



# Plastics development and processing

Scion has specialised equipment and capability to deliver innovative plastics that would support a circular bioeconomy through biopolymers, additives, wood plastic composites, and their derived products, for industry.

Many of the plastic and bioplastic materials we develop are renewable and/or compostable, and are often derived from biomass feedstocks. Products are tested to international standards.

## Extrusion

Scion has five extruders for use in plastic, bioplastic and biocomposite R&D and product development.

**Labtech twin screw extruder** (capacity of 20kg per hour) for use in:

- Plastics and bioplastics compounding.
- Processing of biomass (such as wood fibres, pulps and fruit residues) with plastics and bioplastics.
- Reactive modification of biopolymers and biomass to improve mixing or adding reactive groups to polymers.

Colourants, stabilisers, additives and UV protectants can be added via hopper feed or side feeder. Vacuum venting allows moisture and volatiles draw-off. A cast film line is used to produce sheets ready for thermoforming.

**Small-scale OMC twin screw extruder** with a film line enables research to be undertaken on quantities of material down to 100 grams.

**Large-scale single screw extruder** primarily for testing wood plastic composite formulations. The high capacity of this extruder is comparable to commercial scale.

**Thermo Scientific™ HAAKE PolyLab OS** is a state-of-the-art measuring mixer and extruder system used to assess melting behaviour, influence of additives, temperature and shear stability. Samples as small as 50g are sufficient to optimise extrusion and mixing processes.

**Small-scale single screw extruder** for product or process development. For film and plastic bag manufacturers, a lab-scale blown film facility creates 40cm sheets to produce plastic bags.

**Computer modelling** can be used to quickly identify suitable twin-screw extrusion conditions without extensive trials. This method is frequently used when processing heat-sensitive materials such as biomass or bioactives, and for scale-up and scale-down.

## Injection moulding

Our injection moulder is used to create ISO multi-purpose test specimens for Flexural Test (ISO 178), Charpy Impact (ISO 179), Izod Impact (ISO 180), Tensile Test - (ISO 527-2) and Tensile Impact (ISO 8256).

Colour step chips and plant pots can be moulded to optimise moulding conditions.

## Equipment and capability

Scion has a wide selection of advanced equipment, and capability to optimise their function.

**5L and 25L capacity high speed mixers.** Used to mix polymers with other compounds such as colourants, fillers or wax for uniform blending. These mixers enable scale-up through to industrial scale.

**Laboratory-scale thermoformer.** For use in plastics thermoforming applications, including packaging using bioplastics that incorporate fruit and wood residues.

**Large drying apparatus.** For projects such as drying wood fibres and scale-up of PLA foam production.

**Material characterisation.** Specialised equipment and capability to characterise the chemical and physical properties of materials over temperature and conditions. These include: Dynamic Mechanical Thermal Analysis (DMTA), Rheometry, Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA) and Melt Flow Index (MFI). Specialists are available to interpret results.

**Biodegradation test facility.** Aligned to international standards for measuring the aerobic composting of materials like bioplastics, paper and wood. This facility is available commercially to clients.

**Chemical analysis.** Techniques for problem solving or developing projects, including multinuclear solid state NMR, multinuclear solution state NMR, liquid chromatography, mass spectrometry, GPC, microscopy, olfactory GC-MS and others.

**Packaging.** We have a range of cyclic creep/humidity testing, box/packaging testing equipment, and a coolstore facility to simulate chilled supply chain conditions, to provide specialist testing for the packaging industry.

## Foaming

Scion has a range of foaming and moulding equipment capable of producing expanded polylactic acid (E-PLA) as a replacement for expanded polystyrene.

Impregnation pressure vessels are used to inject CO<sub>2</sub> into beads. A laboratory-scale pre-foamer (pre-expander) applies heat as steam or hot air, expanding beads to a desired density. Moulds of various shapes are used to provide samples for mechanical or insulation testing to international standards. A pilot plant, owned and operated by the Biopolymer Network Ltd, enables commercial-scale manufacture of E-PLA products.

## Working together

Scion can tailor contractual relationships to meet the specific needs of each customer. These may include:

- Service provision. Undertaking specific projects for clients, usually specialised testing and problem solving.
- One-on-one confidential research projects targeted to maintain client competitiveness.
- Joint technology development partnerships with joint risk and reward.
- Strategic multi-party alliances to address sector-based challenges and innovation opportunities.

## Contact information

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