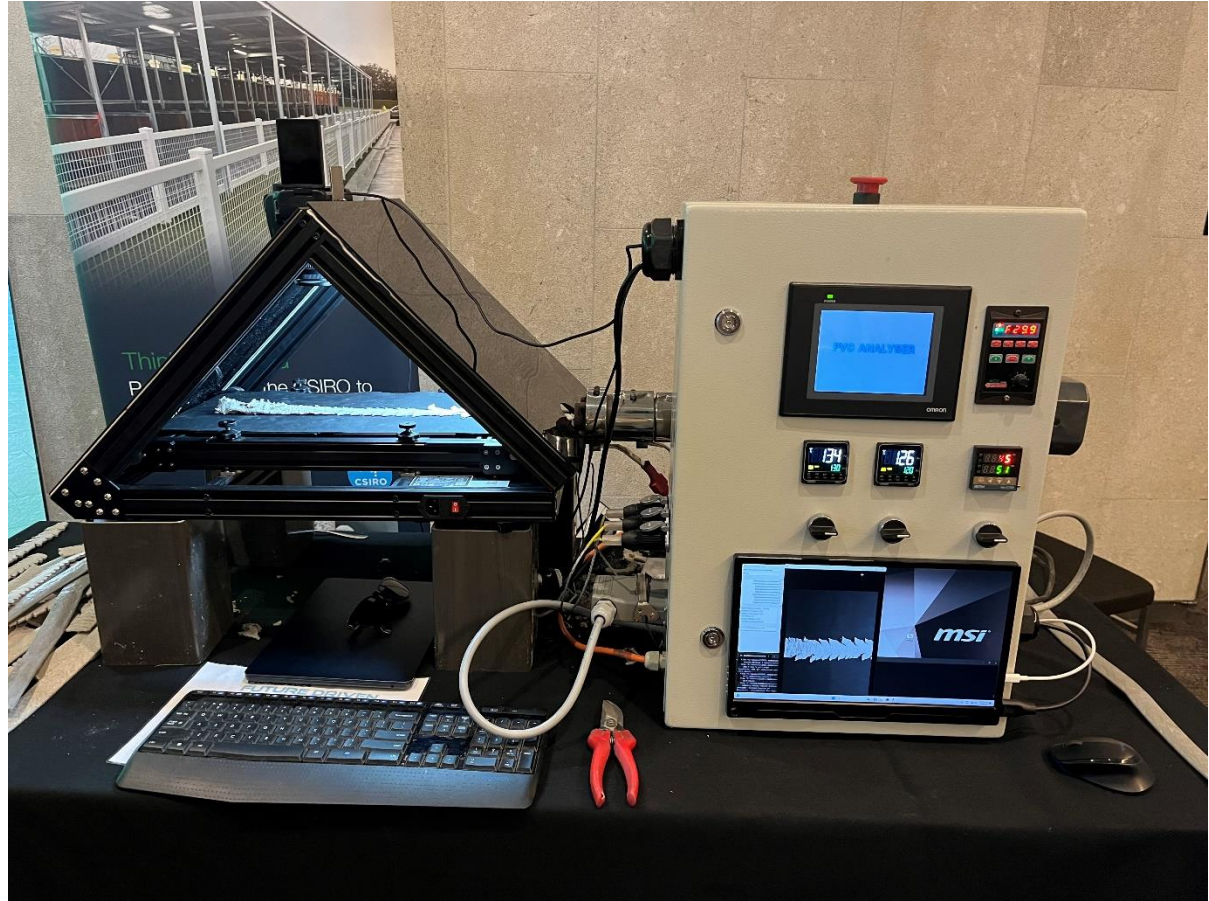
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Today

- Prototype working device
- Semi-automate process
- Proof of principle with fully automated temperature control.
- Submitted a provisional patent

Future
- Fully-automated process
  - Device control
  - Additive addition

This device allows for the processing of unknown samples of PVC, knowledge of the formulation or origin of the granulated PVC material is not required.

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Acknowledgements

Thank you

MANUFACTURING
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