



A model for predicting and minimizing impact of post-consumer recycled resins on injection molding cycle time



Background

Post-consumer recycled (PCR) content in PET (polyethylene terephthalate) bottles is on the rise. Brands are demanding the inclusion of 15% - 100% of recycled plastic in their bottles. In 2-step stretch blow molding of PET containers, the first step is to injection mold the plastic into the shape of a preform, which looks like a test tube with a threaded neck. Cycle time refers to the total time required to complete one cycle of the injection molding process, from feeding the resin to dispensing the preform. It includes various stages, such as melting the resin, injecting and molding, holding, demolding and cooling before dispensing the finished parts. In the context of incorporating PCR content in PET containers, variations in the properties of recycled materials can affect each stage differently compared to the processing of virgin resin alone, leading to longer or inconsistent cycle times. These variations reduce manufacturing efficiency and quality consistency. Amcor is seeking a partner to develop a predictive model to minimize the impact of PCR content on injection molding cycle time.

What we're looking for

We are looking for a model that can predict the impact on cycle time based on PCR attributes and the percentage of PCR incorporated into the PET resin. The developed model should take into account different preform designs and machines with varying capacities and functionalities.

Solutions of interest include:

- Experts skilled in injection molding that can provide insights and perspectives about the process and contribute to the creation of accurate predictive models.
- Mathematical modeling and artificial intelligence to predict and optimize cycle times.
- Material science-based models able to predict changes in flow and thermal properties due to the presence of impurities in resin blends.
- Machine learning algorithms that analyze historical data to forecast the impact of PCR attributes on cycle times.

Our must-have requirements are:

- Ability to adjust the model for different preform designs, machine manufacturers and machine generations.

- The developed model (after collaboration with Amcor) should ultimately possess a cycle time prediction accuracy of 95%.

Our nice-to-have's are:

- An interface that can directly recommend the optimal machine settings.

Acceptable technology readiness levels (TRL): Levels 2-9

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- Sponsored research
- Material transfer
- Licensing
- Supply/purchase
- Co-development
- Equity investment
- Acquisition

Benefits:

Sponsored Research

We are able to provide funding for model development. Final funding amounts to be discussed at the appropriate stage of engagement.

Data

Selected partners will be able to access to our data for the duration of project.

Facilities and Services

Partners will be able to access to our pilot plant and analytical labs to generate relevant data.

Expertise

Partners will have access to experts from the industry (injection molding expert, polymer scientist etc.) to guide them to best practices and current manufacturing processes.

Tools and Technologies

Partners will be able to access our work processes and training materials to understand the development cycle and manufacturing processes.

Who we are

We solve packaging challenges, around the world every day. We develop differentiated products, services and processes to protect your products and the people who rely on them, all around the globe. Drawing on unrivaled heritage in design, science and manufacturing, more than 1000 R&D experts are innovating new materials, formats and technologies to better protect your products. In 2018 we pledged to develop all our packaging to be recyclable or reusable by 2025. On our journey to our 2025 pledge we are innovating across various sustainability options, delivering you more sustainable packaging solutions under the new EcoGuard™ brand.

Reviewers

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