

# Sustainability

## FARREL POMINI Biodegradable Plastics Compounding

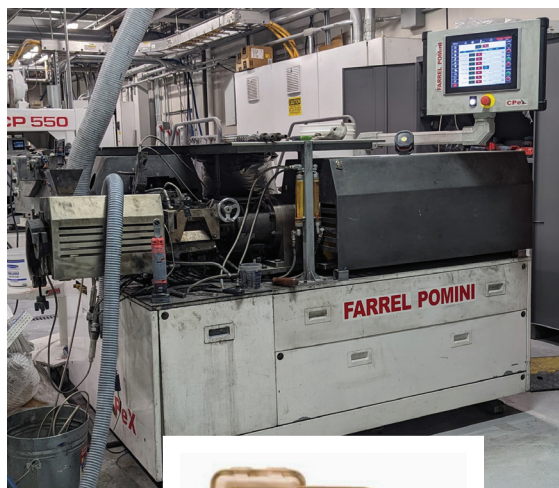
### PHA Compounding

The energy efficient and versatile FCM™, Farrel Continuous Mixer is ideally suited to process PHA and other biodegradable plastics.

### Processing Challenges

PHA presents significant compounding challenges:

- Temperature sensitive
- Shear sensitive
- Volatile and moisture build-up
- Molecular weight loss



### PHA Case Study: Processing on the CPeX®

The CPeX® is a laboratory scale FCM™, Farrel Continuous Mixer and extruder.

Study Conducted in Partnership with CJ Bio.

#### Objective:

Evaluate the PHA compounding capabilities of the CPeX® vs. a twin screw extruder.

Materials: CJ Bio: PHA Resin Pellets  
Talc

#### Parameters Evaluated:

- Specific energy input
- Melt index value
- Notched impact comparison

#### CPeX® Mixer Configuration:

- 15/7 Standard Rotors, 600rpm
- Downstream dam

- Rotor cooling used

- Vent port open
- Orifice 75% open
- Specific Energy Input 0.143 Kwh/kg
- Melt temperature 182 °C

#### Extruder Configuration

- 2.3:1 Compression ratio feed screw, 32rpm
- Breaker Plate
- 20-mesh screen

#### Downstream Equipment

- Water bath
- Strand pelletizer

#### Temperature Profile

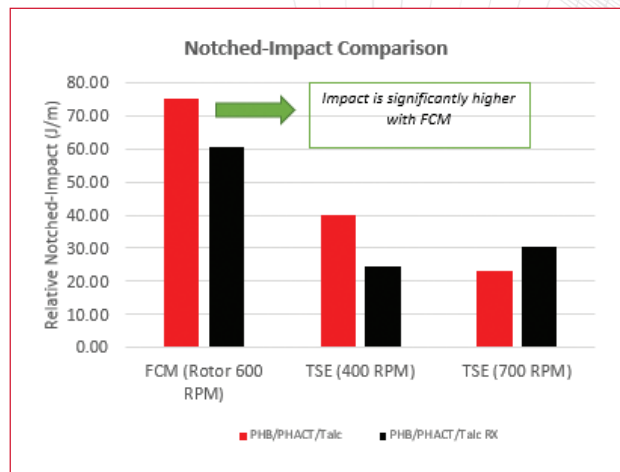
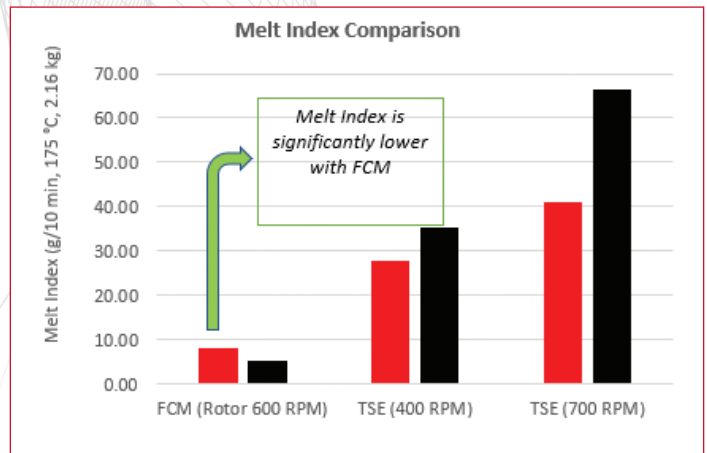
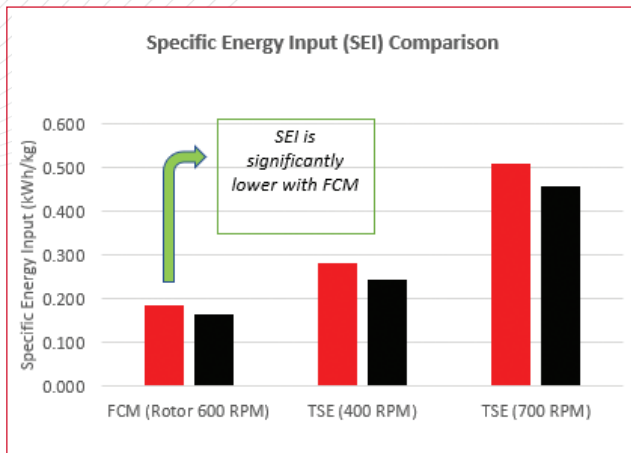
Mixer Zone 1 Temperature (°C)	45
Mixer Zone 2 Temperature (°C)	110
Mixer Orifice Temperature (°C)	140
Extruder Hopper Temperature (°C)	140
Extruder Cylinder Temperature (°C)	120
Extruder Head Temperature (°C)	160

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continuous compounding systems

## Study Data:



Reference: Molecular Weight Optimization Strategy for Biopolymers Compounding, ANTEC 2023

## Study Results:

The results of every trial parameter had more positive outcomes with the CPeX® with Continuous Mixing Technology vs. a twin screw extruder..

### Summary:

FARREL POMINI Continuous Mixing Technology addresses the challenges of compounding PHA by leveraging its distinctive design features, including:

- A single-entry feed port that reduces the contamination potential.

- A low-pressure, adiabatic, large volume mixing chamber enabling liberal material circulation and superior distributive mixing.
- The 6 L/D rotors provide short residence time for minimal heat history and maximum molecular weight retention.
- The two counter-rotating non-intermeshing rotors, with specialized profile geometry, facilitate efficient and uniform levels of shear and excellent dispersive mixing.

The test results demonstrate the FARREL POMINI Continuous Mixing Technology is superior to twin screw extruders when processing PHA.



Scan the QRcode to learn more or by visiting our website: <https://www.farrel-pomini.com/applications/biodegradable-plastics/>

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For more information, please contact your local Sales Engineer or call +1 203 736.5500 to schedule time in a Customer Demonstration Facility.

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