IN THIS ISSUE:
Moldmaking With 3D Printing
Re-thinking the Workforce Shortage
Proactive Tooling Design
Benjamin Memorial Scholarship Winner
Get everything you need in no time flat.

You make ideas real by giving them shape and form. As your partner, we're committed to supporting you by manufacturing customizable thermoplastics of the highest quality in low MOQs with short lead times. Plus no stress. We get it, and make sure you do, too.

Learn more at sekisui-spi.com

Visit our booth at SPE Stand 410-412
Departments

Chairman’s Corner | 4
Thermoforming in the News | 6-8
The Business of Thermoforming:
  Re-thinking the Workforce Shortage | 10-11
  Steps for Success in Today’s Marketplace | 12-16
University News | 15

Features

Proactive Tooling Design | 18-22
Moldmaking With 3D Prints | 24-25
Influence of Processing Conditions on the
  Thermoformability of PP-Sheet Material | 26-30

In This Issue

SPE News | 28
Thermoforming & Sustainability | 31

Cover image courtesy of Formlabs Inc., Somerville, MA.
Rip-Raring to Go

“It’s the most wonderful time of the year,” crooned Andy Williams in 1963, just one year after the word “thermoforming” entered the common lexicon*. And though he was singing about Christmas and mistletoe, he might as well have been singing about thermoforming in September! It’s almost time for the annual conference and we are raring to go again after our untimely absence last year.

Our program will feature a new item: The War Room: Where Thermoforming Meets Design. Product designers are faced with almost unlimited choices when it comes to plastics processing. As members of the thermoforming community, we are familiar with our own specialty niches, but how do we promote our talents beyond our customers and suppliers to tastemakers farther upstream? There are real challenges when it comes to selecting the right material for a given job. According to Ed Flaherty of Nexeo Solutions, there are approximately 846 companies that supply polymers and plastic materials. Each company supplies numerous families and grades of plastics. Matweb has over 12,000 grades to choose from. How does a designer select the right one? This is what we’re going to explore, and we look forward to a raucous debate.

In this issue of the magazine, we bring you multiple perspectives on another key topic that we continue to cover: workforce development. Two articles offer insight for both individuals and companies. For the former, the job interview can be a stressful proposition, even in a tight labor market where specific skills are in high demand. For the latter, a closer and more honest analysis of the current employee base reveals that companies might be giving short shrift to thoughtful innovation in existing processes. In both cases, ‘just winging it’ is not a strategy for success. Attendees in Ft. Worth will also hear from a variety of industry participants on workforce development in our moderated roundtable titled, “Hunting Unicorns.”

Our technical articles cover the spectrum from proactive tooling design to advances in 3D printing for thermoforming molds. Although it is always easier said than done, taking the time to think through projects in a realistic manner, i.e. “what can go wrong here?” with adherence to best practices will provide solutions built on solid foundations. And, as we all know, thermoforming is inextricably linked to extrusion. We dug into the archives for a classic ANTEC paper that illustrates the influence of raw materials and the extrusion process conditions on the finished formed part. Wash, rinse, repeat.

From a macro perspective, we continue to see robust growth in the thermoforming industry. Our news roundup summarizes more M&A activity, including a humdinger from Down Under, and new investments in capacity. Plastics are replacing traditional materials in many markets, though we must acknowledge the environmental factors that are driving consumer and regulatory changes, particularly in the packaging space.

On behalf of the board, I want to thank all of our sponsors and volunteers who dedicate their time and talent to make our conference one of the best in the SPE calendar. Be sure to stop any one of us at the event and let us know where we can improve, what we’re doing well, and what you want to see next year.

Precise, space-saving, and efficient heat control increases reliability and efficiency.

SIPLUS Heating Control System (HCS)

Key benefits:
- Seamless integration into the automation architecture
- Integrated diagnostic functions
- UL certified controllers
- Space savings of up to 85% in the control cabinet
- Reductions of up to 80% in cabling work
- Significant cost savings
- Energy efficiency

siemens.com/siplus-hcs
Universal Plastics Buys Custom Thermoformer W. Kintz Plastics

by Audrey Laforest, Plastics News

June 11, 2018 – Universal Plastics Group is bulking up its thermoforming division with the acquisition of custom thermoformer W. Kintz Plastics Inc. in upstate New York.

Terms of the deal, which was finalized June 11, were not disclosed.

W. Kintz Plastics specializes in heavy gauge, vacuum, pressure and twin-sheet thermoforming to make custom plastic parts used in the medical and transportation industries, among other markets. The company, founded in 1976 by Wynn Kintz, operates out of an 80,000-square-foot facility in Howes Cave, N.Y., near Albany, and employs about 90.

Universal Plastics said no material changes will be made to staff or the facility.

“Kintz was a perfect fit for us because they have a reputation of making extremely high-quality parts,” Jay Kumar, president of Universal Plastics Group, said in a June 11 phone interview.


This is the first acquisition for Universal Plastics this year, following a somewhat steady pace of buying activity that began not long after Kumar and his father, Sunil, purchased Holyoke, Mass.-based custom thermoformer Universal Plastics Corp. back in 2012.

In addition to Universal Plastics Corp. and W. Kintz Plastics, the group owns Mayfield Plastics Inc., another thermoformer in Sutton, Mass., that Universal Plastics bought in 2013.

Going forward, both W. Kintz Plastics and Mayfield Plastics will be rebranded as Universal Plastics Albany and Universal Plastics Sutton, respectively, to consolidate the group’s thermoforming division, which now employs 300 workers across the three thermoforming facilities.

“The driving force really is that we want to become a more complete plastics supplier to our customers, and Kintz brings to the table some really unique capabilities in terms of the size of the machines and in terms of their relationships in the business,” Pia Kumar, the group’s chief strategy officer, said in a phone interview.

“It was a way for us to expand capacity and hopefully create some efficiency, which we can pass along to the customer,” she added.

With the three thermoforming facilities, Jay Kumar said Universal Plastics now has everything from “small machines that can make parts that are a couple of inches by a couple of inches all the way up to parts that are 9 feet by 14 feet.”

“And that’s really the real synergy of owning these three thermoforming facilities,” he explained. “Our goal is to be, in every space that we enter, the preeminent supplier in that specific space, and we see that the bigger we get, the more value we can provide our customers across processes.”

In December 2017, the group purchased Premium Plastics Solutions LLC, a custom blow molder in Latrobe, Pa., that makes large parts for a range of industries, including medical, garden/lawn equipment, waste management, safety equipment, recreational equipment and water bottles.

Earlier that year, Universal Plastics also bought large-part injection molder Sajar Plastics LLC. The Middlefield, Ohio, company is just under a three-hour drive from Premium Plastic Solution’s Latrobe facility. Sajar Plastics specializes in gas-assist injection molding, straight injection molding and structural foam molding.

Universal Plastics Group employs a total of 500 across the five member companies.

Pia Kumar said the group’s recent acquisitions are partly strategic and partly opportunistic, describing each member company as one piece of a broader puzzle the group is building to be a “one-stop shop supplier.”

“We also do have a strategy where we’re trying to grow both organically as well as inorganically,” she said. “We are acquisitive. We want to acquire businesses, and we want to
grow and enter new markets as well as penetrate deeper into the markets we’re in.”

**Simona Acquires PMC**

July 31, 2018 — PMC (Premier Material Concepts) announced today the completion of the sale of the company to the Simona Group. PMC is an established manufacturer of custom-engineered, high-performance plastic sheet and roll stock, primarily used for thermoforming applications in attractive niche and end markets such as recreational vehicles, marine and agricultural equipment.

Simona is a leading producer and development company in the field of thermoplastics, offering best-in-class solutions for tailored applications, with operations spanning the globe. Founded in 2003 as a business unit of Rowmark LLC, PMC has maintained a specialized focus on next-generation materials, such as TPO, ABS and custom-engineered solutions. Bertram Capital previously owned PMC under The Rowmark Family of Companies, and successfully established PMC as a standalone business, complete with its own dedicated management team and state-of-the-art facility.

“I am incredibly proud of the PMC Team and the success we have achieved since our inception in 2003,” said Duane Jebbett, President & CEO. The next chapter with Simona will be an exciting one, leveraging the synergies of the company and Simona’s global reach.”

**Coveris Rigid to Resume Paccor Name Following Sale**

by Plastics News Europe

August 2, 2018 — Coveris Group has sold its rigid packaging business to a private equity firm as part of a strategic move to flexible packaging.

The company announced July 31 that U.S.-based Lindsay Goldberg LLC had acquired Coveris Rigid, for an unspecified amount, and is renaming the group Paccor, returning the operations to an identity it had prior to 2013 when it became part of Coveris.

New York-based Lindsay Goldberg also owns rigid packaging firm Weener Plastics GmbH based in the Netherlands and Austria’s Schur Flexibles GmbH.

The move is part of Coveris’ realignment strategy, which is targeting high-performance solutions for the food, pet food, medical and pharmaceuticals markets, as well as other growing consumer segments, primarily in Europe.

A leading pan-European plastic packaging business for food and non-food applications, Coveris Rigid has a sales of 560 million euros ($651 million) and has 18 manufacturing sites in Europe and in United States.

The company supplies plastics packaging for blue chip companies and local manufacturers active in the dairy and spreads, processed and fresh food and food service industries.

The divestment follows the $1.32 billion sale of the Coveris Americas business to Canadian packaging firm TC Transcontinental Inc. in April.

At the time, Coveris said the divestment of the Americas business would help it focus on operations in Europe, where it is a leading player in flexible packaging. Now the sale of the rigids business furthers that concentration.

“The sale of rigid that follows our recent divestment in the Americas is an important and successful milestone in our strategy to transform Coveris into a European champion for flexible plastic and paper-based packaging solutions,” said Coveris CEO Jakob Mosser in a news release.

The rigid packaging business has both injection molding and thermoforming along with decorative technologies. It has 3,500 employees.

“We are very pleased to have Lindsay Goldberg as our new partner,” said Coveris Rigid CEO Dieter Bergner. “Lindsay Goldberg’s packaging expertise and its global network will allow Coveris Rigid to continue its development into a preferred supplier for innovative packing solutions with an international footprint.”
Australia’s Amcor to Acquire Rival Bemis for $5.26bn

by Jack Caskey, Bloomberg

August 6, 2018 — Australia’s Amcor Ltd. agreed to acquire U.S. competitor Bemis Co. in an all-stock deal valued at $5.26 billion to expand sales of plastic packaging in the Americas.

Bemis shareholders will receive the equivalent of $57.75 a share in Amcor stock, according to a statement Monday. The offer represents a premium of 25 percent over Bemis’s closing price on Aug. 2, the day before news reports of an impending deal sent shares surging. The companies valued the transaction at $6.8 billion, including the assumption of debt.

The purchase hammered out by Amcor Chief Executive Officer Ron Delia is an effort by the Melbourne-based company to capitalize on growth opportunities for flexible packaging in North America and Brazil. It is the company’s biggest acquisition ever, adding $4.1 billion to company revenue -- all of it from flexible packaging products that are typically made of plastic.

“There are an increasing number of opportunities arising for a leading packaging company to capitalize on shifting consumer needs, an evolving customer landscape and the need to provide responsible packaging solutions that protect the environment,” Delia said in the statement.

The deal is at “medium risk” of hitting a snag during antitrust reviews in the U.S. and, possibly, China, Joseph Abbatiello, an analyst at MKM Partners LLC, said in a note. Bemis identifies Amcor as a “key competitor” in its annual report, he said.

Bemis fell 0.2 percent to $51.44 at 11:43 a.m. in New York, after climbing 11 percent on Friday. Trading in Amcor shares was halted in Australia on Monday.

Thermoformer Tek Pak Expands Medtech and Food Packaging Capabilities

by Norbert Sparrow, Plastics Today

August 8, 2018 — Thermoforming company Tek Pak Inc. (Batavia, IL) has announced that it is adding a 35,000-square-foot production facility at its St. Charles, IL, plant. As first reported by Daphne Allen, Editor in Chief of sister brand MD+DI, the expansion will house the company’s thermoforming division serving medical device and food packaging customers and will include a 3,400-square-foot cleanroom.

The company will be addressing the speed at which it accommodates customers, President Tony Beyer told Allen. “We will be adding high-speed thermoformers to complete our products at a speed that is uncommon in the industry,” Beyer said.

The new facility is expected to be up and running by the end of this year.

In addition to supplying thermoformed products using
industry-standard materials, Tek Pak employs laser trimming to provide solutions for technically demanding applications. Applications include multi-layer materials with unique barrier properties.

Tek Pak also develops production, tooling and thermoforming molds for the food, medical, electronics and retail markets. Its equipment can make very large to very small molds, while holding tolerances up to ±0.0005 inches, according to the company.

Graham Partners Buys Thermoform Packaging Supplier Nuconic Packaging

by Canadian Plastics

August 9, 2018 — On the heels of two previous purchases of thermoformed packagers, private investment firm Graham Partners is buying Nuconic Packaging LLC of Vernon, Calif., another maker of thermoformed packaging.

The terms of the deal have not been disclosed.

Nuconic makes thermoformed PET packaging for the food industry, including containers and lids in a variety of shapes and sizes.

“[Nuconic] has experienced strong growth driven by a strategic market focus and strong customer relationships,” said Adam Piatkowski, managing principal at Philadelphia, Pa.-based Graham Partners, in a statement. “We have identified significant synergies due to the expanded geographic coverage and capabilities of the combined platform. Nuconic, with expertise in product and tool design, will offer a combined platform to deliver a wide range of solutions to the market. Nuconic has decided to expand the combined company’s footprint to the West Coast, a potential key growth area.”

“With the new investment and Nuconic’s innovative approach and customer focus, [we] will be able to pursue our strategy to build a nationwide, top tier, mid-sized packaging provider taking Tray-Pak and EasyPak along with it,” the statement continued. “Nuconic supplies thermoformed PET plastic packaging serving the food market that is a complementary product of EasyPak and Tray-Pak.”

Graham Partners’ acquired both Tray-Pak Corp. of Reading, Pa., and EasyPak LLC of Leominster, Mass., within the last year.
Re-thinking the Workforce Shortage

By John W. Lloyd – CEO, MANTEC
NIST MEP National Network

The message comes through loud and clear! Everywhere I go I hear the familiar and desperate plea, “I can’t find skilled people.”

So what’s the solution? Despite the best efforts of many institutions with scores of various programs, the problem hasn’t diminished.

- Career and technical schools
- STEM education academies
- Community and technical colleges
- Specialized training courses
- Technical and online training
- Apprenticeships and mentorships

Each of these is an important link toward addressing the talent shortage. One critical element is missing, however: what if we could figure out how to do more work with the workforce we have?

Lean Manufacturing

This simple premise is supported by countless success stories. Lean manufacturing techniques, now known as Operational Excellence, have a proven track record that extends back over many decades. Often referred to as Continuous Improvement (C.I.), no matter how lean your facility is, there are always opportunities to make further improvements. MANTEC’s and the National MEP Network C.I. Teams have vast experience in helping companies meet the challenge of higher demand with the workforce currently in place. In addition to higher output, C.I. enables companies to lower their cost of goods sold and increase margins.

Are you constantly thinking you need to hire more employees to meet your ever-demanding customers?

- Tired of the weekly (if not daily) revolving employee door?
- Temporary worker agencies not doing their diligence?
- Seeing your turnover rate in double digits?
- Not getting to know a new employee’s name before they’re gone?

- Seeing a rise in new employee injuries (and no longer seeing the employee)?
- Feeling like the costs of new hire physicals and training are eclipsing your sales?

Consider these questions:

- How hard are your current employees working?
- Are they waiting for an answer, looking for materials or tools?
- Are machine changeovers slow, tedious and hard on the operators?

Due to these and other non-value-added activities, you might think you need to hire more employees. This puts you back in the cycle of not finding skilled employees. There is an alternative! Continuous Improvement or LEAN is a proven methodology to help eliminate or reduce wastes in the production process. Benefits of training, implementing and changing a company’s culture include:

- More productive workforce
- Higher output with less stress
- Meet the needs of customers more quickly

LEAN isn’t about cutting people. By implementing Continuous Improvement you can make employees more effective instead of looking for more people to hire. And you will have happy customers.

Innovation

Introducing technology is another great opportunity to achieve higher productivity with the existing workforce. Progressive companies are installing new technologies which yield a quantum leap in output. More and more small- and medium-sized manufacturers are integrating robotics, automation, and 3-D printing into existing operations. The new generation of collaborative robots works side-by-side with production workers to drive unprecedented levels of efficiency and output.

We live in a critical time when everything is changing. Manufacturing methods that were successful just 10 years ago will no longer keep you competitive in the decade ahead. The MEP National Network is available to assist in assessing your opportunities to utilize new technologies to meet your objectives, satisfy your customer demand and, perhaps most importantly, solve the critical workforce shortage.
Re-thinking the Workforce Shortage with implementation of automation and furthering the lean culture will support sustainable manufacturing excellence.

John Lloyd is the CEO of MANTEC a full service nonprofit consulting service in South Central PA, part of the National Institute of Science and Standards Manufacturing Extension Partnership network. NIST MEP is a public-private partnership with centers in all 50 states dedicated to serving small and medium sized manufacturers. For MEP contacts in your state contact MANTEC at 717-833-6196 or Roger Kipp at 717-521-9254.
Steps for Success in Today’s Marketplace

By Monica Jacobs, Rigid Packaging Recruiter, KLA Industries

This article will offer the reader a recruiter’s perspective on the essential “steps to success” for jobseekers, whether you are actively looking or just perusing the job market. At KLA Industries, we talk to hundreds of job seekers weekly and see excellent, well-written resumes, as well as poorly-written ones that get moved immediately to the trash. Companies are trying to choose the most qualified candidates from looking at a resume, which isn’t possible, but you can improve your own odds if you think like the hiring authority.

There are three major components to landing a great new job: getting an interview; the interview process; and getting an offer that you will accept and not look back. We’ll look at the best way to approach each one of these.

The Resume

Keep in mind that the resume is just your ticket to getting an interview. It will not get you an offer, and you are not trying to tell your life story. The resume is a tool to sell yourself, so get comfortable with that idea. Don’t exaggerate or embellish the truth, but emphasize the positive aspects of your education, experience, skills, and accomplishments to generate interest on the part of a potential employer.

You are actually more likely to screen yourself out by providing too much information. At some point the reader (if they stick with it) will feel like they have learned enough about you to conclude you would not be right for the job. Also, the reader may start skimming because the resume is so long, thereby missing important information and getting the resume tossed into the “no” stack.

The task of resume writing seems to get a little more complicated with each passing year. A resume serves one purpose: to get you an interview. The hiring manager will likely decide whether to interview you based almost entirely on reading your resume, so it’s imperative you show off your accomplishments and skills. There are a lot of books out there on how to write a resume. Save your money, but do make sure you follow a few basic housekeeping rules:

■ Make certain your contact information is clear and current.
■ Keep it brief - two pages maximum – one if you’re early in your career.
■ Make it easy on the eye, clearly listing the names of your previous employers, the position you held, and the years of employment.
■ Skip the lengthy profile at the top of the resume. Most employers immediately bypass that to get to what is important to them: your work history, education, skills, and accomplishments.
■ Summarize your responsibilities. Spend more time on what you accomplished and what the impact was on the company.
■ The best accomplishments involve a dollar sign. What you did either resulted in increased sales or profits, or saved the company money.
■ It should not read like the job description for each of your positions.

The Interview

So now that you have an interview scheduled, what do you need to know? When many of us think of an interview, we think of a series of questions and answers, but the interview is not a fact-finding mission. How about this: let’s quit calling it an interview and start calling it something that is closer to reality -- an audition. In my opinion, here are the best tips I know for acing an audition.

The first is done before the audition, but you will use it throughout. Prepare. Oprah Winfrey said, “I believe luck is preparation meeting opportunity. If you hadn’t been prepared when the opportunity came along, you wouldn’t have been lucky.” Research the company, starting with their website. Read every news article from the past year, know what their markets are, who their customers are, where they make their money, what new products they have, who their competitors are, and so on. This will help you understand the context of specific questions, and reference what you have learned when you answer questions which will impress the company.

But don’t stop there. Research the specific opportunity you are auditing for and the people for whom you will be auditioning. No matter how great your personality, education, skills, and experience are, if the hiring manager and their boss don’t think you are the right fit for the position, you will not get hired. Put yourself in their
GN
Thermoforming Equipment

GN800
Form/Cut/Stack model

Are you still producing too much waste?
Do you want to reduce production costs?

If yes contact us at gn@gnCanada.com

www.gnCanada.com
position and plan how you will show them the fit between what they are looking for and your qualifications.

Second, here is my most secret tip (the one that people thank me for repeatedly): it is born of two basic principles—the long-term memory doesn’t work well under pressure; and you cannot possibly prepare for every interview question you will get. Have you ever been asked a question where you did not give a good answer, only to think of what you should have said an hour later?

The solution is to write down 3-5 (if your career has been longer, this might be 6-7) success stories in your career, such as projects or teams you have led or joined. It is okay to take this with you to the audition. What you will find is that, if you are ever initially ‘stumped’ for a response, by referring to this list you will be able to answer virtually any question. I have had candidates tell me afterwards that this worked so well they almost felt like they were cheating.

Lastly, be prepared to finish strong and close the company to a decision on whether you are right for the position and what the next steps will be. About 95% of candidates tell me after an interview that they thought it went well. What I want to know is, how did it conclude? If at the end of two hours, the interviewer stands up and says, “thank you for your time”, most likely that means it did not go well.

Before you leave, you should understand the process and the timetable for bringing you on-board. But you also want to know if you are the gal or guy, don’t you? Ask a question like this, to everyone you talk to during the process: “Do you have any questions about my ability to succeed in this position?” If there is a big negative, and it is real, then it is better to know right away instead of leaving and thinking all is well. Also, if it is not real, you can correct the misinformation on the spot.

The Offer

Now let’s look closely at the offer process. Your potential new employer will have a set of standards on which they will rate you before making an offer. Some of those are obvious, like a degree or certification or experience with a specific process, software, or market. Others are a bit less tangible, embodied in such phrases as ‘cultural fit’ or ‘energy’.

Similarly, you should have a set of standards to which you hold a potential new employer: stability, market position, vision for growth, and so on. In addition, the position within that company needs to make sense for you—does it allow you to utilize your strengths, provide an opportunity for professional growth, will you enjoy what you are doing? If both you and the company feel good about the mutual fit, here are the three key steps to closing the deal and moving on.

First, make sure to get your questions answered before the company issues an offer, to the extent possible. Just because you had a ‘final interview’ doesn’t mean you won’t have questions after you leave. If you are looking at a sales role and you’re not certain what accounts you would inherit, what the expectations are for new business development in the first year, or how your market is defined—ask! Likewise, questions about the role provide evidence that you are interested, and the conversation is usually easier to have pre-offer. If these are a few basic questions, a follow-up email might be best. If you really have some major unanswered issues, request a 15-minute follow-up phone call with the person who would be your supervisor. There could be any number of potential clarifications at this point depending on the position, but as a general rule, they should not include compensation just yet, although that leads to the second key.

Be certain that at some point in the process the company understands precisely where you are now in total compensation, and what your needs would be when making a move. This may have happened during a meeting with HR, or in an application process, or if you are working through a recruiter. As obvious as this is, remember that if you haven’t specifically told the company (and preferably in writing), there is no way they could know where you are today or what you need in the future. Most of us readily understand base salary, but there are so many other components of your overall compensation to consider including paid time off, cost of health insurance, retirement plans or 401(k) contributions, bonuses, and so on. While the compensation equation contains many variables, we have found the two biggest to be what you make today and how well you have impressed the company thus far.

Everyone has heard an anecdotal story of a huge increase accompanying a job change, but there are usually unique circumstances and that is not the norm, nor should it be your reason for making the change in the first place. It is, however, a reasonable expectation to take a step forward in making the change, and if the company has all
Scholarship Recipient

The Society of Plastics Engineers (SPE) Thermoforming Division has awarded its Bill Benjamin Memorial Scholarship to Haven Bontz, a student at Pennsylvania College of Technology in Williamsport, PA.

Mr. Bontz has been invited to attend the 26th SPE Thermoforming Conference®, which will be held September 24-26 at the Fort Worth Convention Center, in Fort Worth, Texas. He will be recognized during the Thermoforming Awards Dinner on Tuesday, September 25, at AT&T Stadium, home of the Dallas Cowboys.

Mr. Bontz is a junior studying for a B.S. in Plastic and Polymer Engineering Technology and expects to graduate in the Fall of 2019. Since May 2017 he has held an internship with Consolidated Container Company in Oil City, PA, where he has carried out 5S workplace organization plans and performed process validations.

“Haven has demonstrated his passion for our industry through his ongoing internship and other activities,” said Matt O’Hagan, SPE Thermoforming Division Student Activities Committee Chair. “Supporting the next generation of thermoforming industry professionals is of paramount importance to the SPE Thermoforming Division.”

Complete information on the Division’s scholarship program and the SPE Thermoforming Conference is available at thermoformingdivision.com or by contacting Lesley Kyle at 1-914-671-9524 or lesley@openmindworks.com.
the information they need, they should be able to know whether they can accommodate that number before putting together an offer. An apples-to-apples increase in the mid-high single digits is what we typically see. If there are gaps between that and your needs in making a change, for example a higher cost of living, let the company know that.

The Decision
Now you fully understand the opportunity, and the company fully understands what you need to see in an offer. Those steps often are not as easy as I’m making them sound in a complicated world, I would acknowledge. The third step should be easy though, if both sides have done their jobs to that point. When you receive your offer, there should be nothing that comes as a surprise. If there is, call a time-out and see where the communication breakdown occurred. It will probably have been in one or both of our first two steps. Minor clarifications are to be expected, like if the offer letter doesn’t specify a start date, or vacation. Those can be handled with a quick email (email has the advantage of documentation).

If all looks in order and your questions have been asked and answered, do not take too long to accept. Taking 24 hours to talk over one last time with your significant other is fine, but as a rule of thumb you should be able to give an answer within 24-48 hours or something was wrong in the first two steps. The company just told you that they love you and want you to join their team, and as humans when we tell someone we love them we want to hear that they love us back, without too much of a pause. If the offer is fair and you want the job, this is not the time to try and negotiate for more.

If you do want the job, and the offer is light in one or more areas however, you should absolutely negotiate. Stay professional, let them know that some part(s) of the offer did not line up with your expectations, and ask them to explain that part of the offer. When that discussion is done, be prepared to let them know that you absolutely want the job, and it is just that one thing where there is a gap. Further, let them know that if they can meet your expectations, which you are able to define, there is nothing else that would prevent you from accepting the offer. For example, if you really need a certain salary level and they come up short, do not just tell them you need more, give them a specific number.

KLA is an executive search firm with offices in Cincinnati, OH and Tampa, FL. Monica leads KLA’s rigid packaging practice, where her clients include many of the top thermoformers and blow molders in the world.

Did you know
the SPE Foundation offers numerous scholarships to students who have demonstrated or expressed an interest in the plastics industry?
HOW MUCH IS
100 MICRON OF MATERIAL
WORTH TO YOUR BOTTOM LINE?

GENUINE HYTAC® PLUG ASSISTS
FROM CMT HELP YOU TO FORM
BETTER PARTS, WITH FEWER
REJECTS, GIVING YOU MORE
SATISFIED CUSTOMERS.

HYTAC is engineered for performance, ensuring
consistent, repeatable parts. Every cycle.

WWW.CMTMATERIALS.COM

CMT
GREAT PLUGS = GREAT PARTS
Proactive Tooling Design

A novel design solution features the absence of a vacuum box

By Mauro Fae, Self Group and Roger Kipp

A previous article, “A Holistic Approach to Sheet Fed Thermoforming Tooling” (TQ3 2017), described the importance of considering the bigger picture when evaluating tooling design. The completed tooling design should not be limited to your standard tool specifications. Due to the variables in processing related to materials, equipment capability, part geometry and budget, it is critical that the final tool design draw on experience as well as general specifications. It is best when the experience factor is developed from a diversity of thinking that can provide the greatest potential for success.

Innovation engineering tells us that our goal should be a continuous flow of innovative concepts, not just a single event. The proactive phase of tooling design therefore involves a management system that begins with Define and Discover. “Define” provides the clarity on concept and “Discover” asks the questions that help identify risks and solutions. This is a tooling Design Failure Mode and Effect Analysis (DFMEA).

The following case study provides an example of implementing a proactive approach to tooling design.

Product Overview:
- Overflow Ring Cover (figure 1)
- 90.7” in diameter with 8” side height and 0.5 degrees draft

The following potential “failure” issues were identified:
1. Process limitations
2. Demolding
3. Product quality
4. Big chill marks

Processing Limitations
The available machine was a closed box design with no plug assist available and no option to mount the mold to the upper platen. Forming machine dimensions and capacity resulted in a mold size of 96.48” x 96.48” (2540.6mm x 2540.6): the closest point of the mold to the clamping frame was only 2.88” (73.1mm) and only one thermo-regulator was available.

Demolding
There was concern that as the material shrinks over this positive ring-shaped mold the part would “lock” onto the mold. Two solutions involving the tool design were identified.
1. Increase the draft angle (could be 20 – 30 degrees) in the scrap area beyond the trim line. It would be necessary to maintain the 0.5 degrees draft for about .5” for trim clearance before increasing the draft. (figure 2)
2. Allow a greater amount of “eject air” on the outside diameter than the inside diameter of the ring. With the ring shape, when blowing air through the entire mold, a big sag in the middle of the ring will be obtained with an increasing of the shrink of the plastic against the mold (figure 3).

This can be accomplished best with no vacuum box and direct lines to the vent holes.
Thermoforming systems
Packaging systems
Molds systems

Therformance
Performance in Thermoforming

ILLIG

IML-T® Setting standards!

RV 74 TF made easy!

RDM 75K Simply the best!

Complete turnkey solutions with superior performance!

ILLIG Maschinenbau GmbH & Co KG
Headquarters, Germany
www.illig.de

ILLIG USA
in North America call toll-free
1-855-824-004, mail@illigusa.com
a. No vacuum box (see figure 4) allows for:
   i. Multi zone circuits connecting every single vent hole to a main manifold or multiple manifolds providing the ability to zone venting and air eject.
b. In addition, there are other benefits of no vacuum box
   i. Energy savings due to greater pump efficiency
   ii. More efficient cooling
   iii. Quicker vacuum response (air volume to be removed is reduced by 97%)
   iv. Mold lifetime is increased because there is no pressure working on the mold surface

Possible solutions would include:
1. Additional heating around the outside diameter corner which should be designed with temperature control tubing and manifolds. The best results are obtained when it's possible to use more than one thermo-regulator so the operator can set different mold zone temperatures. (As stated above, having only one regulator was one of the process limitation factors.)
   a. It is also possible to add additional strategic heating with cartridge heaters
2. Zoned venting providing fast air evacuation inside the ring and slow evacuation around the outside diameter. As shown in Figure 6 “Start” diagram, the chilled material is initiated at the red dot. With standard vacuum, the chill mark is moved down as seen in the “Movement” diagram. Inside fast vacuum with slower outside, as seen in the “Stop” diagram, will hold the chilled material at the initial contact area. This vent control in combination with a proper roughness on top

Product Quality and Big Chill Marks
Another concern that needed to be proactively addressed was the highly likely occurrence of a chill mark around the outside peripheral wall of the cover as shown in figure 5.

The chill mark is well known as the result of the cooling of the material against the cooler mold, and then the movement of the cooled material away from the area of contact. The movement could be due to the mold movement through the plastic sheet or to the air that pull/push the plastic against the mold.
LOW FLEX™ FORMER SERIES
- LF5.0 Shown – 190 Ton
- Numerous quick change features
- Easy maintenance access

LINEAR RAIL TRIM PRESS
- LRS Shown - 45 Ton
- Side Loading of Tool
- Numerous quick change features
- Precise tolerances via linear rails

TECHNOLOGY
- Flat Bed Formers
- Form-Trim Models
- Linear Trim Presses
- Linear Vertical Press
- Heavy Duty Presses
- Tilt Bed (IML)
- Linear Pre-Punch
- Linear Scoring Station
- Rotary Drum Former

PROCESSES
- PP, PET, HIPS, OPS
- PLA, HDPE, PS Foam
- In line/Roll Fed
- Cups, Car Cups, Lids
- Retort Products
- Tamper Evident
- Hinged Trays
- Storage containers
- T1ML

VALUE
- Energy Efficient
- Production Rates
- Move Times
- Ease of Access
- Reliability

SERVICE
- Training Classes
- On line help
- Process Training
- After hours help
- Included start up service

Thermoforming Systems LLC
1601 W. Pine Street, Union Gap, WA 98903-9502 • 509 454 4578 • Fax 509 454 4598
www.tslusa.biz
of the mold, and with slow vacuum inside the ring, had enough force to form the part tightly before the material is too cold but not enough force to move the chill mark.

Typically, the “eject” and the “vacuum” air are coming from one source only (the vacuum box) and passing through the same venting holes. The two-air flow requirements (compare Figure 3 and Figure 6) are opposite. To solve this problem a double effect air circuit was designed (see Figure 7).

The mold result is shown in Figure 8.

Summary
Proactive evaluation of the possible failures that could be related to tool design will help identify problems before they happen. Designing tooling with engineered solutions will result in decreased product development time and related costs. Both engineering and manufacturing will find this approach to be consistent with lean principles and eliminating wastes: Waiting, Unnecessary Movement (set ups), Defects, and Unused Team Creativity.

Get it right the first time!

Thermoforming Division Membership Benefits

- Access to industry knowledge from one central location: www.thermoformingdivision.com.
- Subscription to Thermoforming Quarterly, voted “Publication of the Year” by SPE National.
- Exposure to new ideas and trends from across the globe.
- New and innovative part design at the Parts Competition.
- Open dialogue with the entire industry at the annual conference.
- Discounts, discounts, discounts on books, seminars and conferences.
- For managers: workshops and presentations tailored specifically to the needs of your operators.
- For operators: workshops and presentations that will send you home with new tools to improve your performance, make your job easier and help the company’s bottom line.

JOIN TODAY!
Pressure Forming Machine for the Packaging Industry

DESIGNED FOR NORTH AMERICA

KMD 90

- Larger tool area
- High output machine performance
- Configured to accept most types of quick change tooling
Moldmaking With 3D Prints: Techniques for Prototyping and Production

By Formlabs, Somerville, MA

3D printing thermoform dies on the Form 2 is a fast and effective method to create high quality vacuum-formed parts for small batch production. Printed thermoform dies can be used to make packaging prototypes, clear orthodontic retainers, and food-safe molds for chocolate confections.

Thermoform dies experience less pressure than injection molds, but still reach high surface temperatures. High Temp Resin resists deformation and surface degradation from the combined heat and pressure of thermoforming with most plastics. Standard Resins may also be suitable for thermoforming with some lower temperature plastics such as vinyl.

**Case Study**
Thermoforming a thin sheet of polycarbonate over a High Temp Resin die results in a part that is transparent, while matching the geometry and detail of the printed die. Thermoformed packaging can be easily prototyped and incorporated into the design process alongside 3D printed product prototypes, all on the Form 2. The printed die was used without any extra processing beyond the necessary UV post-cure. A texture is recommended in thermoform design to prevent air from becoming trapped under the sheet—the layer lines on the printed thermoform die can be helpful in this regard.

**Temperature Control**
The surface temperature of the printed die will increase over multiple cycles. High Temp Resin is highly resistant to deflection, whereas if using Standard Resins, you must allow the printed die to cool between cycles, otherwise deformation and degradation may occur.

If temperature build-up becomes a limiting factor in moldmaking efficiency, cooling channels are an effective way to draw heat out of the print. When used in conjunction with an automated thermoforming machine, a water-cooled die can produce a larger run of parts with shorter cycle times.

Conformal cooling channels are easy to incorporate when
designing for SLA 3D printing, and print successfully without any internal supports that could disrupt flow. After printing, the channels are flushed of uncured resin using isopropyl alcohol. The mold is connected to a pump and a source of cold water. Integral water cooling as a strategy can also be applied to Standard and Tough Resin parts, to reduce heat deflection when used in higher temperature environments than the HDT of those materials.

Conformal water channels visible in a High Temp thermoform die.

Example prototype packaging formed with a Formech thermoformer.
Influence of Processing Conditions on the Thermoformability of PP-Sheet Material

By Fabian Beilharz and Christian Bonten, Institute of Polymer Technology, University of Stuttgart, Germany; Peter Eyerer, Fraunhofer Institute for Chemical Technology, Pfinztal, Germany

Editor’s Note: This paper was originally presented at ANTEC 2011. Given the symbiotic relationship between thermoforming and extrusion, the topic remains relevant today. Many of our readers might not have seen this or other ANTEC papers that are archived on the new SPE website. With the recent improvements to the SPE Online Technical Library, members now benefit from enhanced search tools. We encourage readers to visit the new online library to see for themselves.

Abstract
The quality of semi-finished products, as they are used in thermoforming, highly depends on the raw material used and their processing history. As a consequence, variations in sheet quality are often observed with their influence on processibility and product properties. Currently, there is no standard test for thermoforming sheet materials available, which means it is not possible to accurately predict how a material will behave in thermoforming. This study deals with the prediction of the thermoformability of sheet materials. A novel test method (Thermoforming Material Characterization TMC) to predict thermoformability is presented.

Introduction
Problems during the thermoforming process can often be traced back to batch variations of the sheet material. These variations in the sheet materials quality can be assigned to different, sometimes interfering causes. Influential factors on the sheet materials quality are the raw material used for extrusion, the extrusion process itself and ageing of the extruded sheet material [1, 2].

The thermoformability of sheet material is known to be dependent on its rheological and morphological properties. Viscoelastic properties at thermoforming process temperatures are the main influential factors on thermoformability [3, 4]. Therefore, deformation characteristics at thermoforming temperatures are the keyparameter to rate the thermoformability of a sheet. Several authors have investigated the influence of biaxial deformation behavior on thermoformability [1, 5, 6], where different methods for biaxial deformation have been applied.

Unfortunately, the most promising approaches to determine the thermoformability of a polymeric sheet material prior to processing are still based on a “thermally open”-process [1, 7, 8], like the thermoforming process itself. Authors demonstrated the appropriateness to identify the deformation characteristics of different types of polymers. The ability to identify batch variations with these test methods is not shown yet.

This study is a holistic view on the whole process chain in thermoforming, covering the extrusion process, the determination of specific sheet properties and the thermoforming process with its resulting products. A regression analysis was used to identify correlations between extrusion process settings of the sheets, their quality in thermoforming and the reaction forces measured by TMC. A multiple regression including interaction of input variables showed a high coefficient of determination and a good statistical significance [9].

Material
Two isotactic homopolymeric grades of polypropylene (PP) from Borealis were used. HB205TF is a non-nucleated PP with an MFR of 1 g/10 min (230 °C/2.16 kg), a melting temperature of 166 °C and a molecular mass of 570000 g/mol with a molecular mass distribution of 3.9. HC205TF is a bimodal reactor-nucleated PP with an MFR of 4 g/10 min (230 °C/2.16 kg), a melting temperature of 163 °C and a molecular mass of 475000 g/mol with a molecular mass distribution of 5.5. Both grades are designed for thermoforming applications. In order to simulate the effect of a potential polymeric pollution of the raw material, one batch containing HB205TF and 5 mass-% polyethylene (PE) was extruded.
Driven by Innovation

There is no substitute for the experience we’ve gained by rolling up our sleeves and working through improvements at every stage of thermoforming technology for over six decades. From process design through putting high-output machinery on the floor, innovation is in our DNA.
Extrusion
Sheets have been extruded on a Collin ECS-30 single screw extruder. The 25D screw was equipped with convoy-elements. The melt discharge was through a flat film die in a Collin chill-roll unit. Extrusion parameters like throughput, melt-temperature and chill-roll temperature have been varied based on a statistical design of experiments (doe). Sheet materials have been extruded at 18 different process settings (N01-N18). Extrusion process settings are summarized in Table 1.

Thermoforming
The thermoforming characteristics of extruded sheet samples were determined by processing the sheets on a fully instrumented single cavity thermoforming machine. Process parameters have been varied to identify the sensitivity of the sheets to changes in process parameters.

The cup geometry was realized by applying a plug for the deformation only. The thermoformed cups were then analyzed by their resulting wall thickness distribution and their optical appearance [9].

A rating of the thermoformability of the extruded sheet materials was done by 8 criteria based on thermoforming and TMC-tests. For example the homogeneity of the resulting wall thickness distribution in direction of extrusion and transverse, the influence of varying deformation speeds on the wall thickness, the optical appearance in dependency of the deformation speed and the required force for deformation were taken into account. The sum of those 8 criteria is defined as the thermoform-index of the sheets (Figure 1). A high thermoform-index results in a good thermoformability of the sheet material.

Effect of Extrusion Process Settings on Thermoformability
Main influential factor on the homogeneity of the deformation is the raw material used. An increase in the speed of extrusion results in a more homogeneous deformation of the sheet in the direction of extrusion and transverse (Figure 2).

The sensitivity of the sheets to varying deformation speed and the resulting optical appearance of the thermoformed parts were determined to be dependent on the raw material used and the throughput in extrusion. The homogeneity of deformation of the nucleated PP is general less sensitive to the deformation speed. An increased throughput in extrusion was determined to improve the optical appearance of the thermoformed parts.

Biaxial Deformation
A biaxial deformation test TMC was used to analyze the deformation characteristics of the extruded sheet materials at thermoforming conditions. The biaxial deformation was applied by a pre-stretching plug under isothermal conditions. Force-displacement curves of the deformation are recorded. Tests have been performed at 150 °C, 155 °C and 160 °C with a plug speed of 20 mm/s, 200 mm/s and 500 mm/s. Further details about TMC are described in [9].

Force displacement curves have been analyzed in the resulting force at a draw depth of 5 mm and 60 mm (Figure 3). This evaluation reflects the application of the thermoforming process for producing shallow and deep parts likewise.
Effect of Process Settings on Biaxial Deformation
Reaction forces at a draw depth of 5 mm are dependent on the raw material used and on the chill-roll temperature (Figure 4). Due to its low melting temperature, sheets extruded from HC205TF show a lower reaction force at a draw depth of 5 mm than those extruded from HB205TF.

With increasing draw depth the influence of the molecular structure and orientation on the resulting reaction force becomes more dominant. At a draw depth of 60 mm, the reaction force of the deformation is, beside the raw material used, dependent on the interaction of melt temperature and extrusion speed (Figure 5).

Conclusion
The interaction of extrusion process settings and resulting thermoforming characteristics could be shown by a regression analysis. The main parameter influencing the thermoformability is the raw material used for sheet extrusion. Minor dependencies between deformation characteristics and extrusion-speed were observed, varying in intensity depending on the raw material used. The regression analysis also showed a relationship between extrusions process settings and resulting sheet properties. The sheet properties are mainly determined by the raw material used and the extrusion-speed, while the crystalline structure of the sheets is influenced by an interaction of extrusion-speed and chill-roll-temperature.

A biaxial deformation test was determined to be practical to quantify the thermoformability of semifinished products. TMC test settings of 160 °C and a deformation speed of 200 mm/s can be used to define regions of good and poor thermoformability in the force/draw depth plot. It was predefined, that sheets show a good thermoformability when the thermoform-index is above 7. Low reaction forces along with a small strain hardening results in a high thermoformability (Figure 6).

Thermal degradation of the polymer due to extrusion can be identified as well by the TMC-test method. A reduction in the molecular mass can be most easily identified at TMC.
settings of 150 °C and 20 mm/s (Figure 7).

An obvious correlation between resulting force/draw depth and the sagging of the sheets exists. The lower the reaction force in TMC, the lower the resistance to sag. The effect of a PE-pollution can be shown by the TMC-test method at a low draw depth, where a low modulus is observed over all TMC test conditions. This is exemplarily shown for results recorded at 160 °C and 200 mm/s (Figure 8).

The TMC test method is capable to detect small changes in the sheet material's quality. TMC shows a high reproducibility of test results. Results can be easily used to optimize the thermoforming process by analyzing the speed and temperature dependency of reaction forces. Thereby an optimal processing window for thermoforming can be determined.

Acknowledgments
The authors like to thank Borealis for providing the raw material for extrusion and Illig for providing the thermoforming machine for this study.

References

Have an idea for an article?
Submission Guidelines
• We are a technical journal. We strive for objective, technical articles that help advance our readers’ understanding of thermoforming (process, tooling, machinery, ancillary services); in other words, no commercials.
• Article length: 1,000 - 2,000 words. Look to past articles for guidance.
• Format: .doc or .docx
• Artwork: hi-res images are encouraged (300 dpi) with appropriate credits.

Send all submissions to: Conor Carlin, Editor cpcarlin@gmail.com
Black Strikes Back with UK Recycling Initiative


A bold initiative has been launched in the UK that aims to recycle black plastics into new food-grade packaging. Backed by UK environment secretary, Michael Gove, the project aims to recycle 120 tons of black plastics (8 million items) each month, having started in July 2018. The companies involved include packaging thermoforming Faerch Plast UK, recycling and waste management firm Viridor, and retailers Marks & Spencer, Tesco, and Sainsbury’s. The volume of material will be steadily increased over the next 18 months with Viridor’s plastics recycling facility at Rochester in Kent becoming a center of excellence for the initiative.

Gove said, “This global leading scheme has the potential to mean the UK exports less of its waste, could divert huge amounts of plastics away from landfill, and prevent virgin plastics from entering the marketing the first place.”

Viridor’s commercial director, Paul Ringham, commented: “The project team, working together since January, has proven that black plastics from household mixed waste recycling can be recycled into high-quality mixed ‘jazz’ flakes to create food-grade packaging.”

The breakthrough took place at two Viridor facilities, the plastics recycling facility at Rochester, which is one of the most advanced optical sorting facilities in the UK, and the polymers reprocessing plant at Skelmersdale in Lancashire, which takes recycled plastics and creates flakes and pellets to be used in the manufacturing process.

Viridor has started passing this material through the new process, adding black to the colored plastics stream already recycled. The flakes and pellets are then taken to Faerch Plast’s manufacturing facility at Ely in Cambridgeshire where they are used in new packaging items.

Andrew Osborne-Smith, regional chief executive of Faerch Plast UK & Ireland added: “This exciting initiative is another step towards enabling the plastics sector to deliver circular economy targets. Procurement of recycled materials is very important at Faerch Plast and further development of PET tray recycling is paramount to the continued success of our business. As rigid plastics packaging manufacturers, it is vital we create the demand for recyclers’ end-market. It has been rewarding to see the whole supply chain collaborating on this project to demonstrate that black PET trays are recyclable. However, there is more work to do to achieve high and sustainable levels of tray recycling with further investment in commercially viable waste collection systems and sorting and recycling facilities for PET pots, tubs, and trays.”

Faerch Plast’s Ely plant produces recycled plastics packaging for the UK and European markets. The site extrudes its own sheet using UK-sourced materials and has benefited from a £20 million ($26m) investment program over the past two years.
Inspiring Plastics Professionals

Each quarter, the Executive Board of SPE will publish a summary of noteworthy activities and discussions that impact the Society. The goal is to keep Council and membership current on goals and activities related to the 3-year operating plan (3YOP) and the Leadership Deployment Plan (LDP).

There was significant SPE activity over the past 3 months with a new website launch, ANTEC and Council meetings. The new website has been very-well received by the majority of members, while work continues to build and enhance our online technical library, one of the major jewels of SPE. Our flagship conference was a great success, with attendance and profitability above budget. ANTEC 2019 in Detroit is coming soon, however, and planning is already underway with new TPCs (Mark Spalding and Donna Davis) hard at work. As many of you know, there will be some new programs at ANTEC and a formal announcement will be coming soon. Many of our RETECs and TOPCONs occur in the fall. A complete list of SPE conferences can be found on the website.

The Executive Board welcomed three new members in the past quarter: Dr. Raymond Pearson (VP Education & Technology); Dr. Scott Eastman (VP Sections); and Lynzie Nebel (VP Young Professionals). EB continues to focus on strategic issues to ensure the long-term viability of the Society. Clear communication, willingness to listen, and recognition of change are areas where all EB members are active. The board is committed to a vision of a global society and is now reviewing tactical matters such as setting variable dues, promoting regional top-cons, and ensuring that SPE staff has adequate resources.

Our operational result is currently significantly better than budget, driven mostly by good cost control and lower-than-expected expenses. It is still too early to tell where we will end up at the end of the year. The relatively flat stock market since the beginning of the year, however, means that our investments have not appreciated in value significantly.

As always, we encourage you to reach out to members of the Executive Board with questions, comments or ideas with how we can continue to improve our Society.

Brian Gradyn
President

Conor P. Carlin
VP Marketing & Communication

Editor’s Note: SPE Council takes place in Charleston, SC from September 21-22. A full Council Report will be available in the Q4 issue.
CUSTOM, SHEET EXTRUSION SYSTEM
DRYER-LESS, PET / PLA SHEET EXTRUSION SYSTEM

- High Performance
- Low Melt Temperature
- Short Dwell Time
- Excellent Mixing
- Low Energy Consumption
- High Vacuum System
- In-line IV Monitoring/Control System
- Compact Design
- Robust Design
- FDA Approved

- Mono Layer- Barrier Co Extrusion
- Thin Gauge – Heavy Gauge
- Extruder Size: 1.5”- 15” In Screw Dia.
- Quick Roll Change Design
- Custom Configuration
- Servo Driven
- Independently Driven
- Roll Diameter: 12”- 40”
- Face Width: 36”- 150”
- State-of-the-Art HMI Control System
- Unparallel Customer Service & Support
- Technology Driven

ADVANCED EXTRUDER TECHNOLOGIES, INC.
Commitment to Excellence

2281 East Devon, Elk Grove village IL. 60007 Tel: 847-238-9651 Fax: 847-238-9654 www.aetextruder.com
Upcoming SPE Thermoforming Division Board Meeting
September 23 • Ft. Worth, Texas
For more information, contact Lesley Kyle: lesley@openmindworks.com or 914-671-9524

Need help with your technical school or college expenses?
If you or someone you know is working towards a career in the plastics industry, let the SPE Thermoforming Division help support those education goals.

Start by completing the application forms at thermoformingdivision.com or at www.4spe.org
World Wide Leader in PS Thermoforming Machinery, Tooling and Granulation.

MODEL 45
THERMOFORMER AND TRIM PRESS

INTRODUCING...

World Wide Leader in PS Thermoforming Machinery, Tooling and Granulation.

MODEL 45
THERMOFORMER AND TRIM PRESS

INTRODUCING...

Irwin Research & Development, Inc
Phone: (509)248-0194 • Fax: (509)248-3503
www.irwinresearch.com • Email: sales@irwinresearch.com
MACHINERY COMMITTEE
James Alongi
MAAC Machinery
590 Tower Blvd.
Carol Stream, IL 60188
T: 630.665.1700
jalongi@maacmachinery.com

Steven Clark (Chair)
Monark Equipment
PO Box 335
4533 S. Garfield Road
Auburn, MI 48611
T: 989.662.7250
sclark@monark-equip.com

Brian Golden
SencorpWhite
400 Kidd’s Hill Road
Hyannis, MA 02601
T: 508.771.9400
bgolden@sencorpwhite.com

Travis Kieffer
Plastics Unlimited, Inc.
303 1st St. N.W.
Preston, IA 52069
T: 563.589.4752
TravisK@plasticsunlimited.com

MATERIALS COMMITTEE
Juliet Goff
Kal Plastics
2050 East 48th Street
Vernon, CA 90058-2022
T: 323.581.6194
juliet@kal-plastics.com

Roger P. Jean (Chair)
Rowmark/PMC
PO Box 1605
2040 Industrial Drive
Findlay, OH 45840
T: 567.208.9758
rjean@buypmc.com

Phillip Karig
Mathelin Bay Associates LLC
11939 Manchester Road #148
Saint Louis, MO 63131
T: 314.630.8384
karig@mathelinbay.com

Ian Munnoch
MSA Components, Inc.
202 S. Douglas Street
Dodgeville, WI 53533
T: 812.322.5080
imunnoch@msacomponents.com

Matt O’Hagan
LyondellBasell
7674 Park Meadow Lane
West Bloomfield, MI 48324
T: 248.760.8590
matt.o’hagan@lyondellbasell.com

Laura Pichon
Ex-Tech Plastics
PO Box 576
11413 Burlington Road
Richmond, IL 60071
T: 847.829.8124
lpichon@extechplastics.com

Ed Probst
Probst Plastics Consulting
5210 Canton Street
Holly, Michigan 48442
T: 248.705.2830
ed.probst@probstplastics.com

Brian Winton
Lyle Industries, Inc.
4144 W. Lyle Road
Beaverton, MI 48612
T: 989.435.7714 x 32
bwinton@lyleindustries.com

PROCESSING COMMITTEE
Jim Arnet (Chair)
Hagans Plastics Co.
121 W. Rock Island Road
Grand Prairie, TX 75050
T: 972.974.3516
jarnet@hagansus.com

Robert Browning
McConnell Company
P.O. Box 45063
Atlanta, GA 31145
T: 770.939.4497
robert@thermoformingmc.com

Evan Gilham
Productive Plastics
103 W. Park Drive
Mt. Laurel, NJ 08054
T: 856-778-4300, x225
EGilham@productivecompanies.com

Bret Joslyn
Joslyn Manufacturing
9400 Valley View Road
Macedonia, OH 44056
T: 330.467.8111
bret@joslyn-mfg.com

Stephen Murrill
Profile Plastics
65 S. Waukegan
Lake Bluff, IL 60044
T: 847.604.5100 x29
smurrill@thermoform.com

Jay Waddell
Plastics Concepts & Innovations
1127 Queensborough Road
Suite 102
Mt. Pleasant, SC 29464
T: 843.971.7833
jwaddell@plasticoncepts.com

Steve Zamprelli
Formed Plastics, Inc.
297 Stonehinge Lane
Carle Place, NY 11514
T: 516.334.2300
s.zamprelli@formedplastics.com

DIRECTORS EMERITI
Jim Armor
Armor & Associates
16181 Santa Barbara Lane
Huntington Beach, CA 92649
T: 714.846.7000
jimarmor@aol.com

Art Buckel
McConnell Company
3452 Bayonne Drive
San Diego, CA 92109
T: 858.273.9620
artbuckel@thermoformingmc.com

Lola Carere
302 Sable Trace Ct.
Acworth, GA 30102-7617
T: 770.883.7055
carerelola@comcast.net

Richard Freeman
Freetech Plastics Inc.
2211 Warm Springs Court
Fremont, CA 94539
T: 510.651.9996
rfree@freetechplastics.com

Steve Hasselbach
CMI Plastics
222 Pepsi Way
Aydin, NC 28513
T: 252.746.2171
steve@cmiplastics.com

Donald Hylton
McConnell Company
646 Holyfield Highway
Fairburn, GA 30213
T: 678.772.5008
don@thermoformingmc.com

Roger Kipp
Roger C. Kipp Consulting
3C Owens Landing Court
Perryville, MD 21903
T: 717.521.9254
srkipp@msn.com

Gwen Mathis
6 S. Second Street SE
Lindale, GA 30147
T: 706.346.2786
gmathis224@aol.com

Stan Rosen
10209 Button Willow Drive
Las Vegas, NV 89134
T: 702.869.0840
thermoipp@earthlink.net

Board of Directors
Since 1965, our mission:
The design and manufacture of the most advanced and
energy efficient thermoforming machines in the world,
for the processing of thermoplastic materials.

O.M.G. srl currently offers a wide variety of standard series machines for both
thin and heavy gauge applications, as well as highly customized complete
packaging lines, and custom thermoforming systems.

ENERGY EFFICIENT, ALL ELECTRIC SERVO DRIVE MOVEMENTS

From large to small size inline machines, Cut-in-place machines, to custom thermoforming lines and
systems for the processing of all types of thermoformable plastics, including PET, PLA, PS, PPEVOH, OPS,
HIPS, EPS, PE, PVC, PC, PE, HDPE and many more...

O.M.G. can provide a cost effective solution for your
everyday challenges!!

OPTIONS:
Edge preheater system, drum pre-heaters for running PP, material grinders, cut-in-place presses,
punch & die presses, additional modules for after the
press automation, single or double sided A/B stacking
robots, complete tooling packages and much more...
Call O.M.G. for all your thermoforming application
needs!!

O.M.G. srl – ITALY
10040 Givoletto (To)
Tel. +39 (011) 9947156
info@omgitaly.com

O.M.G. USA
Paxton, Ma 01612
Tel. +1 (508) 7521457
pietro.caiani@omgusa.net

WWW.OMGITALY.COM
These sponsors enable us to publish *SPE Thermoforming Quarterly*

- Advanced Extruder Technologies ........................................ 33
- Brown Machinery ............................................................. 27
- CMT Materials .................................................................... 17
- Formed Plastics .................................................................. 25
- GN Thermoforming Equipment ......................................... 13
- Illig ................................................................................... 19
- Irwin Research & Development ....................................... 35
- Kiefel ................................................................................ 23
- MAAC Machinery ............................................................. 16
- O.M.G. SRL ........................................................................ 37
- Polyscope ........................................................................... 7
- Portage Casting & Mold ..................................................... 15
- Premier Material Concepts .............................................. Back Cover
- Profile Plastics .................................................................... 25
- PTi Extruders ............................................................... Inside Back Cover
- Sekisui Polymer Innovations .......................................... Inside Front Cover
- Self Moulds ......................................................................... 9
- Senoplast ............................................................................ 25
- Siemens ............................................................................... 5
- Solar Products ..................................................................... 25
- Stiles ................................................................................... 15
- Thermoformer Parts Suppliers ....................................... 9
- TSL .................................................................................... 21

**Quarterly Deadlines for 2018 Copy and Sponsorships**

<table>
<thead>
<tr>
<th>Deadline</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEB 15</td>
<td>Spring</td>
</tr>
<tr>
<td>AUG 01</td>
<td>Fall</td>
</tr>
<tr>
<td>OCT 15</td>
<td>Winter</td>
</tr>
</tbody>
</table>

*Conference Edition Post-Conference Edition*

All artwork to be sent in .eps or .jpg format with minimum 300dpi resolution.

**Why Join?**

It has never been more important to be a member of your professional society than now, in the current climate of change and global growth in the plastics industry. Now, more than ever, the information you access and the personal networks you create can and will directly impact your future and your career.

Active membership in SPE – keeps you current, keeps you informed, and keeps you connected.

The question really isn’t “why join?” but …

**Why Not?**
G-SERIES® QuadPLUS™

PTI's 4-layer G-SERIES® Quad Cup 4 extruder co-ex complex, mezzanine mounted co-extruders, & Model G-SERIES® GCVD661824 with dual auxiliary cooling rolls

QUAD CUP
STRIPES
SIDE x SIDE
BARRIER

Special low-friction adapter piping and sheet die feature insulation blankets for high energy efficiency and operator safety.

Low-boy co-extruders positioned on a mezzanine assure easy operator access to the extrusion complex and a compact footprint.

G-SERIES® configurable 5-roll compact vertical roll stand features high efficiency temperature control modules and open operator access.

- MEZZANINE CO-EXTRUDERS/COMPACT MACHINE FOOTPRINT
- HIGH RATES OF PRODUCTION/MANY SIZES AVAILABLE
- TITAN® CONTROLS AUTOMATION FOR EASE OF OPERATION
- MULTI-RESIN PROCESS CAPABILITIES (PP, PS, HDPE, ...)
- QUAD CUP, SIDE X SIDE, BARRIER & STRIPE CONFIGURATIONS
- SEVERAL ADVANCED OPTIONS TO CHOOSE FROM!

PTI® World Class Sheet Extrusion Systems
Processing Technologies international, LLC. • 2655 White Oak Circle • Aurora, IL 60502 • T 630.585.5800 • F 630.585.5855
www.ptiextruders.com

Visit PTI at:
Extrusion Sep 18-20 2018 Cleveland, Ohio BOOTH 101/103
SPE Thermforming Conference Sep 30-Oct 2 2018 Fort Worth, Texas BOOTH 419/421
Hello!

Meet Chad.

SIMONA PMC Production Scheduler
Since 2006

"I love working directly with our customers to find solutions that exceed their expectations. It’s that open communication that makes sure the customer is getting exactly what they need to complete the job!"

− Chad Sendelbach

MORE THAN JUST SHEET, EXPERIENCE THE PMC DIFFERENCE!

Our team of extrusion professionals and material experts will help you find the best material for your demanding applications.

ABS | TPO | Acrylic | ASA | PC/ABS | Soft-touch | Laminated Sheets

REALIZE THE SIMONA PMC DIFFERENCE

877.289.7626 // sales@simona-pmc.com // simona-pmc.com