

# MuCell® Process News

April 2003

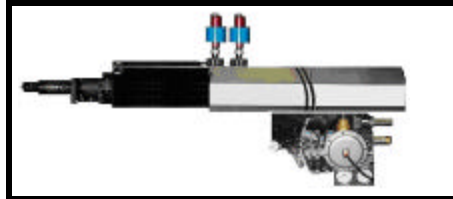
Volume IX

## Trexel Makes Two Major Breakthroughs for the MuCell® Process

Ease of use is a key determinant of a product's mainstream success. Trexel has long understood this point and has focused its engineering program on the objective of global mainstream adoption.

To achieve this objective, Trexel's engineers knew it would be impractical to expect that all future MuCell Products would be produced only on new injection molding machines. Therefore, a straightforward upgrade solution for existing molding machines was needed.

Second, Trexel needed to address the needs of their customers for a robust




*MuCell modular upgrade*

process able to run anywhere in the world with minimal special training, operator involvement, or supervision. These two objectives have now been met.

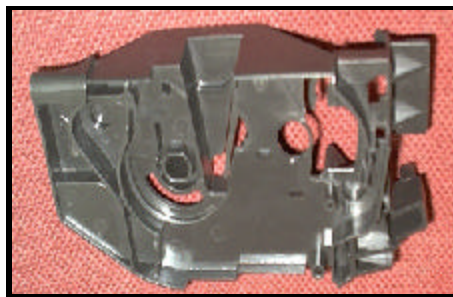
The recently introduced MuCell Modular Upgrade represents an extraordinary advance for the technology as nearly any injection molding

machine can now be converted to a MuCell Injection molding machine. The Upgrade, which can be installed at the customer's facility within one week (allowing, of course, for lead time in screw manufacture), was enabled by the replacement of the original 28:1 screw design with a 22:1 design. This allows direct replacement of current screws and barrels without complex and costly mechanical adaptations. Testing has proven that the 22:1 screw creates no compromise in the ability to make microcellular parts.

Trexel's earlier introduction of the


 continued on page 4

## Achieving High Quality While Reducing Costs








technology, Schroeder began running trials at Ticona GmbH, a material supplier and MuCell licensee. The targeted application required strict dimensional tolerances to ensure that mechanical functions were maintained after assembly with a metal mechanism.

"I was impressed that I did not have to sacrifice quality to reduce the manufacturing costs of the part," states Martin Witulski, Vice President and General Manager of Schroeder Kunststofftechnik. "On the contrary, I was able to improve its dimensional accuracy." Witulski notes that he realized a significant reduction in cycle time and a 10 % reduction in weight while minimizing warpage and eliminating sink marks.

 continued on page 4

In July of 2001, Schroeder Kunststofftechnik GmbH (Kierspe, Germany), whose primary business is supplying precision-molded parts to the automotive industry, held a foaming technologies seminar for its customers. The seminar was well received, especially by one customer that requested Schroeder to evaluate the MuCell technology in greater detail.

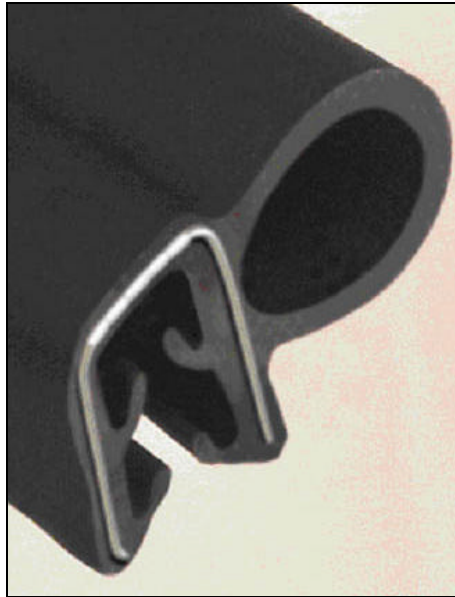
After learning the theory behind the

-  **TREXEL MAKES TWO MAJOR BREAKTHROUGHS**
-  **ACHIEVING HIGH QUALITY WITH REDUCED COSTS**
-  **JYCO LEADS IN FOAMED TPV SEALING SYSTEMS**
-  **GENESIS FIRST US MAKER OF MUCELL BUSINESS EQUIPMENT COMPONENTS**
-  **MOLDFLOW INTRODUCES MUCELL SIMULATION**
-  **AVAPLAS AND MUCELL EXPAND TO CHINA**
-  **HP APPROVES MUCELL FOR LARGER FORMAT PRINTER**

## Jyco Leads US Automotive Industry in Foamed TPV Sealing Systems

Jyco Sealing Technologies, Inc., a Trexel licensee, has established a business converting automotive weatherstrips or sealing systems from EPDM rubber (ethylene propylene diene monomer) to TPV (thermoplastic vulcanizate). In 2001, building on its many years of industry experience, Michigan-based Jyco started to produce microcellular-foamed and solid TPV seals.

Jyco licensed the MuCell Extrusion Technology after thoroughly evaluating traditional processes such as chemical and water foaming. "The foaming process is critical as an open-cell structure prevents us from meeting the stringent automotive requirements that permit the conversion from EPDM sponge to TPV foam," says President & CEO Sam Jyawook. "The MuCell process, which uses supercritical fluids, gives us better control over cell structure. We are able to achieve a closed cell structure that keeps mois-



*Photo courtesy of Jyco Sealing Technologies*

ture out, and a pore-free surface finish,"

TPVs are rapidly replacing EPDM due to their advantages in recyclability, part cost reduction, colorability, and durability. Multi-component weather-

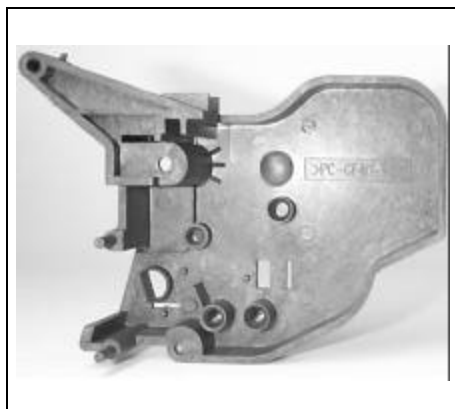
strips, such as door and trunk seals, often require a high performance foam element. It is for these reasons that Trexel has applied its microcellular expertise to the development of a robust TPV foaming process and to the screening and testing of appropriate TPV formulations.

"Our goal has been to put processors into a position to focus their energies on business-generating application development instead of spending time and resources on developing equipment and material formulations for foaming processes," explains Alex Schröder, Trexel's Sales and Marketing Director. "Unlike other methods, MuCell offers weather seal producers a consistent high-output manufacturing process to obtain critical product performance properties such as low water absorption. These benefits have attracted worldwide interest in the MuCell extrusion process."

## Genesis First US Maker of MuCell Business Equipment Components

As of December 2002, Genesis Plastics & Engineering, LLC (Indiana) has qualified and started production of its first two MuCell business equipment applications. Both parts are made of a glass-filled engineering resin and require tight dimensional tolerances, which is a common requirement for most printer components.

Analysis of critical functional dimensions on these parts showed that the MuCell process not only maintained, but also, improved the process capability index (CpK) compared to solid molded parts. Genesis' experience with other MuCell applications, including a Tecumseh fan, also showed an improvement in the CpK



value. The improved dimensional tolerances are attributed to the lower stresses inherent with the MuCell process. Besides improved quality, the MuCell process enabled reduced part cost through controlled material reductions and increased productivity

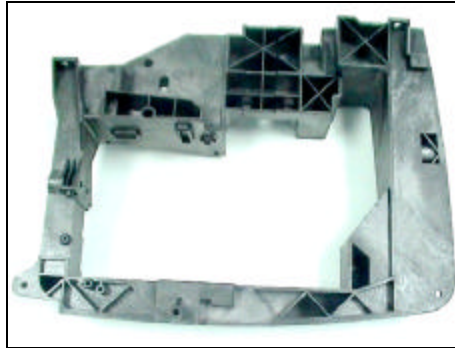
through lower cycle times.

As a QS-certified custom injection molder, Genesis services industries that require precision molded parts, such as printing and imaging, electronics, and automotive. Genesis is dedicated to surpassing customer expectations through the use of modern equipment and innovative manufacturing processes. Totally committed to providing the highest quality and service, Genesis explains it became a MuCell licensee because the process helped them to solve problems, improve manufacturing quality, and deliver to their customers new products with unique performance characteristics.

## HP's Imaging & Printing Mfg. Operation Approves MuCell for Large Format Printer

HP's Imaging & Printing Manufacturing Operation (IPMO) continues to expand the application of the MuCell Process for demanding printer applications.

According to, Sankara Raman, Senior Procurement Engineer for HP's Asian Operation, the goal in using MuCell for these highly structural parts was to reduce weight without sacrificing rigidity or dimensional tolerance. Sankara says the MuCell parts have met or exceeded all performance requirements, including part rigidity and dimensional tolerance. He adds that this performance, combined with the weight reduction and faster cycle times enabled by the process, means significant cost savings to HP, which is



a critical element in today's design.

The parts, which are molded for HP-IPMO by Avaplas in Singapore and Shanghai, China, demonstrate the unique ability of the MuCell Process to provide cost savings on tight dimensional tolerance structural parts without sacrificing mechanical performance.

## Moldflow Introduces MuCell Simulation

Concluding almost two years of collaboration with Trexel, Moldflow has announced that its new release, Moldflow Plastics Insight 4.1, makes available MuCell simulation results including filling pattern, injection pressure and cell size. These are all critical factors in optimizing a given part for the process as well as the process itself.

Having these capabilities will allow Trexel's customers to optimize their

part and mold designs specifically for the MuCell process before they ever have to invest any capital in tooling, machine modifications or mold trials. Since MuCell eliminates most molded in stress, thereby assuring greater conformance between the part and the mold at initial release compared to solid molding, this simulation capability will make it easier for customers to gain important time-to-market advantages by releasing their products directly as MuCell parts.

## Avaplas and MuCell Expand to China

In order to respond to demands from its largest customer to provide the highest quality parts at the lowest landed cost, Avaplas has set up a Shanghai-based molding operation in record time. Concurrently, it has received approval from its customer for a broad-based expansion of MuCell production in Shanghai.

Avaplas' greatest challenge in establishing MuCell production in Shanghai was meeting the tight start-up schedule. Fortunately, Trexel's recently announced Modular Upgrade enabled Avaplas to convert several Nissei machines, ranging from 150-320 tons, to MuCell-capability. To meet local installation regulations, Trexel enlisted the support of Japan-based manufacturing partner, Showa Tansan Ltd. and its Shanghai subsidiary. This enabled Trexel to manage the local installation and support the systems in the Shanghai area.

Avaplas is the largest MuCell molder in Asia. After receiving extensive training for both mold design and MuCell processing, its Singapore plant was recognized in 2002 as the first fully certified MuCell molder. Recently, Avaplas' Thailand and Shanghai operations were also MuCell-certified as having the trained staff and resources necessary to satisfy their customers' demands in Asia.

## Takagi Seiko Introduces First Commercial Parts in Japan

Takagi Seiko (Takaoka-shi, Toyama) recently commercialized its first MuCell product, a material tank for a color copying machine. Takagi Seiko entered into a licensing agreement with Trexel about two years ago, and has since been engaged in technology

development.

With the production of the material tank, Takagi Seiko became the first molder in Japan to commercialize a MuCell part in this field. Takagi Seiko reports that as a result of applying the

MuCell process to the material tank, they achieved not only significant weight reduction, but also a high degree of precision since the MuCell process inhibits non-uniform shrinkage, reduces part stress, and enhances dimensional stability.

## Achieving High Quality with Lower Costs



continued from page 1

After consulting extensively with Krauss-Maffei, Schroeder purchased a 180-ton MuCell machine instead of the 300-ton conventional machine that would have been necessary for solid production. Krauss-Maffei was able to offer a competitive price for the MuCell option by incorporating the new shorter MuCell screw design developed as part of the MuCell

Modular Upgrade program.

Schroeder's close proximity to Trexel's European Technical Center at Plastec in Gummersbach will ensure that it will continue to receive expert advice on mold design and MuCell processing, including obtaining training in German at the facility. Schroeder's first MuCell parts have been approved and will be delivered to its customer in mid-2003.

## PlusHUB Adds Licensees in Korea

PlusHUB, Inc., Trexel's exclusive marketing and technical support partner in Korea, has announced the addition of three unnamed MuCell licensees that represent global suppliers to the automotive and appliance industries. Two of these licensees will be entering into MuCell production immediately, having already completed product testing and qualification. In each case, the decision to become a

licensee was made based on the quality and processing benefits provided by the MuCell process.

Yong-il Park, President & CEO of PlusHUB, explains that Korean manufacturers have conducted many successful mold trials at the MuCell Technology Center and expects a five-fold increase in licensing during the next twelve months.

## LG Electronics uses MuCell for Digital TV



LG Electronics, Inc. (LGE) of Korea is the first global supplier of consumer electronics to undertake mass production of MuCell products. Having commenced active research and development in 2001, LGE introduced the technology on the speaker box set for

its 29" Digital TV models in May 2002. This Speaker Box, which is comprised of an upper and lower part, is being attached to the Digital TV models with flat displays. LGE, which is using talc-filled polypropylene for these MuCell parts, is realizing a 15% weight reduction, reduced cycle time, elimination of sink marks, and reduction in warpage.

These benefits have led directly to improved productivity through easier assembly and fewer rejects. LGE intends to expand this application to all of its Digital TV models starting in the first half of 2003.

## Trexel Breakthroughs



continued from page 1

Series II SCF System provided a powerful logic controller that could manage the MuCell functions of the injection molding machine independently of the molding machine controller. As a result, Trexel developed a standardized user interface and software for upgraded machines. This ensures that all end-users, irrespective of the machine that is upgraded, will share the same MuCell user interface and control software.

To meet its second objective of easy global deployment, Trexel has introduced the Automated Delivery Pressure Control system (ADPC). It was developed as a direct response to customer requirements for 24/7 operations with minimal monitoring of the process. The ADPC is a new integrated hardware and software system that automates, controls, and monitors the delivery of SCF into the barrel of the injection molding machine, resulting in less manual adjustment and operator supervision. By continually adapting to normal changes in the injection molding process, the ADPC reduces the amount of operator expertise to set up and maintain a consistent MuCell Process. The ADPC is available on any MuCell Machine, new, upgraded, or previously installed.

## Trexel at NPE 2003

Visit Trexel at our NPE booth (#3038 South). Please watch for a special notice and invitation regarding our NPE program.