Section MiniTec
TUESDAY MARCH 31, 2009
HENNEPIN TECHNICAL COLLEGE NORTH CAMPUS • 9000 BROOKLYN BLVD, BROOKLYN PARK, MN
www.hennepintech.edu • 1-800-345-4655
12:30 PM REGISTRATION 1:00 – 4:00 PM SEMINAR

DOE FOR INJECTION MOLDING
Presented by:
Bob Launsby of Launsby Consulting

Bob Launsby will discuss some new approaches to experimental design as applied to injection molding. Fundamental to conducting useful, practical design of experiments in injection molding is having a solid understanding of injection machines, cycles, and materials. Injection molding is truly different than other processes. Unless one has a fundamental understanding of this technology they will do unwise things with design of experiments. In addition to reviewing these fundamentals we will also discuss some modern approach to experimental design that are directly applicable to injection molding processes.

DOE stand for Design Of Experiment. By incorporating a DOE into your process, you will be able to understand your process better and realize what factors make a good part or a bad part. DOE is NOT a substitute for knowledge of technology; it incorporates current understanding by utilizing physics first. If You do not understand the basics, you will do EVIL things with your DOE. Join us to learn more:

- Special Considerations in Injection Molding
- What is an Experiment?
- Case Studies
- What are the Steps?
- What is new in DOE?
- D-optimal Designs
- Desirability Functions
- Questions

Bob Launsby, Taught experimental design to over seven thousand of people. Bob participated in over 1,000 actual experiments (many in MI). He is also a co-developer of DOE Wisdom software. Bob is a co-author of text "Experimental Design for Injection Molding"

For reservations or questions,
email Sean Mertes (sdmertes@ashland.com) or Jeff Voelker (jeffrey.voelker@sabic-ip.com).
If you don’t have access to the internet then call Sean Mertes at 612.801.2417 - EMAIL IS PREFERRED
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President’s Remarks

Dick Bopp

It’s my first shot at writing the President’s Corner and I can hardly wait to hear what I have to say. At least that was the situation until last night. You see last night I was sitting on the lawn, that’s right—the lawn—listening to Jonny Lang, the uber-talented blues musician who moved to the Cities from Fargo some years back. He was singing a song entitled “One Person at a Time” under a clear night sky in Coachman Park, Clearwater, Florida.

It occurred to me then that just about everything we accomplish gets done by doing one thing at a time. Just put one foot in front of the other. Right? So, why bring this up? It’s because today we find ourselves in a period of immense “Change”—some would say, “upheaval.” We’re seeing change in our politics, economy, technology, personal lives, professional careers. So, it’s really no surprise to see SPE going through some major Change as well—as plainly seen in Tom McNamara’s Councilor Corner.

And, there’s no doubt about it, Change can be scary. Fortunately, our past president, Paul Rothweiler, and our section board of directors have left us on a solid footing so that we’re able to go forward making Change from a position of strength rather than weakness.

So, what Change? You might ask. Well, I’m not going to go through the whole litany. But, let me highlight just two: 1) Eric Swensied is spearheading a series of social networking meetings where we can all get to know one another better and exchange career development/job search information and 2) the education committee (Dan Mishek, Eric Swensied, Tom McNamara and Paul Rothweiler) has submitted a daring proposal for a Husky Award that will help introduce the benefits of plastics to youngsters in our community.

Now, to effect these changes the board is going to have to put one collective “foot” in front of the other; and to do that we’re going to need all your good “feet” to help as well. You can help in many ways—everything from renewing your membership, to attending MiniTechs, to recruiting a new member, to volunteering for a committee, to joining the board. The list goes on.

As Jonny sang soulfully last night…

“Change the World
One boy, One Girl, One Person at a Time.
Change the World, One Person at a Time…
One Person at a Time, Yeah, Yes”

Wish you could have been there with me. It sounded much better from him. You can change the world. I can change the world. One thing is for sure: Big Change is Gonna Come.

LET’S DO IT TOGETHER!
We are very pleased to welcome the following 14 new members who joined our section during the months of November, December and January. Please take a minute to introduce yourselves to them at the next opportunity, possibly the Networking Meeting from 5 – 7 p.m. on March 12th at the Alaska Eatery and Glacier Bar in St. Louis Park or our MiniTech at Hennepin Technical College at 12:30 p.m. on March 31st.

### New Member

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<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tr>
<td>Dixon Brown</td>
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<td>Plymouth, MN</td>
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<td>Bryan Deneen</td>
<td>Raven Industries</td>
<td>Sioux Falls, SD</td>
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<td>Dilhan Fernando</td>
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<td>Fargo, ND</td>
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<tr>
<td>John Fisher</td>
<td>Raven Industries</td>
<td>Sioux Falls, SD</td>
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<td>Brian Glaeser</td>
<td>McKinley Group Engineering</td>
<td>Minnetonka, MN</td>
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<td>Shellie Irwin</td>
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<td>Fargo, ND</td>
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<td>Sherry Klemetson</td>
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<td>Lakeville, MN</td>
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<td>Dave Lindemann</td>
<td>3M</td>
<td>St. Paul, MN</td>
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<td>John Longabach</td>
<td>Boston Scientific</td>
<td>Osseo, MN</td>
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<td>Robby Lucken</td>
<td>Univ. of MN BBE</td>
<td>Minnetonka, MN</td>
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<td>Jesse D. Lund</td>
<td>Bekum America Corp.</td>
<td>Williamston, MI</td>
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<td>Joseph Slenk</td>
<td>Vi-Chem Corp.</td>
<td>Maplewood, MN</td>
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<td>Phil Vaccaro</td>
<td>Arctic Cat</td>
<td>Thief River Falls, MN</td>
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**SPOTLIGHT ON THE BOARD**

**Dick Bopp, Membership Chairman**

This issue’s *Spotlight* features Ajay Gupta, our very able section secretary, who as you’ll soon discover has had an extensive and remarkably diverse background in plastics, particularly in bioplastics over the past 17 years.

In fact, I think it would be fair to say that his long and distinguished career in biopolymers qualifies Ajay as a true pioneer in a field that in the past was pretty much relegated to a few committed true believers, but now sits center stage as the most promising emerging technology in our industry.

So, here in his own words is Ajay’s story. Please don’t hesitate to take him up on his offer to talk with you about SPE, biopolymers or the challenges of entrepreneurship in the medical device field. Or, if you make it to our next MiniTech on March 31st, why not just say, “Hi!”?

I joined SPE in 1992 soon after enrolling in the MS Chemical Engineering program at Michigan State University where I specialized in polymer alloys and blends under the guidance of Dr. Ramani Narayan, a pioneer in the field of biodegradable polymers and an early evangelist for sustainability. But, the full scope of the plastics industry really didn’t “hit” me until I attended ANTEC and NPE in 1994. I have been part of SPE ever since. I find that I can network effectively and keep in close touch with other plastics professionals in SPE. I also find that I can stay up to date with the latest technical developments as a member of the Extrusion, Injection Molding, Color and Appearance and Medical Polymers Divisions. By joining the Upper Midwest Section (S22), I’ve been able to network and stay abreast of opportunities in the local plastics industry as well.

After graduation I teamed up with my advisor and two other engineers to start up BioPlastics Inc., a company focused on the commercialization of a specialized polycaprolactone (PCL)/starch blend for compostable bags. From there I moved to Chronopol, a high-tech startup owned by Coors, Inc, to work on the development of PLA resins. I then went on to the University of Minnesota to develop biodegradable...
This is the third and final installment of this low-volume production series. We have defined what the range of low-volume production is. We have discussed current trends in production along with identifying the technologies that are the top performers to get plastic parts to market.

In this finale, parts will be identified and compared between Direct Digital Manufacturing (DDM) and Rapid Tooling (RT) using aluminum molds. Again, as described in the previous articles, you will need to decide what is important in the plastic part to you and your project. Is it tolerance, speed, surface finish, material, etc? These charts are going to make the assumption that you have already considered your requirements and now it is strictly up to cost.

To recap, DDM is defined as a direct production of finished goods from additive manufacturing technologies. The additive manufacturing technology that we are using in our comparison is Fused Deposition Manufacturing (FDM). FDM is the process of extruding plastic to build a part layer upon layer. Commonly used materials are ABS, PC and PPSF.

Before you see the price comparisons here is how we came up with the pricing to make sure the comparisons are accurate.

The cost of Rapid Tooling Unit Pricing has the cost of unit pricing and the cost of the tooling. Direct Digital Manufacturing Unit Pricing has the cost of programming, build time, and post processing to make the parts.

**PART #1 | LATCH**

This latch is 3” x 1 ½” x ½” made from a white ABS. With aluminum tooling, this design is a straight pull with no undercuts. This part would be considered a simple part with no complex geometry. In showing the data, the breakeven point would be at the quantity of 250 units. To buy less than 250 units, it is more cost effective to use DDM and after 250 units, an aluminum tool is more beneficial.

**PART #2 | SPACER**

This Spacer is made of a black ABS and has the dimensions of 7.21” x 5.95” x .57”. The breakeven number would be at a quantity of 75 units. Again, this part is a simple part with no complex geometry. This product life was only meant to be 60 units and DDM was the perfect fit.

The parts were completed in 3-4 days without any tooling cost.

**PART #3 | GPS COVER**

The top cover dimensions are 9” x 9” x 2” made from a yellow ABS. The breakeven area is around 30 parts. This customer ended up needing thousands of parts to fulfill their low-volume production needs so the aluminum tool was very beneficial. The tools were completed in 2-3 weeks and used for over 10,000 parts. The matrix shows that you need to understand the quantities for your product to best choose your manufacturing method.

**PART #4 | CIRCUIT PLUG**

This circuit plug has complex geometries. We made assumptions in this matrix to show data with this part having one, two and three undercuts to show how different the breakeven points can be based on geometry. DDM has no biases to complexity, because it builds layer upon layer. Rapid Tooling needs to capture these features with a hand pick-out. The plug is 3” x 2” x 1” made from black polycarbonate. Depending on the complexity, the breakeven point floats between 100 and 220 parts.

Choosing your manufacturing method greatly depends on the size and the complexity of your part. Use these matrices to better understand where the value add is in each of these technologies. Be sure to always evaluate and re-evaluate your projects because each of these methods may not be niche specific.  

*Continued on page 9*
Upper Midwest Section (S22)  
Membership  
February, 2009  

Total ............................................513

CALENDAR OF EVENTS

March 12, 2009  
NETWORKING EVENT

March 31, 2009  
MINITEC

July 31, 2009  
Upper Midwest Section  
Golf Outing  
Oak Marsh Golf Course in Oakdale  
Watch for details in future issues.

Networking Event  
THURSDAY, MARCH 12, 2009  
DETAILS ON PAGE 11
At our last Council meeting in October, elections were held for various SPE Intl officer positions for the 2009-2010 year. The results were:

President Elect – Ken Braney
Senior VP – Russel Broome

In addition, the proposed 2009-2010 budget was approved with one major impact on Sections and Divisions. The approved budget has a reduction in rebates to all Sections and Divisions in the amount of 2/3 of the formula amount that normally would have been rebated. SPE HQ did make concessions also but this is a big hit for the Sections in particular with the Divisions typically being in better financial shape than the Sections. Our Section is in reasonable financial shape but we will have to balance expenditures with income generation. We have plans to provide interesting and educational Mini-Tecs to allow our Section membership valuable learning opportunities while maintaining our financial position to help fund other activities of benefit for our members.

Our Student Activities Committee continues to work hard to provide incentives for students to join the SPE. We are looking at initiating a resume book for graduating students. We most likely will be looking for sponsor companies to help fund the effort with the sponsor companies getting an early look at the resumes. The book will also be available in a CD format. We are considering a survey for the students that would provide much of the input for the resume book. We are working with the SPI for possible distribution at the 2009 NPE. The resumes may also be posted on the SPE website.

While we anticipate a dramatically reduced attendance of students at this years ANTEC because of the co-location with NPE and the late event date (many students may be in their new employment), we still must provide attractions and events for those students attending. We are considering these possible activities: special tours for students, webcam events, speed interview sessions, workshops on interviewing or resume writing, free transit passes, housing blocks, and possible use of dorms at U of Chicago.

As a member of the Educational Awards Committee, much effort has been given to informing and attracting educational institutions and SPE Sections to apply for the various awards available. Last year only three schools applied for the $2500 Chase Plastics Student Chapter Education Award. Only six schools applied for the Outstanding Student Chapter Award. And only six Sections applied for the $5000 Husky Section Education Award. I am very pleased to announce that our Upper Midwest Section did apply for the 2009 Husky Award and I would like to personally thank Eric Swensied, Dan Mishek, and a special thanks to Paul Rothweiler for the efforts to author our submission.

On other local Section news, we have a new Section President. Richard (Dick) Bopp has accepted the gavel from Paul Rothweiler. Dick has been a very active member of our Board in the roll of Membership Chair and will be a very capable President for our Section. I would also like to take this opportunity to extend a hardy “Thank You” to Paul Rothweiler for his outstanding tenure as our Section President. As with every good leader, Paul is leaving our Section in a better position than he received it. Paul will remain as an active member on our Board as Past President.

Please plan to attend the announced Mini-Tec in this issue and bring your work colleagues. The knowledge gained is only part of the benefit with face-to-face networking also being a great benefit. These Mini-Tecs are one of the best values for updating your knowledge on various aspects of our industry. While many technical seminars are priced at $495, $795, $1,295 and more, we shorten the content and travel required and are very affordable at $20-25 per Min-Tec session.

And I will close with my standard pitch for you to help make our Section a more vibrant, growing Section by urging you to help us recruit your vendors, customers and colleagues to join our Section. Please contact any of the Board members listed on the back of our SPEcialist for more information. Thank you for your assistance.
FINAL THOUGHTS

As we see our trends hold true to produce lower-volume products with higher margins, overseas suppliers are less competitive. The need for speed is at a premium along with quality. Commodity buyers are being asked to evaluate best ways to produce new products. My suggestion is that it begins before that. Engineers and designers need to be aware of these options. Imagine if you are designing your next product knowing you will be using DDM. Using this method of production, you can design without draft, radii and design parts with trapped volume or reverse undercuts. Without deciding this upfront, the design must be designed in a traditional fashion.

As we come to an end in our 3-part low-volume production discussion, I hope that you have had the courage and the foresight to look to the future of your design and your method of manufacturing. Our country is only as strong as our manufacturing. Use these technologies and their advantages to keep manufacturing alive and well in the United States. You and your products will benefit for tomorrow.

Dan Mishek is the Sales Manager and part owner of Vista Technologies. Dan has been published in Moldmaking Technology, Injection Molding, Manufacturing Engineering, and Time Compression. He has also presented at the RP&M Show (‘07) in Chicago and Mold Making Expo (‘07–’08) in Chicago and Detroit. Dan Mishek graduated from Mount Mercy College in 1997 with a double major in Marketing and Public Relations. He started at Vista Technologies in 1998. Dan manages Vista's direct sales people and directs the marketing efforts to better assist Vista's 1600+ customers.

Vista Technologies was founded in 1996. Vista is a full-service Rapid Prototyping, Rapid Tooling and Injection Molding Service Bureau. Today, this privately held company has in-house capabilities of SLA, Polyjet, FDM, High Speed Milling, Mold Making, and Injection Molding.

Continued - Spotlight on the Board "Ajay Gupta"

resins for injection molding applications with Professor Bhattacharya. And, now for the last eight years, I’ve been working at Boston Scientific in Maple Grove where I design and develop polymer components and new manufacturing processes for the production of catheters. Rounding out my understanding on the business side of the plastics, I burned some midnight oil to also complete an MBA from the Carlson School of Management.

A few years back I reached a stage in my career where I felt the urge to give something back to the Society which had nurtured me so well through my formative years. I found myself giving talks, mentoring others, etc., but most importantly working with the SPE Upper Midwest Section board which I joined in 2006. I think my most significant contribution as a board member has been organizing a full day of presentations at the Design for Medical Devices Conference (DMD 2007) in collaboration with Dr. Erdman at the University of Minnesota. Being on our board has been a very rewarding experience and an opportunity for me to contribute and develop in a fun-filled, low pressure, but still challenging milieu. I look forward to continuing my support of the local plastics industry, particularly entrepreneurs starting new businesses in the medical device field. Please feel free to get in touch with me with any ideas, problems or suggestions you may have on how we can make SPE more meaningful for you or your business...or even just to say, “Hi!”
NatureWorks Discovers There Is No Technical Barrier for Recycling Plastic Bottles Made From Plants

MINNEAPOLIS, February 23, 2009 — Following an extensive analysis of current technology, NatureWorks LLC concludes that automated systems being used today in the recycling industry are capable of sorting natural plastic bottles from other plastic bottles with an accuracy approaching 100 percent. This finding is significant because it demonstrates that there is no technological barrier to recycling bottles made from plants instead of oil.

“To become more sustainable, the packaging industry must lower the overall waste, energy consumed, and greenhouse gas emitted from the use of plastics, metals, and fibers,” said Steve Davies, NatureWorks director of communications and public affairs. “Demonstrating that natural plastic bottles can be brought seamlessly into the recycling steam through the use of automated sorting equipment available today is a major finding and another step towards greater sustainability.”

During the past two years, NatureWorks has surveyed equipment manufacturers that have systems with the potential to sort biopolymers from such other plastics as PET, HDPE, PVC, and PS. These sorting systems are usually based on one or more of the following technologies: infrared, ultraviolet, x-ray, color identification, and laser. NatureWorks has identified a dozen companies offering systems than can potentially sort bioresins and has worked closely with three to ascertain actual sorting accuracies.

Titech, www.titech.com, demonstrated the ability of its near-infrared sorting systems to eject concentrated amounts of NatureWorks Ingeo™ natural plastic in a PET sorting operation. Sorting efficiency in a single pass was found to be a minimum of 97.5 percent accurate. This result is consistent with sorting efficiencies for other materials the equipment ejects as contaminants or passes through as desired streams.

Unisensor, http://unisensor.iuveno-net.de/, showed its laser technology was fully capable of sorting Ingeo™ flakes from desired PET flakes at efficiencies of 96 to 99 percent. This is consistent with other plastics considered contaminants in the PET flake stream. (Please make sure the Unisensor link is correct.)

MSS, www.magsep.com, tested Ingeo™ natural plastic in its Aladdin near-infrared system. The test confirmed that Ingeo™ emits a unique polymeric signature. The test demonstrated that Ingeo™ comes up as “other plastics” in a system specifically designed to identify PET, PE, and other plastics. The unique signature of Ingeo™ means that the equipment is programmable to identify Ingeo™ and sort with high accuracy.

WRAP, the internationally recognized not-for-profit company that helps individuals, businesses, and local authorities to reduce waste, conducted a comprehensive assessment of its own. Published in June 2008, Domestic Mixed Plastics Packaging Waste Options, WRAP concluded that, “NIR (near-infrared) systems can effectively remove PLA bioplastic and carton board from a mixed packaging stream.” Ingeo™ is highly engineered bioresin made from Polyactic acid (PLA).

“Accurate sorting is at the heart of making recycling an economically viable business because the recycling operation must be able to separate materials into pure streams — aluminum separated from steel or PET and HDPE plastics from other polymers,” Davis said. “Based on our own work and the analysis of WRAP, we know now that automated systems on the market today can sort natural plastics within industry accepted norms.”

A comprehensive overview of NatureWorks analysis of Ingeo™ bottles and automated sorting equipment can be found at (insert link) on the company’s website www.natureworksllc.com.

In his 14 plus years in the bioplastics industry, Dan Sawyer has worked with NatureWorks LLC in a variety of positions ranging from analytical to manufacturing, applications development and technical support. After a three-year assignment in Asia, Dan has returned to play a key role in bottle and beverage technical and market development and end-of-life issues.

About NatureWorks LLC
NatureWorks LLC is a company dedicated to meeting the world’s needs today without compromising the earth’s ability to meet the needs of tomorrow. NatureWorks LLC is the first company to offer a family of commercially available low carbon footprint biopolymers derived from 100 percent annually renewable resources with performance and economics that compete with oil-based plastics and fibers.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.
The Upper Midwest section of SPE is proud to announce our first Networking Event of 2009

When: Thursday March 12, 2009 • 5 p.m. to 7 p.m.
Where: Alaska Eatery and Glacier Bar
6501 Wayzata Boulevard
St. Louis Park, MN 55426
Who: Everyone in the plastics industry
Why: It is FUN! Plus, there has never been a better time to get to know your fellow professionals in the plastics industry. You never know when you will need it.

Cost: FREE!! Food and Drinks off the Happy Hour menu are extra.

If you have any questions please feel free to e-mail me at: EricS@Harbor-Plastics.com

If you plan to come please e-mail me so I can make sure we have enough space reserved.

upper midwest section
GOLF
july 31, 2009
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CALENDAR OF EVENTS

March 12, 2009
NETWORKING EVENT

March 31, 2009
MINITEC

July 31, 2009
Upper Midwest Section
Golf Outing
Oak Marsh Golf Course in Oakdale
Watch for details in future issues.

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