spe INJECTION MOLDING

MOLDING VIEWS

Brought to you by the Injection Molding Division of the Society of Plastics Engineers

Spring 2019 | No. 109

Chair's Message

Srikanth Pilla

Dear Friends:

The Injection Molding Division is so delighted to bring to you another wonderful edition of our newsletter which covers not only relevant technical papers from leading experts but also topics of interest to the community. We are also very proud to announce the first recipient of the Outstanding Young Injection Molding Engineer Award (OYIME), Ben Ellis of Beaumont Technologies Inc. This award was instituted in 2018 to recognize injection molding professionals aged 35 or under who are deemed the future leaders of the injection molding industry.

This year's ANTEC in Detroit has full of outstanding technical papers. Specifically, in the injection molding sessions, we have top scientific and application-oriented papers in materials, processing, inject 4.0, simulation and modeling. With your continued support, we wish to bring many more technical and impactful papers, articles, webinars, etc., for the benefit of the injection molding community, at large. Our primary goal is to provide you with an increased value to your IMD membership while also fulfilling our core mission and service.

The past year has been a real pleasure chairing the wonderful injection molding division board. As I hand off to another inspirational leader of our board, Rick Puglielli, I thank all my fellow board members, SPE colleagues, sponsors, Clemson University colleagues, students, and above all the injection molding community for their support.

Sincerely,

Srikanth Pilla
2018-2019 IMD Chair
Clemson University
spilla@clemson.edu

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!

MARCH 2019

MARCH 18
ANTEC® Detroit
Detroit, MI

MARCH 11
Extrusion Event, After-Market Suppliers
Akron, Ohio

MARCH 19 - 21
Molding 2019
Indianapolis, IN

APRIL 2019

APRIL 10
International Injection Moulding Conference (IIMC)

APRIL 18
Single-screw Maintenance and Troubleshooting Workshop - SPE Ontario Section
Mississauga, ON

MAY 2019

MAY 1
SPE Extrusion Minitec-PLUS PET/PLA Extrusion
Polymers Center for Excellence
Charlotte, NC

JUNE 2019

MAY 1
amerimold
Rosemont, IL

WEBINARS

APRIL 11, 2019 AT 11:00AM–NOON EDT (EST)
Basic Rubber Technology

APRIL 24, 2019 11:00 AM (EST)
Resume 101-You've Written Your Resume-Now What?

MAY 1, 2019 11:00 AM (EST)
Design = Emotion + Function

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.

Integrating Injection Molding Machine Interface into Mold Filling Analysis
One of the challenges for CAE engineers is to shorten the gap between the simulation and the actual manufacturing process. In this webinar, we will introduce how Moldex3D removes barriers by providing real-world injection molding machine interfaces in the process settings, which can improve communication and overall operational efficiency between CAE engineers and injection molding machine operators. We will also cover how Moldex3D analysis can take into account the dynamic response of an injection molding machine to help users produce more accurate simulation results.

News

Congratulations Bill Ellis Outstanding Young Injection Molding Engineer Award (OYIME)

Ben Ellis is our first award winner for the Outstanding Young Injection Molding Engineer Award (OYIME). He has an impressive resume and comes highly recommended by fellow employees at Beaumont, as well as outside customers. He started his interest in injection molding when he was a sophomore in high school. His school received CAD/CAM software, a CNC mill, and a table top injection molding machine. Being one of the first classes to use this equipment gave Ben hands on experience. He attended Penn State Behrend for Plastics Engineering Technology. While in school he worked as an intern for Plastic Services Network. He graduated in 2010 and took a job at York Imperial Plastics, where he spent time designing and implementing end of arm tools, managing press and equipment maintenance in addition to his official title of process engineer. After a few years he was offered a position at Beaumont Advanced Processing. He has worked to develop Thermaflo (Beaumont's patented material characterization method) and has expanded his role to prototyping and helping to acquire ISO Class 8 cleanroom certificates. Congratulations, Ben!

If you know an Outstanding Young Injection Molding Professional, please keep an eye out this summer for information to nominate for next year's award.

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.

By Dallas Cada. DCC Consulting

Mold Filling Orientation

The following tech brief examins the phenomenon of mold filling orientation. The information can be used as a good basic understatnding of what happens once the material enters the mold. Thematerial used can be made up of most resins and filled matrixes.

As we know, most parts have some degree of "frozen in" molecular orientation. The molecular orientation will be influenced by molecular weight and relaxation characteristics, by process conditions during production. The orientation can also be minimized through design and process variables that minimize mold filling pressure requirements.

Residual (frozen-in) orientation is equal to the orientation level due to flow, which is equal to the relaxation of the molecules. A warmer tool and material temperature will promote molecular relaxation. This will usually result in a longer cycle time however, will decrease molded in stress. This is because of the material mold filling orientation the polymer at the cavity sees. The higher temperatures, will allow the flow-induced stresses and molecular orientation to relax after mold filling. The injection speed used will also influence the degree of orientation at the time of fill. Faster fill leads to an increase in viscous heating and a decrease in the amount of conductive cooling. As a result, there is more molecular mobility at the instant of fill so relaxation can occur.

All polymers experience a pseudoplastic laminar profile (see figure 1). Basically, molecular orientation develops during the mold-filling phase. Polymere chains become stretched out due to velocity gradient associated with laminar flow behavior. While most orientation occurs at the surface of the part, the molecules remain in a coil configuration at the core, Because the cavity and wall freeze first this leads to high interfacial shear stresses. Orientation will continue during process especially near the gate region. Packing and holding can be modified to increase or decrease orientation. Orientation problems are more significant for higher molecular weight and fiber reinforced polymers.

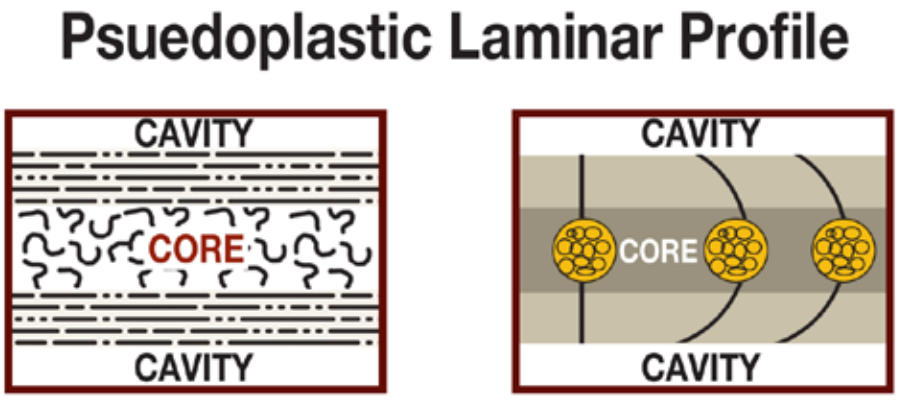


Figure 1

In summary, orientated molecules tend to radiate from the gate towards the end of flow. This results in relatively high stresses in the gate as the polymer molecules attempt to recover. This can also lead to dimensional distortion at elevated temperatures. Annealing can relieve internal stresses however the part should be fixtured in order not to distort it. Gating the part correctly will help with molded in stress and molecular orientation. Positioning the gate properly will promote orientation in the direction of the maximum stress associated with the end use application. The use of a hot runner system will also reduce molded in stress by increasing the flow of the polymer. Last but not least, is process optimization. Reducing molded in stress by increasing heat and velocity can help with molecular orientation.

Conclusion

Any success of ultrasonic welding will only be as good as the part design, type joint and equipment used. Prototyping and testing consistency are very instrumental when proving any given application. It is relatively inexpensive to build prototype tools to prove the design. As we know, prototype tools can be altered fairly easy which in turn favors joint design and part function. One should get a good statistical sample with long prototype runs. Consistent testing is importnant becuase even if the weld looks perfect and you can't pull it apart it must still perform out in the field. Take advantage of technical resources such as ultrasonic equipment suppliers. They are ready, will ing and able to offer help in part and joint design.

Reference

Mally's Plastic Part Design for Injection Molding
Ezrin's Plastic Failer Guide

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.

By Amos Shavit, Plastokit, Member of Rion Group

How to Determine Realistic Tolerances for Plastic Injection Molded Parts

The design of a product includes dimensions. Dimensions are required for functionality or correct fit in an assembly. It is impossible to produce identical parts; therefore, the designer defines tolerances for the design dimensions. These tolerances are to ensure that all dimensions fit the assembly requirements. Standards like DIN 16901 (and others) define general tolerances for different materials and different locations on the produced part. However, this is a general recommendation that cannot always be achieved in injection molding. The designer, most of the time, does not take into account the ability to produce the designed part.

This article discusses how to analyze the dimensions, tolerances, and ranges in injection molded parts in a more accurate and practical way to help the designer know in advance about production capability.

Definitions:

- **Tolerances** – are given by designer to designed dimensions
- **Deviation and ranges** - are the results of production
- **Range** - the difference between the smallest and the largest measurement of a dimension in a batch of produced parts

The injection molding process has its advantages because production is "in-mold". The cavities of the mold are produced from steel (hardened steel), and therefore, there is no dimension change in the mold. So, it is possible to deal with product dimensions by analyzing the shrinkage.

The following analysis is limited to:

- Dimension shrinkage only (not for distortion)
- No change in injection parameters

Simple Example

For illustrative purposes, let us start with a simple example (all dimensions in mm). **See Figure 1**:

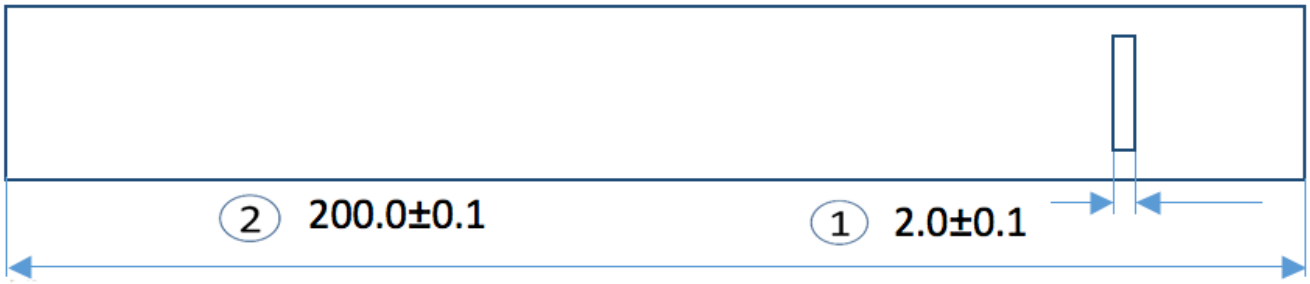


Figure 1: Sketch of a simple part.

Start with dimension no. 1 (2.0±0.1). In order to achieve this dimension on the product, we add shrinkage for mold production. Assume that the shrinkage rate is 2%. Cavity dimension will be 2.0/0.98=2.0408 mm, meaning: in order to meet the nominal dimension (2.0) the cavity dimension will be 2.0408mm. In the same part we have another dimension, no 2, (200.0±0.1). For Dim 2, the mold dimension will be: 200.0/0.98=204.08 mm. **See Figure 2**.

Mold dim (mm)	Shrinkage	Drawing dim (mm)	Dim no.
2.0408	2%	2.0±0.1	1
204.08	2%	200.0±0.1	2

Figure 2: Mold dimension to receive nominal part dimension.

Dimensions of the cavity in the mold are fixed so shrinkage will be calculated from these dimensions.

On our simple part, each dimension can reach the tolerance limits. Now we can check what the shrinkage should be for each dimension in order to reach the limits. **See Figure 3**.

Percentage of tolerance from dimension	Shrinkage to min dim allowed	Min dim allowed (mm)	Shrinkage to max dim allowed	Max dim allowed (mm)	Mold (cavity) dim (mm)	Dim no
10%	6.9%	1.9	-2.9%	2.1	2.0408	1
0.1%	2.05%	199.9	1.95%	200.1	204.08	2

Figure 3: Shrinkage of the part that is needed to reach the tolerance limit.

Analysis of shrinkage to tolerance limits:

1. Dimension 1 – 2.0±0.1mm
   a. Shrinkage from mold size to maximum is impossible. Cavity dimension is smaller than the allowed maximum dimension on drawing (negative shrinkage).
   b. Shrinkage from mold size to minimum dimension is also impossible. There is no way that a material expected to shrink 2% will shrink 6.9%.
   c. The difference between minimum and maximum tolerance is 10% from dimension.
   d. This means that there is almost no chance that this dimension will be out of tolerance.

2. Dimension 2 – 200.0±0.1mm
   a. The shrinkage from mold size to the maximum allowed dimension is 1.95%.
   b. The shrinkage from mold size to the minimum allowed dimension is 2.05%.
   c. The difference between maximum and minimum tolerance is 0.1% from dimension.
   d. This means that it will be much more difficult to produce this dimension within tolerance.
   e. When the average shrinkage is not equal to 2% it will be almost impossible to produce within tolerance

Since these two dimensions are on the same part and in the same direction, the percentage of shrinkage of both of them will be equal to each other. Therefore, if dimension 200.0±0.1mm is maintained during production meaning the maximum range of production is 0.1% from dimension, the range of shrinkages of dimension 2.0±0.1mm will also be 0.1% (0.002mm). **See Figure 4**.

Range (mm)	Min dim for shrinkage of 2.05% (mm)	Shrinkage to min dim of dim no. 2	Max dim for shrinkage of 1.95% (mm)	Shrinkage to max dim of dim no. 2	Mold (cavity) dim (mm)	Dim no
0.002	1.999	2.05%	2.001	1.95%	2.0408	1
0.2	199.9	2.05%	200.1	1.95%	204.08	2

Figure 4: Calculation of shrinkage results when it is equal for both dimensions.

This range of dimension 2.0±0.1mm (0.002mm) is very small for injection molded plastic parts and we do not have the ability measure it or maintain it in production. Figure 4 relates to shrinkage of 2%. Later we will discuss different shrinkages. One conclusion is that there is a correlation between percentages of tolerance from drawing dimension, to the ability to produce the product. The higher the percentage, the easier the production and the opposite is also true. If the dimension 200.0±0.1mm is kept, there is no reason to measure the dimension 2.0±0.1mm. If, for example, the Quality Control Inspector measures this dimension and finds 2.08mm, it is easy to say that it is a mistake of measuring since the technology cannot produce this dimension.

Calculation of percentage of tolerance from drawing dimension (POT) is:

$$\frac{T}{D} X\ 100 = POT$$

Where:
T – Tolerance
D – Dimension
POT – Percentage of Tolerance from dimension
The POT is defined by the part designer.
How do we know what the POT is that can be achieved? We have to connect it to the production capability.

Calculation of percentage of range from average (POR) is:

The production capability can be measured with the percentage of the range from average (POR). Calculation of POR:

$$\frac{R}{A} X\ 100 = POR$$

Where:
R – Range of results
A – Average of results
POR – Percentage of Range from average
POR is a result of production

- Selection of the right POR should be based on data collection from production
- POR depends on the quality of the injection process
- The more accurate the process, the lower the POR. For example:

✓ Raw material. Should be uniform within batch and between batches
✓ More accurate machines
✓ More accurate molds with efficient and uniform cooling
✓ Stable and repeatable injection process with big injection window
✓ Using materials with low shrinkage
✓ Uniform climate of injection molding facility (air-conditioned)
✓ And so on

- To begin the process, we can take a general expected number to all dimensions
- Good start for POR can be 0.2% to 0.3%
- Later on, after data collection, this number can be updated

Results that are more accurate can be achieved by taking measurements for some time and by calculating the percentage of range from dimension. As said before, it is possible to start with POR = 0.2% and change it later according to real results.

Now we can connect the expected percentage range of average (POR) with the POT. The POT enables us to rank the dimensions according to difficulty in production.

Real drawing analysis (based on a real part drawing – not shown here)

We used excel for this analysis (**Figure 5**):

Columns 1, 2, 3 and 4 will be filled with the dimension no. along with the specified dimension and tolerances from the drawing.

In column 5, the POT will be calculated for each dimension.

The expected POR (percentage of range from average) is shown in column 6. It is 0.2% for a starting point.

Now we rank the dimensions according to column 5 (POT) from smallest to largest.

1	2	3	4					5	6
Dim No	Nominal dim (mm)	Upper Tolerance (mm) +	Lower Tolerance (mm) -	Center Dim (mm)	Min (mm)	Max (mm)	Tolerance (mm)	POT (%)	Expected POR (%)
1	127.76	0.25	-0.25	127.76	127.51	128.01	0.50	0.39%	0.20%
2	85.47	0.25	-0.25	85.47	85.22	85.72	0.50	0.59%	0.20%
3	29.46	0.25	-0.25	29.46	29.21	29.71	0.50	1.70%	0.20%
5	9.80	0.13	-0.13	9.80	9.67	9.93	0.25	2.59%	0.20%
8	4.78	0.08	-0.08	4.78	4.70	4.86	0.16	3.35%	0.20%
6	6.05	0.13	-0.13	6.05	5.92	6.18	0.25	4.20%	0.20%
7	5.59	0.13	-0.13	5.59	5.46	5.72	0.25	4.54%	0.20%

Figure 5: Drawing dimensions, tolerances, POT and POR.

Now we produce a graph from data that will show the analysis of the drawing and tolerances with relation to our ability to produce the part. **See Figure 6**.

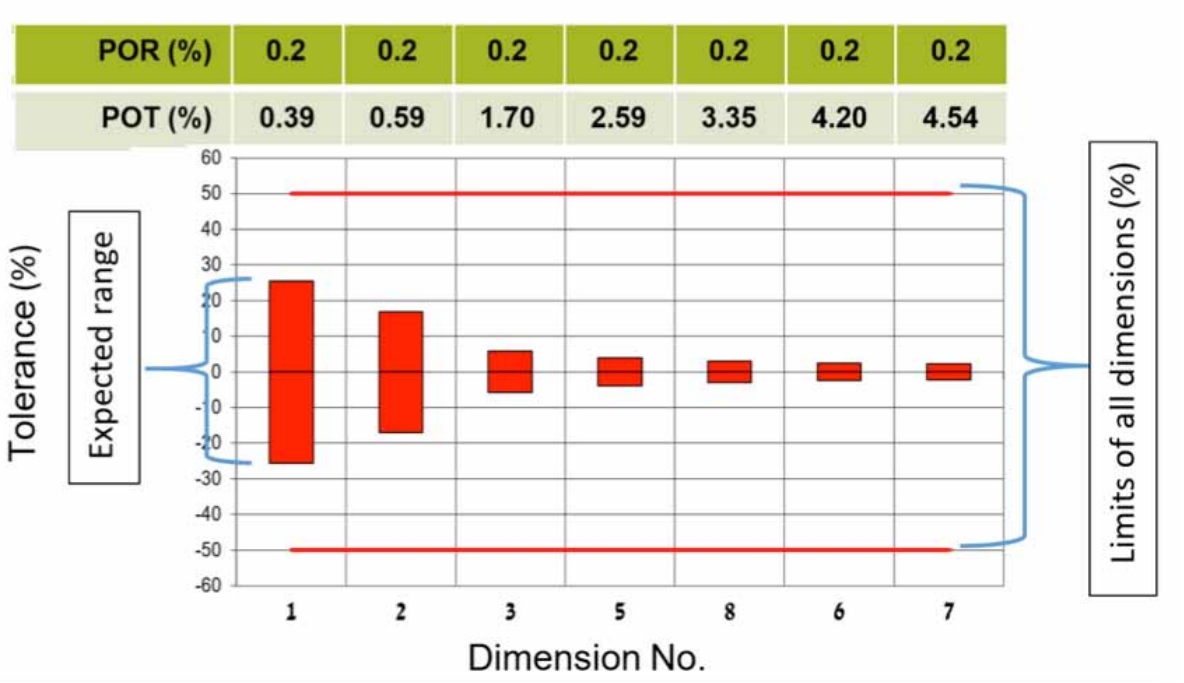


Figure 6: Analysis of drawing dimensions. Expected range of each dimension with relation to the tolerance borders, taking into account the general POR during production.

All dimensions in this graph are normalized to percentage. The upper and lower lines represent the maximum and minimum limits of each dimension, 50% above the nominal and -50% below the nominal.

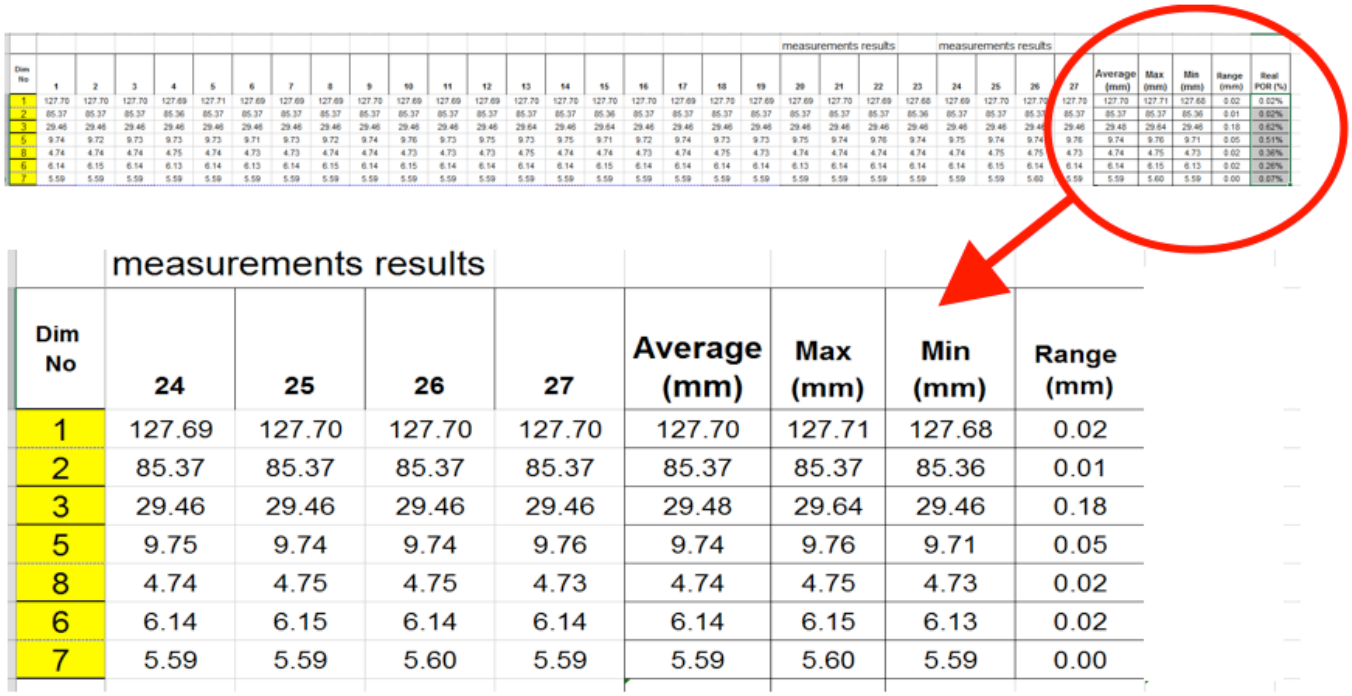
The vertical red lines represent the distance between the expected ranges for each dimension with relation to dimensions limits.

The lower the POT, the more difficult it will be to produce the part (and vice-versa).
The higher the POR the more difficult it will be to produce the part (and vice-versa).

All the dimensions are ranked according to their difficulty to be produced. The graph in figure 6 shows that there is no problem to meet the tolerance requested since the columns are far from the limits.

Analysis of Measurement Results

Now we add the measurement results. **See Figure 7**.



measurements results

Dim No	24	25	26	27	Average (mm)	Max (mm)	Min (mm)	Range (mm)
1	127.69	127.70	127.70	127.70	127.70	127.71	127.68	0.02
2	85.37	85.37	85.37	85.37	85.37	85.37	85.36	0.01
3	29.46	29.46	29.46	29.46	29.48	29.64	29.46	0.18
5	9.75	9.74	9.74	9.76	9.74	9.76	9.71	0.05
8	4.74	4.75	4.75	4.73	4.74	4.75	4.73	0.02
6	6.14	6.15	6.14	6.14	6.14	6.15	6.13	0.02
7	5.59	5.59	5.60	5.59	5.59	5.60	5.59	0.00

Figure 7: Measurement results and calculation of average, maximum and minimum to each dimension.

Columns 1 to 27 show measurement results (There is no limit to the number of measurements). At the end, there is a calculation of average, maximum and minimum for each dimension.

From this data, we produce a graph with all the results. **See Figure 8**.

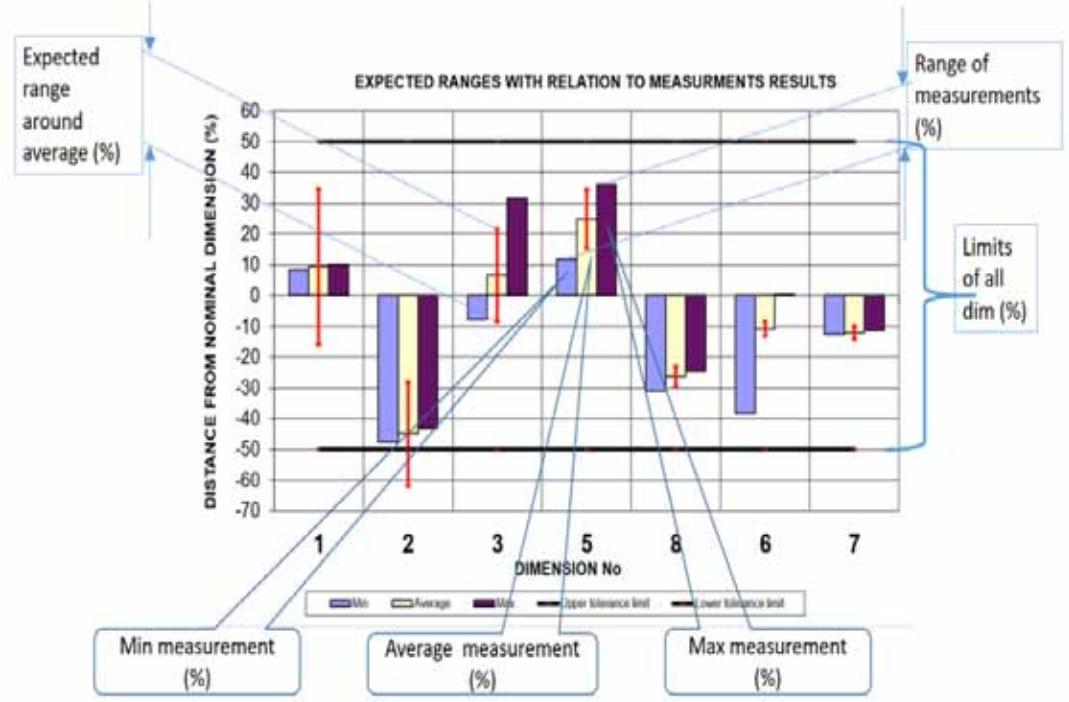


Figure 8: Results of actual measured data, average, min and max to each dimension and the expected POR.

Now results can be analyzed:

- The blue line is the minimum measured for each dimension
- The yellow line is the average calculated for each dimension
- The dark purple line is the maximum measured for each dimension
- The real shrinkage is different from 2% (if the real shrinkage would be 2% for all dimensions, the average of each dimension would be on the centerline). Above the centerline, the shrinkage is less than 2% and below the line is more than 2%.
- The expected POR (vertical red line) is around the average of each measured dimension.
- Measurements above zero shrink are less than anticipated (and are therefore larger).
- Measurements below zero shrink are more than anticipated (and are therefore smaller).
- **Measurements 1 and 2:** the actual range is much lower than expected (vertical red line is much longer than the difference between the dark purple line and the blue line).
- **Measurement 2**: measured dimension is within limits. The expected range shows that there is a possibility that the measurement will not meet the specification and can be too small. Expected range line (vertical red line), is crossing the lower limit.
- **Measurement 5, 8 and 7:** The actual range meets expectation. The expected range is between the minimum and the maximum.
- **Measurement 6:** the actual range is significantly greater than anticipated. i.e., the shrinkage significantly exceeded. Since no such range result is possible, it can be concluded that there is either a mistake in the measurement or data input.

Conclusions:

After collecting enough data, the prediction of POR will be much more accurate.

The data can be collected with relation to: materials, type of molds, size of molds, machines etc.

This suggested method enables us to:

- Analyze the feasibility of meeting the customer's part specification before entering the investment and commitment stages
- Be instrumental in forecasting which of the dimensions will be difficult to achieve.
- Determine the possibility of finding measurement errors.

This method can serve the following:

- For the designer of plastic parts
- Define tolerances to dimension – feasibility of meeting the customer's requirements/specifications.

- The sub-contractor of injection molded parts before accepting order for new product.
- Checking the possibility to meet drawing requirements and to select critical dimensions

- Mold maker
  - Checking the possibility of meeting customer requirements
- Mold test T1
  - Checking all drawing dimensions
  - Analysis of critical dimensions and ability to produce the parts
- Quality control
  - To give focus on critical dimensions that are difficult to produce
  - To find measurement mistakes

About Amos

Amos Shavit was a chief engineer and quality assurance manager for Naan Irrigation System in Israel. He received his MSc degree in Polymer Technology at Loughborough University, UK in 1992. He later worked as a consultant for Quality Assurance and Injection Molding. He also taught at colleges and businesses a course that he created about technology and quality in the injection molding process. He is currently working part time at Plastokit, Member of Rion group, an injection molding plant in Israel, and continues to teach injection molding in the industry.

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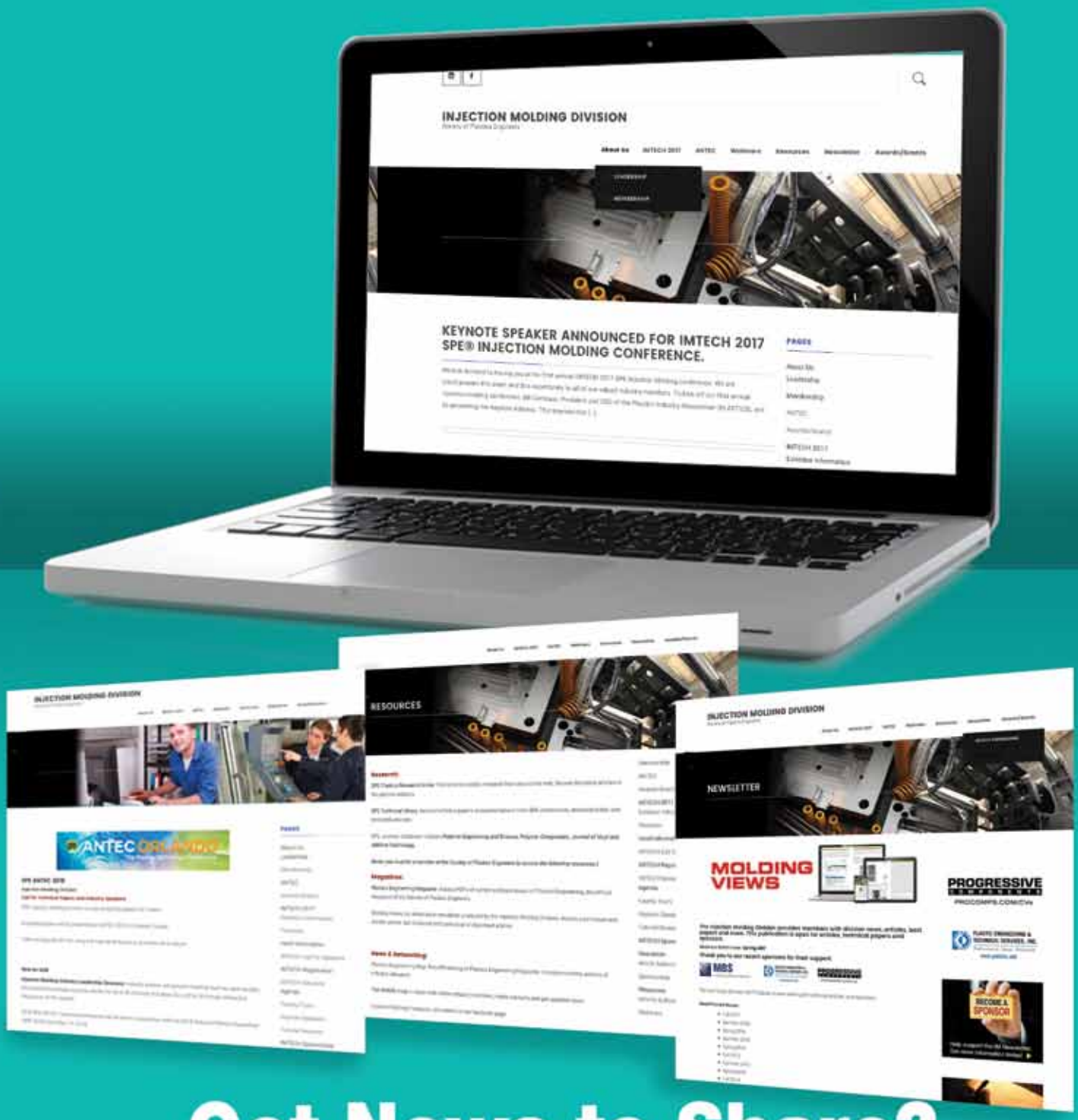
Injection Molding Division Website

injectionmoldingdivision.org

Get the latest news, events, articles an more.



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E-mail your news to: PublisherIMDNewsletter@gmail.com

January 18th, 2019

Tupperware Worldwide Headquarters located in Orlando, FL

Submitted by Joseph Lawrence

Welcome & Opening Remarks – Srikanth Pilla, Injection Molding Division Chair

Chair Srikanth Pilla called the meeting to order at 9:00 AM EST and welcomed all attendees to the 2019 Winter IMD Board Meeting. Secretary Joseph Lawrence called roll at 9:02 AM (EST).

Roll Call – Joseph Lawrence, Secretary

Present in person were:

Jeremy Dworshak, Brad Johnson, Edwin Tam, Adam Kramschuster, David Kusuma (ANTEC 2019 TPC), Ray McKee, Kishor Mehta, Susan Montgomery (Councilor), Lynzie Nebel, David Okonski, Hoa Pham, Srikanth Pilla (Division Chair), Rick Puglielli (Chair-Elect), Jon Ratzlaff (Guest), Kathy Schacht (Guest) and Tom Giovannetti (Invited Guest).

Present via teleconference / WebEx were:

Erik Foltz, Joseph Lawrence (Secretary), Sriraj Patel, Angela Rodenburgh, Tom Turng, Jim Wenskus (Treasurer), Pete Grelle (Technical Director), Vikram Bhargava and Chad Ulven

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

Absent were:

Jack Dispenza, Nick Fountas (Emeritus), Mal Murthy (Emeritus), Larry Cosma (Emeritus), Pat Ferrey (Invited Guest), Jim Peret, Larry Schmidt (Emeritus) and Alex Beaumont.

Approval of the October 10th, 2018 Meeting Minutes

The meeting minutes from the IMD Board Meeting of October 10th, 2018 were presented.

Motion: Edwin Tam moved that the October 10th, 2018 meeting minutes be approved as written and presented. David Okonski seconded, and the motion passed at 9:05 AM (EST).

Membership Report – Erik Foltz, Membership Chair

Erik Foltz mentioned that he was not able to get access to the online numbers. He stated that the membership number has dropped to 1,783 members, a drop of 15% from historical numbers. In addition, approximately 200 members have a membership lapse. We were around 2100 members consistent in the previous years. There was a drop in membership under age 40 and 85% of our membership is 40 or older. There was a discussion on improving membership for people <40 years of age.

Note: A talk was provided by Tupperware Headquarters on the "State of Tupperware"

Presenter: Bill Wright, Executive Vice-President of Supply Chain Management

Bill provided a brief update on the "State of Affairs" at Tupperware. In summary; last year has been a biggest year in transition for Tupperware. They now have 3 new group presidents and had a difficult time with transitions in different positions. They have sales in 81 countries and biggest countries sales are now down. Brazil was their largest market in sales. The emerging markets like China and South Africa are leading the way.

He mentioned that 2019 will be a much better year and showed some new products to the board. He also spoke about the high cost of polycarbonate resins, innovation with respect to materials, war on plastics, and how the industry continues to thrive.

Note: Invited guest Tom Giovannetti, Technical Service Engineer from Chevron Phillips Chemical Company LP introduced himself to the IMD Board of Directors. He expressed interest to join the board. IMD Chair, Srikanth Pilla appointed him for 1 year and he will be up for election next year.

HSM & Fellows Update – HSM & Fellows Chair Tom Turng

Tom Turng mentioned that he has been working with Prof. Mohanty and Prof. Hoffman for their Fellow nominations. He also stated that he had participated in the SPE fellow's Fellow Election as a committee member. He also mentioned that it has been a pleasure to work with them and asked the board to recommend Fellow and HSM nominations for 2020.

Financial Report – Hoa Pham

Hoa presented the financial report for the fiscal year 2019 until the end of November 2018. The starting balance was ~$39,200. We received SPE rebate of $4,900 till November ($10,000 budgeted for the fiscal year). Total income for this period was $9,900. Total expense was $7,800 with ending balance of $39,900. The website management cost was ~$1,400 and this is due to the update and re-build of the website by Heidi Jensen. The website hosting costs are ~$200/year.

Motion: Srikanth Pilla moved to increase the budget for award plaques from $750 to $1,000. David Okonski seconded, and the motion passed at 10:06 AM (EST).

OYIME Award Nominations – Lynzie Nebel

We received 5 total nominations for the Outstanding Young Injection Molding Engineer (OYIME) award. Anyone who is <35 years age outside of the division can apply for the award and need not be a SPE member. Lynzie announced that Ben Ellis from Beaumont Technologies is the winner of the award this year. There was a discussion on changing the word Engineer in the award to Professional and rename it as OYIMP to be inclusive of all plastics professionals.

Motion: Lynzie Nebel moved to change the award name from OYIME to OYIMP. Ray McKee seconded, and the motion passed at 10:21 AM (EST).

Note: The motion to change the award name to OYIMP was then deferred by Srikanth Pilla to ANTEC 2019 board meeting after a discussion among the board members. It was decided that the board will consider all the criteria for the award and come up with an appropriate title in the next meeting.Announcement: Kishore Mehta announced an award to Ray McKee for his excellent service to the Injection Molding Division. Congratulations Ray!

Technical Director Report – Pete Grelle, Technical Director

Pete Grelle started by saying that David Kusuma will provide an update on the ANTEC 2019 and Pete will provide the ANTEC historical data in the next IMD meeting in March 2019. Sriraj Patel provided an update

on the free webinar opportunity with MOLDEX and mentioned that MOLDEX is committed to be a platinum sponsor for the ANTEC reception in 2019. Edwin Tam asked about the advertising medium for the webinar. The board members mentioned that the webinars are advertised on social media and via emails.

Pete presented the IMD technical program schedule for 2019 and 2020. David Okonski provided an update on the 2019 SPE Detroit Section AutoEPCON and mentioned that he is looking for sponsors. Brad Johnson provided an update on the 2019 SPE IMD TOPCON scheduled for June 2019 in Erie, PA.

Pete provided an update on the 2020 IMTECH. Susan Montgomery has volunteered to be the chairperson for the 2020 IMTECH. Sue and David Okonski will meet in Orlando during the IMD board meeting to discuss about strategies for sponsorship for IMTECH 2020. The board discussed about the location of the IMTECH and suggestions were made by board members to have it at the same location every year. Pete also mentioned that he is drawing up a plan for a vice-technical director.

Note: The oldest living SPE past President Mr. Peter Simmons joined the meeting as a guest. He served as SPE president in 1957. He spoke to the board about him and shared his experiences with SPE.

David Kusuma presented the SPE-IMD TPC report. He shared the critical milestones and requested for moderators for the sessions. He mentioned that IMD was the number one division with most number of papers with extrusion division trailing behind. 56 papers were initiated and 43 papers were accepted for presentation in IMD sessions. There were two outstanding papers with highest scores and he recommended to award 2 best paper awards (1 on processing and 1 on materials). There are 8 sessions with 2 joint sessions with PD3 and MTD Joint in ANTEC 2019.

Nominations Committee Report – Hoa Pham, Chair

Hoa Pham provided the following information regarding the 2019 Nominations for the IMD Board Executive Officer Positions,

Current IMD Board Officers with terms ending at ANTEC 2019 & the 2019/20 Nominees are:

1) Chair: Srikanth Pilla / Nominee for 2019/20: Rick Puglielli

2) Chair-Elect: Rick Puglielli / Nominee for 2019/20: David Kusuma

3) Treasurer: Jim Wenskus / Nominee for 2019/20: Jim Wenskus

4) Technical Director: Pete Grelle / Nominee for 2019/20: Pete Grelle

5) Secretary: Joseph Lawrence / Nominee for 2019/20: Joseph Lawrence

Motion: Srikanth Pilla moved to change Jim Wenskus to Ray McKee as nominee for Treasurer Position. Kishor Mehta seconded, and the motion passed at 2:01 PM (EST).

Motion: Hoa Pham then moved that the Board approve the 2019/20 nominees for the Division Executive Officer Positions as presented. David Okonski seconded, and the motion passed at 2:03 PM (EST).

Motion: Srikanth Pilla moved to present an honorary Treasurer title for Jim Wenskus. David Kusuma seconded, and the motion passed at 2:04 PM (EST).

Hoa Pham provided the following information regarding the IMD Board members that are up for general election in 2019:

1) Adam Kramschuster Term ends at ANTEC 2019
2) David Kusuma Term ends at ANTEC 2019
3) Kishore Mehta Term ends at ANTEC 2019
4) Tom Turng Term ends at ANTEC 2019
5) Edwin Tam Appointee

Motion: Hoa Pham moved that the Board approve the above nominees for posting on the general ballot to be elected to the IMD Board as presented. Jeremy Dworshak seconded, and the motion passed at 2:08 PM (EST).

There was a discussion on the number of board members up for election and number to be elected. For the current election there are 5 members on the ballot and voting will be cast for 4 members.

Action item: For this voting cycle, Hoa will follow the current voting rules. Kishore Mehta will look into the bylaws and update the board in the next meeting regarding any changes in voting rules.

Note: All board members that are up for general election in 2019 must submit their biography to Hoa Pham by January 23rd, 2019.

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,

Hoa issued a "Call for Volunteers for TPC Chair" for ANTEC 2024 and beyond. Edwin Tam volunteered for 2024 and Lynzie Nebel volunteered for 2025.

Education Committee Report – Srikanth Pilla, Chair

Srikanth Pilla provided an update on the YouTube channel for education. He proposed to host 10-15 min short webinars. He mentioned that when soliciting content from outside industry, we need to accommodate their logos/advertisements at the end of the video. The board members suggested that a disclaimer is to be added to all video contents.

Motion: Srikanth Pilla moved to create a YouTube channel and solicit content from outside industry. The content provider can put a logo at the end for marketing purpose. A disclaimer will be put on each video. Edwin Tam seconded, and the motion passed at 2:24 PM (EST).

Action item: The boiler plate for the disclaimer will be finalized by Srikanth Pilla and Heidi Jenson by next board meeting.

Kishor Mehta recommended that all the motions to be recorded by the historian Hoa Pham at the end of the year. David Okonski proposed that the secretary will document all the motions and will pass it on to the

historian at the end of the year.

Action item: IMD secretary, Joseph Lawrence to provide a list of all motions for calendar year 2018 to Hoa Pham for archiving purpose.

There was a discussion about voting on the chain and displaying the email address, phone numbers and name on the IMD website and newsletter. A suggestion was made to keep the online voting on the chain for at least 5 business days for discussion. Voting will follow after the discussion period.

Motion: Srikanth Pilla moved to use the chain for online voting on issues and allow a minimum of 5 business days for review. In addition, the individual posting the issue for motion should send an email to all board members. Kishore Mehta seconded, one "no" was recorded and the motion passed at 2:38 PM (EST).

Call for Vote: IMD chair, Srikanth Pilla called for a vote to allow the display of the division officer's name and contact info (email address) on the website and newsletter. 11 members voted yes and 4 members voted no. Majority wins. Going forward the names and email addresses of the division officers will be displayed on the website and newsletter.

Srikanth Pilla announced that he reserved two slots to market/showcase the Injection Molding Division and its activities at ANTEC 2019. David Okonski proposed that the marketing should be handled by the sponsorship committee of IMD reception.

Action item: The secretary to distribute the names, email and phone numbers of the all the board members along with meeting minutes as a separate document.

Financial Update – Jeremy Dworshak

Jeremy thanked the FC committee volunteers and announced one open spot for volunteer. He talked about the financial best practices and provided the year-to-date update on financials. The 2019 budget included a revenue increase by 10% and an expenses increase by 5%. The 2018 membership revenues were up by 11% for regular dues and new member dues were up by 20%. The revenue from sponsorship and advertising were above budget by 32% in 2018, ahead of 2017 by 21%.

Pinnacle Award Application – Chair-Elect Rick Puglielli

Rick Puglielli mentioned that all the details on the Pinnacle award are now available online and we apply once a year. He described that there are 5 different types of award and he showed the details of each award on the website. These awards are to recognize the groups who deliver member value to the society.

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

Rick Puglielli mentioned that Angela Rodenburgh joined the communications committee and she will present the review of the newsletter performance. Currently, the newsletter is sent as an email with a link to the pdf file of the letter. She presented the message sent statistics for 3 months. The statistics summarized that 1,806 emails were sent, 1,763 were delivered, 373 were opened and only 6 of them clicked the link to read the newsletter. In addition, 43 emails bounced. Based on the statistics, Angela summarized that we need to make sure that the persons receiving the email should be able to read the contents rather than open a link. The benefits of changing the format with links can drive people to various pages and landing pages. She proposed

that the format change will give us a chance to increase sponsorship opportunities, promote events and improve credibility. She showed a sample of how the new newsletter email will look. It will have easy to navigate links to each individual articles instead of having all the content as one pdf file. The board decided to try the new format and re-evaluate later the effectiveness of the new format versus the traditional pdf newsletter. Rick mentioned that he recruited Adam and Srikanth to review the contents before publishing on newsletters.

Councilor Report – Susan Montgomery, Councilor

Susan started by stating that the December 13, 2018 council meeting was a virtual online meeting. The VP of Finance, J. Dworshak presented SPE's financial performance. They were projecting an operating deficit for 2019 in the amount of $493K. The investment results were expected to be lower based on portfolio/ strategy. Sue also summarized the financial Q&A by Pat Farrey. There is a ~10% increase in membership income. Pat Farrey reviewed IT infrastructure and realized savings, some will not occur until 2020. Farrey also announced that a global agreement has been negotiated by SPE to offer insurance for all chapter board members for $450/yr starting on October 1, 2018. Sue concluded by stating that the next councilor meeting is scheduled for March 16th and 17th in Detroit.

IMD Reception Report – David Okonski

David Okonski showed pictures of the GM Renaissance Center, the venue for the IMD networking reception at ANTEC 2019. The reception will be on the 3rd floor in 2 ball rooms. The menu package is $60/person and he went through the menu options. He estimated the cost for the reception with food and 2 drink tickets per person to be $26,000. He also presented different options for the menu for costs in the range of $22,000 to $26,000. David stated that we are expecting around 200 people for the reception this year, last year we had 175 and in Vegas we had 300 people. The sponsorship committee will sit down and finalize the menu and beverage options. A discussion followed on different options to reduce the cost of the reception.

New Business & Round Table – Rick Puglielli, Chair-Elect

No other board member raised any additional new business or round table items for discussion.

The next Board Meeting is to be held in Detroit, Michigan on the Sunday before ANTEC 2019. Chair-Elect Rick Puglielli is to publish the agenda.

Adjournment – Rick Puglielli, Chair-Elect

Motion: Adam Kramschuster moved to adjourn the meeting. Jeremy Dworshak seconded, and the motion passed. The meeting was adjourned at 4:28 PM (EST).

The next meeting will be held during ANTEC 2019 on March 17th, 2019. The venue to be decided. Starting Time: 8:00 AM / Meeting must end by 12 noon to allow people to attend other events in the afternoon.

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IMD Welcomes 102 New Members!

Zeyang Yu
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Daryl Vittal
Bob Duncan
Ming Jin Huang
Hossein Abedsoltan
Krishna Nookala
Peter Vichos
Daniel Azbell
Tim Van Leeuwen
Colton Greathouse
Nicholas Mutsakis
Martin Benning
Anna Duguid
Trystan Meyer
Antonia Deller
Adeniji Adetayo
Brandon Lim
Rao Neelam
Laura Douglas
Jacob Byron
Ambar Gupta
Brandon Birchmeier
Ron Hedman
Nicholas Ludlow
Patrick Mabry
Gary Chen
Sidney Chen
Hamid Givehchi
Jason Huang
Philips Lin
Ehsan Raee
Sam Wang
Bill Hall
Jari Ketomäki
Md. Shahruk Nur-A-Tomal
Garrett Stewart
Alex Koehn
Nathan Vandersluis
Jason Lin
Nicole Cooper
Neetika Singh
Trupti Vadhan
Pao Her
David MacDonald
Tyler Jacobs
Jennifer Whang
Michelle Hartmann
Lukas Amershek
Dalton Bates
Hunter Cleland
William Jaekel
Raven Lawlor
Edward VanWassehnova
Jim Vandenboom
Anshul Singhal
Bradley Collins
Herbert Dennis
Howard Henderson
Christian Hernandez-Ortiz
Tyler King
Belibaldo Morales
Michael Moreno
Jonathan Pavon
Maria Santoyo-Llamas
Edward Snow
Elidio Vivas-Rivera
Derrick Wilson
Rainer Hohendorf
Alex Petersen
Andy Bushmaker
Diana Durham
Bruce Maclachlan
Jeff Pedersen
Chris Rodgers
Giacomo Davoli
Matthew Meyer
Perapong Woointranon
Behrad Kangarlou
James Knoll
Qiang Li
Jim Hill
Benjamin Katsarsky
Josh Kouba
Alexander Kumi-Larbi Jnr
Al Fosco
Bobby Ubhi
Jose Landers
Coy Ward
Charles Davis
Gaige Ackley
Eti Gueta
Annarita De Meo
Pedro Rodrigues
Ciera Cipriani
Yokly Leng
Paolo Maldari
Casey Cooper
Julia Michel
James Mijares