Injection Molding Process Guide For Cereplast Compostables®

Cereplast Compostables® resins are renewable, ecologically sound substitutes for petroleum-based plastic product, replacing nearly 100% of the petroleum-based additives used in traditional plastics. Cereplast Compostables® resins use polymer and additives derived from starch and other renewable resources chemistry. These components are carefully blended together in state-of-the-art compounding equipments.

All Cereplast Compostables® resins are certified as biodegradable and compostable in the United States and Europe, meeting BPI (Biodegradable Products Institute www.bpiworld.com) standards for compostability (ASTM6400D99, ASTM6868) and European Bioplastics Standards (EN13432).

PROCESSING INFORMATION

Cereplast Compostables® resins can be processed on conventional injection molding equipment. The material is stable in the molten state, providing that the drying procedures are followed. It is recommended to balance speed, back pressure and process temperature to control melt temperature. Injection speed should be medium to fast.

Processing Parameters	Fahrenheit	Celsius
Feed Throat	60-80	15-25
Feed Zone	325-350	160-175
Middle Zone	350-375	175-190
Front Zone	350-400	175-205
Nozzle	350-400	175 -205
Melt Temperature	345-400	175-205
Material Drying Temp. (non crystallized)	100-120 (4 hrs.)	40-50
Material Drying Temp. (crystallized)	160-180 (2-4 hrs.)	70-80
Mold Temperature	50 -80	10-25
Screw Speed	50-100RPM's	

(These are recommended starting parameters and may need to be optimized)

Cereplast Compostables® resins are true thermoplastic, meaning that processing needs to be done below decomposition temperature, which will occur about 250°C (480°F) and above. Avoid temperatures above 220°C (425°F) (unless needed to effect processing).

Start with "clean machine" – using either general purpose polystyrene or polyethylene as purge compound – before and after processing

DRYING

Injection molding grades of Cereplast Compostables® resins can be crystalline or amorphous and drying temperature and time is critical to a successful process. Cereplast Compostables® resins are hydroscopic and will absorb a small amount of moisture from the atmosphere. The amount absorbed will depend on the environmental conditions, and the temperature and humidity of the storage area. In-line drying is recommended with Cereplast Compostables® resins. Standard closed loop desiccant based column driers work best. A moisture content of less than (400 ppm) is recommended to prevent viscosity and property degradation. The dew point of the air at the input of the hopper should be -40 °F/-40°C or lower.

STARTUP and SHUTDOWN

Cereplast Compostables® resins are not compatible with a wide variety of polyolefin resins, and special purging sequences should be followed:

1. Purge injection molder using low-viscosity general purpose polystyrene or polyethylene run at manufacturer's recommended temperatures.
2. Vacuum out hopper system to avoid contamination
3. Introduce Cereplast Compostables® resins into the injection molding machine at the operating condition used with polystyrene or polyethylene and adjust accordingly.
4. Once the Cereplast Compostables® resins are purged reduce barrel temperatures to desire points.
5. At Shutdown, purge machine with polystyrene or polyolefin.

MACHINE CONFIGURATION:

Cereplast Compostables® resins will process on conventional molding equipment. A general purpose screw with sliding check ring designed to minimize residence time and shear works well. Low shear or general purpose screws are recommended. Compression ratios of 2.2-2.8 should work well.

MOLD SHRINKAGE:

Shrinkage is around 0.1 to 0.4%. Actual mold shrinkage may vary and is dependent on wall thickness, flow length and a combination of many other process conditions such as injection pressure, injection speed, melt temperature, mold temperature and cycle time.

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CYCLE TIME:

Since PLA has a lower glass transition temperature than PS or PP, it might take longer to set up in the mold. Finding the optimum process conditions will insure the best quality parts at the shortest cycle times.

REGRIND:

25-30% regrind can be used if it is clean and dry. All regrind is non-crystallized and must be dried at the lower drying temperatures.

MOLD DESIGN CONSIDERATIONS:

Most all considerations for mold design fall into the category for designing a tool for an engineering material. (Example: ABS or PC). Runners should be full round wherever practical - typically 0.25 inch (6.35mm) diameter for lengths under 6 inches (152 mm). For small components a gate size of 0.030 inch (0.76mm) should be adequate. Vents should be 0.0025-0.0030 inch (0.05-0.064mm) in depth. Break all sharp corners where possible. Ribs and bosses should be half to two thirds of the nominal wall thickness if possible to prevent sink. Hot runner systems designed for heat sensitive materials work well. Externally heated systems with no dead spots are best for manifolds and drops. These considerations are only general guidelines and will vary depending on the specific design requirements for each application.

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