

MuCell® Process News

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Avaplas Takes Southeast Asian Lead in MuCell Technology

Leading Injection Molder Expands Business by Manufacturing MuCell® Printer Parts for Hewlett Packard

Avaplas, Ltd. of Singapore has just qualified its first commercial production runs for Hewlett Packard (HP).

Established in 1993 by Chairman and CEO Boone Quek, Avaplas presently has 53 machines equipped with robotic and computer automation. It services industries such as printing and imaging, computer peripherals, telecommunications, semiconductors and consumer electronics. Avaplas customers include HP, Motorola, Texas Instruments, General Electric, and Sony.



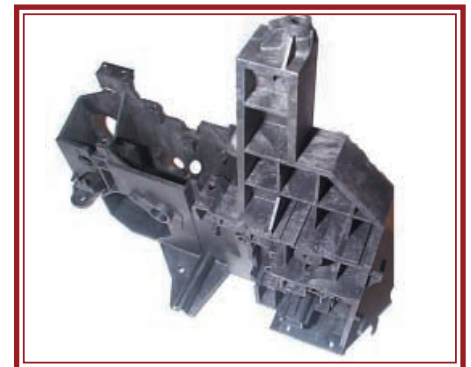
Avaplas' first approved MuCell part is an internal component of an HP 1220C printer

Avaplas purchased its first MuCell license and MuCell-equipped **Engel** injection molding machine in November 2000, and has added two more since then. It is now working with HP and Trexel on the commercialization of MuCell-based products.

"With the rapid changes in the operating environment, exploitation of knowledge-based technologies will be the key to succeeding in this increasingly competitive and global environment," said Quek. "MuCell fits this bill by allowing us to operate in a more efficient and effective manner to meet our customers' exacting demands."

Steve Friend, Trexel's Director, Strategic Marketing, labeled Avaplas' success with the MuCell process on HP parts an excellent example of the benefits to be derived from end-users teaming up with suppliers

to identify new technologies. "This cooperation enabled HP and Avaplas to confirm the savings and performance benefits in record time. Now, with the first MuCell parts approved and in production, HP's imaging group is accruing part cost savings and Avaplas has extended its technological leadership in the very competitive Asian Market."



MuCell processed Left Support for HP printer manufactured by Avaplas

Kok Hock, Avaplas' Finance Manager, noted that because of rising resin prices, customers are aggressively looking for ways to maintain or lower the cost of their products. He sees the MuCell process fitting this bill by providing improved profitability through cost reduction. "We feel that the successful commercialization of the MuCell technology for mass production provides a tremendous opportunity for our company," said Hock.

HP PRINTER PART APPROVED

INJECTION MOLDERS GO COMMERCIAL

- EMPIRE
- GENESIS
- GERARD
- SEEBER
- SOUTHCO
- VALEO

TREXEL AT K '01

MUCELL NOTES

UPCOMING EVENTS

Injection Molders Going Commercial with MuCell Products

A number of injection molders have begun manufacturing MuCell® commercial parts for customers, and they report that it is giving them a substantial competitive advantage.

Empire Precision Plastics of Rochester, New York became a MuCell licensee in June 2000, hoping to get in on the ground floor of a technology it expected to revolutionize the plastics industry.

"One of our materials suppliers told us about MuCell and suggested we jump on board right away," explained Empire President Neal Elli. "We finally decided it was one of those rare opportunities we couldn't afford to pass up."

"We believed from the start that MuCell could open new doors for us, and it certainly has done that," he added. "We're getting into companies now that we would have never imagined."

Empire specializes in high-volume, high tolerance injection molded parts. Its customers are from the automotive, business equipment, electronics, consumer, and industrial sectors.

"We're known for our precision work and finesse processing," stated Elli. "Adding MuCell to our available technologies has reinforced that image."

According to Elli, Empire is already well positioned to work with the MuCell process and will be improving on that capability. "We have one 66-ton MuCell-equipped **Arburg** machine in operation now, and a number of others that we plan to convert in

the coming months. That will make us physically capable of handling a wide variety of MuCell projects."

Right away, Elli saw encapsulating electrical components as an excellent application. "High temperatures and pressures destroy printed circuit boards. By reducing these factors, MuCell improves manufacturing efficiencies."

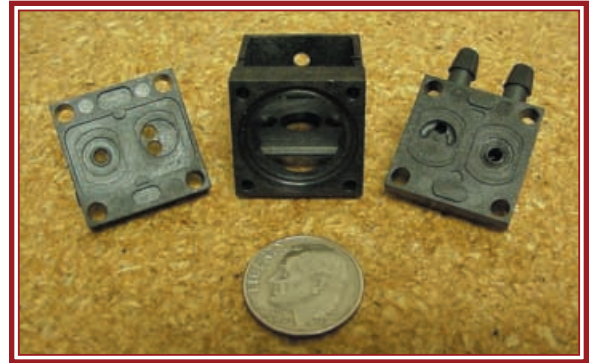
Each of the parts Empire is presently manufacturing had serious dimensional and performance obstacles to overcome. Using the MuCell process, Empire prevailed.

On a level sensor made of HDPE, Empire reduced part weight by 10% and cycle time by 20%; on an industrial ice machine float made of polypropylene, Empire reduced part weight by 10% and cycle time by 30%; on glass-filled Polyphenylene Sulfide valve parts, Empire reduced sink mark depth by 80%, part weight by 5%, and cycle time by 20%.

The process also complements Empire's tooling. "We have a hybrid tooling technology that uses an aluminum alloy to improve thermal conductivity," explained Elli. "This allows us to run at higher temperatures and faster cycle times. Our tooling technology combined with the lower injection pressure of the MuCell process reduces the stress on tools. That means lower tool costs and shorter lead periods."

Genesis Plastics and Engineering of Scottsburg, Indiana is also into commercial production. It originally

saw the MuCell process as a tool to solve existing problems such as mold-



MuCell processed Tiny Precision Valve Parts manufactured by Empire

ed-in stress and warpage, and to increase flow length through reduced viscosity.

"We did an extensive investigation on MuCell and concluded it would be a great addition to our portfolio of technologies," explained President and CEO Jim Gladden. "It lowers material viscosity and molding pressure while reducing clamp tonnage requirements. We've been able to run one part at 40 tons instead of the 245 we would have normally used.

Today, Genesis is commercially producing a number of MuCell parts on an **Arburg** machine: On a glass-filled polypropylene hinged-cover where flatness was critical, cycle time was reduced by 30%; on a polypropylene molded living hinge part, cycle time was shortened considerably; on a glass-filled polycarbonate housing with very tight tolerances, Genesis is reducing weight and cycle time by 20%.

Gladden sees these as just the beginning. "We receive inquiries on a daily basis about MuCell, and it can only get better."

Seeber Systemtechnik Preparing to Supply MuCell Door Trims for Volkswagen AMPV

Seeber Systemtechnik KG of Peine, Germany has contracted with Volkswagen to supply MuCell® door trims for its AMPV vehicles. The Seeber Group, which is comprised of fourteen companies, is a leading manufacturer of paneling and engine compartment systems. Its customers include Ford, Lancia, Rover, Fiat, BMW, Alfa Romeo, Renault, Volvo, Peugeot, Citroen, Volkswagen, Audi, Porsche, Saab, Mercedes, Chrysler, and General Motors.

"We came across the MuCell technology in the German newsletter *Kunststoff Und Kautschuk*," explained Dr. Ulrich Woelfel, Technical Director. "We began testing it for our needs with Engel, Austria,

and the results warranted our becoming a licensee and purchase of an **Engel** 1000-metric ton machine."

"In addition to reducing materials, we have been able to improve on the design with respect to the one shot technique for fabric and laminate. The improvement came as a result of the lower temperatures and pressures associated with the MuCell process."

Rob Janisch, Trexel's Sales Director-Europe, stated, "Seeber is another example of an innovative company that is applying the MuCell technology to offer its customers a unique product. Seeber has discovered that the MuCell process allows it to design new products in ways that are

Gerard Producing Three MuCell Parts for Commercialization

Gerard Industries, an Australian-based supplier of electrical accessories doing business in over 25 countries on 5 continents, recently purchased its second MuCell-capable **Arburg** injection molding machine and license for use in manufacturing its Clipsal line of parts. Gerard already is producing three MuCell parts for commercial use, and has a number of others planned for the near future.

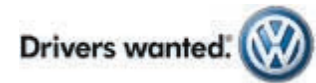


This switch is one of many MuCell parts being manufactured by Clipsal

Southco to Manufacture MuCell Latch Parts

Southco, Inc. of Concordville, PA, a global provider of latches and access hardware, has approved the manufacturing of a number of proprietary MuCell products. Southco employs more than 1700 people in 15 countries.

Drawing on over 100 years of manufacturing experience, Southco provides latching and access hardware solutions for the electronics, enclosures, computer, telecommunications, automotive, recreational vehicles, heating, ventilation, and air conditioning/refrigeration, and medical industries. Southco expects that its use of the MuCell process will allow it to reduce manufacturing costs while providing dimensionally superior products.



not possible with standard injection molding processes. It also will allow Seeber to take advantage of the lower pressures associated with MuCell, and to utilize smaller injection molding machines than would be required through other injection molding technologies."

Valeo Submits Control Panel Fascia for Approval

Valeo is in the process of having a MuCell control panel fascia approved for a major automotive manufacturer.



MuCell processed Automotive Control Panel Fascia manufactured by Valeo

Valeo is an independent industrial group fully focused on the design, production and sale of components, integrated systems and modules for cars and trucks and ranks among the world's top automotive suppliers. The Group has 162 plants, 49 R&D centers, 10 distribution centers and employs 78,000 people in 25 countries worldwide. Valeo's customers include all major car manufacturers.

Valeo has purchased two MuCell licenses to date along with two MuCell-equipped **Engel** tiebarless machines. One is a model 125 T, and the other a model 250 T.

Trexel Exhibiting at K '01

At the upcoming K2001 Trade Fair in Dusseldorf, Germany, Trexel will continue with its theme of *"The MuCell Process Creates New Cost Structures for Molded and Extruded Parts"*. To exemplify this, Trexel will have on display a number of parts presently being manufactured for commercial use.

In addition, visitors to the Trexel booth will be given a new CD that was created to enable them to better design MuCell® molds and products.

"We've taken the knowledge that we've gathered from working with nearly one hundred MuCell licensees, and created a CD that will answer customer questions and facilitate

commercial applications," stated David Bernstein, Trexel President and CEO.

Trexel's Extrusion Group will also have a major presence at K '01, displaying new products such as PVC profiles, PP thermoformable sheets, PS trays, TPE seals, and HDPE bottles.



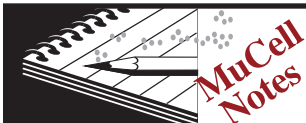
Trexel K-Show booth, Hall 12, Stand D22

SEE MuCell PARTS RUNNING!!

ARBURG
Hall 11, Stand A13

JSW
Hall 12, Stand C34

ENGEL
Hall 15, Stand C58



Bemis Manufacturing Company has successfully completed the installation of MuCell-capable extrusion equipment and is now set up to provide contract manufacturing of MuCell products.

Battenfeld GmbH has delivered two 1000-ton HM Series machines to Textron, Italy. These will be used for the serial production of high-quality MuCell automotive parts.

Husky has installed a 160-ton machine at its Singapore Technical Center to demonstrate MuCell molding and to determine its suitability for specific customer applications.

UPCOMING EVENTS

SPE Chapter Meeting <i>Atlanta, GA</i>	Sept 24	<i>"Improving your Process for Injection Molding"</i>
Husky Open House <i>Novi, MI</i>	Sept 25	Running the MuCell process on a 750-ton machine!
K-Plast '01 <i>Paper/Presentation</i>	Oct 24	<i>"A New Cost-effective Modification to Retrofit Twin Screw Extruders for the Manufacture of Microcellular PVC Products"</i>
K Show <i>Dusseldorf, Germany</i> Trexel: Hall 12 Stand D22	Oct 25-Nov 1	Arburg, Engel, JSW Running the MuCell process!
Molding 2002 <i>New Orleans</i> Trexel: Presenter and Sponsor	Mar 4-6	<i>"The Fundamentals of the MuCell Process; How MuCell Changes the Cost Structure of Injection Molded Parts; and Review of Commercial MuCell Applications"</i>

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