MOLDING VIEWS

SPE INJECTION MOLDING

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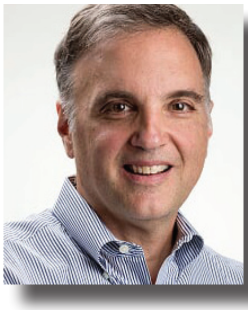
Summer 2019 | No. 110



Chair's Message

Rick Puglielli

It is a great honor to be selected as chair for the board of directors of the Injection Molding Division of SPE for the 2019-2020 Fiscal Year. We have added nearly 50 new members this year and I look forward to connecting with members that wish to contribute ideas, provide valuable content for webinars and seminars or host special events for the injection molding community. As SPE continues to host more webinars and add valuable content to their member exclusive library, they have been attracting many new plastics professionals from industry to join.

The injection Molding Division is proud to be working with the local and student chapters to help promote events such as the Plastivan and finding technical speakers for local academic and industry events.

We are also excited to be working on technical content and planning out special activities for the following national events planned for the upcoming year:

- Antec 2020 in San Antonio Texas: SPE's Annual Technical Conference with speakers from all over the world covering topics from the latest research to best industry practices and ground breaking technologies.
- IMTECH 2020 in Cleveland OHIO: Technical conference put on by the injection molding division.

I wish all our members much success in the upcoming year!

Sincerely,

Rick Puglielli

2019-2020 IMD Chair

Promold Plastics
info@promoldplastics.com

In This Issue:

This Month's Features:

Keep the connection!
Join us on:

LinkedIn Find us on Facebook

Industry Events/Webinar Calendar

Click the show links for more information on these events!

August 2019

AUGUST 27 - 29

Additive Manufacturing Conference 2019

Austin, TX

The sixth annual Additive Manufacturing Conference + Expo focuses on industrial applications of additive technologies for making functional components and end-use production parts. This year's event will again offer a dynamic conference program covering processes, applications and materials the deliver practical knowledge on how to implement AM in your facility.

September 2019

SEPTEMBER 9 - 11

SPE Thermoforming Conference®

Milwaukee, Wisconsin

The SPE Thermoforming Division invites you to attend its 27th Annual Conference created exclusively by and for the Thermoforming Industry. The Conference will be held at the Wisconsin Center and the Hilton Milwaukee City Center Hotel in downtown Milwaukee, Wisconsin.

WEBINARS

Integrating Injection Molding Machine Response into Mold Filling Analysis

August 14, 2019 at 11:00AM–NOON EDT

Simulation is playing an increasingly important role in manufacturing. However, engineers still face challenges in bridging the gap between simulation and manufacturing. Join us for this webinar to learn how to maximize simulation utility with Moldex3D, where we integrate real-world conditions to more accurately take into account crucial information from the physical world, including considering the dynamic machine response of an injection molding machine, ensuring the optimized processing conditions obtained from simulations can be directly applied on the production floor.

Strategies for Flexible Package Integrity and Seal Inspection

August 21, 2019 at 11:00AM–NOON EDT

The webinar will cover technologies deployed for on-line seal inspection of pouch seals as well as off-line microleak detection. Practical case studies of implementation of each technology will be presented with key factors of success for deploying each solution. The path to assuring seal quality and package integrity requires multiple strategies to achieve the necessary results.

ON-DEMAND WEBINARS

Plastic Injection Molding Parts Clinic 3.0

Injection Molded Parts Troubleshooting Clinic

Join Xcentric Mold & Engineering for an interactive plastic parts troubleshooting clinic. Are you working with a challenging injection molding part issue? Would you like someone to provide you with a complex part solution? Xcentric Mold & Engineering's webinar will review select case studies addressing common issues that hinder progress to producing a plastic injection molded part.

By Dallas Cada. DCC Consulting

The Gate

The gate is a key component for the filling of the part from a tooling point of view. The gate is not used as a balancing tool. This is usually determined by the runner. The gate geometry should not be adjusted until you have generated data. The data includes but is not limited to: gate freeze time, pressure drop, and shear. The gate should be identical in multicavity tools. The gate is composed of three things: land, height, and width. This provides necessary information for overall effect on the processing window.

Land

The land is the distance from where the runner stops to where the part starts. This length should be as short as possible, and in most cases is only 0.040" to 0.060" in length. The pressure drop across the gate will become greater as the land length dimension is increased. If the gate is properly sized but the land area is too long, there will be a pressure drop. Take a typical 3 lb. polycarbonate part that was not completely filled. How large should we open the gate? The original land length was 0.125" in length; you will only need to reduce the land length to approximately 0.055". A simple measurement with a caliper is easiest. You can also do short shots to find pressure drops across the gate. If the land length of the gate is altered, the gate freeze time will also change due to the cooling rate and flow characteristics through the gate.

Height

This is the thickness' of the gate and may be used to determine gate freeze time. It is usually recommended to start at 40% to 60% of the wall thickness for the height of the gate. This ensures that the gate will freeze off prior to the part, thus letting the screw recover while the part continues to cool.

Width

The width is how wide the gate is at the part. A starting point would be at 40% to 60% of the wall thickness. If you determine that you need more volume of material into the part, you can increase the width without increasing gate freeze time.

When both the height and width are the same size, they are equal in determining gate freeze time. Whichever dimension is effected that dimension will determine gate freeze time. Also note that there are many formulas to determine the actual size of the gate. Practical knowledge and prior experience of the tool maker, molder will also help determine gate geometry.

Height/Width

When looking at the height and width of the gate, we need to determine the gate freeze time. If the gate is freezing off too fast, it will usually cause inadequate packing. Short shots, and sinks will be obvious. If it is not freezing off soon enough, there will be problems of size repeatability and quality problems. When actual gate freeze time is determined, multiple data points are generated. This will be used to determine to add more pack time or pressure based on that data. The physical measuring of the gates will help with, relative viscosity analysis, pressure drop and balance of the fill. If the height or width of the gate is increased, greater volumes of flow of material will allow shear rate by increasing the material viscosity. Additionally, the time for the gate to freeze will be increased. The real key is to base the modification of the gates on data. Viscosity curves, pressure drops of flowing materials through a gate will help. If you are not on the flat portion of the viscosity curve and the gate is opened the material viscosity can increase enough to create more problems. If the pressure drop through the gate in not significant in relation to the runner and part then changing the gate geometry may not help at all in filling the part.

In conclusion, this information may seem basic but is very important. Think of the gate as it actually is; an opening to let the appropriate material into a part. Too big will result in uneven fill while too little will result in short shots and sinks.

Dallas Cada is a highly trained plastics engineer with over 20 years of sales support experience. Owner of a plastic consulting business (DDC Consulting), his experience includes technical service, application development, market engineering, injection molding, design, tooling, material suggestions and problem solving for plastic manufacturing companies. For more information with troubleshooting plastic problems or helping with new plastic applications, contact Dallas Cada by e-mail at dallascada@charter.net. Contact Dallas by phone (507) 458-5785 or (507) 452-1584 or www.ddcconsulting4@webnode.com.

By Leah Bartlett, Eric Grunden, Rachmat Mulyana, and Jose Castro
Department of Industrial & System Engineering The Ohio State University
Columbus, Ohio, USA 43210

A Preliminary Study on the Performance of Additive Manufacturing Tooling for Injection Molding

Tooling for injection molding is expensive and the time it takes to manufacture a tool is also a concern, especially for companies who are on a tight production schedule. The introduction of Additive Manufacturing (AM) tooling for injection molding is an attractive option for cutting cost and time for not only prototype designs, but also for short production runs. The objective of this research is a preliminary study on two AM tooling questions: How long will the plastic tool survive, and will the parts look similar to the parts produced from a traditional steel tool? In this paper, we compare the mechanical integrity of ribs of different aspect ratio (length to thickness), both experimentally and via computer simulation. We show that there is good agreement between both. The rib with the larger aspect ratio (10 to 1) breaks as predicted by the simulation and the one with the smaller ratio (5 to 1) survives several moldings as expected. In the second case, if the cycle time is adjusted to allow the mold to cool down between cycles, the rib survived a large number of moldings. The effect of tool wall thickness under different packing pressures is also evaluated.

Introduction

Injection molding is the most widely used manufacturing process for thermoplastic parts[1]. Tooling is expensive and takes a long time to manufacture, so there could be a benefit to using AM technologies to manufacture tools for certain situations. Currently, AM is being utilized mostly for direct print design confirmation. This capability has been beneficial to the design process; however, with the current technologies available these direct print designs do not match mechanical properties of the final design [2]. The next step is to direct print molds for injection molding [3]. Currently, injection molding is economical for only large production quantities [1]. With the integration of the current AM tooling technology, the initial tool cost of injection molding will decrease, opening a new economical option for low production quantities and prototypes. These molds require little to no post processing and are capable of delivering a prototype part in hand that is from the same material as the final design. This new manufacturing method, due to its lower cost and much shorter manufacturing times, can lend itself to multiple design iterations to be tested and verified on a timeline that has never been available without a large price tag.

Experimental Set Up and Materials

In the present work, two sets of experiments were carried out. First, what we will call experiment A, measured tool survivability by examining the impact of flow rate and the mold open phase time on tool rib aspect ratios. The rib analysis will compare the lifetime of two rib aspect ratios under varied flow rates. This study could assist in determining a pass/fail critique of the AM tool design under the specified molding parameters [4]. Secondly, what we will call Experiment B, explored part similarity by measuring the impact of holding pressure and the mold open phase time on tool dimensional integrity. In this experiment, we will measure the deflection of different wall thicknesses with several holding pressures.

The tooling used for both experiments was selected because it was able to integrate an AM insert into an available mold base. The AM insert was printed and pressed into the mold base. The mold base available was a U-Frame Master Unit Die (MUD) manufactured by DME. The geometry of the pocket design is a 2 mirrored Ohio shape shown in **Figure 1**. The pockets inside this mold base allow for customization with different inserts.

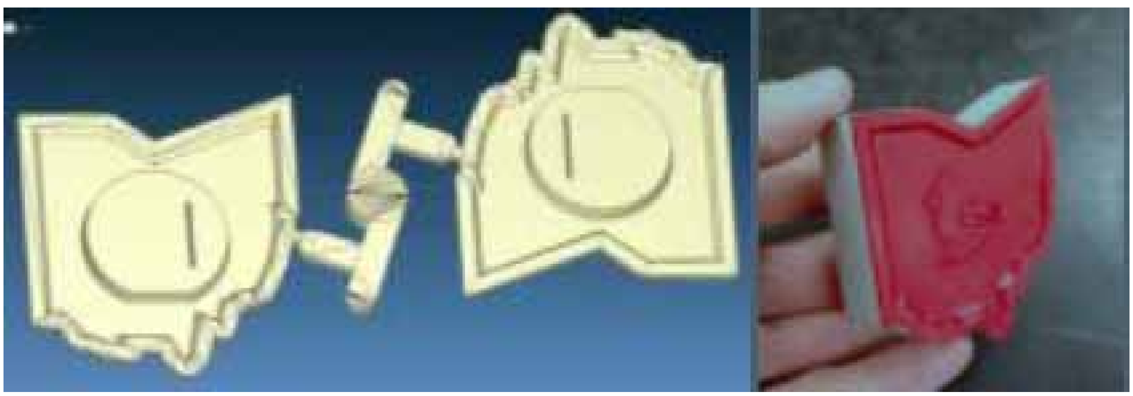


Figure 1: Moldex drawing of the lid and final molded lid/box assembly

The AM material used during both the rib analysis and tool thickness experiments was Digital ABS from Stratasys' Objet1000 3D printer that prints with Polyjet technology [5]. The Objet1000 3D printer uses a liquid UV curable resin with layer thicknesses between 16-30 microns. Stratasys recommends printing with Digital ABS for AM tools because the printer's capability of printing within 1 mm of the design specifications [5]. Another reason to choose this AM material is the increased mechanical properties of Digital ABS compared to other AM materials. The heat deflection temperature (HDT) and tensile strength are capable of handling the injection molding process parameters [6]. At the HDT, Digital ABS will start to deform under a load of 0.45 MPa [3].

The molding material used was thermoplastic polyolefin (TPO) with recommended melt temperature range between 180-220°. All of the injection molding experiments were conducted on a Sumitomo 50-ton injection molding machine. This machine can develop a maximum hold pressure of 167 MPa and maximum injection speed of 160 mm/sec.

Experiment A Set Up

Experiment A consisted of using printed inserts with ribs of two different height-to-width ratios. The height to width ratios used were 10:1 and 5:1. Both ribs had the same height of 3.75 mm, but the 10:1 rib was 0.375 mm thick and the 5:1 rib was twice as thick (0.75 mm). The two rib designs have the rib located in the same place relative to the mold cavity and each rib had a one-degree draft angle. **Figure 2** shows the insert geometry modeled in SolidWorks, and **Figure 3** shows the inserts after they were pressed into the mold base.

The rib inserts were tested by molding using different injection rates. Flow rate was varied in order to determine the critical rib failure point. The flow rates used were 66.15, 15.04 and 6.15 $cm^3/second$ for the 10:1 rib. The flow rates for the 5:1 rib were 54.88, 40.16, 18.29 and 6.59 $cm^3/second$.

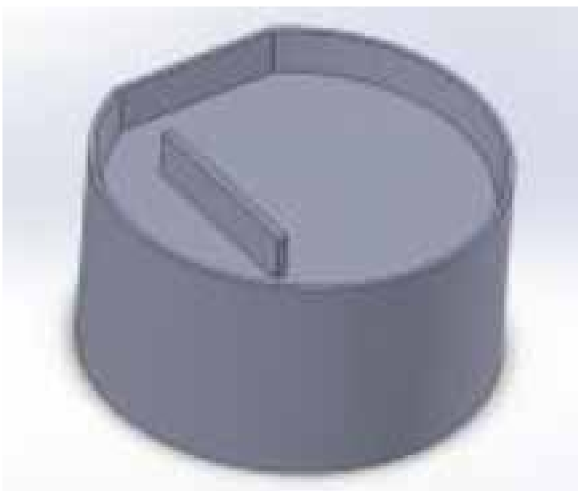


Figure 2: Rib Insert drawing in SolidWorks. There were two different rib designs: 10:1 and 5:1

Figure 3: Rib insert configuration in Mold

To validate the experimental, the software Moldex3D was run using the same molding parameters. Pressure data at the ribs were obtained using sensor nodes during the filling phase. Placement of sensor nodes is shown in **Figure 4**.

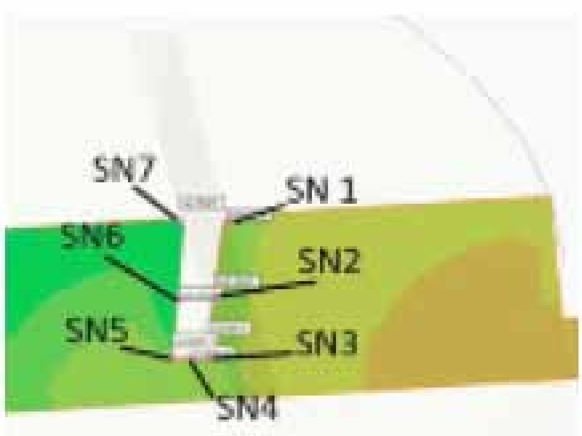


Figure 4: Moldex Simulation showing the sensor nodes placed on 7 different areas on the rib

Figure 5: Hole Depth Insert (Back side is pictured) in Solidworks. Labeled with the corresponding tool thicknesses:

The Finite Element Analysis (FEA) Software, Abaqus, was used to predict when the rib will fail under the pressures during the filing phase. Failure in the rib is defined as the melt front applying a net pressure difference large enough to cause the Von Mises stress at the base of the rib to exceed the yield strength of Digital ABS [4]. When the Von Mises stress exceeds the yield strength of the rib, plastic deformation is predicted to occur. The simulation predictions were then compared to the experimental results.

Experiment B Set Up

Experiment B used flat inserts with 4 holes of 3 different depths, but the same diameter (**Figure 5**). These holes represent different tool thickness values of 3.2 mm, 5.2 mm and 7.2 mm.

The inserts were tested by varying the packing pressure during injection molding. Packing pressure was varied in order to determine critical tool thickness failure points. The three holding pressures used were 7, 48, and 57 MPa. These levels were chosen based on the maximum packing pressure this particular mold geometry was capable of without flashing.

Surface profile values were taken to measure the changing deflection on the surface of the parts due to tooling deflection during molding. The surface profile was measured with a Mitutoyo Surftest SJ-500/P, SV-2100 profilometer.

Results

Experiment A:

Effect of Flow Rate

The 10:1 rib failed during the first shot for all flow rates tried (66.15, 15.04 and 6.15 $cm^3/second$). Failure is defined as the rib breaking off the insert base. **Figure 6** shows an example of the broken rib on the insert. The 5:1 rib did not fail during the first shot like the 10:1 rib. The 5:1 rib insert produced 9 good shots at 54.88 $cm^3/second$, 10 good shots at 40.16 $cm^3/second$, 14 good shots at 18.29 $cm^3/second$ and 4 good shots at 6.59 $cm^3/second$. The last shot that ultimately broke the rib was not included in the count of number of good shots produced.

Figure 6: 10:1 rib failed rib after molding

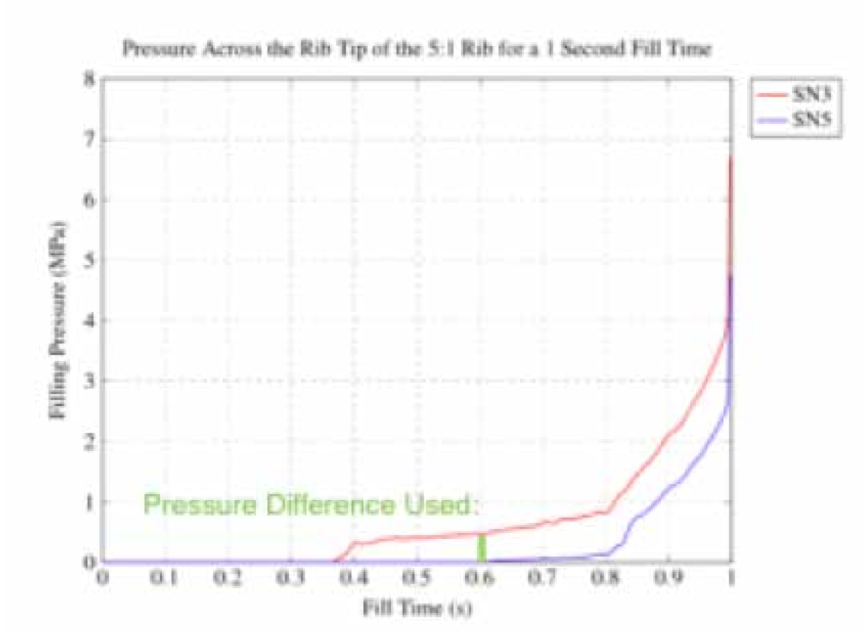


Figure 8: Moldex sensor nodes recording pressure difference felt on the front of the rib and back of the rib due to injection pressures

The predicted pressure from two opposing sensor nodes (SN3& SN5) during filling is shown in **Figure 8**. The results for the other pairs of sensor nodes is similar. It is assumed that the rib has the largest potential for failure when the pressure is largest in the forward face of the rib before pressure develops in the back face. **Figure 10** shows the Abaqus model of a uniform net pressure difference applied on the face on the rib

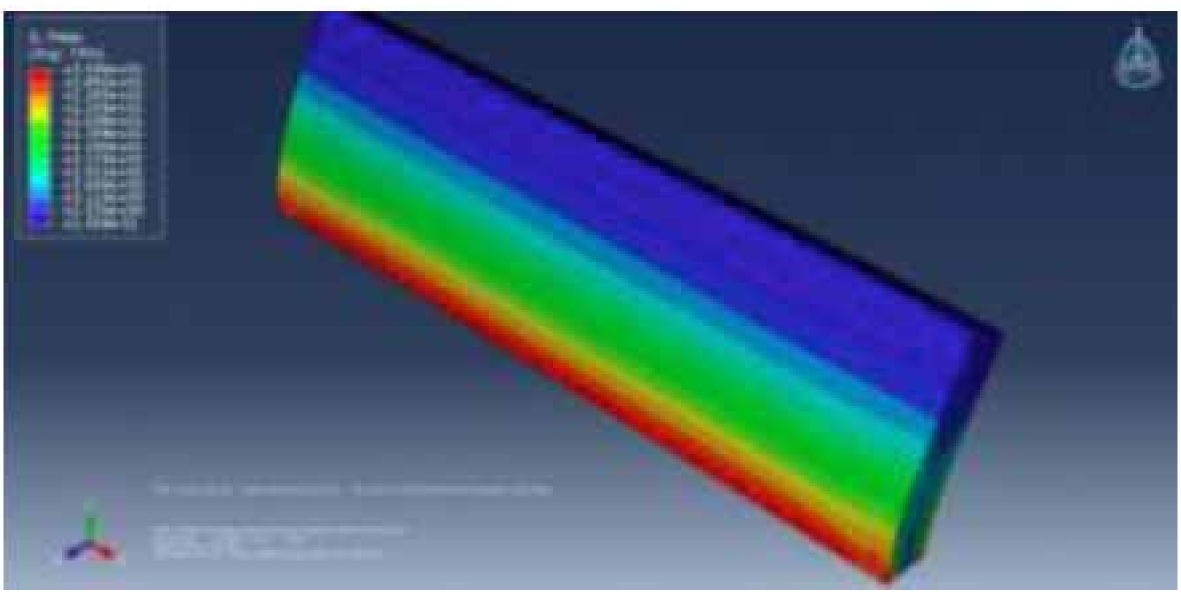


Figure 10: Net pressure difference values from Moldex graph applied to the rib in an Abaqus simulation

with the base fixed. **Table 1** shows the Von Mises stresses at the base of the rib from the Moldex3D simulation during filling. If the Von Mises exceeds the tensile strength of Digital ABS, then it is predicted that the rib will fail during filling for the first shot. The 10:1 rib was predicted to fail for all cases. The simulated stress at the base of the 5:1 rib does not exceed the tensile strength of Digital ABS, so the 5:1 rib is not predicted to fail during the first shot, and it doesn't. The rib however does fail after a certain number of shots. This is most likely due to the temperature increase during continued molding. The temperatures of the inserts at the time of the failure shots are recorded to be above 58°C which is the lower limit of the HDT of Digital ABS given by Stratasys. Therefore, the larger rib is most likely failing due to the increase in temperature rather than the injection pressure difference.

Test Condition	Flow Rate (cm^3/s)	Pressure Difference (MPa)	Von Mises value
10:1 Rib	66.15	0.34	**51.6**
	15.04	0.35	**53.1**
	6.15	0.50	**63.7**
5:1 Rib	54.88	0.68	29.69
	40.16	0.55	24.02
	18.29	0.70	30.56
	6.59	1.05	45.85

Table 1: Recorded von Mises stresses at the base of the rib geometries under the pressure from filling. The bold values represent values that exceed the tensile strength of the Digital ABS insert material.

Effect of Temperature

The temperature was recorded on the insert at the run when the rib failed. Temperatures were recorded on the face of the insert using a type K thermocouple. The 10:1 rib did not produce any good parts, so no conclusions can be made. The 5:1 rib as discussed above did not fail at the first shot. In all experiments when the 5:1 rib did fail, the temperature was consistently recorded on the last shot to be above the HDT lower limit of 58°C An additional experiment was done to examine the effect of temperature on the survivability of the 5:1 rib. A longer mold open phase time of 270 seconds was determined by recording the time it takes for the temperature of the rib to drop below 5°C, the lower limit of the HDT [6]. A longer cycle time is necessary for plastic molds due to the lower thermal conductivity of Digital ABS compared to a traditional mold[6]. The mold open phase time was increased to allow the insert to cool down between runs longer than in the previous experiments. The insert temperature dropped below 58°C before the start of the next molding. During this experiment, the holding pressure and cooling time remained the same: 8.25 MPa and 70 seconds, respectively. The flow rate tested was 6.59 $cm^3/second$. The 5:1 rib did not break with the longer mold open time. With a longer mold open phase time, we were able to mold at least 40 shots without the 5:1 rib being damaged.

Experiment B:
Effect of Holding Pressure

Holding pressure affects the different tool thicknesses by applying a uniform normal force on the surface of the insert. Deformation results are shown in **Table 2**. The deformation values shown are measured off of the last molded part in each experiment, which consistently had the largest deformation measurement. 150 shots were completed with 7 MPa of holding pressure and an 80 second cycle time. The 7 MPa of holding showed a maximum of 0.042 mm of deformation on the 3.2 mm wall, 0.005 mm on the 5.2 mm wall, and 0.002 mm on the 7.2 mm thick wall. **Figure 7** shows an example of the insert deformation at the different tool thickness areas on the insert.

Displacement (mm) Experimental		Wall Thickness (mm)		
		3.2	5.2	7.2
Pressure MPa	7	0.042	0.005	0.002
	48	0.107	0.046	0.005
	57	0.197	0.066	0.098

Table 2: Wall thickness inserts maximum measured deformation on the parts after molding

Figure 7: Tool deformation on different wall thicknesses

100 shots were completed with 48 MPa of holding pressure and an 80s cycle time. With this elevated holding pressure, the 3.2 mm tool thickness (thinnest wall) showed immediate plastic deformation. The largest deformation measured with the profilometer was 0.107 mm on shot number 80. The 5.2 mm wall showed a maximum of 0.046 mm deformation and the 7.2 mm thick wall showed a maximum deformation of 0.005 mm.

200 shots were completed with the 57 MPa of holding pressure and an 80s cycle time. **Figure 9** shows a graph of the increasing deformation from the 3 different wall thicknesses during molding as measured

on the parts. The 3.2 mm wall thickness displaced a maximum of 0.218 mm. The 5.2 mm wall thickness displaced a maximum of 0.069 mm. The 7.2 mm wall thickness displace a maximum of 0.048 mm.

Effect of Temperature

An additional set of experiments was run on t he tool thickness inserts with the same holding pressures, but a longer cycle time of 160 seconds. At 48 MPa of holding pressure and a longer cycle time of 160 seconds, the maximum deformation measured was 0.051 mm on the 3.2 mm thick wall, 0.044 mm on the 5.2 mm thick wall, and 0.032 mm on the 7.2 mm thick wall.

With the maximum holding pressure for this mold geometry of 57 MPa, the maximum deformation measured was 0.069 mm on the 3.2 mm thick wall, 0.036 mm on the 5.2 mm thick wall, and 0.027 mm on the 7.2 mm thick wall.

A longer cycle time with lower packing pressure caused less deformation on the inserts than the shorter cycle time with higher packing pressure. Comparing experiments 57 MPa/80s and 48MPa/160s, there was 0.167 mm less deflection on the 3.2 mm wall. Similarly, on the 5.2 mm wall there was 0.046 mm less deflection and on the 7.2 mm wall there was 0.016 mm less deflection.

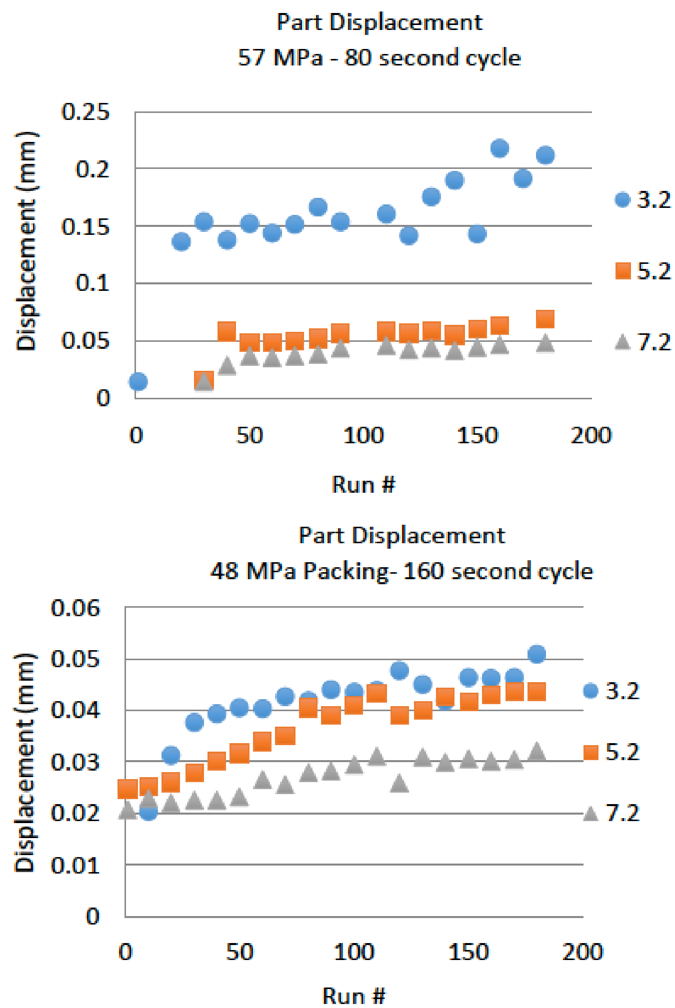


Figure 9: Part displacement results from two experiments due to packing pressure and high temperatures on different wall thicknesses

Conclusions and Future Work

Tool survivability was measured by analyzing the effect of different flow rates on different sized ribs. The predicted Von Mises stress at the base of the 10:1 rib were larger than the tensile strength of Digital ABS, so it failed during all molding trials. For the 5:1 rib, Von Mises stresses did not exceed the tensile strength in the simulation, which matched the experimental results of the rib not breaking during the first shot. The 5:1 rib failed after several shots.

Part dimension was studied by measuring the effect of packing pressure and high temperatures on different tool thicknesses. Results showed the thinnest wall deforming more than the thicker walls. Results also determined that a longer cycle time will help decrease part deformation.

Additional studies with AM tooling are currently being performed on the mechanical properties of parts being produced from AM tools. Preliminary results show the Ultimate Tensile Strength, Yield Strength, and Elastic Modulus are similar to parts molded in steel molds. Surprisingly, results show a significant decrease in percent elongation at break in parts molded from in a plastic mold compared to a traditional steel mold. More work is being performed to understand this decrease in ductility.

Acknowledgement

This work was supported by the Center for Design and Manufacturing (CDME) in Columbus, Ohio.

References

1. Groover, Mikell P. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems. Upper Saddle River, N.J: Prentice Hall, 1996. Print.
2. Kay, Ryan "Effect of Raster Orientation on the Structural Properties of Components Fabricated by Fused Deposition Modeling." Electronic Thesis or Dissertation. Ohio State University, 2014.
3. Rajitha Aluru, Michael Keefe, Suresh Advani, (2001) "Simulation of injection molding into rapid-prototyped molds", Rapid Prototyping Journal, Vol. 7 Iss: 1, pp.42 – 51
4. Grunden, Eric. "Examination of Rapid Prototype Tooling." 30 Sep 2016.
5. Stratasys. "Object1000 Plus", Accessed September 30,2016. http://www.stratasys.com/3dprinters/production-series/objet1000-plus
6. J. Kovács, F. Szabó, N. Kovács, A. Suplicz, B. Zink, T. Tábi, H. Hargitai, Thermal simulations and measurements for rapid tool inserts in injection molding applications, Applied Thermal Engineering, Volume 85, 25 June 2015, Pages 44-51, ISSN 1359-4311

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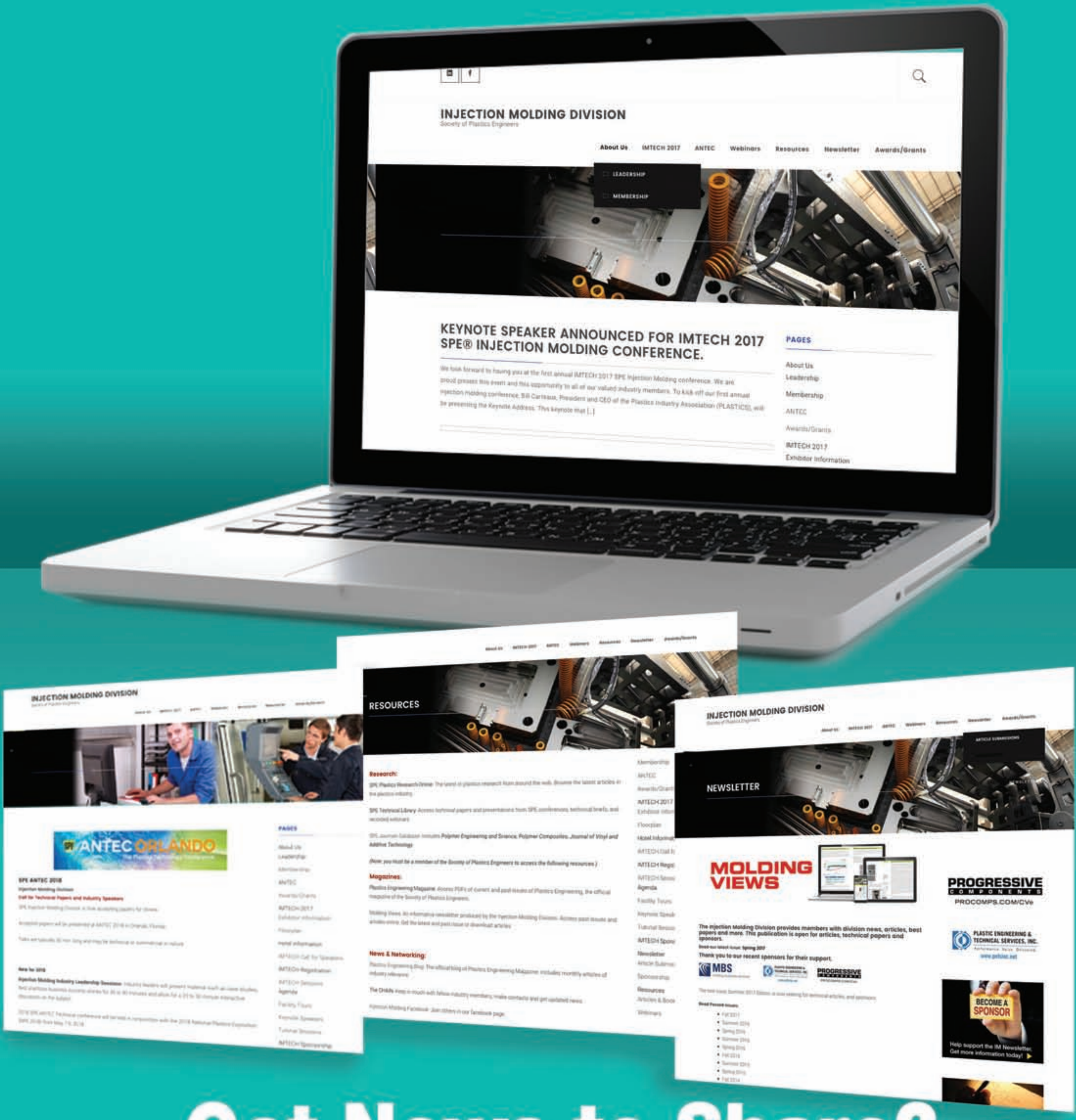
injectionmoldingdivision.org

Get the latest news, events, articles an more.



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March 17th, 2019

Courtyard Marriott Downtown, Detroit, MI

Respectfully Submitted by Secretary Joseph Lawrence June 3rd , 2019.

Welcome & Opening Remarks – Rick Puglielli, Division Chair

Chair Rick Puglielli called the meeting to order at 8:00 AM EST and welcomed all attendees to the ANTEC 2019 IMD Board Meeting. Rick called roll at 8:02 AM (EST).

Present in person were:

Alex Beaumont , Vikram Bhargava, Erik Foltz, Tom Giovannetti, Pete Grelle, Edwin Tam, Adam Kramschuster, David Kusuma (ANTEC 2019 TPC), Susan Montgomery (Councilor), Lynzie Nebel, David Okonski, Srikanth Pilla, Rick Puglielli (Chair), Hoa Pham and Saeed Farahani (invited guest), Tom Turng

Present via teleconference / WebEx were:

Ray McKee and Sriraj Patel

The participation of the official IMD Board Members constituted a quorum.

Absent were:

Brad Johnson, Jeremy Dworshak, Joseph Lawrence (Secretary), Kishore Mehta, Angela Rodenburgh, Chad Ulven and Jim Wenskus

Approval of the January 18th, 2019 Meeting Minutes

The meeting minutes from the IMD Board Meeting of January 18th, 2019 were presented and approved.

Invited guest Dr. Saeed Farahani was approinted for one year term on the board.

Action item: Joseph Lawrence will provide a list of all motions for 2018 for record keeping

Question on attendance was raised

Action item: Rick will form an ad hoc committee to see whether there is any language needs to change on attendance on the by-laws. Rick will contact "inactive" members on their intention, whether they still want to continue as Board member.

Action item: Srikanth Pilla will upate the boiler plate disclaimer for the Board to use for the Youtube Channel.

Action item: Joseph Lawrence will provide the current Board members contact information to all board members.

Technical Director Report – Pete Grelle, Technical Director

Pete Grelle started by congratulating David Kusuma for an outstanding job with ANTEC 2019. Pete presented historic data on ANTEC papers on three main categories; academic, corporate and collaboration between academic and corporate. He also shared data based on demographics for ANTEC papers. The papers from USA increased in the coporate category in 2019 compared to 2018 and the overall quality of papers also increased. Pete concluded by reminding the important dates in 2019, 2020 and 2021.

Pete gave a presentation on the topic "IMD Technical Director" and discussed the history, roles and responsibiites of the director and also defined the role of the to be established Vice-Technical Director position. Pete also stated that if anyone is interested in the role of Vice-Technical Director, to contact him to discuss this new Board position.

David Okonski provided the IMTECH report at the meeting. David Kusuma (ANTEC 2019, TPC) provided an update on ANTEC 2019.

Financial Report – No report

Ray McKee will provide the financial report after the meeting to the Board.

Communications Committee Report – Angela Rodenburgh, Rick Puglielli and Adam Kramschuster

The newsletter is finished by Angela Rodenburgh and it will be sent in March/April. Adam Kramschuster will discuss with Angela on contract renewal and will discuss with Heidi in the sponsorship role. We need new sponsors for events.

Membership Report – Erik Foltz, Membership Chair

Erik Foltz presented the membership report. The membership number has droped to 1,783 and this is a drop of 15% from historical numbers. He shared the membership costs and the new young professional membership initiative.

Nominations Committee Report – Hoa Pham, Chair

Hoa Pham presented the 2019 ballot results. Total number of valid votes was 92. Hoa also shared the comments and reponses from the survey. The re-elected board of directors with term ending at ANTEC 2022 are Kishor Mehta, Tom Turng, Adam Kramschuster, David Kusuma and Edwin Tam.

Current IMD Board Officers with terms ending at ANTEC 2020 are:

1) Chair: Rick Puglielli
2) Chair-Elect: David Kusuma
3) Past Chair: Srikanth Pilla
4) Treasurer: Ray McKee (Jim Wenskus, Honorary Treasurer)
5) Technical Director: Pete Grelle
6) Secretary: Joseph Lawrence

Hoa finished by confirming the following information for the ANTEC Technical Program Chair (TPC):

1) ANTEC 2019 TPC is David Kusuma,
2) ANTEC 2020 TPC is David Okonski,
3) ANTEC 2021 TPC is Joseph Lawrence,
4) ANTEC 2022 TPC is Chad Ulven,
5) ANTEC 2023 TPC is Ray McKee,
6) ANTEC 2024 TPC is Edwin Tam,
7) ANTEC 2025 TPC is Lynzie Nebel

Councilor Report – Susan Montgomery, Councilor

SPE developed a strategic plan with a global strategy and reaffirmed SPE purpose and direction. The activities will continue to be events, contents, recognition, award and market awareness.

Adjournment – Rick Puglielli, Chair

The meeting minutes were recorded by Edwin Tam since secretary Joseph Lawrence was absent.

IMD Leadership

DIVISION OFFICERS

IMD Chair
Rick Puglielli
Promold Plastics
info@promoldplastics.com

IMD Chair Elect
David Kusuma
Tupperware
davidkusuma@tupperware.com

Treasurer
Raymond McKee
Currier Plastics
raymckee@gmail.com

Secretary
Joseph Lawrence
The University of Toledo
joseph.lawrence@utoledo.edu

Education Chair, Reception Chair and TPC ANTEC 2019
David Kusuma
Tupperware
davidkusuma@tupperware.com

Technical Director
Peter Grelle
Plastics Fundamentals Group, LLC
pfgrp@aol.com

Past Chair
Srikanth Pilla
Clemson University
spilla@clemson.com

Raymond McKee
Currier Plastics
raymckee@gmail.com

David Okonski
General Motors R&D Center
david.a.okonski@gm.com

Adam Kramschuster
University of Wisconsin-Stout
kramschustera@uwstout.edu

Erik Foltz
The Madison Group
erik@madisongroup.com

Councilor, 2017 - 2020
Susan E. Montgomery
Lubrizol Advanced Materials
susan.elizabeth.m.montgomery2@gmail.com

COMMITTEE CHAIRS

Awards Chair
HSM & Fellows
Lih-Sheng (Tom) Turng
Univ. of Wisconsin — Madison
turng@engr.wisc.edu

TPC ANTEC
Education Committee Chair
Srikanth Pilla
Clemson University
spilla@clemson.com

Conference Chair (IMTECH/Topcon)
Susan E. Montgomery
Lubrizol Advanced Materials
susan.elizabeth.m.montgomery2@gmail.com

Sponsorship Committee Chair
Sriraj Patel
spatel@currierplastics.com

Membership Chair
Erik Foltz
The Madison Group
erik@madisongroup.com

Tech Program Chair
Peter Grelle
pfgrp@aol.com

Nominations Committee Chair Historian
Hoa Pham
Freudenberg Performance Materials
hp0802@live.com

Engineer-Of-The-Year Award
Kishor Mehta
Plascon Associates, Inc
ksmehta100@gmail.com

Newsletter Editor / Communication Chair
Angela Rodenburgh
Ladder Up Inc.
angela@ladderupinc.com

Web Content Master
Adam Kramschuster
University of Wisconsin-Stout
kramschustera@uwstout.edu

TPC ANTEC 2020 Sponsorship Chair
David Okonski
General Motors R&D Center
david.a.okonski@gm.com

TPC ANTEC 2021
Joseph Lawrence
joseph.lawrence@utoledo.edu

TPC ANTEC 2022
Chad Ulven

TPC ANTEC 2023
Raymond McKee
Currier Plastics
raymckee@gmail.com

IMD Leadership

BOARD OF DIRECTORS

Alex Beaumont
Beaumont
abeaumont@beaumontinc.com

Bradley Johnson
Penn State Erie
bgj1@psu.edu

Chad Ulven
culven@c2renew.com

David Okonski
General Motors R&D Center
david.a.okonski@gm.com

Edwin Tam
etam@teknorapex.com

Jeremy Dworshak
Steinwall
JDworshak@steinwall.com

Jim Wenskus
wenskus1@frontier.com

Kishor Mehta
ksmehta100@gmail.com

Lynzie Nebel
lynzie.nebel@gmail.com

Vikram Bhargava
VikramBhargava@gmail.com

Dr. Saeed Farahani
sfaraha@clemson.edu

Tom Giovannetti
giovatl@cpchem.com

EMERITUS

Mal Murthy
Doss Plastics
Dosscor@gmail.com

Larry Schmidt
LR Schmidt Associates
schmidtlra@aol.com

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IMD Seeking Nominations for SPE Fellows and Honored Service Members

The SPE Injection Molding Division (IMD) encourages its members to nominate candidate(s) or self-nominate for two of the Society's distinguished memberships, namely, Fellow of the Society (Fellow) and Honored Service Member (HSM).

Fellow of the Society

To be elected Fellow of the Society, a candidate shall have demonstrated outstanding achievements in the field of plastics engineering, science or technology, or in the management of such activities. Candidates must be sponsored by an SPE Division or Special Interest Group and elected by the Fellows Election Committee on the basis of their professional record as well as written sponsorships from at least two SPE members. Candidates shall have been a member in good standing for six years.

Detailed information on Fellow application and guidelines as well as past honorees can be found at:
https://www.4spe.org/i4a/pages/index.cfm?pageid=3576

Honored Service Member (HSM)

According to SPE Bylaws, "To be elected an Honored Service Member, a candidate shall have demonstrated long-term, outstanding service to, and support of, the Society and its objectives; shall be sponsored, in writing, by the Board of Directors of at least one Section or Division."

Detailed information on HSM application and guidelines as well as past honorees can be found at:
https://www.4spe.org/i4a/pages/index.cfm?pageid=3580

Members interested in the nomination process please contact Prof. Lih-Sheng (Tom) Turng, IMD HSM & Fellows Committee Chair, at turng@engr.wisc.edu or Tel: 608-316-4310.