



EXTRUSION DIVISION NEWSLETTER

WINTER 2015
VOLUME 40, ISSUE 1

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A Message From the Chair



It is that time of the year again! In about a month, many plastics professionals will be gathering in Orlando for the SPE's Annual Technical Conference (ANTEC). This year, ANTEC will be co-located with NPE2015, so there are many reasons to come to Orlando, March 22-27. Once again, the Extrusion Division will have a full program with seven sessions including two tutorials, one for single screw and one for twin screw extrusion. We will be hosting our Annual Business Meeting on Tuesday afternoon, followed by a reception to honor and meet the recipients of this year's awards. Come to mingle with friends old and new, exchange ideas and network! You'll see the Extrusion Division's entire

agenda in this newsletter.

A few months ago, we announced an initiative to involve more younger professionals (YPs) by forming a YP committee. We are very pleased to have identified two highly qualified young engineers who will join our board: Graciela Terife from Merck and Richard Kanarski from Davis-Standard. They will be officially joining us at the Board Meeting in Orlando. We look forward to working with them, and integrating their ideas into our future.

We continue with the effort to improve communication with our members. We are in the process of revamping our Extrusion Wiki website. The new website is currently functional and is being updated with new content. The goal of the Extrusion Wiki is to provide extrusion tips and technical articles which will be useful for anyone involved in extrusion. More importantly, this Wiki will accept content from users, which will be reviewed for appropriateness. This will be a great place to learn and share knowledge. We look forward to your involvement in this.

Come and meet your Extrusion Division Board members in Orlando! We look forward to meeting you!

Karen Xiao, Ph.D.

SPE Extrusion Division Chair, 2014-2015

Email: Karen.xiao@celgard.com



Check Out the New SPE Extrusion Division Website

extrusion.4spe.org

2015 ANTEC Extrusion Sessions

Monday AM

Mixing/Compounding Moderator: Greg Campbell

	Paper #	Author	Affiliation	Title
8:30 AM	2118661	Campbell, Gregory	Castle Research	A Review of Some Important Mixing Processes for Single-Screw Extruders
9:30 AM	2098279	Wetzel, Mark	DuPont	The Effects of Particle Type, Size and Compounding Conditions on the UV Durability of Thermoplastic Elastomers
10:00 AM	2139365	Fukuda, Graeme	University of Maryland	Combinatorial Effects of Kneading Elements on Mixing in Twin-Screw Compounding
10:30 AM	2097690	Marulanda-Paz, Gonzalo	B&P Process Equipment and Systems	Abrasive Wear And Speed Relationship In Technical Compounding

General Extrusion I Moderator: Karen Xiao

8:30 AM	2093615	Hyuang, Wenyi	The Dow Chemical Company	Heat Transfer Simulation for a Continuous Annealing Process of Plastic Sheets
9:00 AM	2091126	Womer, Timothy	TWWomer and Associates, LLC	Extrusion Screws for Thermoplastic Composites
9:30 AM	2089045	Ponting, Michael	PolymerPlus LLC	Advances in 1D & 2D Layer Multiplication Coextrusion for Film and Non-Woven Fiber Applications
10:00 AM	2093628	Huang, Wenyi	The Dow Chemical Company	Effect of Rheology on the Morphology of Coextruded Microcapillary Films
10:30 AM	2082799	Spalding, Mark	The Dow Chemical Company	Process Optimization of Single-Screw Extrusion Systems for Polyolefin Resins

Monday PM

Twin-Screw Extrusion Moderator: Jane Spikowski

1:30 PM	2081980	Matsumoto, Koki	Doshisha University	Dispersion Effect of Extensional Flow for PP/CNT Nano-Composite with Blister Disk of Twin Screw Extruder
2:00 PM	2136364	Ertl, Johann	Henschel ExtruTec	Development Of A New Type Of Melt Pump

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2015 ANTEC Extrusion Sessions

Monday PM (cont.)

Twin-Screw Extrusion Moderator: Jane Spikowski

	Paper #	Author	Affiliation	Title
2:30 PM	2094759	Laske, Stephan	Polymer Processing Austria	Investigating the Influence of Filler Type, Particle Size and Weight Fraction on Rheological and Thermal Behavior of Polypropylene/Blast Furnace Slag Microcomposite
3:00 PM	2098070	Russell, Kenneth	Optimized Compounds, LLC	Melt Temperature Measurement in Compounding
3:30 PM	2096653	Herken, Tobias	Kunststofftechnik Paderborn	Process Optimization – A New Model for Calculation of the Axial Temperature Curve for Twin-Screw Extruders
4:00 PM	2103090	Amba, Rakshit	SABIC	Downstream Pigment Feeding for a Twin-Screw Compounding
4:30 PM	2093809	Li, Changjin	Beijing University of Chemical Technology	Advanced Preparation Technology of Electrically Conducting Composites with Microlayer Structures
5:00 PM	2139631	Shahid, Ahmed	University of Ontario	Experimental Study to Investigate Optimal Process Conditions for Consistency in Coloration of a Compounded Plastic Grade
General Extrusion II				
1:30 PM		Richard Spontak	International Award Winner	
2:30 PM	2087485	Wagner, John	Crescent Associates	Characterizing an Extrusion Process Using Design of Experiment (DOE)
3:00 PM	2090713	Rieg, Peter	Battenfeld-Cincinnati Germany	Improvements in Processing Semi-Crystalline Polymers for Thermoforming Sheet in Multiple Nip Systems
3:30 PM	2081362	Lessmann, Johann	University of Paderborn	Parameterization and Validation of Discrete Element Simulations Regarding the Pressure Propagation in Plastic Pellets Bulk
4:00 PM	2079061	Brockhaus, Sebastian	University of Paderborn	Effects of Barrel and Screw Heating in Rubber Extrusion
4:30 PM	2158006	Greenlimb, Peter	Chemengineering Corporation	Extrusion Performance Fluids - Crucial in Maintaining Water-Cooled Extruder Efficiencies

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2015 ANTEC Extrusion Sessions

Monday PM (cont.)

Twin-Screw Extrusion Moderator: Jane Spikowski

	Paper #	Author	Affiliation	Title
5:00 PM	2124756	Huang, Keyuan	The University of Akron	Effect of Degree of Crosslinking on Ultrasonic Decrosslinking of Peroxide Crosslinked High Density Polyethylene
5:30 PM	2139020	Ketteler, Christoph	University of Duisburg-Essen	Integrated Waste Heat Utilization for Extruder Barrels by Interconnection of Fluid Streams

Tuesday AM

Dies/Films

8:30 AM	2151887	Catherine, Olivier	Cloeren Incorporated	A Practical Example of Film Extrusion Process Troubleshooting and Fine Tuning
9:00 AM	2095243	Ozdemir, Ozgun	Clemson University	Continuous Extrusion of LLDPE Films Modified with Hexagonal Boron Nitride Nanoplatelets
9:30 AM	2118346	Neubert, Benedikt	University of Duisburg-Essen	A Numerical Verification and Experimental Validation of the Multi-Jet Cooling System for the Blown Film Application
10:00 AM	2094397	Gupta, Mahesh	Michigan Tech University	Virtual Fine-Tuning of a Profile Coextrusion Die using a Three-Dimensional Flow Simulation Software
10:30 AM	2097255	Eslami, Hassan	Macro Engineering and Technology	Understanding Spiral Mandrel Dies: Layering Effect and Gauge Uniformity

Single Screw Tutorials Honoring Frank Nissel

8:30 AM		Kevin Slusarz	American Kuhne	Basic Fundamentals of the Major Components of a Single Screw Extruder
9:00 AM		Tim Womer	TWWomer and Associates, LLC	Extrusion Screws for Thermoplastic Components- General Design Info and Materials of Construction
9:30 AM		John Perdikoulis	Compuplast Canada Inc.	Analysis of Some Common Extrusion and Coextrusion Problems
10:00 AM		Mark A. Spalding	The Dow Chemical Company	Metering Channel Flows and Troubleshooting Single-Screw Extruders
10:30 AM		Maria Noriega	ICIPC	Energy Efficiency in Single-Screw Extrusion

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2015 ANTEC Extrusion Sessions

Tuesday PM

Twin-Screw Tutorials Moderator: Adam Dreiblatt

	Paper #	Author	Affiliation	Title
1:30 PM		Adam Dreiblatt	Century Extrusion	Computer Modeling of Twin-Screw Compounding Using One-Dimensional Process Simulation
2:00 PM		Tony Neubauer	Materials Processing Consultants	Twin Screw Extruder and Continuous Mixer Rate Limitations
2:30 PM		Bert Elliott	Leistriz	Top Tips for Effective Vacuum Degassing on Twin-screw Extruders
3:00 PM		Paul Anderson	Coperion	Scale-up, the Bump in the Road for Development to Commercialization
3:30 PM		Ken Russell	Optimized Compounds, LLC	Melt Temperature Measurement in Compounding
4:00 PM	Extrusion Division Awards and Business Meeting			

MARK YOUR CALENDARS FOR MAY 14

The Extrusion Division will be holding a Minitec at the University of Massachusetts-Lowell. The program will include talks, tour, reception and tabletops. For more information, email Charlie Martin at cmartin@alec-usa.com.

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Tech Tips

An Engineer's Five-Step Plan to a Seamless Extruder Start-Up

By Eldridge Mount

Many new lines are built and commissioned every year and the large majority of them come online producing in-specification product in a short period of time, if not from the initial start. There are however, lines where nothing seems right or to go well at the point where production is required. The questions that are raised at that point are:

1. Why is this happening?
2. Whose fault is it?
3. What do we do to correct the problem?
4. Who pays for the changes?

As you can imagine, this is not a happy time to be associated with the line but with a little extra attention it could have been a resounding success.

So what is the genesis of the few times when a line starts poorly? In my experience it is usually related to the lack of a clear description of what the line is supposed to do, or a poor specification. What do I mean? First you will generally get what you ask for, and if you ask for a film line, you will get a film line. But, if what you really wanted was a line to produce a barrier coextrusion for deep draw thermoforming, you may end up with a line for cast PE or cast PP for bread bags! It is all in how you ask (side bar A: creating a new line specification; asking for what you want).

Assuming you have specified the line well, how can you make sure the line starts to produce sellable goods in the minimum time? There are five start-up steps every business owner, manager, project manager and process engineer should know when installing and starting a new line. These five steps should be performed in sequence and not all at once during the line start in production.

1. The "smoke test" (turn it on and make sure it keeps working).
2. Check that all critical process safety or shutdown switches and indicators are operational. Any item which can cause a runaway must be checked carefully.
3. Ensure all of the moving parts of the line turn the right direction and don't shake themselves to pieces or suffer from excessive wear at start up.
4. Confirm the design calculations of each critical process component by measuring the actual performance with the materials you plan to use.
5. Start the line and begin the process of making the product to specification. Once again measuring the performance against targets.

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Tech Tips

An Engineer's Five-Step Plan to a Seamless Extruder Start-Up (continued)

These five steps can be done in sequence as each component is installed, prior to shipping to your location and in combination with other installed components. For me, one of the most critical steps is step four, as it determines if the line will be able to produce product at the rate and quality that you need for maximum productivity and profit.

Five steps—almost sounds almost too simple—but it is very necessary to ensure that all is well when product production is scheduled and new capacity is needed. A poor line start up benefits no one, except perhaps your competitors.

Who is responsible for all of these checks? Ultimately the purchaser, but how and who conducts the checks, pays for necessary modifications etc. are a partnership with the supplier (if a turnkey) or critical component suppliers. At times there may be multiple entities responsible for the final outcome. This has to be clear in the contract for the supply and installation of the line and various technology components. If it isn't clear who is responsible for a poor start (it could be you!), then you can only hope for honest suppliers who stand behind their equipment, or perhaps the courts. Make sure they did not supply a terrific line for the production of a product you did not really want.

Click [here](#) to download this article in its entirety.

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Marino Xanthos, Ph.D.



Marino Xanthos Ph.D. was a professor of Chemical, Biological and Pharmaceutical Engineering, Associate Provost for Graduate Studies, and Senior Technical Adviser to the Polymer Processing Institute (PPI) at NJIT until his passing in the summer of 2013. Dr. Xanthos earned a bachelor's degree in chemistry from the Aristotelian University of Thessaloniki and master's and Ph.D. degrees in chemical engineering from the University of Toronto, where he studied under Professor R. T. Woodhams.

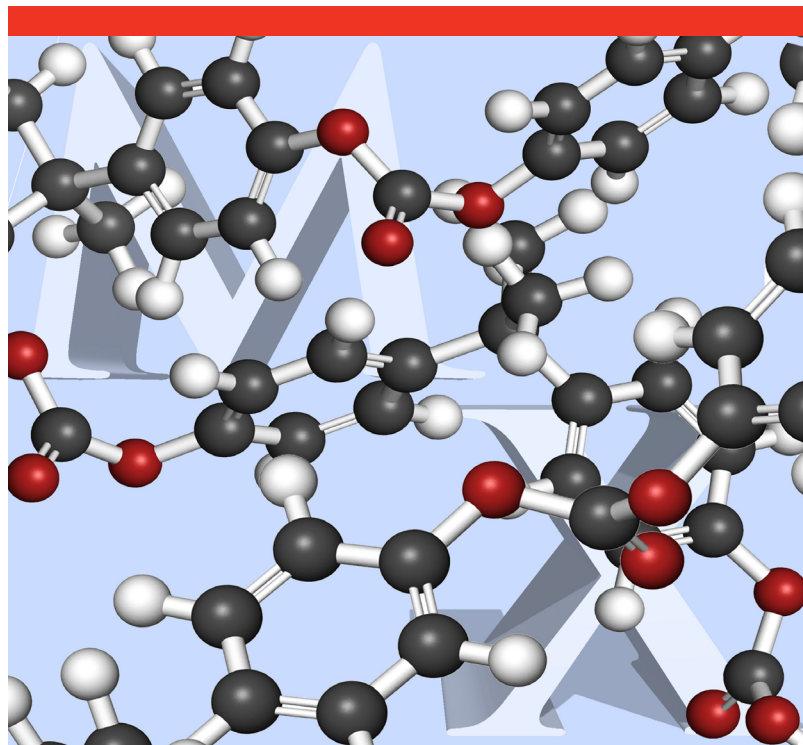
After receiving his doctorate in 1974, he joined the research division of Martin Marietta Resources International, where he eventually rose to the position of Research, Development, and Technical Services Manager. From 1980 to 1986 he served as professor and later as director of Stevens Institute of Technology overseas International Programs Office Department of polymer science, engineering and technology, jointly operated with the Algerian Petroleum Institute. During the period of 1987 to 1995, he was the research director of the PPI and Stevens Research Professor. He was appointed professor of chemical engineering at NJIT in 1995, where he served until his passing as Director of the Polymer Engineering Center, Director of the Center of Processing of Plastics Packaging, Chairperson of the Executive Committee of the Materials Research Council, Senior Technical Adviser to the PPI at NJIT, and finally Associate Provost for Graduate Studies.

Dr. Xanthos was internationally recognized for his polymer blends, polymer composites and polymer foams expertise, and his studies on polymer modification through the use of functional particulate additives and reactive extrusion processes, which he also applied to the processing of pharmaceutical oral dosage forms. His research work and publications involved Ph.D. and master's students at NJIT and Stevens, for whom he was a renowned mentor and adviser. He was also involved with PPI technical staff and industrial colleagues nationally and internationally in the solution of numerous important industrial problems.

Dr. Xanthos became a Fellow of the Society Engineers (SPE) in 2003 and received the NJIT Board of Overseers Harlan J. Perlis Award that same year in recognition of his exemplary scholarship and outstanding research in the field of polymers. He served as the U.S. representative to the Board of the Polymer Processing Society since 2005. In 2010, he received the Heinz List Award in recognition of his outstanding achievements in Reactive Processing and Devolatilization

Dr. Xanthos cared for deeply and was a renowned mentor and advisor to his graduate and undergraduate students. For many years, he was the advisor and life force of the NJIT student chapter of the Society of Plastics Engineers (SPE).

This lecture series was established by his two sons Dimitris and Harris, as well as his friends and colleagues to memorialize his accomplishments and love of his chosen field.



Marino Xanthos Memorial Lecture 2015

The Unusual Rheology of Concentrated Suspensions

Morton M. Denn, Ph.D.
*Benjamin Levich Institute
City College of New York*

Wednesday, March 11, 2015



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What is The Plastics RACE?

The Plastics Race is a team-centered, Smartphone-based question hunt in which teams of four young plastics professionals and soon-to-graduate students (all current and active SPE members) compete for exclusive prizes totaling over \$12,000.

Using a supplied map, each team plots their own course from one sponsor location to the next, answering questions which can only be accessed by visiting the sponsors' booth!

Following their course and using a specialized mobile application, one participant from each team will scan a specialized code posted in the sponsor's booth. This code will automatically populate a randomly generated question which will test the team's knowledge in the fields of polymer science, polymer chemistry, plastics engineering and more.

At the end of the six-hour race points are totaled, winners determined and prizes awarded!

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- Bring traffic to your booth and enhance your visibility
- Attract students and young professionals



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- ▶ Connect with future employers; find out who will be recruiting
- ▶ Test your knowledge of plastics and polymers
 - ▶ *Race for amazing prizes!*



REGISTER FOR THE RACE TODAY!

www.4spe.org/antec/tpr



WHEN & WHERE

ANTEC 2015



TUESDAY, MARCH 24, 2015

10:00 AM - 4:00 PM

WEST & SOUTH EXHIBIT HALLS

\$20 REGISTRATION FEE
(INCLUDES GREEN RACE SHIRT)



PRIZES & AWARDS

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Four \$600 Apple Gift Cards

3rd PLACE TEAM

Four \$400 Apple Gift Cards

*Additional prizes & awards
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Brought to you by SPE's
Next Generation Advisory Board

The Source of New Plastics Leaders!



"As a student member of SPE, I've been given many opportunities to network and learn about the industry primarily through conferences and events. My first conference was ANTEC® in May 2014 and it was an eye opening experience that I will never forget. Next Generation put together a Plastics Race that enabled participants to explore the city of Las Vegas, network with everyone there, as well as learn new things about plastics. There were riddles to be answered and the top four teams won prizes such as an iPad for the team that came in first, iPod touch for second, iPod nano for third, and iPod Shuffles for the team that came in fourth. Next Generation did an amazing job encouraging the participants to do their best, have fun, and I know that they'll make Orlando an even better experience in 2015!

I encourage everyone to attend every conference they can. I especially encourage students to attend because they are the future of the industry and learning what companies are doing now will help to understand what you can do to change the industry for the better."

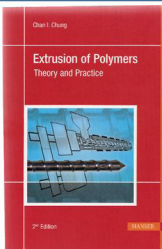
**Julia Gilchrist, SPE Student Member
Pennsylvania College of Technology**



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Extrusion of Polymers, Theory and Practice (2nd Edition) Chan I. Chung

This book focuses on the fundamentals and design of single-screw extruders, providing the reader with the necessary tools for basic equipment design. The first three chapters provide basic knowledge for single-screw extruders, twin-screw extruders, and polymer science. These chapters set the stage for Chapters 4 and 5 for theories on single-screw extrusion, screw design, scale-up, and high performance screw designs. Prof. Chan Chung was one of the original innovators in barrier screw designs and the co-inventor of the very successful Energy Transfer (ET) high performance screw. Three new chapters were included with the second addition: i) Viscoelastic Effects of Melt Flow written by Joseph Dooley, ii) Die Designs, and iii) a chapter on a Special Single-Screw Extruder with Channels on the Barrel. All proceeds from this book are donated to the Extrusion Division.

Ontario Student Chapter Tours SABIC



The SPE's Ontario Student Chapter was inaugurated in November 2013. The main objective of the Chapter is to connect students with professionals in the field of polymers and provide insight into polymer industries, laboratories and research institutes. Members of the Chapter are from Queens University, McMaster University, University of Waterloo, University of Western Ontario and University of Ontario Institute of Technology. In late August of last year, SPE-ON Student Chapter had its first plant tour at Sabic Innovative Plastics in Cobourg, Ont. Sabic is a diversified company, active in chemicals and intermediates, industrial

polymers, fertilizers and metals. Sabic Innovative Plastics is one of the leaders in thermoplastics materials. The plant at Cobourg is a manufacturer of small lot custom colored pellets and sheets (ABS, polycarbonate and other thermoplastic resins). Dan Ross, operations leader, provided an impressive introduction about the company.

The introductory presentation was followed by visit to quality laboratory. Students learned about standard tests and protocols to ensure consistent quality product. Sabic's plant is equipped with high class compounding extruders, dry mixers and sheet making extruders. The plant tour provided information about compounding process and Sabic's environment, health and safety policy.

The tour was concluded with thanks note from Student Chapter's President, Manoj Nerkar. SPE Extrusion Division's sponsorship for the tour is greatly appreciated by the Chapter.

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Student Chapter Embarks on Tour of Great Northwest

For the past 17 years, the Western Washington University SPE/SAMPE Student Chapter has lead a student trip to tour multiple manufacturing companies between Bellingham, Washington and Portland, Oregon. Last year the trip took place on Oct. 16-17. The student chapter took 39 students to 6 facilities in the fields of aerospace composites, injection molding, and sporting goods.

On the way to Portland, the members toured the Boeing

Frederickson Composites Manufacturing Center, where the entire 777 tail section and the 787 vertical stabilizer are manufactured. Everyone raved about what an awesome experience it was to see Boeing's cutting edge fiber placement technology in action. Thursday concluded with a pizza dinner and a speaker from Denton Plastics, who explained how they revitalize post-industrial plastic waste by cleaning/sorting, extruding, and re-pelletizing.

After staying at a hotel in Portland Thursday night, students gained insight into the entire injection molding process on Friday by visiting Bestco Inc., Epson Portland, and R&D Plastics. The students also had a great time touring DeMarini Sports and Nike in-house-manufacturing (IHM). Students helped test DeMarini's carbon fiber-aluminum hybrid baseball bats by taking some swings in their testing center, and learned about their lean bat assembly process. At Nike IHM, the students saw how Nike manufactures their high-energy-returning shoe soles with twin sheet thermoforming and blow molding.

Overall, this trip was an invaluable experience for all of the students, who ranged from freshman hoping to find out more about engineering to fifth year seniors seeking connections for a job after graduation. Most importantly however, the trip provided students with real life examples of things that are not done justice in the classroom, such as the complex and continuous dialogue between designers and manufacturers, or the way a business takes on the increasing automation of manufacturing.

Thank you to the SPE Extrusion Division for a generous grant that helped fund this trip!



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Macro Technology (MT) is an independent technology company focusing on consulting and R&D services for the plastics extrusion industry. MT has collected a group of extrusion experts with over 150 years of combined experience. Areas of expertise include: Cast, Blown, Sheet, Foam, Bi-oriented film extrusion, extrusion coating/lamination and extrusion training courses.

Long-Time Extrusion Division Member Rick Knittel Passes

Long time SPE Extrusion Division member Richard (Rick) Knittel passed away peacefully in his home in South Portland, Maine last August. Rick was 79 and his passing followed a courageous decade-long battle with Parkinson's disease.

Rick was born in Newark, N.J., the oldest of four sons. He studied jazz trombone at school and formed a band while still in high school. He earned a B.S. in Chemical Engineering at Cornell University, where he played in the marching band, and formed a Dixieland jazz band, The Cornell Ivy Five.

He began his career in plastics engineering at Union Carbide, and went on to work for various extrusion machinery suppliers, perhaps most well-known for his years at Sano, which specialized in blown-film machinery. With Sano, Rick helped introduce multi-layer film extrusion to North American processors. Over the course of his career, Rick gave many technical presentations at conferences in Asia, Europe, Australia, New Zealand, and throughout the U.S. While living in Maine, he formed a consulting business to the plastics industry, and was called upon as an expert witness in legal cases involving machinery design.

Rick was a member of the New Jersey Jazz Society, and frequently performed at clubs in New York and New Jersey, including the Village Vanguard and The Cajun. He regularly attended the annual memorial weekends in Davenport, Iowa, which commemorated the life of jazz hero Bix Beiderbecke, performing with the Bix Beiderbecke Memorial Jazz Band. He also had the opportunity to play at Preservation Hall in New Orleans. After moving to Maine, he continued playing jazz with different groups and formed the Maine Street Paraders with the late Craig Johnson.

Extrusion Division members likely remember Rick and his jazz band The Hot Polymer 7 performing at many ANTEC events.

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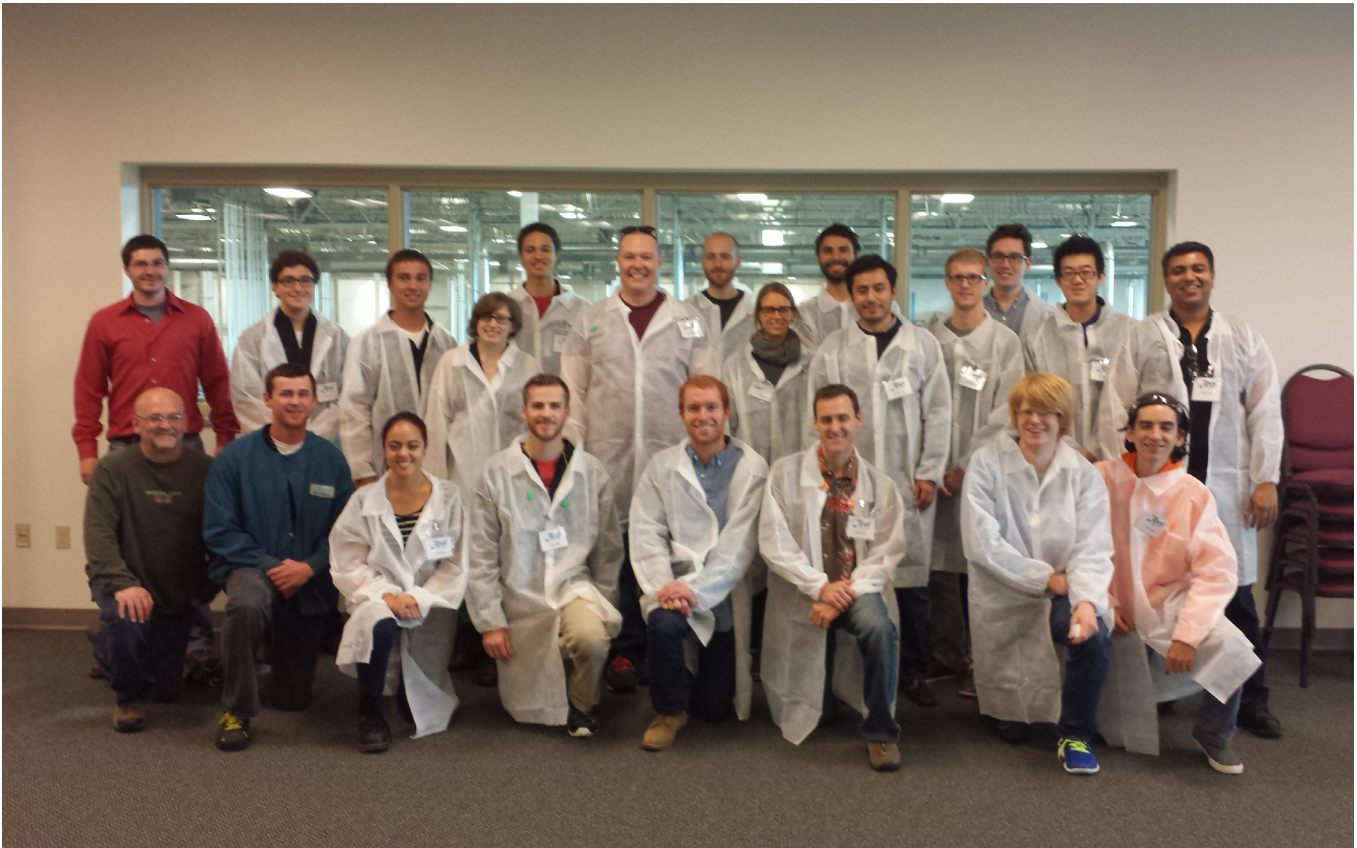
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Wisconsin Students Tour Teel



Last fall, a group of students from the University of Wisconsin – Madison – Society of Plastics Engineers Student Section toured Teel Plastics' facility in Baraboo, Wis. – headquarters, extrusion, finishing, compounding and laboratory sampling products division. The group consisted of members from the school of chemistry, engineering, bio-sciences and pharmaceuticals. The contact from the student section that coordinated the tour is Neil Doll, v.p. of SPE student chapter.

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