MOLDING VIEWS

SPE Injection Molding

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Summer 2021 | No. 115

Chair's Message

Joseph G. Lawrence

I am honored to be selected as the next Chair of the Injection Molding Division (IMD) of SPE for the fiscal year 2021 – 2022. I would like to thank Rick Puglielli for serving as the Chair of IMD for the past two years. As Covid-19 restrictions are being lifted off in many areas and with more people being able to get vaccinated, we hope to return to normalcy in the coming months. We have endured the pandemic for more than a year and have successfully finished two ANTEC meetings during this time. ANTEC was not the same during the pandemic, yet we all came together to provide high-impact technical presentations spanning a broad range of topics.

In recent years, plastics have gained attention in the media due to their impact on the environment and our ecosystem. Plastics have now become a part of our lives and have been used by millions every day for many applications including food supply chain, storage, and healthcare. Especially, during the pandemic, we have seen the significance of plastics use in personal protective equipment that played a major role in saving lives. Responsible manufacturing and end of life considerations for designs is an increasingly key area of focus around the globe. We, as plastics community have to keep sustainability in mind while developing new materials as well as while designing new things.

The Injection Molding Division has a core mission to providing services and solution to its community. Our team of board members look forward to providing continued value to our IMD members while fulfilling our core mission. While we are beginning to resume normal activities, we are planning to host our IMTECH 2021 conference sometime in November. Please look for updates on our website and communications regarding this event. While we are making progress to restore to full normalcy, continue to stay safe and healthy.

Sincerely,

Joseph G. Lawrence
2021-2022 SPE IMD Chair
Polymer Institute, The University of Toledo
joseph.lawrence@utoledo.edu

In This Issue:

This Month's Features:

Keep the connection!
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Industry Events/Webinar Calendar

Click the show links for more information on these events!

JULY 2021

ACRYLIC IMPACT MODIFIERS FOR PVC: CORE-SHELL MODIFIER CHEMISTRY AND PERFORMANCE - ALL THINGS PVC PART II

JULY 21, 2021

The speaker will review the basics of core-shell chemistry focusing on acrylic technology and its advantages for mechanical property improvement and weatherability in PVC formulating. Core principles of mechanical property improvement via stress concentrators for PVC matrices and formulations will be presented. In addition to rheology and mechanical property enhancement via acrylic chemistry, the presentation will also provide perspective on choosing the best impact modifier based on specific formulation needs or application types where standards vary based on the final needs of the vinyl building product, for example. The talk will follow-up on the principles covered in the introduction to PVC Gelation and Formulation.

FOR MORE INFORMATION: https://www.4spe.org/i4a/pages/index.cfm?pageID=6737

APPLIED RHEOLOGY WORKSHOP 3-PART SERIES

JULY 13, 2021 11:00AM–NOON ET WORKSHOP 1

JULY 20, 2021 11:00AM–NOON ET WORKSHOP 2

JULY 27, 2021 11:00AM–NOON ET WORKSHOP 3

This workshop may be of interest to all that work in a lab that tests polymers, where flow properties of molten polymer is of interest. If you deal with moldings, extrusion, or compounding, if you are concerned about processing of virgin, recycled materials, or a mixture of those, you are likely in need of Melt Indexers and/or Capillary Rheometers. Here you will learn when and how to use which instrument and for what purpose.

FOR MORE INFORMATION: https://www.4spe.org/i4a/pages/index.cfm?pageID=6669

AUGUST 2021

IT'S MUCH MORE THAN A "PLASTICS RACE"... IT'S SPE'S PLASTICS SUMMER OLYMPICS!

AUGUST 6, 2021 - AUGUST 9, 2021

Think you've got what it takes to win a Gold/Silver/Bronze-colored plastic medal? Compete against your SPE colleagues and test your plastics knowledge by answering a wide variety of questions in our first Summer Olympics Competition.

Details:

- Points are awarded for each correct answer, and deducted for hints used
- Speed matters! Tiebreaker is the amount of time spent answering the questions
- Contestants try to medal in as many events as they choose
- Participate in all 5 events to compete for the SPE Olympic Pentathlon Medals
- Students and Plastics Professionals compete in separate competitions
- Student Chapters with the highest average score from at least 3 participants will receive the coveted plastic Olympics Traveling Troph

No cost for SPE members to participate!

FOR MORE INFORMATION: https://www.4spe.org/i4a/pages/index.cfm?pageid=6756

Industry Events/Webinar Calendar

AUGUST 2021

SPE ONTARIO GOLF TOURNAMENT

THURSDAY, AUGUST 26, 2021 8:30 AM (EST) - 4:30 PM E (EST)

Piper's Heath Golf Course, 5501 Trafalgar Road, Milton, ON, L0P 1E0

FOR MORE INFORMATION:

https://events.r20.constantcontact.com/register/eventReg?oeidk=a07ei0t9wq31ae8fc07&oseq=&c=&ch=

SEPTEMBER 2021

WEBINAR: FAILURE OF PLASTICS SESSION 1

TUESDAY, SEPTEMBER 14, 2021 11:00 AM (EDT) - 12:00 PM (EDT)

FOR MORE INFORMATION VISIT: https://www.4spe.org/i4a/pages/index.cfm?pageID=6496

ON DEMAND WEBINARS

NEXT-GENERATION TOOL STEEL AND ADDITIVE MANUFACTURING FOR THE PLASTICS INDUSTRY

Plastic molding is a part of our everyday lives. In this presentation, Uddeholm USA will talk about the current trends in the plastics industry, next-generation stainless tool steels, production techniques and additively manufactured parts and components.

WATCH NOW: https://www.bigmarker.com/gardner-business-media-inc-w1/Next-Generation-Tool-Steel-and-Additive-Manufacturing-for-the-Plastics-Industry?utm_bmcr_source=web

FROM PROTOTYPE TO PRODUCTION: WHY SLA IS THE BEST CHOICE FOR YOUR BUSINESS IN 2021

SLA 3D printing has evolved over the years to augment traditional manufacturing methods and support an increasing number of robust traditional applications.

WATCH NOW: https://www.bigmarker.com/gardner-business-media-inc-w1/From-Prototype-to-Production-Why-SLA-is-the-Best-Choice-for-Your-Business-in-2021?utm_bmcr_source=web

UNSCHEDULED DOWNTIME: THE FOUR-LETTER WORD

In today's manufacturing world, the need for reliable and repeatable equipment is a must.

WATCH NOW: https://www.bigmarker.com/gardner-business-media-inc-w1/Unscheduled-Downtime-The-Four-Letter-Word?utm_bmcr_source=web

Manufacturers are Having Huge Hiring Challenges

How do We Attain the Best Talent in Today's Climate

By Raymond McKee
Director of Manufacturing, Currier Plastics, Inc.

It seems that all manufacturing companies are having challenges with hiring people. This challenge is at all levels of organizations as well. Let's face it, if you are a person that is willing to work, you can find employment. If you are unhappy with your current position, employer or location, there are plenty of positions available for you to consider and very likely at a higher salary than you currently earn. The question for companies is how do we handle this current climate? How do we find the people we need to produce the parts that we have committed to make for our customers?

Fundamentally, we have a few difficulties being in the manufacturing industry. One is the perception of manufacturing careers. There are many old stories, touting manufacturing facilities as unsafe, dark and dirty environments, with intense physical jobs. The reason many people took those extreme jobs in the past was most often the compensation and benefits that couldn't be made in the service or retail sectors. The undesirable working environments were just worth the paycheck.

Over the past 30 years, things have changed significantly within manufacturing facilities. Although manufacturing careers are generally far less laborious than they were in the past, the old perceptions leave potential candidates to go elsewhere for the same wages. Manufacturing jobs no longer offer significantly higher wages than other industries, benefit costs to employees have increased significantly (as it has everywhere), and there is an uneven playing field in terms of the cost of doing business across the country.

As state governments have increased the minimum wage in their respective states and localities, the competitive environment has become more difficult across state lines. Generally, customers are striving to achieve the lowest cost part. They don't care if it comes from New York, California, North Carolina, or Arkansas. The competitive environment for labor and supplies isn't equal between states leaving some companies profitable and others struggling. There are a lot of other things we can point to that we can't control as well but fortunately there are a lot of things that we CAN control.

Manufacturers are Having Huge Hiring Challenges

Manufacturing isn't the dark and dingy workplace that it used to be anymore. Most modern factories are clean, bright, and safe. Is that message getting out to the public? Most companies only promote what they are selling to the marketplace. What would your message be if you considered your customers to be your perspective employees? Are you selling a higher wage? A better culture? Employee development? Long-term company growth? Environmental sustainability? When you determine what it is that you are selling, how are you marketing it? Do you have marketing collateral that you give to your prospective employees? Are you promoting your culture on your website, employee review websites and social media channels?

As a manufacturer, you know you have to optimize production, promote your product and deliver on the promises made to your customers. Hiring the best team members requires a strategy and process as well. As long as prospective employees can earn similar wages in lower-stress roles that may have more flexible hours/work terms, we as manufacturers have to be creative in promoting our businesses as exciting and opportunistic places to work. Let's face it, the general public still doesn't view manufacturing as a desirable field of work and at the current wage structures, it will make it more and more difficult. The companies that are having less issues with acquiring talent have already made these adjustments and unless you begin to devote resources to your people and prospective talent, they will be going elsewhere.

Ten Part-Design Rules for Gas-assisted Injection Molding Process

By Hank Tsai., Effinno Technologies Co., Ltd.

Process introduction:

In general, it has four stages in a gas-assisted injection molding process (**Figure 1**).

Stage 1 – Filling by Molding Machine Injection:

Molten plastic material is injected into a mold by a molding machine to fill the part cavity. The amount of the material injected is about to fill 60~90% volume of the cavity, depending on the types of part in which how much the volume to be cored out by gas is designed.

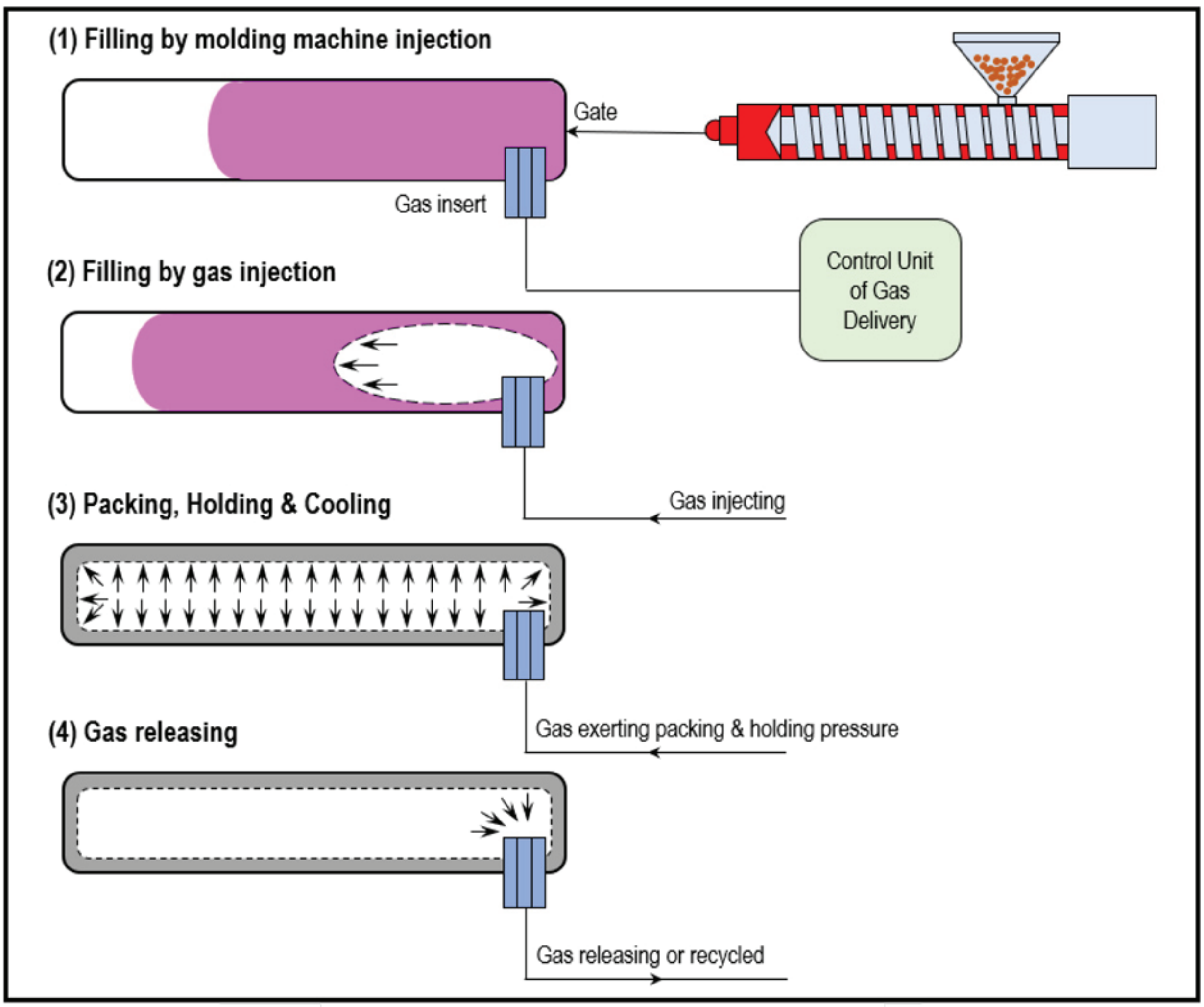


Figure 1: Illustration of a gas-assisted injection molding process

Stage 2 – Filling by Gas Injection:

After the material filling stage has finished, gas (usually nitrogen) is injected into the center of the molten plastic material, pushing it forwards to the rest of the cavity space to fill the part cavity completely.

Stage 3 – Packing, Holding, and Cooling:

The injected gas exerts uniformly distributed pressure to the previously filled plastic material from the inside of the part outwards against the mold wall. Instead of the machine screw, here it's the injected gas to act as the pressure source of packing and holding, while in the way that provides across the part with much more uniform pressure and a much closer and more effective pressure source. It results in much less pressure gradient and brings this process advantage over traditional injection molding, especially from viewpoints of part dimension control and avoiding part warpage. When the injected gas is exerting its packing and holding pressure, the part is under cooling simultaneously.

Stage 4 – Gas releasing:

After the part is cooled and solidified, the injected gas is released or recycled before mold opening for part ejection.

Two Types of Part in Application:

It is diverse to design a part in its geometry, shape, size, thickness, etc., for an injection molding process. Generally, molding parts can be categorized into two types as follows for applying gas-assisted injection molding process.

(1) Handle-like part:

So-called handle-like part refers to those such as various kinds of handles and chair arms. This type of part is so wholly thick that cycle time has to be very long for cooling if using the traditional injection molding process. It also probably brings in appearance defects such as sink marks caused by the insufficient packing effect to such a thick part. To fit in with the traditional injection molding process and eliminate the mentioned problems, this type of part is typically designed as two splitting halves, each with a regular (much thinner) nominal thickness of part surface and structure reinforced ribs beneath it. Ideally, it requires two molds and two machines to produce the two halves individually. After the two halves are injection molded, a secondary process is needed to join them, becoming a finished good.

When applying gas-assisted injection molding process at such a part, it is the gas injected to push melt forwards coring out the central portion of the part (**Figure 2**), then followed by the packing and holding actions pressure-exerted by the gas itself in a uniformly distributed manner from right beneath the residual thickness across the part. Compared to the original solid part design produced

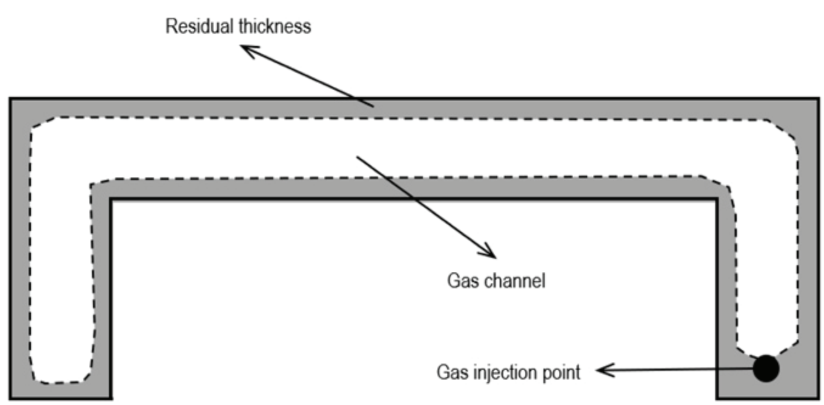


Figure 2: Gas-assisted injection molding process at a handle-like part.

by the traditional injection molding process, it can result in a much shorter cycle time and meanwhile without sink mark problem. Additionally, compared to designing part with two-half components, the time and cost saved are significantly in the tooling and the finished-good manufacturing points of view. With the gas-assisted injection molding process, it requires only one and less complex mold instead of two, each more complex caused by more complex part design with structure-reinforced ribs, and it needs only one molding machine and molding production instead of two that eliminates the need for the subsequent secondary process to join the two-half components.

(2) Flat part:

So-called flat part refers to various kinds of table, panel, housing/cover parts in electronic devices, home appliances, automotive, etc., industries. This type of part is nominally thin in thickness in comparison with its overall length and width. The most challenging issue of producing such parts by traditional injection molding process is warpage. To overcome it, a part designer has to design structure-reinforced ribs beneath the cosmetic surface across the part to resist its trend to warp. It might require a multiple-gate design for the mold to provide a balanced melt filling and packing/holding effect. And hot runner system might be required to provides the part with a closer and more effective source of packing/holding pressure, etc.

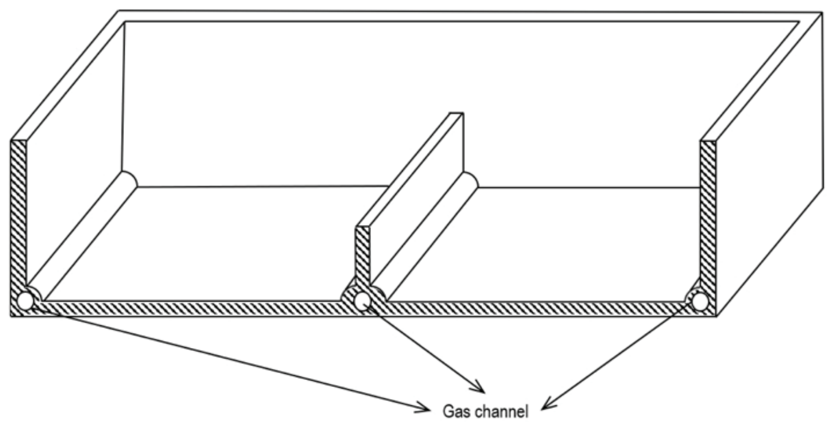


Figure 3: Gas-assisted injection molding process at a flat part.

When applying gas-assisted injection molding process at such a part, in lieu of the situation that central portion of the whole part is cored out as a handle-like part, gas is guided into a purposefully designed gas channel only (**Figure 3**).

Compared to the traditional injection molding process, the advantages it brings about include a closer and more uniform pressure source at packing and holding stages that right within the part, and fewer ribs are required to make the part equivalently strong. Both facilitate to avoid warpage problem with less cost of the mold.

Concerning a handle-like part, the part itself has acted as a gas channel already. Under proper melt gate location, gas insert location, and process conditions, the injected gas is restricted; it can flow towards one direction only within the part from one end to the other without a doubt. However not the case in a flat part; the injected gas must selectively flow along the designed route of the gas channel rather than core out the part everywhere. And if not properly design in the melt gate number/locations, gas insert number/locations, and layout of the gas channel, the gas will not necessarily flow into, along, and core out the entire length of the gas channel. In such a situation, the gas-unfilled portion of the gas channel is more like being processed under traditional injection molding process but with unusually much thicker part thickness at the base of the rib. It tends to result in serious sink mark defect at the part surface and generally is of no use in trying to solve it by adjusting parameters of process conditions. For a flat part, it is crucial that the gas channel layout is tailor-made to guide the injected gas accurately flow into/through the entire network of the gas channel; and the injected gas exists only within the gas channel without penetrating the adjacent area.

One Fundamental Concept:

There is one fundamental concept about the gas-assisted injection molding process, as follows, which indicates how gas will flow and towards which direction the injected gas will flow within a part.

"Gas flows towards the direction in which the resistance to its flow is the least."

Simply put, there are two significant factors in the part cavity which influence resistance to gas flow: pressure and temperature. Generally, the direction with the least resistance to make gas flow towards refers to the direction in which lower melt pressure and higher melt temperature exist.

The pressure-related variables include:
1. Location of melt front.
2. Section size of gas channel.
3. Distance from melt gate.
4. Distance from other gas channels, etc.

And the temperature-related variables include:
1. Part thickness.
2. Shear-heating effect.
3. Mold temperature, etc.

Ten Part-design Rules:

Basing on the fundamental concept of gas flow, it develops ten part- design rules to facilitate the application of the gas assisted injection molding process.

Rule 1: Prioritize layout design of gas channel

Designing the layout of the gas channel at first according to the purpose of applying gas-assisted injection molding process, no matter it's for coring out the central portion of the part, saving material, enhancing structural strength by gas channels, avoiding warpage, or merely using the pressured gas at some local area to avoid a sink mark there.

Rule 2: Clearly define the path of gas flow. Avoid branched gas flow.

Gas is sensitive. It prefers the least resistance so much that it flows towards that direction at first. It is hard to realize for a gas channel design to have gas split equally into two identical branches, as illustrated in **Figure 4**. The possibility of creating identical resistance conditions in reality at the two branches during the actual molding process for leading to identical gas flow and distribution within the two branches is quite remote. Minor condition differences between the two branches, such as tool dimension, melt temperature, melt front advancement, and mold temperature, cause a difference in gas flow resistances, resulting in the expected identical gas distribution in the gas channel non-identical.

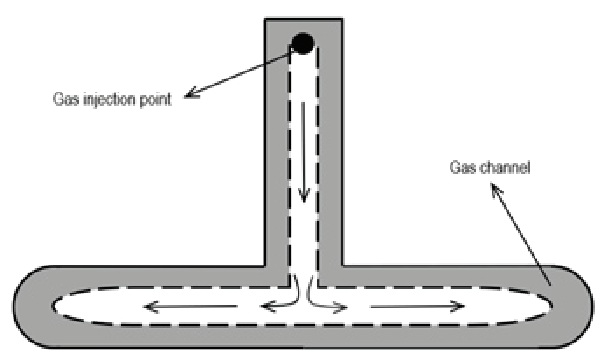


Figure 4: Avoid branched gas channel.

It leaves a gas-unfilled segment of the gas channel where a high risk of sink mark issue. A part designer shall clearly define the path of gas flow. The branched gas channel, which is ambiguous for gas to flow forwards, shall be avoided.

Rule 3: Design layout of the gas channel across the entire part and in a symmetrical manner.

Packing and holding are important process stages during which the injected plastic material is compressed, making the molded part's density as high as possible and as uniform as possible. In the traditional injection molding process, it is the machine screw to exert the packing/holding pressure a long way from the machine nozzle through the sprue, runner, gate to the inside cavity through the viscoelastic melt injected. Instead, in the gas-assisted injection molding process, it's the injected gas within the part already to exert packing/holding pressure by itself. For a flat part, it is important to design the layout of the gas channel across the entire part to provide the molding part with an overall nearby source of packing/holding pressure and its uniform effect along the gas channel. It is also important to design the layout of the gas channel in a symmetrical manner to provide the molding part with a uniform and balanced packing/holding pressure effect transverse to the gas channel (**Figure 5**). Additionally, the symmetrical layout of the gas channel can reduce the complexity of process conditions about gas control and delivery.

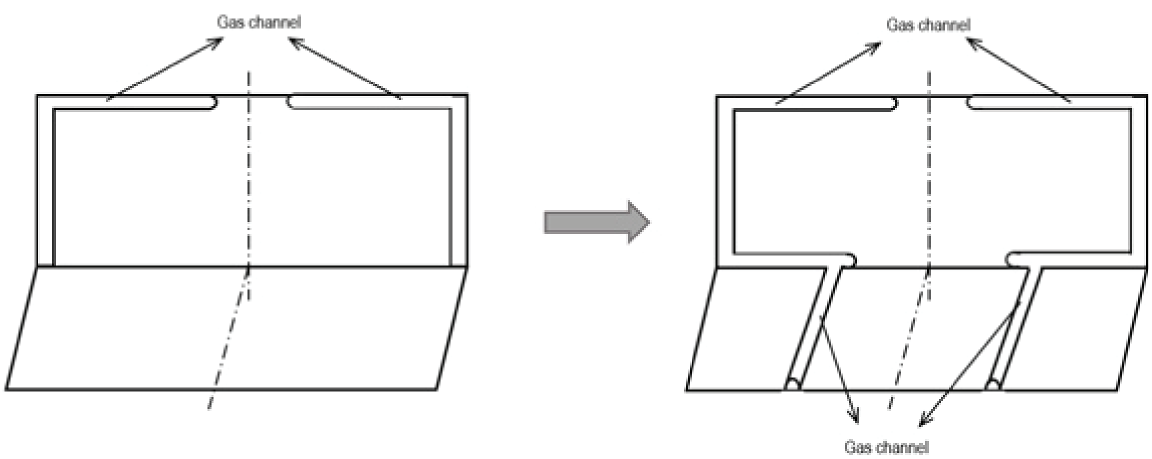


Figure 5: Flat part with symmetrical gas channel layout across a part.

Rule 4: Thinning part overall and thickening part locally wherein designed the gas channel.

Compared with the traditional injection molding process, the overall nominal part thickness for gas-assisted injection molding can be thinner for saving material. Then the part strength can be enhanced by a gas channel, where it acts like a rib but with an unusually thicker base without getting sink problem if adequately designed (**Figure 6**). Additionally, before injecting the gas into the gas channel, the gas channel plays the role

Figure 6: Thinning part overall and thickening part locally.

of a flow leader at first to help the melt fill across the thinning part overall. After the gas distributes within the gas channel, the gas channel plays the second role as a packing/holding pressure source. And finally, after the process, the gas channel plays its third role as a thickening rib to perform the part's strength avoiding warpage with less complexity of mold structure and tooling process.

Go with part thickness to design the gas channel's height and width. Comparatively, too large a section of a gas channel might bring about too strong a flow leader effect during the melt filling stage, leading to the melt in gas channel flows much faster than that of the adjacent area and resulting in an air trap problem (**Figure 7**).

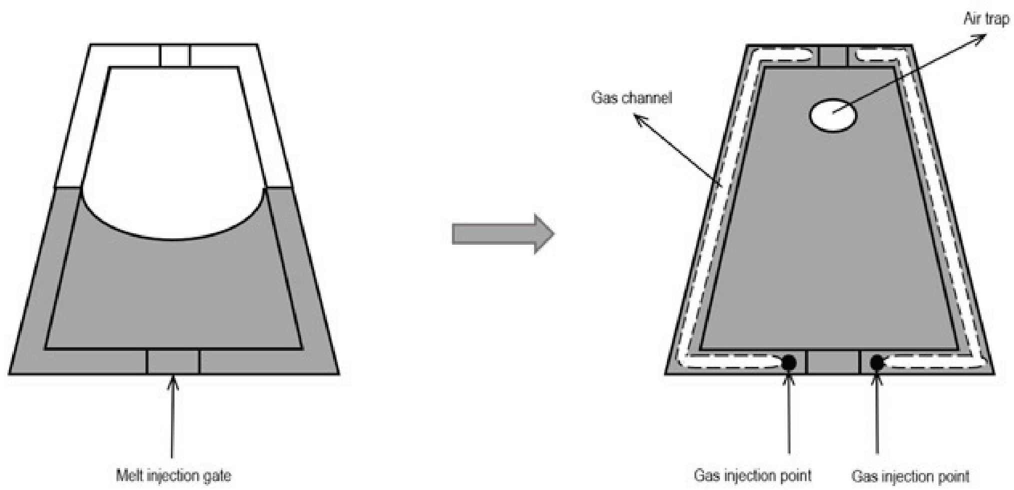


Figure 7: Air trap caused by too strong flow leader effect of gas channel.

Rule 6: Avoid the fingering effect caused by too small a gas channel section.

Go with part thickness to design the gas channel's height and width. Comparatively, too small a section of a gas channel might not offer the least resistant direction for gas to flow in the intended gas channel, resulting in that gas penetrates the area adjacent to the gas channel during the gas filling stage and packing/holding stage, which is called fingering effect (**Figure 8**). Typically, designing the height of the gas channel, not including the part thickness, one and a half times the adjacent part thickness as a start. It is necessary to avoid the fingering effect lest it weakens the part's surface structure at the place where it happens.

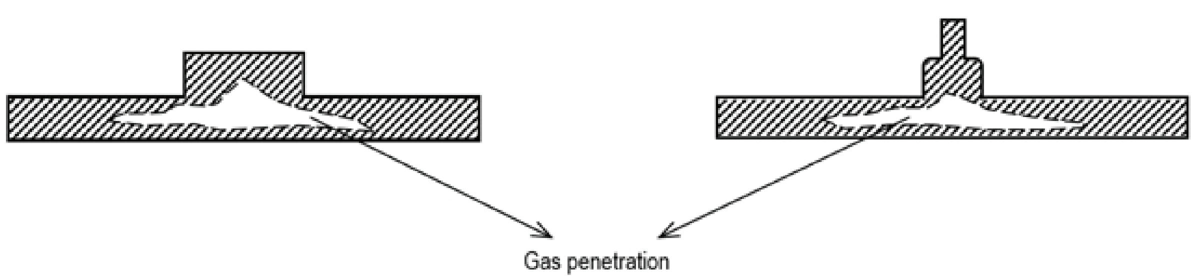


Figure 8: Fingering effect.

Rule 7: Avoid closed-loop gas channels.

The expectation that gas flows around and forms an entirely closed-loop gas channel hardly comes true (**Figure 9**). Nomatter how well-balanced is the gas flow in the closed-loop gas channel, anyway melt fronts in the gas channel from the two directions will meet sooner or later, forming a solid portion where the gas can't flow further. It is essential to avoid designing a closed-loop gas channel because the residual solid portion mentioned causes a high risk of sink mark problem and a longer cooling time and cycle time.

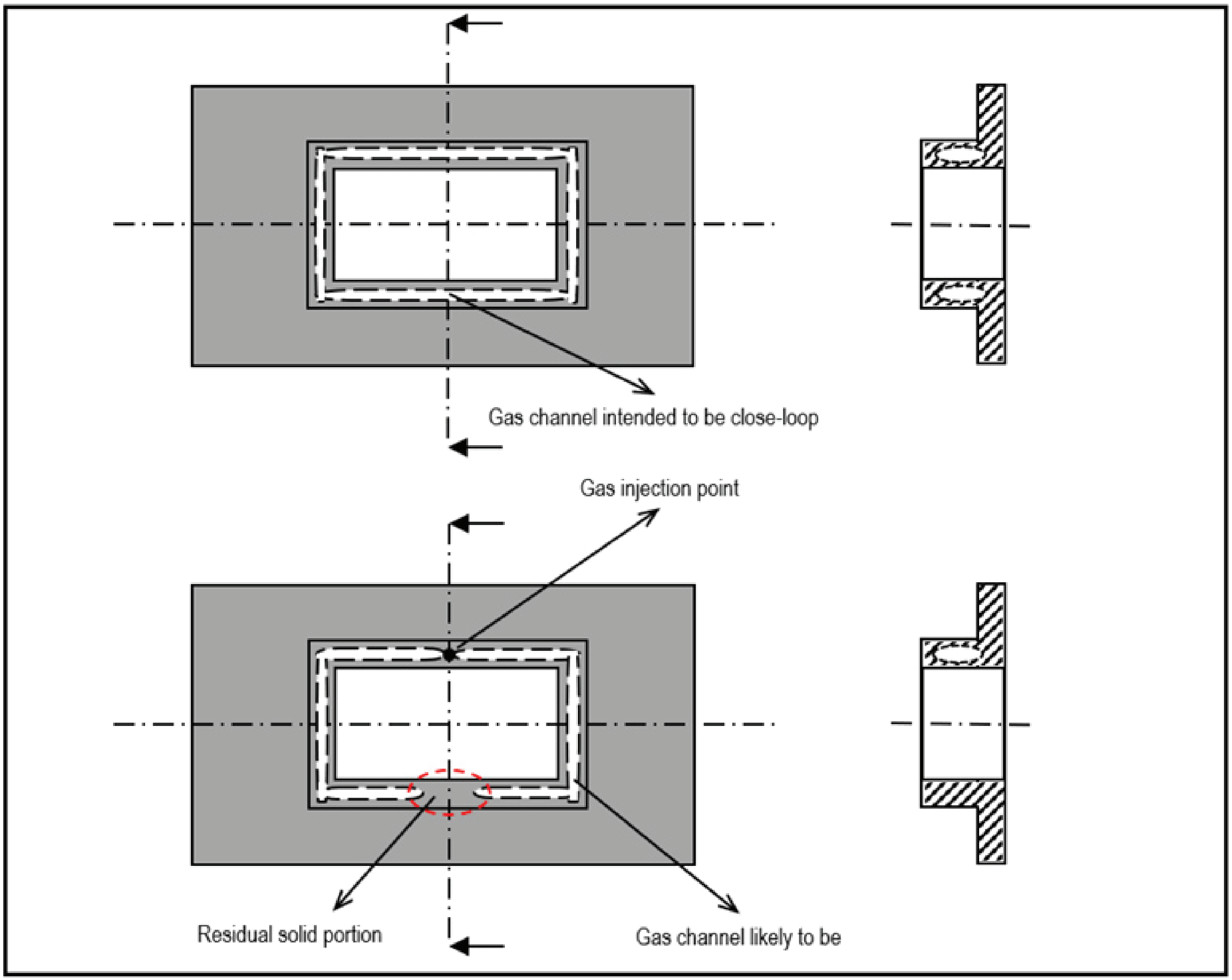


Figure 9: Closed-loop gas channel design.

Rule 8: Extend the gas channel to the area where melt fills the last.

Where there is a proceeding melt front, there is a path with the least resistance for gas to flow towards. Extend the gas channel to the area where melt fills the last also helps the gas channel across the part overall, as mentioned in Rule 3. Following this rule, the design of the gas channel must go with a melt filling pattern which is determined by melt gate location, melt gate number, part thickness, and gas channel size. Change in melt filling pattern caused by any changes of the mentioned determinants often means that an inevitable modification in gas channel layout design is also required.

In other words, the melt filling pattern must be designed by optimizing the mentioned determinants to have the gas flow in the intended gas channel and penetrate in it only without any air trap problem and fingering effect.

Rule 9: Gas injection point to be far away from the area where melt fills the last.

Assuming a design for a flat part has been done by following Rule 1 to 8, as shown in **Figure 10**, gas injection points shallbe placed at point 1 and point 2. By such a design, it is expected for the gas injected from point <1> to flow in the right gas channel and that from point <2> in the left, pushing melt forwards to the ends of both gas channels, the area where melt fills the last. In case that gas injection points are placed at point <3> and point <4>, the injected gas will also directly flow downwards the ends of gas channels, leaving the segments of gas channels from point <1> to point <3> and point <2> to point <4> solid without being cored out by gas.

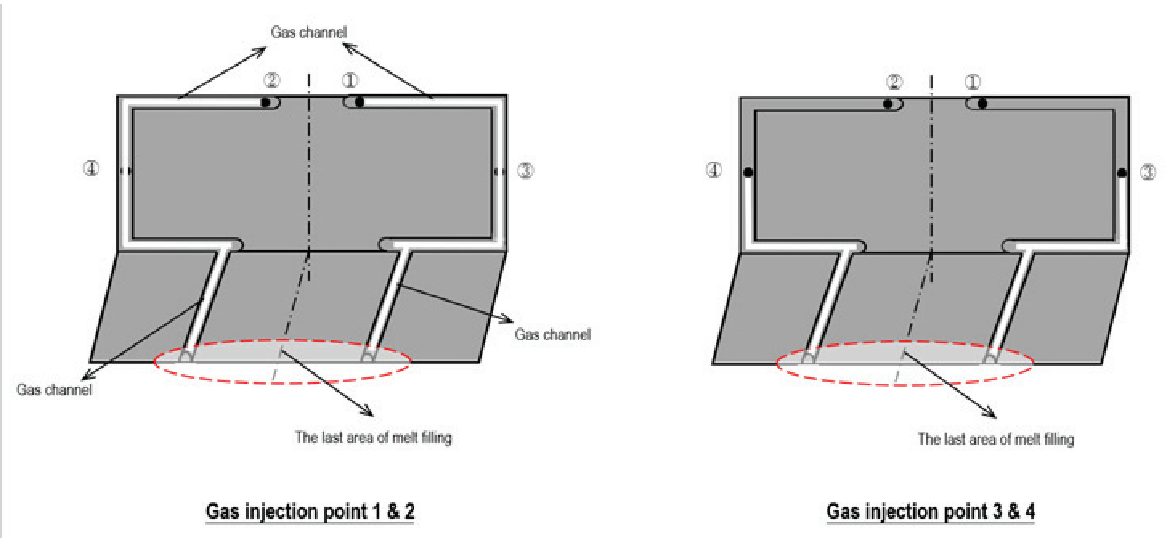


Figure 10: Gas injection point vs. gas channel vs. melt filling pattern.

Rule 10: Fine-tune the melt filling pattern and gas penetration length by adjusting the size of the gas channel.

Usually, the primary melt filling pattern and gas distribution are decided by means of the designs in part thickness, melt gate location/number, gas injection position/number, and gas channel layout/size. If needed, a minor change in melt filling pattern and gas penetration length, especially at the end of the gas channel, could be done by adjusting and finetuning the size of the gas channel nearby.

The behavior of gas in the melt is sensitive, dynamic, complex, and difficult to predict by experience. The consequence of producing a part with a solid gas channel is severe and expensive because it can hardly get resolved at the same mold. Part design for gas-assisted injection molding process must involve integrated and systematic considerations in, part thickness, melt gate location/number, gas injection position/number, and gas channel layout/size. So, doing it with the help of Computer-aided Engineering (CAE) is highly suggested, especially for melt and gas filling analysis. Applying the ten part-design rules with CAE could help reach a low-risk solution more systematically and efficiently.

Complement

Gas-assisted injection molding might have its niche in small or micro parts, on which the space for designing gas channel is not available or not necessary. Here small or micro part refers to those each has much less part volume when compared with the cold runner volume of its mold. It has two types of small or micro parts at which this technology could apply, and it appears to be much easier.

(1) For solid short-fat-like micro part without core-out structure, the gas injection point is placed at runner so that gas is controlled to low in runner only and stop before melt gate, the closer the better (**Figure 11**). In such a case, the part is filled with the melt pushed by the gas. It is packed and held by the gas, too, right from outside of the melt gate.

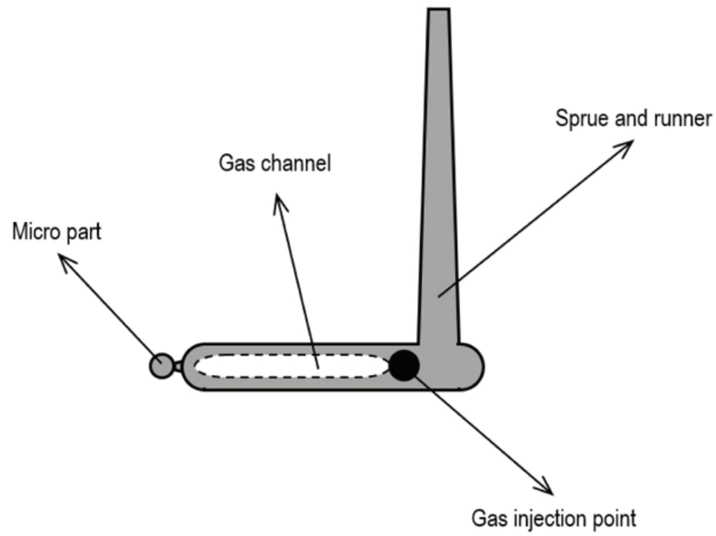


Figure 11: Gas-assisted injection molding process at solid short-fat-like micro part.

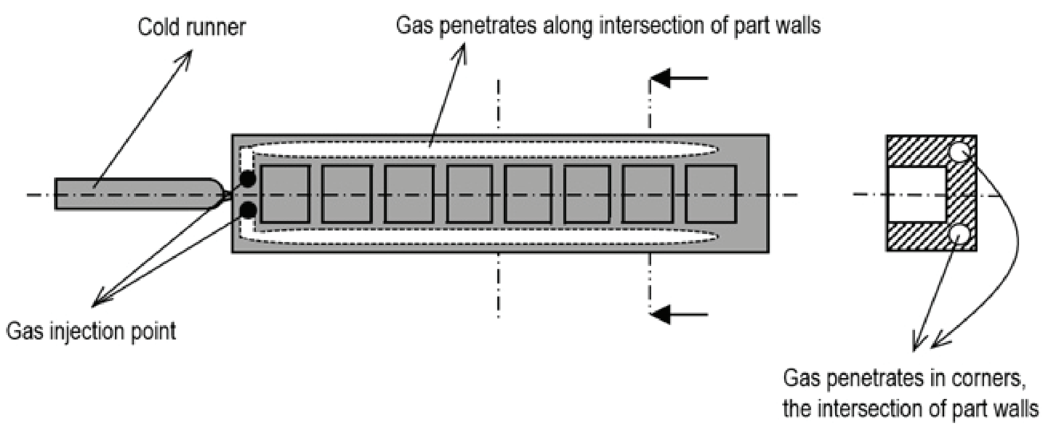


Figure 12: Gas-assisted injection molding process at thin-slender-like small part.

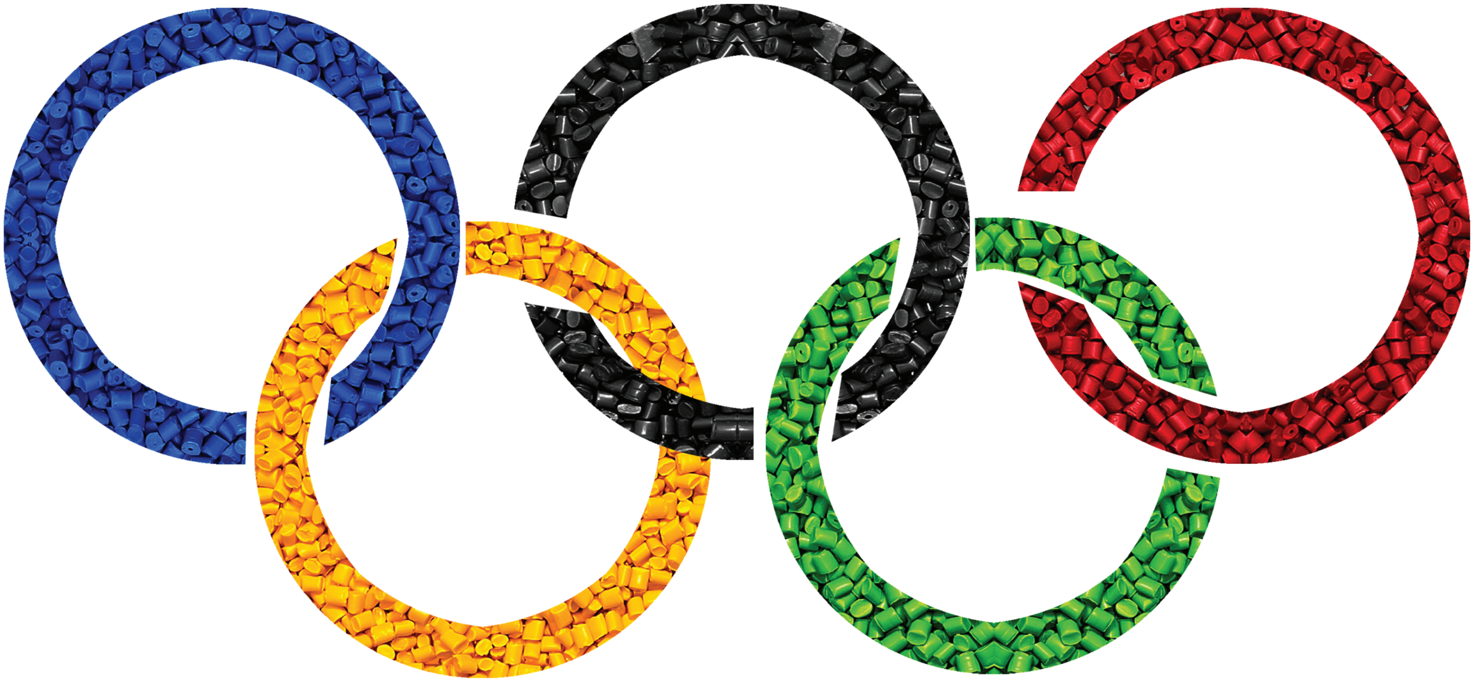
(2) For a thin-slender-like small part with a complex core-out structure designed with rules for traditional injection molding, the gas injection point is placed inside the cavity. In such a case, the part is filled by melt at first at melt filling stage; then, skipping gas filling stage, the process is directly followed by gas packing/holding stage so that gas penetrates in part along the path where the least resistance is, generally along the path of the intersection of part walls (**Figure 12**). The formed gas channel acts as a linear pressure source inside the part to provide an effective and uniform packing/holding effect, which helps improve quality in part flatness and avoid warpage. Although the intersection of part walls acts as a natural channel for gas to penetrate, still care should be taken not to have gas penetrate adjacent part walls resulting in the inferior mechanical performance of the part.

About the Author:

Hank Tsai is the owner and consultant of Effinno Technologies Co., Ltd. in Taiwan, an injection molding training and consulting service provider. He has more than 25 years of experience in the injection molding industry. He has expertise in injection molding technologies and practices, production efficiency management, part costing, troubleshooting, simulation, mold/process/machine performance evaluation, and process optimization by Taguchi DOE. Contact: hank.tsai@effinno.com.

It's much more than a "Plastics Race"

it's SPE's Plastics Summer Olympics!



Think you've got what it takes to win a Gold/Silver/Bronze-colored plastic medal?
Compete against your SPE colleagues and test your plastics knowledge
by answering a wide variety of questions in our first Summer Olympics Competition.

Details:

- Points are awarded for each correct answer, and deducted for hints used
- Speed matters! Tiebreaker is the amount of time spent answering the questions
- Contestants try to medal in as many events as they choose
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- Students and Plastics Professionals compete in separate competitions

Student Chapters with the highest average score from at least 3 participants will receive the coveted plastic Olympics Traveling Trophy

SPE's Plastics Summer Olympics, powered by QMe Tech, will be held for 4 days starting on Friday, August 6 (starting at 9am ET) through Monday, August 9 (am ET).
You can compete at your convenience! Watch the leader board and see if you'll be taking your spot on the winner's podium!

No cost for SPE members to participate!
Winners will be announced on August 10 and recognized on the SPE website and in Plastics Engineering magazine.

SIGN UP HERE

May 07,2021

Respectfully Submitted by Secretary Jeremy Dworshak

Welcome & Opening Remarks – Rick Puglielli, Division Chair

Chair Rick Puglielli called the meeting to order at 9:00 AM EST and welcomed all attendees. Secretary Jeremy Dworshak called roll at 9:00 AM (EDT).

Roll Call – Jeremy Dworshak, Secretary

Motion: Previous minutes approved by Jeremy Dworshak, and seconded. Motion passes.

Financial Report – Ray McKee, Treasurer of IMD

Ray McKee presented the General Balance Sheet Overview. A review of the budget and overview of the conference budget line of $30K was discussed.

Council Update – Edwin Tam

CCOW zoom meeting occurred this month of May. Council, in their new advisory role, is determining how to be most effective in their role. Discussion around the BD&T (business subcommittee).

Action: A call for business ideas. Information to be sent to Roger Avakian (EB member).

Technical Director Report – Pete Grelle, Technical Director and Joe Lawrence

ANTEC 2021, IMTech update and TOPCON activities review

Thank you to TPC Joseph Lawrence for your efforts with ANTEC 2021.
University of Wisconson-Madison is expecting to hold the Polymer Collequim in 2022.

IMTech:

Review for interest for a November 2021 hybrid conference for IMTech. A hybrid conference cost will be $14,650 for space, food, minimal AV support (up to 60 people). A $4,650 deposit has already been aid. An additional $10,000 cost will be needed to hold the event. The IMD membership in the Cincinatti to Cleveland Ohio area is a total of 58 members.

Motion: Edwin Tam made motion to move forward with IMTech. Gio seconded the motion. Motion passes.

Bylaws Committee Update - Pete Grelle, Technical Director

1st draft of bylaws has been complete and sent to the subcommittee for review. The draft review will be later this month during the next meeting. Team review includes Team is Hoa Pham, David Okonski, Mehta, Peter Grelle, and Jeremey Dworshak.

Action: The goal is to have a bylaw draft for board review by winter board meeting 2022.

Board Nominations Update - Hoa Pham

The board members have been re-elected. Out of 57 responses, only 3-4 had indicated an interest in board membership activities and membership.

SUMMARY OF BALLOT 2021

BoD Officers 2021 – 2022 *(ends on June 30, 2022)*

❑ Chair	Joseph Lawrence	❑ Treasurer	Raymond McKee
❑ Chair Elect	David Okonski	❑ Technical Director	Peter Grelle
❑ Past Chair	Rick Puglieli	❑ Secretary	Tom Giovannetti

Re-Elected/Elected BoD Directors *(term ends on June 30, 2024)*

❑ David Kusuma	❑ Chad Ulven
❑ Erik Foltz	❑ Alex Beaumont
❑ Jeremy Dworshak	❑ Angela Rodenburgh
❑ Amanda Nicholson	❑ Larry Geist
❑ Srikanth Pilla	❑ Vikram Bhargava

Councilor July 1, 2020 – June 30, 2023: Edwin Tam

H. Pham – BOD Mtg – Ballot 2021 Results

Motion: ***Motion made to accept the Ballot Summary (Tam), seconded (Pilla). Motion passes.***
Action: ***The TPC needs chair volunteers for 2026 and beyond.***

Membership Update - Erik Foltz

The current membership number has dropped ot 1,201 members. This is a drop of 323% from historical numbers. 105 of these members have a membership lapse. Membership has previously been holding con-

Membership Type	May 2021	January 2020	April 2019
Distinguished	7	7	7
Emeritus	76	90	90
New Young Professional	0 (No longer a Category)	27	27
Professional	889	759	1346
Student	115	212	212
Young Professional	114	106 (133)	106
Totals	1,201	1,560	1,788

Overview: January 2021 - SPE

Year	Paid Members	Total Customer
July 2018	7,663	24,272
January 2019	8,706	25,807
January 2020	9,222	37,616
January 2021	8,058	26,377

MI	95
PA	90
WI	85
OH	82
CA	65
IL	56
NC	50
MA	46
TX	39
MN	34
NY	31
CT	21
NJ	20
GA	19
IN	18
WA	15

sistatent at approximately 2,100 - 2,200 members.

Action: ***Reach out to Erik Foltz for helping with the membership chair role.***

Communications Update - Angela Rodenburgh

Email open rate is quite good. 22.4% open rate (367 people) yet, the click-thru rate was only 40 people. Stats on the website show only 236 visits (from USA) the past year which is low. Visitors are not spending time on our site which is likely due to lack of interesting content. A sponsorship form for newsletter and show sponsorship has been created to be used by the board.

Action: Ray McKee will draft an article on 'hiring challenges in manufacturing.'

Other Business-Passing of the Gavel - Rick Puglielli

Joe Lawrence and Rick Puglielli will be gathering information about making money on IMD submitted papers/content.

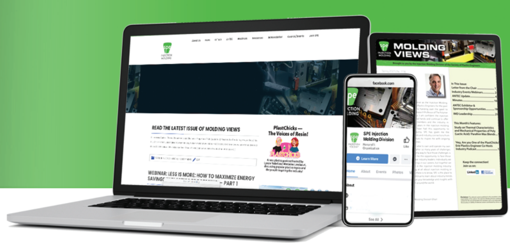
Adjournment

Next meeting to be scheduled in September 2021 by new chair Joe Lawrence

Motion: Motion to adjourn by Rich Puglielli and seconded by Peter Grelle. Motion passes.

spe INJECTION MOLDING

Sponsorship Opportunities



The Injection Molding Division (IMD) is the largest single entity within the Society of Plastics Engineers; we have just over 1,750 active members across the world comprising of professionals working in the industry as well as academia who care about and are concerned about the future of plastics. IMD membership promotes the responsible growth and use of plastics, and the IMD vigorously supports this initiative through education and innovative technical programs.

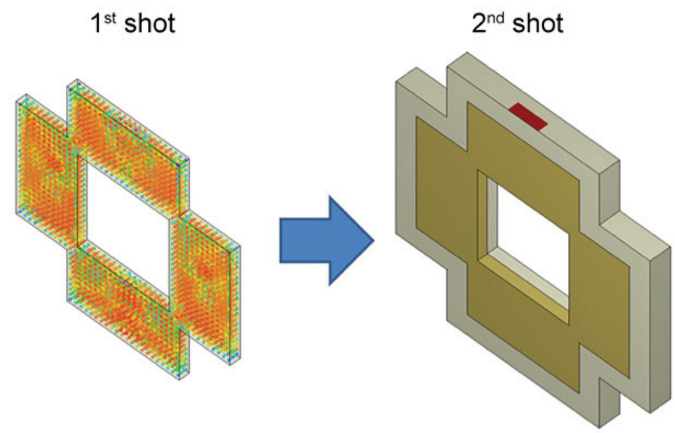
IMD sponsorship dollars will help the Board fund: community outreach programs that educate the masses about the many aspects of plastics, technical programs such as TOPCON's, Minitecs and Webinars, and student projects/activities at universities such as Penn State, Ferris State, Clemson and Western Michigan.

Sponsorship opportunities available for newsletter, website, ANTEC and IMTech.

E-mail for more information>

Comprehensive MCM Simulation Considering the Previous Shot's Effects

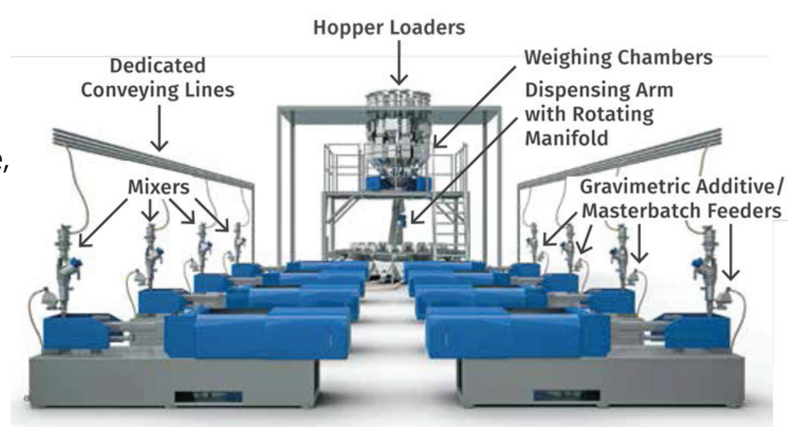
The multi-component molding (MCM) technology can efficiently integrate more than two separate plastic parts and is widely applied in the industry. Through CAE analysis, manufacturers can simulate product quality in advance. However, if we only consider the processing of the second shot, the product quality and design optimization cannot be ensured. Due to the effects of multiple injections and numerous materials, the part insert status at the end of the first shot will affect the part warpage behaviors in the second shot. Thus, we need to better control the effects of the previous shot on the part warpage.



Read Full Story>

New Central Blending System Offers Greater Accuracy, Flexibility

A brand-new approach to central blending promises to save processors money, speed changeover times, and improve flexibility compared with current machine-mounted and central blending technologies. Called BlendSave, the technology holds out the promise to impact central blending in the same fashion as central drying influenced that process. It is said to be suitable to processors of all kinds and is particularly beneficial to those that do frequent job changes that require recipe adjustments. Since the system requires less in the way of operator attention to make recipe changes and cleanups, BlendSave is also billed as ideal for processors with clean rooms.



Read Full Story>

Trexel Introduces NEW NC-Series Nitrogen Booster

Trexel's newly introduced NC-Series Nitrogen Boosters provide a reliable supply of supercritical Nitrogen (SCF) to multiple Satellite Dosing Units, enabling a low-cost option for equipping multiple machines in the same plant with MuCell capability.

Their compact design enables optimal placement in any facility. With dosing and control taking place upstream near each injection molding machine, this central booster can be placed as far away as the gas distribution lines allow. NC-Series boosters can be networked with a second booster to provide simple system redundancy. Two models are available: NC-250 (215 l/min) and the larger NC-500 (500 l/min).

Read Full Story>

HASCO Plug Baffles Enable Efficient Cooling

Cores in injection moulding tools generally have to be cooled. For conventional temperature control the cooling channel bores have very little space available. Plug baffles provide the optimum solution for this.

Especially for high-temperature applications The new HASCO plug baffles for core cooling Z9650/… offer optimum conditions for efficient cooling, especially with high-temperature applications with water and oil up to 180 °C.

Read Full Story>

Have news about your company? Send in your press releases to share on the injection molding division website.

Email your news>

DIVISION OFFICERS:

Chair: Joseph Lawrence (University of Toledo)
Chair-Elect: David Okonski (General Motors)
Treasurer: Raymond McKee (Currier Plastics)
Secretary: Tom Giovannetti
Technical Director: Peter Grelle (Independent Consultant)
Past Chair/Education Committee Chair: Rick Puglielli (Promold Plastics)

BOARD OF DIRECTORS:

Communications Chair: Angela Rodenburgh (Ladder Up)
Communications Committee: Adam Kramschuster (University of Wisconsin)
Membership Chair: Erik Foltz (The Madison Group)
Sponsorship Committee Chair: Sriraj Patel (Currier Plastics)
Sponsorship Committee: Alex Beaumont (Beaumont Technologies), David Kusuma (Tupperware)
Education Committee: Vikram Bhargava (Independent Consultant),
Dr. Saeed Farahani (Clemson University), Chad Ulven (C2Renew)
Awards/Scholarships Chair: Lynzie Nebel (Tech Tank)
Awards Committee: Kishor Mehta (Retired Plastics Engineer), Tom Turng (University of Wisconsin)
Board Nominations Chair/Historian/Asst. Treasurer: Hoa Pham (Freudenberg Performance Materials LP)
Bylaws Chair: David Okonski (General Motors)
Bylaws Committee: Hoa Pham (Freudenberg Performance Materials LP),
Peter Grelle (Independent Consultant), Jeremy Dworshak (3M), Kishor Mehta (Retired)
Councilor: Edwin Tam (Teknor Apex)
Larry Geist (Ferguson Production)
Amanda Nicholson (Polymers Center)

ANTEC TCP:

2020 Dave Okonski
2021 Joseph Lawrence
2022 Chad Ulven
2023 Raymond McKee
2024 Edwin Tam
2025 Lynzie Nebel
2026 TBD

EMERITUS:

Mal Murthy (Doss Corp.)
Larry Schmidt (LR Schmidt Assoc.)
Jim Wenskus (Retired Plastics Engineer)