MuCell™ Microcellular Injection Molding Processing Technology
MuCell™ Molding Technology

CYCLE TIME REDUCTION ◆ WEIGHT REDUCTION ◆ CLAMP TONNAGE REDUCTION

New opportunities for injection molders originate from a breakthrough molding technology, offering tremendous capabilities never before seen with other molding processes. MuCell™ opens new markets for innovative product design, optimized processing and reduced part costs. Products manufactured using MuCell technology are being developed and marketed in a variety of industries worldwide, including automotive, medical devices, consumer goods, electronics, food services and industrial and consumer structural parts.

Molders can gain a competitive advantage with the MuCell process by utilizing its processing benefits, e.g. endothermic reaction, lower viscosity and lower melt and mold temperature. These benefits typically result in significant reductions in cycle time, material consumption, injection pressure and clamp tonnage. This microcellular foam process is unique because it can be applied to thin-wall parts and to materials that cannot be foamed successfully with any other foaming technologies. In summary, competitive advantages can be achieved not only in existing markets, but also in new markets.

Injection molding applications of the MuCell molding technology have produced the following results:

◆ Up to 60% reduction in material viscosity due to the introduction of the supercritical fluid
◆ Significant reductions in processing temperatures (as much as 78°C, 140°F), resulting from lower viscosity
◆ 30-50% reduction in hydraulic injection pressure
◆ Reductions in cycle time due to the elimination of hold pressure and time
◆ Controlled weight savings
◆ 30-80% reduction in clamp tonnage
◆ Elimination of sink marks

The innovative MuCell microcellular foam process, which was developed at the Massachusetts Institute of Technology (MIT) and Trexel, is covered by patents and patents pending in Asia, Europe and North America. The MuCell molding technology is available as an option on selected new injection molding and structural foam molding machines. All MuCell-capable injection molding machines and structural foam machines are also capable of conventional, non-foaming operation.
The MuCell™ process technology is being applied to a broad range of injection molded thermoplastic materials and applications. Molders are currently taking advantage of the unique process benefits that MuCell provides. The applications that have been selected take advantage of the controlled weight savings and significant reductions in cycle time. Many products have been converted from larger machines to smaller MuCell equipped machines utilizing the drastic reductions in clamp tonnage. Most notably, the process is being applied in applications never before thought possible with other conventional technologies.

Filled and unfilled materials such as nylon (PA), polycarbonate (PC), polypropylene (PP), polycarbonate/acrylonitrile butadiene styrene (PC/ABS), polystyrene (PS), acetal (POM), polyethylene (PE), high-temperature sulfones, and TPE’s, (e.g. Santoprene and Kraton) have been molded.
Adapting the MuCell process injection molding requires the following changes or additions:

- A SCF metering system with sufficient capacity to deliver the SCF blowing agent to the screw at the rate and pressure required for the MuCell process. (Trexel’s Equipment Division supplies properly-configured pump systems for SCF delivery and other proprietary components to licensees)
- A Trexel-designed screw for creating a single-phase solution of the SCF blowing agent. (The screw design allows for both solid and MuCell materials to be processed)
- Minor modifications to software, system hardware and hydraulics to create and maintain the uniformity of the single-phase solution throughout the injection molding cycle

MuCell Machine Requirements

![MuCell Machine Diagram](image)

**Equipment Modifications**
- MuCell Screw and Barrel
- Barrel modifications
- MuCell SCF injector
- MuCell SCF metering system
- Minor software and hydraulic changes
  Equipment can operate in both solid and MuCell modes.

**Fig 1.1**

49” x 24” x 61.25”
(125cm x 61cm x 156cm)
MuCell™ Technology Cost Savings

Where do potential cost savings come from?

Areas of Potential Savings

Savings and Paybacks

Cost Savings

Where do potential cost savings come from?

Areas of Potential Savings

Savings and Paybacks

Application

(Material)
Implementing MuCell™ Technology

**Step 1:** Contact a licensed OEM injection molding equipment supplier and Trexel for hardware and license quotations.

For a list of licensed OEM machine suppliers, please refer to our website or contact us directly.

**Step 2:** Obtain a MuCell end user license agreement from Trexel, granting user rights to make, use and sell microcellular foam products.

- Trexel provides the MuCell license to end users on a machine-by-machine basis
- The machine license is paid annually for seven years, after which it is fully paid and irrevocable
- The annual license fee is determined by:
  - Machine size (measured in clamp tonnage)
  - Resin type (either restricted: commodity type resins such as PP, PE, and PS, or unrestricted: all resin types)