

ROTATIONAL MOLDING NEWS

VOLUME 02/1

Stuart J. Lipsteuer, Editor
Robert D. Swain, Asst. Editor

Did You Fill it Out Yet?

In the last issue of this newsletter, a membership survey was enclosed. If you have not filled it out, please do so. If you do not have your last newsletter handy, you can fill out the survey online by going to our home page: www.rotomolding.net and click on the survey icon. Completed hard copies of the survey should be mailed to: Ken Wessler, PO Box 99, Dunkirk, OH 45836-0099, or fax: (419) 759-3843.

Your input counts in determining the future direction of RMD. We look forward to receiving your completed form.

Stuart J. Lipsteuer
Newsletter Editor

Summer Internship

If you are seeking the availability of summer interns or if you are an employer looking to hire an intern for the summer, please feel free to contact:

Nick Schott
Phone: 978-934-3404
Fax: 976-458-4141
E-mail: jeanschott@aol.com

Don't forget to visit our website at:

www.rotomolding.net



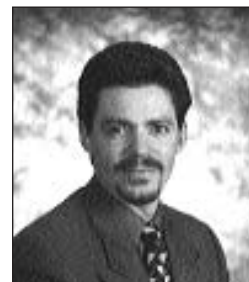
See the updated SPE website at:

www.4spe.org



Message from the Chair

We are well into the new year with several important events taking place. The first being ANTEC May 5-9, 2002 in San Francisco, CA. The rotational molding program is split into two different sessions. The first is focused on processing and the second is focused on materials. The papers are quite extensive in their subjects and the titles are listed in the newsletter and on our website at www.rotomolding.net. I encourage you to attend in order to learn the most recent findings in these areas. I would encourage everyone to get the proceedings on CD-ROM too. It is a great reference to the papers and is easily searchable for review of papers that you attended or missed. ANTEC offers a tremendous amount of knowledge about the polymer industry in one location and is a great opportunity to meet the people who make up our industry.



The second event is the RETEC this June 9-11 in Independence, OH which is titled "*Advances in Materials and Processes in Rotomolding*" and is focused on developments in the rotational molding industry. The list of titles and industry respected authors is impressive and will be valuable for members and non-members alike attending this RETEC. Again, more information is available in this newsletter or at www.rotomolding.net.

I wanted to report to you on our survey so far. First of all, we still need our members and interested non-members to fill out the Rotational Molding Division's survey. We have only had about 10% use of the form by respondents who either filled out the printed form from our last newsletter or by downloading the electronic version on our website www.rotomolding.net. If you need a printed copy, please contact our Newsletter Editor, Stuart Lipsteuer at (815) 759-2213 or you can go to the website and print off a copy. The best way to answer the survey is to fill out the electronic version while you are at the website. Again, if you fill out the electronic version, you will get an immediate report on the results from the survey so far. Remember, this is the best way to give the Board of Directors your opinions and suggestions for the direction of our Division. I look forward to getting your responses.

Also, we have included a troubleshooting guide for rotational molding in this issue of Rotational Molding News. Our main purpose is to convey relevant information that our members can put to good use. This guide does not cover all rotational molding issues, but does cover the majority of the issues. First and foremost, use wise judgment when it comes to safety because not all situations may apply to your process. "*Processing Tips*" should help answer common problems and reduce the amount of troubleshooting time.

In summary, I hope to hear back from each of you especially via our survey and I hope to all of you will be at ANTEC. Remember, we have our annual business meeting on Monday, May 5 at 6:00 PM at ANTEC, so bring your ideas and comments. In the meantime, be safe, work hard, and we will see you there.

Jon Ratzlaff
Chairman, RMD

PLASTICS PIONEERS GRANT \$24,000 FOR 16 COLLEGE SCHOLARSHIPS

GREER, SC, December 12, 2001—It was announced today by G. Palmer Humphrey, Managing Director of The Plastics Pioneers Association, a society of industry leaders, that \$24,000 in \$1500 scholarships was awarded to 16 college students working toward careers in plastics.

“This year’s scholarship awards continue an annual tradition begun by the Pioneers in 1988,” said Humphrey. *“The money for these grants consists of the earnings of a special fund based entirely on contributions from Association members.”*

The scholarship program is administered by the Plastics Institute of America, based at the University of Massachusetts / Lowell.

Awardees for the 2001 / 2002 school year are:

Angela S. Albertson	Penn State Erie
Joel Bell	Winona State University (MN)
Jeff Brandewic	Edison Community College (FL)
Josh Bunting	Minnesota West Community College
Ryan Butler	Dunwoody Institute (MN)
Brett L. Davidson	Pennsylvania College of Technology
Damon B. DeVore	Penn State Erie
Robert Greenfield	Minnesota West Community College
Stephen Hlopick	Penn State Erie
Erica Hoover	Pittsburg State University (KS)
Erik Hutchins	Ridgewater College (MN)
Lucas W. Mellinger	Pennsylvania College of Technology
Tymon J. Moore	Pennsylvania College of Technology
Joseph Naber	Minnesota West Community College
Brian J. O’Connell	Ferris State University (MI)
David A. Yates	Edison Community College (FL)

The Plastics Pioneers Association was founded in 1942 as a society dedicated to fostering friendship among long-standing members of the plastics industry. Today, the Plastics Pioneers has two objectives: friendship and education. Membership is limited to 250. An applicant must have made some significant contribution to the industry and must have been employed in the industry for at least 30 years.

Managing director of the Pioneers is G. Palmer Humphrey, who is Chairman of R.C. Molding, Inc., 19 Freedom Court, Greer, SC 29650.

The following is a continuation of the FUTURE TRENDS IN ROTATIONAL MOLDING article by Sandy Scaccia, President of Norstar Aluminium Molds

**Processing
Corner**
(continued from 01/3 issue)

IV. FUTURE TRENDS

Future Trend 1 - Consolidation and integration of molders

Consequently, custom molders will continue to consolidate and integrate to provide the basis for competitiveness and growth. This “follow the customer” strategy has proven out many times in the past for other industries and the time has come for rotational molders to do the same.

Future Trend 2 - A continuing gap between strategic types of molders

On the other side of the creek, soon to be a river, are the molders who are embracing a different strategy. That of growth into new markets through the use of higher technology and advanced processes. These molders are investing time and money into the integration of new technologies and developing the process of rotational molding so as to allow themselves to go after emerging markets.

Future Trend 3 - The move to automation

In reality, automation is just not as much of a push as it once was for the rotational molding industry.

Future Trend 4 - Development efforts will move away from a focus on cycle time and toward productivity

We belong to that huge market called plastics processing.

The question is should the rotational molding industry’s real concern be cycle time? Shouldn’t it be productivity?

*In the next ten years,
rotational molding will be the one to watch!*

RETEC 2002 Rotational Molding Program

June 9-11, 2002 ♦ Cleveland Ohio- Advances in Materials & Processing in Rotomolding

Sponsored by the Rotational Molding Division.

- ▶ Improving Impact Through Modification of Nylon 6
- ▶ TPO's and Plastomers for Rotational Molding
- ▶ Thermoplastic Polyurethane Slush Molding for Automotive Instrument Panels
- ▶ Abrasion Resistance for Crosslink Materials
- ▶ Effect of Ethylene Content on Melt Stability of PP roto micropellets
- ▶ Liquid Colors for Rotational Molding
- ▶ Additives for Effects in Rotational Molding (e.g: *antistats, antimicrobials, etc.*)
- ▶ The development of New Coatings for Rotational Molding
- ▶ New Release Agents and Anti-Stats
- ▶ New Color System for Rotational Molding
- ▶ Simulation of Powder Densification in Rotational Molding
- ▶ Recycled Polyethylene for Rotational Molding
- ▶ Technical Analysis of Material and Color Problems
- ▶ Physical Properties & Different Mold Textures
- ▶ Effect of Processing and Test Conditions on ESCR
- ▶ Rotational Molding Process Control at Boeing Commercial Airplane Co.
- ▶ New TRIP Technology for Rotational Molding
- ▶ FEA Analysis for Rotational Molding
- ▶ Foaming in Rotational Molding
- ▶ Single Step Skin Surrounded Rotational Molding Products

THE CONFERENCE WILL BE HELD AT THE HOLIDAY INN--INDEPENDENCE, OHIO.

Contact Bruce Muller, Plastics Consulting, Inc. 682 SW Falcon St., Palm City, FL 34990

Telephone 561-784-6699, e-mail: plastics@aol.com

or contact Paul Nugent by telephone: 610-370-0596, or e-mail: email@paulnugent.com

What's New?

A new book for Rotational Molding has been published-*Rotational Molding: A Practical Guide* was written by Paul Nugent, former Manager of the Rotational Molding Research Centre at the Queen's University of Belfast and Director of Technology at Remcon Plastics, Inc. Covering some 809 pages with over 400 figures including over 80 tables of data, it represents a complete reference to all aspects of the process. It provides insight into the major technical work carried out in rotomolding over the last 30 years and practical tips based on the author's academic and real-world experience. Full details can be seen at: www.paulnugent.com

Jan. 27-29, 2002 Large Product Category winner

Nauticraft Corporation of Muskegon, Michigan won first place in the competition for the Large Product Category at the Winter general meeting of the Association of Rotational Molders held Jan. 27-29, in Minneapolis, Minnesota. The award was for the rotational molded hull of Nauticraft's Encore pedal boat, which is 14'2" long x 4'9" high. (*This company and a picture of the craft was featured in our 01/3 newsletter in the Company Profile Section*) This award is given annually for outstanding achievement in the advancement of the rotational molding process.

2.Pan-Europe Rotomoulding Conference May 5-7, 2002 Newport Hotel, Paris Disneyland, France

This is the second European based event bringing together some of the world's leading authorities on Rotomoulding to provide information on the issues affecting Rotomoulders today.

It is the best way to keep your company up to date with current innovations, concepts and ideas in the sector, which is particularly important in today's ever changing business climate.

The program of events will provide a variety of highly stimulating and important subjects, presented by expert speakers from throughout the industry and from around the world.

During the conference the technical sessions will be simultaneously translated into FIVE languages (*English, French, German, Italian and Spanish*). This is for your convenience and to provide you with a better and more comprehensive understanding.

Complementing the conference program, a tabletop exhibition will provide all delegates with the opportunity for "hands-on" inspection of materials, technology, and product samples. Suppliers and technical personnel will be available to answer questions and to discuss your product and equipment needs.

For more information:

website: www.2pec.com

General inquires: contact@pec.com

Registration inquiries: register@pec.com

Or you can contact ARM:

phone: 1-630-571-0611, fax: 1-630-571-0616



Advances in Materials and Processes in Rotational Molding

Holiday Inn Independence

6001 Rockside Road
Independence, Ohio 44131
Phone: 216-524-8050

Sponsored by:
*Rotational Molding Division and
the Cleveland Section of the
Society of Plastics Engineers.*



Advance Registration

Rotational molding topical conference advanced registration must be postmarked on or before May 21, 2001. Make check payable (U.S. Funds) to: **Roto Mold Conference**

Mold Conference

and mail with this form to:

SPE - Cleveland Section c/o Don Haeske
19125 E. Shoreland Ave
Rocky River, OH 44116
e-mail: dhaeske@aol.com

First Name _____ MI _____

Last Name _____

Company _____

Position _____

E-mail: _____

Address _____

City _____ State _____

Zip _____ Phone _____

SPE Member Number: DSM# _____

Non-member _____ Student _____

	Advance	On-site	
SPE Member	\$345	\$395	_____
Non-Member	\$445	\$495	_____
Student	\$105	\$155	_____
Mini-Seminar			
with RETEC	\$50	\$75	_____
Mini-Seminar Only	\$100	\$125	_____

Exhibit (includes one conference registration) Display area 8' x 10'

Exhibit - Member \$650 _____

Exhibit- Non Member \$750 _____

Number of registrations _____

Amount of Enclosed Check _____

Please photocopy form or attach list with complete information of additional names registered with check.

Non-member registration includes a one year membership in SPE.

No cancellations after May 15, 2002.

Registration Questions - Pete Nenadal (216)524-5293.

Sunday, June 9, 2002

Glenn Beall Seminar & Reception with Exhibits.

Monday, June 10, 2002

Session 1: New Materials

Moderator: Harry Covington, Ferry Industries

Improving Impact Through Modification of Nylon 6

- Randy Fleck, Honeywell

TPO's and Plastomers for Rotational Molding

- Marianna Kontopoulou, Queens Univ. Canada

Thermoplastic Polyurethane Slush Molding for Automotive Instrument Panels

- Jack Chan, Bayer

Abrasion Resistance for Crosslink Materials

- Ed Boudreau, Chevron Phillips

Effect of ethylene content on melt stability of PP roto micropellets

- Hank White, PennState

Session 2:

Additives, Color & Release Agents

Moderator: Glenn Beall

Liquid Colors for Rotational Molding

- Stu Lipstour, Chroma Corp

Additives for Effects in Rotational Molding (e.g.: anti-stats, antimicrobials etc)

- Urs Stadler, Ciba

The development of new coatings for rotational molding

- Marty Toth, DuPont Coatings

New Release agents and Anti-Stats

- George Barton, Chem-Trend

New Color System for Rotational Molding

- Dennis Foy, Teknor Color

Tuesday, June 11, 2002

Session 3:

Material Testing & Evaluation

Moderator: Jim Brauenig, Hedstrom Corporation

Simulation of powder densification in rotational molding

- Celine Bellehumeur, U. of Calgary

Recycled Polyethylene for Rotational Moldings

- Elizabeth Takacs, McMaster

Technical Analysis of Material and Color Problems

- John Steele, Rotec Chemicals

Physical Properties & Different Mold Textures

- Steve Andrzejewski, Equistar

Effect of Processing and Test Conditions on ESCR

- Mark Weber, Nova Chemicals

Session 4:

Material Processing

Moderator: Carl Dobrzeniecki, The Molding Company

Rotational Molding Process Control at Boeing Commercial Airplane Co.

- John Moser, Boeing

New TRIP Technology for Rotational Molding

- Don Schraegle, SJS Industries

FEA Analysis for Rotational Molding

- John Fawcett, Fawcett Designs

Foaming in Rotational Molding

- Jim Throne, Sherwood Technologies

Single Step Skin Surrounding Rotational Molded Products

- Remon Pop-Iliev, Ingenia Polymers

COUNCILOR'S SUMMARY REPORT By: Robert Swain

The council meeting was held October 19 and 20, 2001 in Quebec City, Quebec, Canada. The majority of our time was devoted to the financial condition of SPE. The economic downturn has adversely affected the cash flow of the society and losses could approach a half million dollars. ANTEC 2001 attendance was down, attendance at seminars and conferences is off 30%, and membership is also dropping. Headquarters has reduced the size of our staff and other expenses...widespread discussions on the 2002 budget were productive...while several good suggestions from councilors were offered and noted. The 2002 budget was approved and the Finance Committee agreed to develop a "worst case scenario" budget in case the economy showed no improvement but remained flat for the year.



The Website has been redesigned and is more user-friendly. We will be able to order technical books on line. We are exploring how to improve cash flow by setting up a mechanism for users to download technical papers for a fee.

Our concerns about the accuracy of our membership mailing lists as generated by staff, I believe, have been resolved with the new programs put into place. A dozen test cases were conducted with staff using names from our more extensive mailing list as generated by Einar Voldnar and his Membership Committee. In each case, staff was able to explain why the members had fallen into a non-member status. Also, each Division has an SPE officer assigned to oversee and resolve any difficulties that could arise. Our Division has been assigned to Len Czuba who may be contacted at LCzuba@aol.com or 630-632-3560.

Finally, Karen Winkler, Chair of the Finance Committee, has invited me to sit in on the meeting of the Finance Committee while they continue to wrestle with their cash flow problems.

A PRODUCT DESIGNER'S GUIDE TO ROTATIONAL MOLDING Instructor: Glenn Beall

April 8, 2002 • Strongsville, Ohio (Cleveland)

PURPOSE & OVERVIEW

This intense fact-filled program dwells on how to design products that optimize the rotational molding process. The use of hollow parts is increasing rapidly. Many designers do not know how to take advantage of the benefits of hollow parts. The capabilities and limitations of the materials being modeled, the molds being used, and how the process works will be explained. Plastic product and part design will then be reviewed in detail.

WHO SHOULD ATTEND?

Design engineers employed by original equipment manufacturers will learn valuable lessons in this seminar. Custom molders, mold-makers, and plastic material manufacturers who help their customers design parts will also benefit in attending this course. Universities that teach plastic product design will find this course to be helpful.

SEMINAR FEE

Registration SPE Member: \$640
Nonmember: \$755

By Phone: (203) 740-5403

By fax: (203) 775-8490

On-Line: <http://www.4spe.org/conferenceseminar.htm>

Then go to Upcoming Seminars.

SEMINAR CONTENT

Introduction

☞ What the process is ☞ How it works ☞ Why you should care (*common, unique and parts consolidation applications*) ☞ A brief history

Processing Requirements

☞ Equipment considerations (*single and multi-arm machines, capabilities and limitations of each*) ☞ Tooling considerations (*nomenclature, mold types, heating and cooling considerations, and selecting the optimum mold*) ☞ Plastic material considerations (*polyethylene, polypropylene, polyvinyl chloride, nylon, polycarbonate, fluorocarbons, special materials, foam and material selection*)

Product Design Considerations

☞ Product design (*defining the requirements, industrial design and structural design*)

Part Design Details

☞ Wall thickness considerations (*parallel wall spacing limits*)
☞ Warpage Reinforcing features (*doming, reinforcing ribs, kiss-offs, flanges*) ☞ Corner radius recommendations ☞ Draft angle considerations
☞ Molded undercuts w/Molded in-holes (*through and blind holes, drop-top, and head-to-head holes*) ☞ Molded threads w/Molded inserts ☞ Tolerances Finishing touches (*decorating, color, polish, texturing, in-mold labeling and painting*)

Selecting the Process

☞ Competitive hollow part processes (*blow molding, twin-sheet thermoforming*) ☞ Cost Considerations ☞ Selecting a supplier

Summary and Future Trends

COMPANY PROFILES

BRUNK CORP.

Brunk Corp. is family owned and has been in operation for over forty years. The business was started in northern Indiana in the late fifties as a small trucking operation. In the mid-nineties, Brunk found a niche in the plastics pulverizing and distribution business offering trucking, warehousing and pulverizing at one location.

With their trucking and service background, Brunk's name grew quickly in the rotational molding industry. The company was able to work with customers to meet tight delivery schedules and provide a high quality powder for rotational molders. In the spring of 2001, Brunk took their experience to Minnesota, opening a facility there to serve the rotational molding industry in and around Minneapolis. By having a warehouse and pulverizing facility in the molders' backyard, Brunk has been able to show customers a tremendous cost savings. The company can also bring in railcars of virgin product to within a few miles of the customer's business. The product can be pulverized and delivered with one phone call. Packaging, warehousing, rail storage, and trucking are all under one roof.

Brunk pulverizes all colors and grades of PE for the rotational molding industry; in addition, regrind and reprocessed material are also available. Check them out at www.brunk-ajp.com. Questions on services can be directed to Tracy Bartow at 800-227-4156

ROTALOC INT'L

Rotaloc Int'l produces a unique line of fasteners that assures maximum pull out and torsional strength from a rotomold insert. First introduced at Rotoplas'99, Rotaloc Int'l displayed their initial product line of Rotaloc bonding fasteners engineered to be molded into plastic components. The product line consists of female and male threaded inserts securely mounted on large-flanged, perforated baseplates. The plastic completely encapsulates the baseplate and flows through the perforations, securing the plate integrally into the molded wall.

Rotaloc currently produces their product in Asia and stocks completed product in Littleton, Colorado. The owners opened a European office in the UK in early 2000 where they also maintain full levels of inventory. Rotaloc has purchased an extensive range of new, specifically designed manufacturing equipment allowing them to perform their own turning, forging, stamping and welding. Customer designed hydraulic testing equipment assures consistent quality. Finished product is maintained in inventory to accommodate same day shipment in most cases.

Contact Rotaloc at 888-rotaloc (768-2562) for more information and free samples or visit them at www.rotaloc.com.

PERSICO

Persico, a leader in producing cast aluminum molds for the rotational moulding industry, has been in operation since 1976.

This company offers a complete service including:

Product Design (*starting from the customer's idea*) using latest generation CAD 2D and 3D systems.

Production of Models and Patterns (*by CAD/CAM technology or by skilled pattern makers*).

Production of CNC Moulds and Cast Aluminum Moulds fully dressed and completed as per customer request with:

- ▶ top quality aluminum castings with minimal porosity, thin and uniform wall thickness, excellent surface finish
- ▶ fitting of specific accessories for increasing productivity
- ▶ fitting of independent frames or full spiders

Custom Projects for any particular customer need relating to the rotational moulding process and automated equipment.

Persico is available to answer inquiries a client or potential client may have and is pleased to quote for tools according to a molder's next project.



Designer's Corner Glenn Beall

Wall Thickness Considerations

The first three articles in this series started with the February, 2000 issue of Rotational Molding News. These articles dwelt on rotational molding product design and the important differences between product design and part design.

As a new product progresses through product design and on into the part design phase, the emphasis changes. During the product design phase, the primary emphasis has to be on creating a structure that will satisfy the function requirements of the product in its end use environment. Part design is concerned with proportioning the individual parts in an assembly in such a manner that they can provide that function and be economically produced.

The first decision to be made in finalizing the design of a rotationally molded part is to determine the part's nominal wall thickness. The thickness of a molded part is dictated by two primary considerations. The wall thickness must provide for the functional requirements of the product, while accommodating the molding requirements of the process. For example; a flexible, PVC medical waste collection bag might be strong enough to function properly with a 0.5mm (0.020 in.) wall thickness, but the molding process can only produce that shape with a 1.0mm (0.040 in.) thickness. In this case, processing would take priority over function and cost.

The ideal wall thickness is the thinnest wall that will provide for both the functional and the processing requirements of the product. Thickness has a direct effect on cost. Plastic material represents a significant fixed cost that cannot be influenced by the molder or the customer. Thinner walls reduce both material cost and molding cycle time. Generally speaking, thinner is better.

The minimum allowable thickness is determined by strength requirements and the material's ability to uniformly coat the cavity. The maximum allowable wall thickness is dictated by cycle time and the material's ability to withstand the long, high temperature, oven cycles without degradation.

Each plastic material responds differently to the rotational molding process. There are exceptions, but the range of wall thicknesses that are suitable for the commonly molded materials are listed in Table I.

This table lists both ideal and possible thicknesses. The best results will always be achieved by selecting a thickness in the ideal range.

Rotational molding is not the ideal process for producing parts that require variation in wall thickness. The only material that lends itself to wide variations in thickness is PVC. A special molding technique called "stop rotation" allows some parts to be produced with both thick and thin walls. This molding technique stops the rotation of the mold in a specific position after the PVC has coated the cavity. Gravity then causes the ungelled liquid material to drain into the lowest part of the cavity to create a thicker wall. The "trip molding" process is also capable of producing parts with abrupt changes in thickness. This new patented process, which is available from SJS Industries, was reviewed in the summer 2001 issue of Rotational Molding News. Trip molding and stop rotation techniques are topics for future articles.

The rotational molding process is noted for its ability to produce hollow plastic parts with uniform wall thicknesses. Some gradually changing wall thickness can be produced by changing the thermal conductivity of the mold in specific areas. Incorporating an aluminum panel into a fabricated steel mold would increase the thermal conductivity of the cavity in that location. The aluminum surface of the cavity would reach molding temperature before the steel surfaces. The aluminum surfaces would then have a longer time to pick up the plastic powder than the steel surface would. The same effect can be achieved by varying the wall thickness of a cast aluminum cavity. In other instances, heat-absorbing projections are placed on the outside surface of a cavity in an area where a thicker wall is desirable. The reverse effect can be achieved by shielding or insulating portions of the cavity so that they take longer to heat up to

Continued on page 10

TABLE I				
Plastic Material	Ideal		Possible	
	Min. mm (in.)	Max. mm (in.)	Min. mm (in.)	Max. mm (in.)
Polyethylene	1.50 (0.06)	12.70 (0.50)	0.50 (0.02)	50.80 (2.00)
Polypropylene	1.50 (0.06)	6.40 (0.25)	0.75 (0.03)	10.16 (0.40)
Polyvinyl Chloride	1.50 (0.06)	10.16 (0.40)	0.25 (0.01)	25.40 (1.00)
Nylon	2.50 (0.10)	20.32 (0.80)	1.50 (0.06)	31.75 (1.25)
Polycarbonate	2.00 (0.08)	10.16 (0.40)	1.50 (0.06)	12.70 (0.50)

molding temperature. These techniques and others extend the capabilities of the process, but rotational molding is at its best producing hollow parts with uniform wall thicknesses.

A properly designed part and a good-quality mold that heats uniformly will produce parts with a uniform wall thickness. This is highly desirable, as parts containing thick walls take longer to form and to cool. The plastic in thick walls stays hot longer and shrinks more than that in thin walls, which cools faster. A molded part with both thick and thin walls will have different shrinkage factors in different locations. These differences in shrinkage create molded-in residual stress and a propensity for post mold warpage.

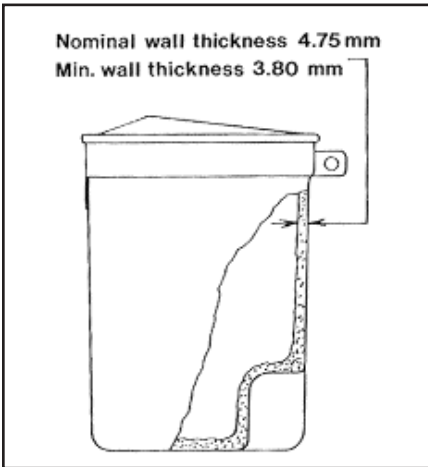


Figure 4

The nonuniform cooling associated with variations in wall thickness also affects the percentage of crystallinity in the molded part.

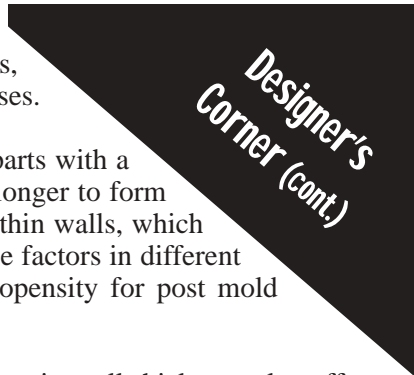
Rotational molding is an open molding process that defines only those surfaces of a part that are in contact with the cavity. The inside surfaces are free-formed. Once the mold is built, it does not change. The wall thickness is thereafter controlled by the amount of material put into the mold and the cycle-to-cycle variations of the process.

The exact wall thickness of a rotationally molded part cannot be specified in the common manner employed for closed-molding processes, such as injection and compression molding. The ideal way to specify a wall thickness for this process is to indicate both the nominal, or average, wall thickness and the minimum thickness that is acceptable anywhere on the part, as depicted in Figure 4.

Wall thickness uniformity is dependent on the size and shape of the part and the material being molded. A commercial thickness variation is in the range of $\pm 20\%$. Thickness variations of $\pm 10\%$ can be achieved in some cases where uniformity is more important than part cost. These wall thickness tolerances do not include this process's tendency to produce thickness variations at the corners of a part. This unique characteristic of the rotational molding process will be reviewed in a later article on corner radiuses.

One of the interesting and useful advantages of rotational molding is that once the mold has been built, it can be used to produce parts with thicker and thinner walls without mold changes, by simply charging the mold with more or less material. The optimum wall thickness can then be established by testing the actual part. These tests are always more reliable than strength calculation or speculation. There are few other plastic molding processes that provide the designer with this capability.

This article is a condensed extract from G. L. Beall's Hanser Publishers book entitled "Rotational Molding Design, Materials, Tooling, & Processing" available From SPE.

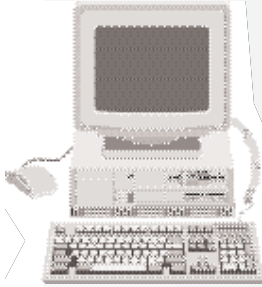


CALL FOR PAPERS

Plans are already underway for the ANTEC 2003 which will be held in Nashville, TN, May 4-8 2003. Your suggestions and ideas for sessions will be welcomed! Let us know if you are interested in moderating/organizing a session or in presenting a paper. Please forward your ideas to Elizabeth Takács, McMaster University (phone) (905) 525-9140 ext. 24100 (fax) (905) 521-1350 or etakacs@mcmaster.ca (email).

New Website features can drive user interest

**E-com
Corner**
Beth Earle, Polysort Acct. Mgr.



Many plastics companies will agree the most important thing about your website is what you say to your online users. However, that notion often gets pushed to the back burner when morphing graphics and hi-fi pictures hit center stage. Suddenly, the emphasis on what information your site offers loses its luster, sometimes resulting in sterile and lifeless content.

A list of links to the websites of important clients, vendors or resources.

- ▶▶ The linked sites can pop up in a new window, allowing your own website to remain on the person's computer screen.
- ▶▶ Listing links to other relevant sites can help give your site a boost on the search engines.
- ▶▶ *Example: www.abapgt.com/contact1htm*

Online edition of company newsletter

- ▶▶ You can code the newsletter in html, or you can provide the document in a pdf-whatever works best for you.
- ▶▶ If many of your clients are already online, moving to an electronic newsletter can be a great way to save on printing and mailing costs.
- ▶▶ *Example: www.abapgt.com/contact1htm*

Property charts, material data sheets, other technical information

- ▶▶ You can increase the value you provide to clients and prospects by giving them the technical information they need the most.
- ▶▶ PDFs, provided by you, are usually the most efficient way of posting this information.
- ▶▶ *Example: www.isternplastics.com*

A news or resource page

- ▶▶ This could be updated monthly or bi-monthly.
- ▶▶ The information could range from product specials to processing and maintenance tips to anything you think your clients and prospects would find useful.
- ▶▶ *Example: www.ashleypolymers.com*

Conversion charts

- ▶▶ Yet another way to show clients and prospects the value you offer to your relationship with them.
- ▶▶ *Example: www.modernplastics.com*

A foreign language page or section

- ▶▶ This, naturally, would be in the language used the most by your international clients.
- ▶▶ What better way to demonstrate to overseas customers that you're sympathetic to their concerns and needs?
- ▶▶ *Example: www.jomarcorp.com*

Calendar of events

- ▶▶ Make sure your clients and prospects know what trade shows and meetings you'll be at -- and what training events you're hosting.
- ▶▶ *Example: www.akronspe.org*

Technical papers

- ▶▶ Demonstrate the lead your company takes in its field by posting the papers your staff presents at trade shows and technical meetings.
- ▶▶ *Example: www.ebeamservices.com*

It's important to gather a fresh perspective on your company site. Review your site and decide what you can add to make it more useful to your visitors. Above all, be creative. You might be surprised how a little tweaking can improve your site's usability.

For more information about updating your web site, contact Polysort's Web Services staff at 1-800-326-8666, ext. 123, or email shays@polysort.com for more details.

ANTEC 2002 May 5-9 San Francisco, California

Antec is just around the corner and the Rotational Molding Division's technical program for ANTEC 2002 is completed. Join us for two sessions filled with thirteen papers scheduled for Monday, May 6, 2002. The annual business meeting is scheduled for Monday afternoon right after the last talk of the session. Technical Sessions and the Exhibition will be held Monday, May 6, through Wednesday, May 8. Seminars will be conducted Monday, May 6 through Thursday, May 9. The conference site is the Moscone convention Center & the San Francisco Marriott.

MONDAY MORNING MAY 6, 2002	
SESSION M17 (<i>San Francisco Marriott</i>) PROCESSING <i>Moderator: J.L. Throne, Sherwood Technologies Ind.</i>	
9:30AM	Powder Flow During Rotational Molding <i>J.L. Throne</i>
10:00AM	The Sintering Behavior of Ethylene/a-olefin Copolymers Powders and Cylinders <i>S.A. Guillen-Castellanos, C.T. Bellehumeur, and M. Weber</i>
10:30AM	Sintering of Thermotropic Liquid Crystalline Polymers <i>E. Scribbs, and D. Baird</i>
11:00AM	An Investigation of the Impact Behaviour of Rotomoulded Polyethylenes Over a Wide Temperature Range <i>L. T. Pick, and E. Harkin-Jones</i>
11:30AM	The Importance of Monitoring Mold Pressure During Rotational Molding <i>R. Crawford, M.C. Cramez, J.J. Oliveriera, and A. Spence</i>

MONDAY AFTERNOON MAY 6, 2002	
SESSION M38 (<i>San Francisco Marriott</i>) MATERIALS <i>Moderators: C.B. Park, University of Toronto and R.J. Crawford, Queen's University in Belfast</i>	
2:00PM	Measurement of Peroxide Content of Crosslinkable Polyethylene By Differential Scanning Calorimetry <i>E. Boudreaux, R.K. Krishnaswamy, and J.D. Razlaff</i>
2:30PM	Rotational Moulding of a Dicyclopentadiene Reactive Liquid Polymer <i>N. Corrigan, E. Harkin-Jones, and R.J. Crawford</i>
3:00PM	Rotational Molding of Polyolefin Plastomers and TPOs <i>W. Wang, and M. Kontopoulou</i>
3:30PM	Foaming with Microspheres in Rotational Molding <i>E. Takacs, J. Vlachopoulos, and C. Rosenbush</i>
4:00PM	Single-Step Rotational Foam Molding of Skin-Surrounded Polyethylene Foams <i>R. Pop-lliev, and C.B. Park</i>
4:30PM	Investigation of the Processing Characteristics and Mechanical Properties of Metallocene Polyethylene Foams for Rotational Moulding <i>E. Archer, E. Harkin-Jones, M.P. Kearns, and A.M. Fatnes</i>
5:00PM	Improving Polyethylene Performance-The Use of Nanocomposites in Ziegler-Natta Polyethylene for Rotational Moulding <i>M.J. Murphy, D.J. Martin, R. Truss, and P. Halley</i>
5:30PM	The Development of Nanocomposites to Enhance Functionality of the Materials for Rotational Moulding <i>D. Martin, P. Halley, R. Truss, M. Murphy, and S. Meusbarger</i>
6:00PM	Business Meeting

WHY ATTEND ANTEC 2002?

ANTEC offers an exhibition in addition to its extensive conference sessions, which contain the latest technical information valued by plastics professionals.

A few other interesting sessions to note in your calendars:

- Product Design and Development Division Sessions on Tuesday, May 7th (SESSIONS Y10, T18, and Y43)
- Fundamentals Forum on Tuesday, May 7th (SESSIONS T24 and T54) and New Technology Forum (SESSIONS M47 and T55)
- Color and Appearance on Monday, May 6th (SESSIONS M1 and M24)
- Polymer Modifiers & Additives on Monday, May 6th and Tuesday, May 7th (SESSIONS M13, M36, T16, T40 and T46)
- Thermoplastic Material & Foams (SESSIONS M32, T9, T34, W8, and W28)

REGISTRATION INFORMATION

Save money by registering early! **The advance registration deadline is April, 2002.** You can register for ANTEC through the ANTEC website at www.antec.ws **Join us in San Francisco, May 5-9, 2002!**

PAST CHAIRMAN'S REPORT



Another year has passed into memory. The year ahead appears to be full of challenges and opportunities. The economy is less than glamorous, but hopefully improving, and all of our work habits have changed because of world events. We cherish our family and friends more today which makes our time away from work in great demand. We are all asked to do more with less and so our appreciation for those who are willing to serve is great.

The Past Chairman is assigned to be the Nomination Chairman for officers and Board of Directors elections. The officers are elected by the Directors at the May ANTEC meeting. If you will recall the membership had elected fifteen board members last year in March. Five members would serve a three-year term, five would serve a two-year term and the last five would serve a one-year term. This would allow the membership to elect five new directors each year. I would like to thank all of the Board Members whose term expires this year. The Board of Directors has done an outstanding job during the past year and has built a solid foundation for us to build on in the coming years. We will be electing five new members to serve on the Board of Directors for a three-year term. I am very happy to report that several very qualified individuals have stepped forward for consideration. These include incumbent directors and many new faces to our group. I am very pleased and impressed with the willingness of these individuals to serve because all of us have so many other demands on our time. We are very lucky to have so many talented people willing to serve on the Board and expand and improve our Division in the coming years. I realize there may be some hard choices, but I urge all of you to cast your votes for our Board members.

Ballots will be sent to you during the month of March or sooner. All Board members, incumbent and newly elected, will be notified in order to be able to attend the board meeting in May at ANTEC. Nominees who are not elected will be asked to serve on Committees or work on special projects in order to keep their talents and skills close at hand. We have a challenging and exciting year ahead of us, building on past successes and taking the Division to even greater heights.

Rotational molding technology continues to grow in complexity and I encourage you all to stay alert, and to stay involved. Our process is being dissected and explained in scientific terms for the first time. We will learn new ways to be competitive and it will be a challenge for each of us to stay on the cutting edge. This engineering reorganization will offer you challenges, new technology, educational opportunities, and professional satisfaction. Our May ANTEC program offers the highest quality technology discussions available today. I have reviewed our tentative June RETEC program and I can honestly say that you will be impressed with the topics and the people assembled for the program. I highly encourage you to take advantage of all of these opportunities that wait you.

Sincerely,

Barry Aubrey

Barry T. Aubrey
Past-Chairman

HOT LINE

Anyone having questions, complaints, or suggestions regarding the R.M.D. or who just wants to chat, contact Glenn or Barry at:

Barry Aubrey: 513-530-4216
fax: 513-530-4268

email: barry.aubrey@equistarchem.com

Glenn Beall: 847-549-9970
fax: 847-549-9935.



PROCESSING TIPS By: Jon Ratzlaff, Chevron Phillips Chemicals

The following is the first of a continuing series of tips that will appear in subsequent editions of this newsletter

PROBLEM

Uneven Wall Thickness

PROBABLE CAUSES

- 1) Improper mold rotation
- 2) Uneven mold thickness
- 3) Shielding of mold preventing air flow
- 4) Buffeting of air flow in deep-dished areas

SUGGESTED SOLUTIONS

- a) Correct mold rotation to get adequate number of powder overlays and even coverage.
- a) Use care in designing molds to eliminate excessive variations in mold wall thickness. This is especially important with steel molds that have low heat conductivity.
- a) Mount mold on spider to minimize shielding.
- a) Avoid deep-dished areas.
- b) Reduce thickness of mold in dished areas. Open hole through handle area to allow air flow through kiss-off in mold.
- a) Increase oven temperature.
- a) Check calibration of instruments as they may be reading high.
- a) Reduce mold wall thickness to normal for industry.
- b) Clean and readjust burners.
- c) Check air velocity and correct.

Excessive Oven Cycle

- 1) Low oven temperature
- 2) Excessively thick molds
- 3) Oven heat capacity insufficient

This document reports accurate and reliable information to the best of our knowledge, but our suggestions and recommendations cannot be guaranteed because the conditions of use are beyond our control. Information presented herein is given without reference to any patent questions which may be encountered in the use thereof. Such questions should be investigated by those using this information. Chevron Phillips Company, assumes no responsibility for the use of information presented herein and hereby disclaims all liability in regard to such use.

ON A CLOSING NOTE By: Robert Swain

As we have put each issue of our newsletter to bed, it seems we generally had more material than available space...and we would opt to drop our closing note column. However, as Stu Lipsteuer assumes the EDITORIAL RESPONSIBILITIES it seems timely to thank you for helping to place our newsletter in "ORBIT." It has been so successful because it has been a team function...and that has made it a lot of fun.

As encouragement to carry on this task, I want to share a poem that my Dad sent me last year called "I Hope You Dance." He will be 99 in June...and he is still "Dancing."

*I hope you never lose your sense of wonder
You get your fill to eat but always keep that hunger
May you never take a single breath for granted
God forbid love ever leave you empty handed
I hope you still feel small when you stand beside the ocean
Whenever one door closes I hope one more opens
Promise me that you'll give faith a fighting chance
And when you get the choice to sit it out or dance
I hope you dance
I hope you dance*

*I hope you never fear those mountains in the distance
Never settle for the path of least resistance
Livin' might mean takin' chances but they're worth takin'
Lovin' might be a mistake but it's worth makin'
Don't let some hell-bent heart leave you bitter
When you come close to sellin' out reconsider
Give the heavens above more than just a passing glance
And when you get the choice to sit it out or dance
I hope you dance.....I hope you dance
I hope you dance.....I hope you dance*

*(Time is a wheel in constant motion, always rolling us along.
Tell me who wants to look back on their years and wonder
Where those years have gone)
I hope you feel small when you stand beside the ocean
Promise me that you'll give faith a fighting chance
And when you get the choice to sit it out or dance
I hope you dance.....I hope you dance
I hope you dance.....I hope you dance
(Time is a wheel in constant motion, always rolling us along.
Tell me who wants to look back on their years and wonder
Where those years have gone)*

RECORDED BY LEE ANN WOMACK

SPE RMD DIRECTORY OFFICERS AND COMMITTEE CHAIRS

Chairman/Fund Raising	Jon Ratzlaff	918-661-3127	ratzljrd@cpchem.com
Past Division Chairman	Barry Aubrey	513-530-4216	barry.aubrey@equistarchem.com
Chairman-Elect	Ken Pawlak	847-229-2055	kpawlak@aksys.com
Secretary/Vice President	Marshall Lampson	209-533-3079	mlampson@polyprocessing.com
Treasurer	Rex Kanu	765-285-5695	rkanu@bsuvc.bsu.edu
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ANTEC	Celine T. Bellehumeur	403-220-8804	cbellehu@ucalgary.ca
ANTEC	Marianna Kontopoulou	613-533-3079	kontop@chee.queensu.ca
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Board/ANTEC Chair Elect	Elizabeth Takacs	905-525-9140x-24100	etakacs@mcmaster.cis.mcmaster.ca
Board	Kenneth Wessler	419-759-3838	wbqf97a@prodigy.com
Board/Nat'l Councilor Proxy	Bob Swain	815-759-2210	bob_swain@specad.org
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Public Interest	Julie Stout	330-686-1292	julie@boyce.com
RETEC	Dr. Paul J. Nugent	610-370-0596	email@paulnugent.com
WEB Page	Dr. Linda Xu	330-650-3883	linda.xu@littletikes.com



Speakers available to our industry:

Glenn Beall	847-549-9970
Charlie Busceme	409-752-5330
Phillip Dodge	513-530-4128
Stuart Lipsteuer	815-759-2213
Dr. Paul Nugent	610-370-0596
Einar Voldner	905-876-1477

2002 Calendar of Events

April 8, 2002

Practical Aspects of Rotational Molding Seminar. Radisson Hotel, La Crosse, WI
http://www.rotomolding.org/pr_seminar.asp

April 8, 2002

A Product Designer's Guide to Rotational Molding Seminar. Glenn Beall Instructor
 Holiday Inn Select, Strongsville, OH
 Contact SPE, Phone (203) 740-5403
 Fax (203) 775-8490 or register on-line at:
<http://www.4spe.org/conferenceseminar.htm>

April 15-17, 2002

Hands-On Advanced Seminar in Rotational Molding. *Sponsored by ARM*
 Belfast, Ireland

May 5-7, 2002

2nd Pan-European Rotomoulding Conference
 Newport Hotel
 Paris Disneyland, France
 for add'l info: Pec@bpf.co.uk

May 5-9, 2002

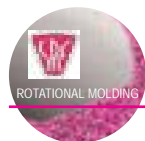
ANTEC 2002 Annual Technical Conference & Exhibition
 Moscone Convention Center,
 San Francisco, CA
 Contact SPE Conference Dept.
 Phone: (203) 775-0471 or Fax: (203) 775-8490.

June 9-11, 2002

Rotational Molding Division **RETEC**
Advances in Materials and Processes
 Cleveland, OH.
 Contact: Paul Nugent, email@paulnugent.com
 or Bruce Muller, plasticsc@aol.com for
 additional information.

October 6-8, 2002

Association of Rotational Molders
 27th Fall Meeting
 Sheraton Centre Toronto Hotel
 Toronto, Ontario, Canada
 Add'l info: www.rotomolding.org.



Society Of Plastics Engineers

Division of Rotational Molding
 436 Morris • Mundelien, IL 60060