

# Extrusion and Material Characterization

## Extrusion and compounding

Extrusion is a process to create new materials or to generate a new property. At the Bio Processing Innovation Centre, the Century CX-40 HT extruder can compound material and extract value-added chemicals from biomass. The pilot scale extruder allows companies to scale up their concept before commercialization. When appropriately adjusted, the feeding rate ranges from kg/hr to hundreds of kg/hr. The 40 mm twin co-rotate extruder can be used as a device to research and develop new products/processes, and to scale up your recipe and process on pilot production.

- **Compounding:** blending and compounding of natural fibre with biopolymer to make new materials
- **Reactive vessel** (extraction and pre-treatment of raw material): continuously extract value-added components from biomass and other agricultural waste streams; pre-treat of biomass to improve efficiency of downstream processing
- **Thermal reactor:** allows controlled temperature and pressure parameters of extruder to develop new products and processes



## Injection molding

Specimen preparation for mechanical property testing, optical testing and rheometry. The Thermo Scientific™ HAAKE™ MiniJet Pro helps to optimize the development process, enabling testing of mechanical properties for specimens ranging from 2-12.5 mL.

- **Specimen:** Several molds such as ASTM D638 Type IV and ISO 527-2-1A are available.
- **Small prototype:** Other standardized molds for common mechanical testing as well as customized molds can be ordered upon request.

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## Characterization and mechanical property analysis

- Tensile, flexural, and compressive test by Instron
- Gardner impact test
- Surface area and pore size analysis by Nova 4200 analyzer
- Particle size profiling by LS 13 320 Laser Diffraction Particle size analyzer or Sweco Sieve Shaker
- Spectral characterization by FT-IR and NIR

The Near Infrared (NIR) Spectroscopy can be used to rapidly predict the chemical composition of cellulose, hemicellulose, lignin and ash content of biomass. This equipment reduces the time required to test the composition of biomass compared to chemical means. It can also be used to predict the cleanliness in bast fibre such as hemp and

flax. The test can be completed in several minutes and provides valuable information to determine yield and chemical cost. This instrument is portable and can be moved.

## Pelletization

The pellet mill includes a hammer mill, pre-steamer, pelletizer and cooler. It can be used to prepare pellets made with oat hulls and wheat straw, for example. The pellets produced can be used as fuel pellets or to densify material for downstream processing such as chemical extraction or as feed into an extruder for bioplastics. It operates at a large scale of 100 kg/hr.



Related services:

- Moisture content test
- Pellet durability test
- Bulk density test
- Drying

## For more information:

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