

# SPE THE SPECIALIST

**November  
2010**

*Volume 38*

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## Section MiniTec

WEDNESDAY, MARCH 30, 2010

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## The Madison Group

### Failure Analysis of Plastics – Jeffrey A. Jansen

Introduction to Failure Analysis

What is a FA

Goal of a FA

Why Perform a FA

The 5 Factors Effecting Plastic Part Performance

Material

Design

Fabrication

Installation

Service Environment

Ductile to Brittle Transitions

Temperature

Strain Rate

Time

Molecular Weight

Chemical Contact

Steps in Conducting a Failure Analysis

Approach

Tests

Case Examples

**Jeffrey A. Jansen** is the Engineering Manager at The Madison Group, an independent plastics consulting firm. Jeff specializes in failure analysis, material identification and selection, and aging studies for thermoplastic materials. He has performed over 900 failure investigations, both for industrial clients and litigation work. Jeff is a graduate of Carroll College and the Milwaukee School of Engineering. He has authored numerous articles and an ASM handbook chapter relating to failure analysis. Jeff has also taught several seminars on plastics failure analysis, chemical effects of plastics, and basic rubber technology.

**For reservations or questions, email Daniel Mishek at [Danny@VistaTek.com](mailto:Danny@VistaTek.com). If you don't have access to the internet then call Daniel Mishek at 651-653-0400**

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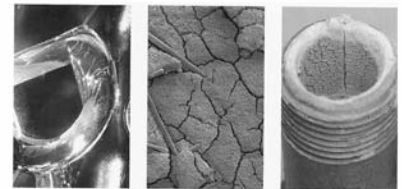
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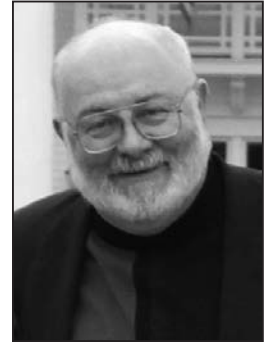
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# President's Remarks

Dick Bopp



## **A Night of Good Fun, Good Company and Good Works**

I'm not sure that you all remember Friday, January 14th. It was only a little bit ago—really in the middle of last month as I write this. But, somehow it feels like it was last year to me. Maybe it's because of some thermal shock from my vacation in Florida last week. I don't know. Anyway, as the title says, it was a night of very many good things...and I even left out the "good food." But, unlike almost every other case I can think of, sometimes one can actually have too many good things...at least that can be the case when you are constructing a title for the next issue of The SPEcialist. But, I digress. The night was that of our Section's annual award dinner held at the Chanhassen Dinner Theatre and it snowed and snowed and snowed. Still, the entire Upper Midwest SPE contingent showed up for all the fun and "goodies" including the opportunity to recognize Sean Mertes and Rolly Enderes for their outstanding contributions to our Section.

As I am sure you know, Sean is stepping down from Technical Program chair after more than 8 years service in providing our Mini/MegaTech events which have been the "meat and potatoes" of our Section's educational program. Dave Erickson thanked Sean for his outstanding service and presented him with a plaque to commemorate the occasion. We are indeed fortunate not only to have had the benefit of Sean's interesting and informative programs, but also his great example at how to make a challenging job look like it's no sweat. Thank you, Sean, for a job very well done. I look forward to continuing to work with you on the board in your new mentoring roll as Dan Mishek takes up the reigns of Technical Program Chair.

Special recognition was also deservedly given to Rolly Enderes who is our hardworking newsletter editor and our webmaster. If you haven't already done so, I'd encourage you to check out his work on our website, [www.uppermidwestspe.org](http://www.uppermidwestspe.org). Rolly's actual title should be CCO, chief communications officer, since he is responsible for putting together virtually all the communications from the board to our membership...although at times I'm sure he may feel more like the section "cat wrangler" as he cajoles us to submit our columns for the next edition before deadline. It has been my pleasure to work with Rolly over the years as he consistently publishes an outstanding--and one of the few remaining "hard copy" newsletters--in SPE. We are indeed fortunate to have his talent, expertise and "can do" attitude as we go forward for yet another year.

Both Sean and Rolly were recognized with plaques and certificates commemorating their outstanding contributions. They and their wives, Tanya and Mel, were special honored guests of the Section for the evening.

And yet, the success of a Section such as ours is truly derived from the hard work and commitment of our entire board of directors—volunteers, all. It was my pleasure to recognize each of the directors present with certificates of appreciation for their individual contributions. It has been my distinct honor to have had their support over the last two years. I look forward to our continuing work together for even better things to come going forward.

After dinner we all enjoyed a very entertaining and lively presentation of "All Shook Up."

What more is there to say? Thank you all...and Rock On!

## WELCOME TO OUR NEW MEMBERS

Dan Mishek, Membership Chairman  
Email: Dan@vistatek.com • Phone: (651) 653-0400



Dan Mishek

**Please welcome our newest members. We are off to a great start for 2011. The SPE looks forward to adding you to this list. Now that you are a member, get involved with the SPE activities. You won't be disappointed.**

<u>NEW MEMBER</u>	<u>AFFILIATION</u>	<u>LOCATION</u>	<u>NEW MEMBER</u>	<u>AFFILIATION</u>	<u>LOCATION</u>
Jeff Anderson	Sanmina-SCI	Turtle Lake, WI	Derek Coover	Raven Industries	Sioux Falls, SD
James Hughes		White Bear Lake, MN	Alex Casillas	Midwest Exchange Inc	Gurnee, IL
Emmanuel Morris		Brooklyn Center, MN	Darryl Tonak		Clark, SD
Junior Gbodai		Minneapolis, MN	Jerry Janicki	FP Intl.	Thornton, IL
Rigobert Nzimi		Brooklyn Center, MN	Daniel Koughan		Eden Prairie, MN
Jerry Roemhildt		Shakopee, MN	Adam Hays	Aqua Poly Equipment, LLC	Elk River, MN
Sarada Pann		Farmington, MN	Scott Blaine	ADC	Shakopee, MN
Mario Olson		Albertville, MN	Steven Gieseke	Donaldson Company Inc	Richfield, MN
Johnny Calderon		Osseo, MN	Joni Davis	Diversified Plastics, Inc.	Brooklyn Park, MN
Dayton Ramirez		Lone Rock, WI	Mary Jo Johnson	3M Company	St. Paul, MN
Mark Smith		Woodbury, MN	Ronald Juedes		Medford, WI
Anthony Padden		Champlin, MN	Christopher Krohe		Saint Paul, MN
Jennifer Millin	UW Stout	Menomonie, WI			
Jesse Dulek	RTP Company	Winona, MN			
Timothy Vanyo	NatureWorks LLC	Minnetonka, MN			

## SPOTLIGHT ON THE BOARD

by Dick Bopp

### *Tim Spahr, Membership Chair*

For this issue of The SPEcialist it is my pleasure to present to you, Tim Spahr, a new board member and our Membership Chair. Tim has been working with thermoplastics for the past 33 years starting with Honeywell MicroSwitch in Freeport, IL in 1979 where he designed permanent magnets in thermoplastic housings for Hall Effect automotive sensors.

In 1987 Tim transferred to Honeywell's plastics processing group, also in Freeport, as a finite element analysis (FEA) analyst responsible for their mold flow programs. As luck would have it, his new job required that he carry out detailed processing studies on all the products he had designed over the previous eight years. So, he got the unique "opportunity" to learn all about the interdependence of product design and processing in an injection molding machine without even the scant satisfaction of saying "I told you so." to anyone, but that guy he saw in the mirror every morning. But, WOW! What a great learning opportunity that must have been.

In 1989, Tim accepted a position with Hoechst Celanese (now Ticona) as a Technical Service engineer responsible for structural, mold filling analysis, tech service and product seminars.

There he added to his understanding of the nuts and bolts of injection molding and picked up much valued additional experience in dealing with

the voice of the customer. He served in this position in Short Hills, NJ and Chicago before moving into highly engineered, thermoplastic technology in late 1993 when he transferred into the Polymer Composites group (now Ticona Celstran), in Winona, MN as Sr. Design Engineer.

In 1998, Tim joined Ticona's technical marketing group as a Sr. Application Development Engineer supporting industrial applications and in 2003 transferred to the Ticona-GUR (UHMWPE) group to develop applications for the melt processable GUR materials.

In 2005 his unique experience with design, product and process development and field experience led Tim to his first position in business development as Market Development Manager for Victrex where he developed new PEEK (polyetheretherketone) applications for the Upper Midwest region. He remained at Victrex until 2009.



Tim Spahr

Continued on page 9

# SPE Tour of The Toro Company

The Upper Midwest Chapter of SPE was hosted by The Toro Company for a tour of its Bloomington, MN world headquarters; and the response from local plastics professionals was, quite frankly, overwhelming. The tour initially had capacity for 50 people. But, because of the extraordinary demand, several more were allowed at the day of the event. Of the attendees, it was a nice blend of SPE members and non-members from an amazing diversity of industries and locations. Most of the people were from the Twin Cities region, but some had traveled from as far away as Bemidji, MN and Sheboygan Falls, WI.

*Left to right – Dan Mishek (SPE Board Member), Richard Bopp (SPE Chapter President) and Todd LeBoeuf (Toro Purchasing).*



After **touring the facility**, SPE also hosted a networking event at Major's Sports Café that drew another 20 people. This was a fantastic way to end a successful chapter event. Everyone had a chance to discuss the tour, share industry insights, and meet new people to strengthen their own personal network. Some background on The Toro Company is given below along with a description of some of the areas highlighted on the tour.



*60+ people attended the Networking Event that followed the Toro Tour.*

The SPE Chapter plans on hosting similar tours of manufacturing facilities in 2011 and 2012. Please sign up early to assure you reserve a spot. Also, if you think your company would be a good facility to host a tour, please contact me at your earliest convenience.

**Where did Toro originally reside?** The original factory and offices were located on Snelling Avenue in Minneapolis.

1952 – Toro opened its engineering and test facility at the company's present Bloomington location. It included expansive grounds used to test a full spectrum of their products on plots with different grasses and field conditions.

1962 – The corporate headquarters were moved to the Bloomington site. One thing hasn't changed over all these years; the company's Bloomington facilities continue to serve as the corporate center for engineering, R&D, and product testing..

**Toro's Test Lab** Toro's test lab covers an area of over 56,000 sq. ft. consisting of 54 test cells, technician work areas, instrumentation labs, and offices. The test group is an important part of the engineering function and is very much involved in the development process that follows six steps, namely concept, feasibility, development, implementation, production, and VOC (voice of the customer) feedback.



*Tilt Table*

*Environmental Stress Screening (Thermal Chambers and Salt Fog)*



*Cold Room*



**Plastic Adding Value at Toro** - Toro uses a variety of plastic/resin technologies to help accelerate development of new products. For example, the company uses multiple RP (Rapid Prototype) technologies to provide marketing groups with "show" units for VOC work, demonstrations and customer meetings. In this way Toro can provide "tangible" and even functional units that can be viewed and used as an operational prototypes.

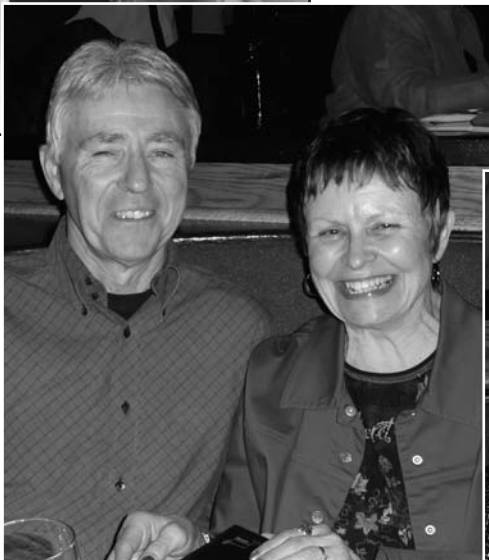
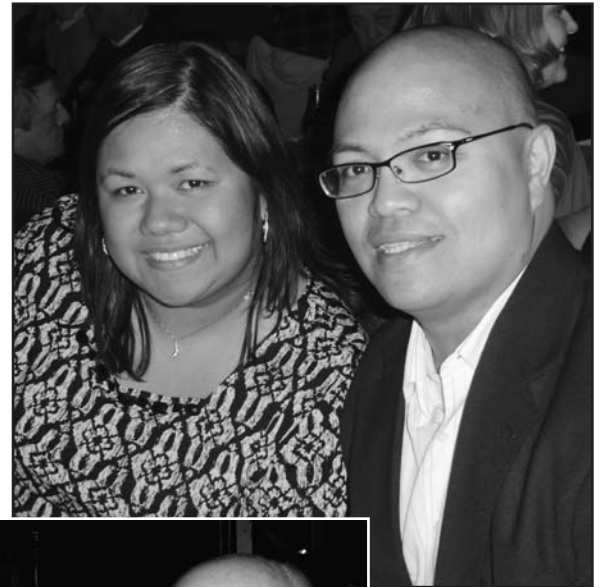
*Continued on page 11*

# SPE Section 22 Awards Ceremony and Dinner at The Chanhassen Dinner Theatre



← Award Recipient - Sean Mertens and Jayne

Award Recipient -  
Rolly Enderes and  
his wife Mel →



Paul and Viv  
Pasche →



←  
Alan and  
Dorothy  
Johnson



← Tom and Sally  
McNamara

Paul and Tracy  
Rothweiler →



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Deb Daily	203.740.5468	dadaily@4spe.org

## Upper Midwest Section (S22) Membership

March 1, 2011

Section Total ..... 429

### OPEN Invitation to all Upper Midwest Section Schools/Colleges to JOIN the Society of Plastics Engineers (SPE)

Here are Top 10 reasons to join the SPE

Student Members of SPE have all the privileges of SPE membership afforded to other member grades, including:

- Reduced SPE membership dues – ONLY \$31.00 per year
- *Plastics Engineering* magazine every month
- Reduced registration for all educational seminars; Reduced registration at ANTEC and other technical conferences
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- Scholarships offered through the SPE Foundation, SPE Sections and Divisions; Cash Awards for Best Paper/Poster at many SPE-sponsored Conferences.
- FREE membership to your local SPE Section; FREE Division affiliation
- Section dinner meetings; technical programs and even Special Events.
- Professional contacts

... and much more!!!

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# Councilor's Corner

Tom McNamara

## Councilor's Corner



The last Council meeting took place on February 11th. This was a teleconference meeting so not as interactive as the normal Council meetings. We apparently are still losing some Sections due to lack of leadership. Central Texas, Hong Kong, Mid-Michigan, St. Louis, and Tri-State have been declared vacant. However, the good news on the overall organization is that after a reduction of more than 2500 members in 2009, we actually had a net gain of over 300 members in 2010. We gained 1000 more new members in 2010 vs 2009 and our attrition rate dropped from 30% to 23%, both positive indicators going into 2011.

This brings us to President Ken Braney's key strategic objectives for 2011.

Membership - - Improve member benefits and delivery infrastructure; initiate new SPE groups outside of its traditional markets; and emphasis on all professional plastic sectors.

Revenue - - Form additional partnerships; provide more licensing opportunities; increase the number of corporate affiliate programs and sponsorships; and implement more disciplined sales programs.

Member involvement & control - - Form a Strategic Planning committee; promote local groups taking local control; and receive input from online activities, social media

A few bylaws were passed with one affecting joining multiple Sections and fees being the same as for belonging to multiple Divisions. Another was concerning Councilor Proxy tenure requirements. Still another was in regards to Council meeting times and places being approved as published.

As far as the financials, the 2010 unaudited results reflect a \$100M + net gain and the SPE Foundation remains in good shape with a gain of over \$125M over 2009 numbers.

The Strategic Planning Committee is very busy looking at alternate operating models for SPE Intl. This

is a huge task and is being investigated with the feeling that a change is necessary for the long term health of the organization. Some of the early models proposed met with a fair amount of resistance and I personally think it was justified. We will have to wait and see what the new model looks like but, again, this is a huge undertaking and resources are limited with this being a volunteer organization.

SPE International is expanding globally with Sections in Europe and Asia. SPE is also sponsoring ANTEC type events in both regions. ASIATEC took place in Tokyo, Japan on February 15-17 and EUROTEC will be taking place in Barcelona, Spain on November 14-15. If you have the opportunity, convince your boss to send you to a technical update in Barcelona around mid-November!!

Also, don't forget that our own ANTEC is coming up fast from May 1-5<sup>th</sup> in Boston. I am told that the paper submissions are up 25% from 2010 and the exhibition sales are on pace with 2010. Also remember to encourage your company to exhibit at ANTEC. It is a great venue to get your name out nationally and our Section will get a rebate for every company that exhibits from our Section's geographic area.

I would also like to announce our newest Board member, Tim Spahr, of Oxford Performance Polymers. Tim has graciously agreed to be our new Membership Chair, while our previous Membership Chair, Dan Mishek, has agreed to take over the role of Program Chair.

I would also like inform you that Sean Mertes won our Sections Meritorius Service award at our recent Awards Banquet. Sean has organized Mini and MegaTec's as our Program Chair for many years and is finally giving up the post due to "exhaustion". Great work Sean. Also Rolly Enderes received our Outstanding Communications award for his fantastic work on our SPEcialist Newsletter and our Upper Midwest Section website. Thanks for all the hard work Rolly!!

And last but not least, I would like all of you to help me congratulate our President, Dick Bopp, for his election as a Fellow of the Society of Plastics Engineers. This is a real honor within the Society as less than 5% of the membership can be elected to this prestigious position. CONGRATULATIONS DICK - - YOU ARE VERY DESERVING!!!!

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## **SPOTLIGHT ON THE BOARD – Tim Spahr**

*Continued from page 4*

Tim is now the Regional Business Manager for Oxford Performance Materials, in the Arkema Group, where he is developing new markets and applications for crystalline and amorphous PEKK (Polyetherketoneketone) polymers, a resin system having even higher temperature performance with a melting point over 340 deg C (640 deg F). Now, that's hot!

If you had the good fortune to attend our MegaTech last November at HTC on "Selecting the Proper Plastic Material," then you heard Tim's expert presentation on "High Performance Resins."

I asked Tim to prepare a brief statement about his involvement in the Society. Here it is in his words:

"In the beginning, I joined SPE to get a better understanding of the plastics industry and to develop a network of industry contacts. I still feel that way today. Involvement in SPE is a great way to network and to stay on top of the new developments (materials and processes) in the industry. I am proud to be a part of the Upper Midwest Section, on their board of directors and to serve in the position of Membership Chair. I look forward to the future as the polymers, processes and markets change."

We are indeed very fortunate to have Tim joining us from Galesville, Wisconsin to serve on our Board as Membership Chair. We all thought it might be a little unfair to ask him to prepare the Membership Matters column for this issue, so Dan stepped up to do double duty. But, I'm sure you'll be hearing more from Tim in the not too distant future. Please join me in welcoming him to our Board and be sure to say, "Hi!" at the next MegaTec on March 30th.

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## **ADVERTISERS WANTED!!**

The SPEcialist is the newsletter of the Upper Midwest Section of the Society of Plastics Engineers and currently circulates to over 800 plastics professionals in the region. At present, the newsletter is published and mailed four times a year. New this year is a website (<http://www.uppermidwestspe.org>) and our plan is to run the print ads on the website, too. Now when you advertise with SPE-Upper Midwest Section you will have even greater exposure than before and we plan to keep the rates we had in the past for the newsletter.

**Rate (per issue): Full Page: \$900; Half-Page: \$450; Quarter-Page: \$225; Business Card: \$75**

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<b>Open positions</b>	<b>\$50</b>
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Once the newsletter is published, you will be invoiced and instructed to issue a check to "SPE, Upper Midwest Section" for the appropriate amount and mail it to Marv Grussing (Treasurer) at 7-SIGMA, 4832 Winterset Drive, Minnetonka, MN. Terms are net 30.

Thank you for your support! Bill Priedeman (Advertising Chair), SPE-Upper Midwest Section S22



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## Applicant Information

**Name:**  
first last mi

**Company Name and Business Address (or College):**  
company/college:  
job title:  
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address:  
city: state:  
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Phone/Fax Format: USA & Canada: (xxx) xxx-xxxx All Others: +xx(xx) x xxx xxxx

**Work Phone:** **Fax:**

**Email:** *used for society business only*

**Home Address:**  
address:  
city: state:  
zip: country:

**Home Phone:**

(✓) Preferred Mailing Address:  Home  Business

**Gender:**  Male  Female

**Birth Date:** (mm/dd/yyyy)

**Demographics**

**Job Function (choose only one)**

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 Design  Quality Control  
 Education (Faculty)  R & D  
 Engineer  Retired  
 General Management  Self-Employed  
 Manufacturing  Student  
 Marketing/Sales  Tech Support  
 Other

**Materials (choose all that apply)**

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 Film  Polystyrene  
 General Interest  TPEs  
 Nylon  Thermoset  
 PET  Vinyls  
 Foam/Thermoplastics  No Interest

**Process (choose all that apply)**

Blow Molding  Injection Molding  
 Compression  Mold Making  
 Compounding  Product Design  
 Engineering Properties  Rotational Molding  
 Extrusion  Thermoforming  
 Fabrication  General Interest  
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WWW

## Continued from page 5 – Toro Company Tour

From the design perspective, plastics help with weight reduction (fuel economy), better weather resistance eliminate corrosion), improve impact durability, and provide attractive styling options. Additionally, plastics often offer a lower cost raw materials option with better recyclability with particular success found in fuel/oil storage applications.

**Why Does Toro Get Involved?** According to Toro, it is important that they stay active in the industry through association relationships and collaboration with industry partners. This enables the company to share expertise and best practices, and ultimately form tighter relationships with external partners.

From the “prototyping” side of the business, industry relationships are very important. Quite often, while developing new products Toro looks for faster, cheaper, and better ways to “simulate” the performance of plastic components in its products. By developing strong relationships with people/ suppliers in the Plastics/Resins Industry, the company not only gets exposure to the “latest and greatest” and “new and improved”, but also ready access to more cost effective alternative raw materials. Any cost savings Toro can realize during the development phase of its products, only enhances the ability to cut costs for end use customers. And technology is key...anything to help Toro get to market faster, is always a great benefit!

**Why does Toro maintain operations in Minnesota?** Toro’s roots run deep in the economic, social and cultural fabric of Minnesota. In the early 1900’s, the Twin Cities was a national hub for agricultural tractor manufacturing. Toro got its start in 1914 providing engines for one of the leading manufacturers in the field – Bull Tractor Company of Minneapolis. At the time, Bull Tractor sold more farm tractors than any other company. By the close of World War II, the company’s founders faced some tough decisions. The original owners decided it was time to sell, but out of concern for the local economy and especially its people, the company wanted to escape the fate of other local companies that had been either shuttered or relocated. So, Toro made a determined effort to find a local group, committed to Minnesota, to purchase the company. Ultimately, the company was sold to a group of buyers led by David Lilly, Robert Gibson and Whit Miller.

This action and their continued commitment to the region reflect the commonality of traditional Minnesota values and those of the company. Toro’s success is founded on a long history of caring relationships of trust and integrity. As Kenneth Goit, the company’s third president put it, “The success of this company is no secret. It has been due to two simple things: building a good product and treating customers honestly and fairly...the only way to success is by fair and honest treatment of customers.” Toro achieves these goals by valuing their employees and empowering them to serve. Toro has always been a Minnesota company and much of its success has to do with its people.

In Minnesota, Toro has manufacturing locations in Windom and Shakopee. Most of the professional product lines are produced in Tomah, Wisconsin and Beatrice, Nebraska. Toro feels that some of the particular challenges facing manufacturers today are: managing capacity, improving their flexibility to better match shifts in demand, and staying cost competitive.

I want to give my personal thanks to the Toro Company for opening its doors to our SPE Section and for their assistance in preparing this follow up article.. Finding welcoming companies, like Toro, who are willing to dedicate the time and effort for a general tour of their facilities for societies like ours is indeed a rarity. It’s easy to see why Toro is a world leader in their industry. Thank you Toro for your gracious hospitality and your great support of the plastics industry in the Upper Midwest. Best wishes for much continued success.

**What’s Next?** Our SPE Section will be hosting similar tours at local plastics manufacturing and research facilities in 2011 and 2012. Announcements will be sent out in our newsletter, The SPEcialist, and by email. Please be sure to make your reservation early as the tour group size is usually limited. Also, if you think your company would be a good facility to host a tour, please contact me, Dan Mishek, Technical Program Chair, (dan@vistatek.com) at your earliest convenience.



The image shows the logo for Forming Solutions Inc. It features a green silhouette of a tree above the text "FORMING SOLUTIONS INC" in bold black letters. Below the logo, the text "Consult - Design - Prototype - Engineer" is written in orange. Contact information for Jeff Ewert (218-556-4353) and Scott Bradley (763-463-9690) is provided, along with the website "www.formingsolutionsinc.com". At the bottom, the tagline "Everything thermoforming related, except production parts." is written in bold black text.

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## CALENDAR OF EVENTS

April 7-8, 2011 - SPE Thermoset  
Conference - Chicago, Illinois

Trump International Hotel and Tower,

May 1-5, 2011 - ANTEC 2011- Boston,  
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Hynes Convention Ctr, Boston Marriott Copley Center Hotel

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