SPE SOUTHERN CALIFORNIA

The SPE Press

www.socalspe.org

January 2016

The Southern California Section of the Society of Plastics Engineers
Local information on resources and education available to plastics professionals

SO YOU WANT TO BE A MEDICAL MOLDER!?

What the FDA requires of medical molders

Date: Thursday, January 21, 2016

Jagerhaus Restaurant
525 East Ball Road,
Anaheim, CA 92806
714.520.9500

Registration: 5:30 p.m.

Dinner & Presentation: 6:00 p.m.

Register Now!

Bob Mehta, Principal Consultant & Recruiter B.S. (chem). GIE Services

For those that are interested in becoming a medical molder or have questions on what the FDA requires in order to becoming a successful and leading molder in the medical device industry, this is the presentation for you. We have set up an hour long presentation with a highly knowledgeable speaker to help inform those inquiring minds what they should expect when striving to enter the world of medical molding. Bob Mehta, GIE (GMP ISO Experts) Services will explain what it takes and the steps necessary to becoming FDA compliant from the lowest and highest levels. Besides having an expertise in GMP and ISO, his expertise also spans from Quality Assurance and Control to Auditing and training, which Is why we have allotted for a generous Q&A session after the presentation to answer any questions or concerns future medical molders might have might

Bob Mehta, MBA, MSQA, ASQ, is a consultant and recruiter in the medical device industry and is recognized internationally as an FDA compliance and regulatory expert. Bob Mehta is a Certified Six Sigma Black Belt (CSSBB) with 24+ years of hands-on experience helping Pharma/Biologics/Medical Device manufacturers with implementation/remediation of Quality Systems, CAPAs, and to support Supplier/Internal Audits, Process Improvements, and Training projects. He is currently on the Medical Device Board of Advisors (MDIEC). Bob is also an Adjunct professor at the University of Dominguez Hills, CA teaching courses for Masters of Science Quality Assurance, as well as an adjunct instructor for Medical Device Certification at North Orange Community College. Along with molding young minds, Bob has also written a book titled "Implementing ISO/IEC 17025:2005 - A Prac[illegible]ide".

2016

HAPPY NEW YEAR!

PRESIDENT'S MESSAGE

Happy New Year! The beginning of the New Year brings with it the inherent feeling of a fresh start. As we reflect on our accomplishments from last year, it is important to celebrate and gain momentum from the successes of last year to inspire us for the year ahead.

We are anticipating an active 2016 with many good events Technical seminars, Education Night, Golf Outing, Plant tours and Western Plastics Trade Fair.
Our first event for 2016 is a Technical dinner in which Bob Mehta will give a presentation on what you should expect when becoming a medical molder. This presentation is on January 21st at Jagerhaus Restaurant in Anaheim. I would like to invite you to attend and you can register for this event on our website.

As always, new members are welcome to attend our meetings and events and learn about our activities and programs by the SoCal SPE Section. And as you can see, there will be many opportunities for networking and meeting with new and old friends in the plastic industry.
We look forward to meeting you at one of our upcoming events in 2016.

Tuan Dao
President, SoCal SPE
(714) 692-9492

Remembering Rich……

Richard, affectionately addressed by his friends as Rich touched many lives with his amiable and magnetic personality, kind and loving nature and everlasting cheery disposition. God broke our hearts to prove to us, He only takes the best. May He keep you in the palm of His hands until we meet again!

Rich started his career as a twenty-two years' young machinist working for W.S. Shamban, an Aerospace and Industrial company in Newberry Park, California. Within a short time, he worked himself up to Injection Molding manager's position. He developed equipment and processes for specialized applications to meet the requirements to produce highly specialized components. In 1980 Rich joined Rain Bird in the capacity of Senior Mold Engineer. His primary responsibilities were New Product Development, sustaining mold support, which included monitoring preventive mold maintenance programs and supporting product improvements. He had extensive experience in evaluating mold designs, trouble shooting of part designs, molds, and processes. He designed and set-up a micro molding department (18 machines) for small components, resulting in increased quality, lower cost production. He Prepared budgets and schedules Performed cost analysis, to ensure optimized cavitation, Identified bottle necks and find quick solutions. He also established cross functional teams, to ensure optimized component and tool designs that are cost effective, and SPC capable. His other responsibilities included conducting Moldflow analysis to troubleshoot part designs and tooling issues.

After leaving Rain Bird in 2007, Richard started his own engineering consulting firm with the goal to work with a diverse Customer base in various industries such as Medical, Energy, and Military etc. to develop new products. He assisted customers with reviewing the part design and tooling for manufacturability, conducted MoldFlow analysis, and worked with mold makers to build new molds and implement design changes.

Richard Heyworth (dressed in black) 1950-2015

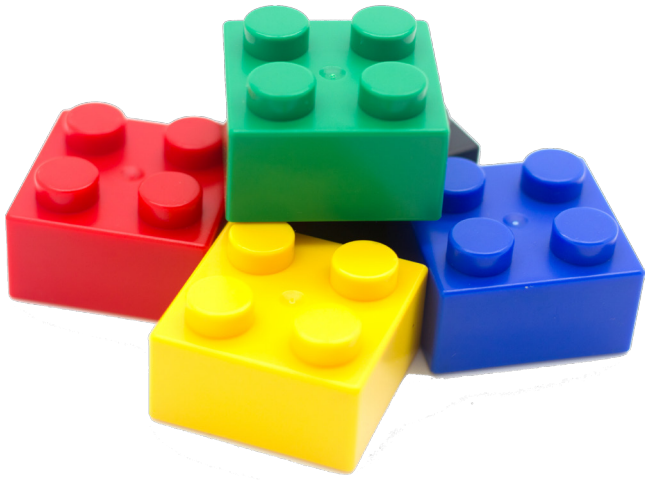
Rich was well-known and well-liked by all who met him and always recognizable by his characteristic warm hello and smile. He enjoyed his work and. He always wanted to do well and wanted everyone else to do well. Most of all, He was known as someone willing to help anyone with a problem or project and do it with a big smile on his face.

Southern California plastics industry, plastics professionals and especially So Cal SPE will surely miss his outward and behind-the-scene contributions.

SPE – The Society for You

Ashley Price, Horn Company – Account Manager
Next Generation Advisory Board – Chair
Southern California SPE Section – Membership Chair

Many questions come to light when making the decision in joining any society. "Do I have time to attend the events and will this cut into my personal or work time?""Will this support my application in my job search?""Are there multitudes of connections to be made in my industry?""Will the society help decipher difficult technical nuances of my current job?"



SPE is quickly becoming the leading plastics society and doing so by setting new platforms to showcase applied plastics research, industrial expertise, and available talent that will bridge the research gap, facilitate recruitment, and stay relevant in our ever-changing industry.

The Society of Plastic Engineers works hard to ensure each member reaps the benefits of being a part of our society. In order to be successful at this, the Southern California Section has been on a mission this past year to revamp SoCal SPE.

We want to continually create leaders in the plastics industry by providing Young Professional members with a centralized leadership training program that will enable them with the skills necessary to lead the society and drive impact across the industry. SoCal SPE has recently brought on four young members to the board. They are receiving training on how to run SPE meetings and events as well as bringing new collaborations that have already brought value to the SoCal section.

Southern California has recently improved the SoCal website making it easier to provide members with information on events, technical presentations, and contacts within the industry. Our goals have, and will always be, to provide SPE members with access to technical expertise through high-quality, specialized events in order to provide differentiated value.

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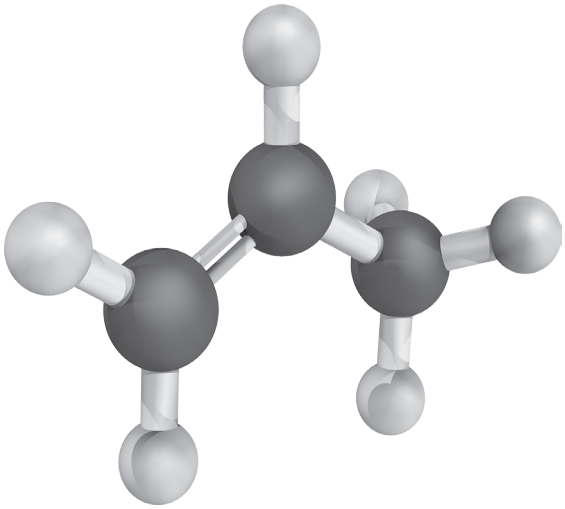


Adam Kohn has been an SPE member for six years now. He explains his outlook on the personal benefits he has gained throughout his years of membership:

"One of the biggest challenges recent college graduates face is developing the connections in their field of industry. Let's face it – the moment we graduate college, we no longer have professors, classmates, or clubs encouraging us to remain involved in activities that develop us professionally. "

The SPE offers recent graduates a way to develop and foster academic and professional connections after college. Currently in my 6th year with SPE, the biggest benefit for me has been developing a network of colleagues that share a passion for the plastics and polymers field. With annual conferences and access to a network of professionals, the SPE creates pathways for those new to the industry to flourish. Today's industry is no longer based solely on what you know. It also is heavily rooted in who you know, how involved you are, and what impact you want to make.

"My own personal experiences with SPE have enabled me to leverage the resources available, thus helping me to not only advance my own career, but cater my own career to what I want. You choose your professional growth, but organizations like the SPE help you identify and utilize the tools necessary to make this happen. "– **Adam Kohn, Nike Inc., Senior Polymer R&D Innovation Engineer.**

We invite you to explore for yourself the many benefits of why SPE is the society for you at:
http://www.4spe.org/Membership/index.aspx?navItemNumber=632

Please feel free to communicate your membership experience to Ashley Price at aprice@ethorn.com.

Thank you,
Ashley Price
Horn Company – Account Manager

CAN YOU HELP A HIGH SCHOOL STUDENT YOU KNOW GET $500 FOR THEMSELVES AND $500 FOR THEIR SCHOOL WHILE LEARNING ABOUT PLASTICS? YES!

"WONDERS OF PLASTICS" ESSAY CONTEST FOR 2016 NOW OPEN

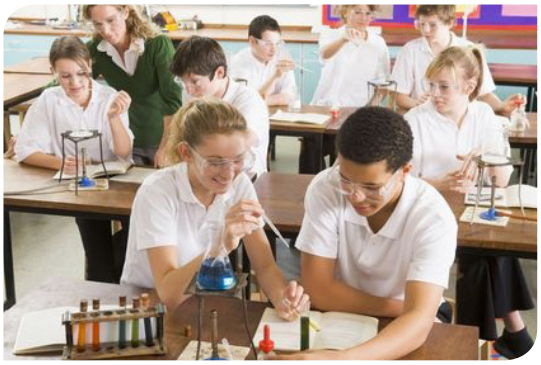
The Southern California Section of SPE is opening the 2016 Wonders of Plastics essay contest. The objective of the contest is to raise awareness and education about the positive aspects that plastics play in society today.

Any high school student in the section region may enter. Thus, as a member, if you know any high school student (son/daughter, grandchild, neighbor, etc) that is eligible, please forward the information to them. The region goes north to San Luis Obispo County, south to the Mexico border and east to the Arizona border.

The essay topics are open to be chosen by the student, they just have to be related to the positive aspects of plastics in our world. Some topics have been the benefits of plastics in medicine, energy savings, plastics recycling, etc. Our goal is to expand the students' plastics knowledge by their submission of original and well researched papers. Again, any plastics related topic of their interest will do! How plastics rockets helped me learn about science? Sure!

In the past, the Southern California Section has awarded over $15,000 in prizes to students with over $15,000 match to their schools. The school decides where the money goes, the Section just writes the check. The donations to schools have typically gone right back to support science classes.

Click here for instructions and submission form. Any questions, please contact Victor Okhuysen at



November Meeting Recap

Energy Efficient Plastics Operation – Symposium

SPE SOUTHERN CALIFORNIA

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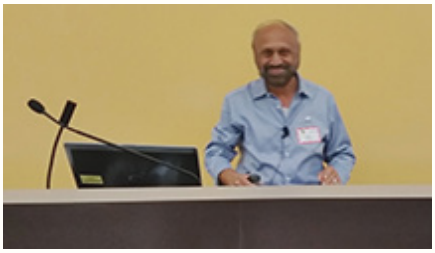
November So Cal SPE and Southern California Edison joint Symposium was held on Tuesday - November 17, 2015 at Energy Education Center in Irwindale.

The morning session included "Energy Efficient Plastics Operation – Overview" and "Energy Efficiency Program updates and benefits, rebates, incentives, etc. Following the welcome remarks by Michael Curley, Economic Development Consultant, Business Customer Division of Southern California Edison, the first topic was presented by Vishu Shah of Consultek Consulting group. A pie chart showing the energy use in a typical Plastics Operation was discussed. The speaker explained that the highest energy consumption was attributed to processing machinery followed by compressors and chillers. Surprisingly, the lighting consumed only five percent of the energy. All Electric machines and their popularity, tremendous benefits in terms of energy usage and improved efficiencies due to machine accuracy and repeatability were discussed. Energy consumption of the auxiliary equipment such as compressors, dryers, chillers, granulators and tips to reduce energy were presented. Other topics of interest such as energy savings from proper water management, insulation blankets, radiant energy heater bands, lighting, etc were also covered in greater detail. Attendees learned about saving energy from common sense approach which included turning off equipment when not in use, reducing oil and air leaks and parts on the floor etc.

Edison account representative explained their role in helping the customers with energy savings, available rebates and incentives, special programs, etc. Following lunch break, panel was assembled by the moderator Vishu Shah. Panel included distinguished industry experts starting with Juergen Giesow, regional manager at Arburg, David Erling, Facilities Compliance Manager at Niagara Bottling and Paul Delaney – senior Engineer at Edison International. Moderator posed many interesting questions to the panel which was quickly followed by intriguing questions from the audience. The entire presentation can be viewed at www.socalspe.org website.



Splay: What is it? How to get rid of it?

Tech Tips by
Suhas Kulkarni

In Injection Molded parts the most common cosmetic defect is splay. See Fig. 1. I have been to several organizations and have been shown their defect charts. Splay is always the issue that tops the charts. To solve any problem one needs to understand the source of the problem. So let us understand what is spay to begin with.

Fig. 1: Splay marks on a molded part

Injection molding is the process of injecting molten plastic into a mold. The cavity steel has a desired texture that gets picked up by the molten plastic and is replicated on the part. Depending on the base polymer that is being molded the plastic melt temperature is anywhere between 350 deg F to up to even 750 deg F. At these temperatures water turns to steam and some of the low molecular additives can burn to produce volatiles. The speed of injection of the plastic into the mold will also shear the molecules. Excessive shear can degrade the molecules. Steam and volatiles (from now on collectively grouped as volatiles) from degradation then flow with the plastic into the mold. Because of the fountain flow of the plastic in to the mold cavities the volatiles get to the surface and prevent the molten plastic from coming in contact with the mold steel and at the same time smearing the volatile on the interface of the melt and the mold steel. This shows up a streaks and is called as splay. Splay is also called as Silver streaks. See Fig 2.

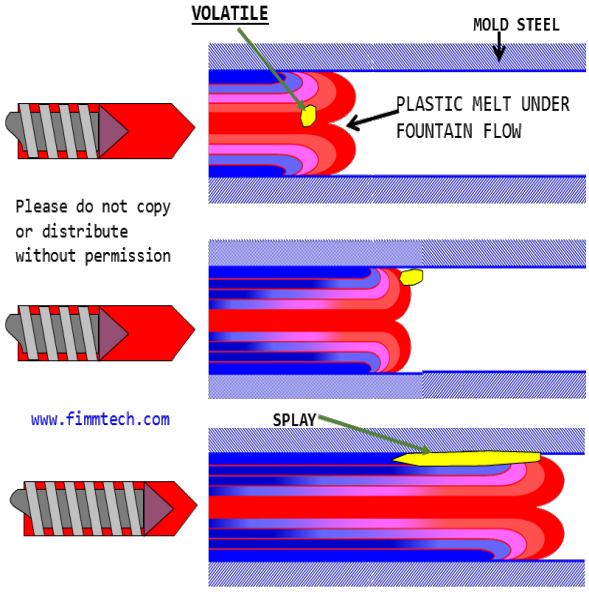


Figure 2: FORMATION OF SPLAY

Another source of volatiles can also be the gate. If the gates are too small or have sharp edges the plastic can get excessively sheared and give out volatiles. In that case, mold design is the culprit. Sometimes a worn out screw and/or barrel can also cause excessive shear resulting in splay.

There will always be some volatiles and definitely air that gets trapped in the melt stream. This air is the air that is present between the pellets as the pellets go from the feed section to the compression section of the screw. Back pressure applied during the screw recovery process helps get rid of this air and volatiles. Back pressure should always be kept to a minimum since excessive back pressure can also increase shear and result in splay. Send me a quick email to tell me you have read this. It will mean a lot to know how many people are reading my article that I take an effort to write.

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Regrind can also cause splay if the regrind has excessive fines. Fines don't convey well since they can get stuck to the screw and finally degrade causing volatiles.

The vents in the mold provide an outlet for the volatiles. If the vents are plugged up and/or are not deep enough and/or are not sufficient in number, then the volatiles have nowhere to go resulting in splay.

Following are the solutions to take care of spay. PLEASE DO NOT FOLLOW THEM BLINDLY! Find the source of the problem!

1. Check moisture in the material
2. Decrease melt temperature
3. Decrease injection speed
4. Increase back pressure
5. Check to see if regrind has excessive fines
6. Check and clean the vents in the mold

Happy Molding!

Contact Info: Suhas Kulkarni www.fimmtech.com

For Your Information

Dow and DuPont to Combine in $130-Billion Merger of Equals, Creating Industry's Largest Deal to Date

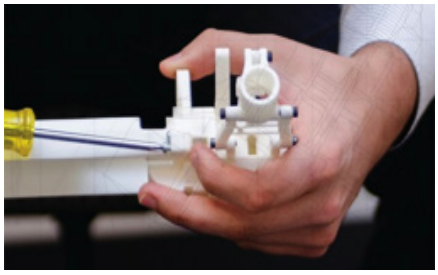
Dow Chemical and DuPont have announced a plan to merge, combining two U.S. industrial and chemical icons in a deal valued at more than $130 billion, which dwarfs the industry's largest deal to date, (AzkoNobel's 2008 acquisition of ICI for $17 billion). The combined company will be named DowDuPont and be dual-headquartered in Midland, MI and Wilmington, DE……..

http://www.4spe.myindustrytracker.com/en/article/73424/dow-and-dupont-to-combine-in-130-billion-merger-of-equals-creating-industrys?referer=left-div

Purging Your Injection Molding Machines

t's a practice nearly as old as injection molding itself, and it still matters. An excellent series of articles at ptonline.com discussing purging compounds and practices reminded me of some queries we'd received about the practice here at BOY Machines. The industry is uniformly in agreement on purging: do it……..

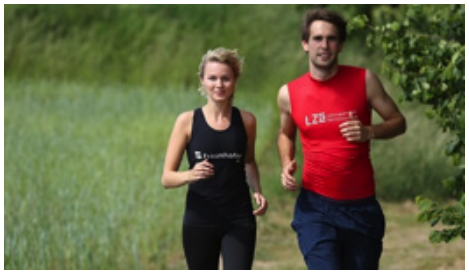
http://www.4spe.myindustrytracker.com/en/article/73433/purging-your-injection-molding



Top 10 ways 3D printing accelerates product design

For the past three decades, rapid prototyping has been synonymous with 3D printing. The technology has come a long way with faster printing speeds, true-to-CAD part accuracy, smoother surface finishes, and sharper resolutions. A wide variety of material options are now available from plastics to metals, and many can mimic production quality end-use products……

http://www.4spe.myindustrytracker.com/en/article/65954/two-shot-injection-molding-benefits-medical



FitnessSHIRT, a smart wearable for reliable performance diagnostics

The Fraunhofer Institute for Integrated Circuits IIS is introducing the FitnessSHIRT during the MEDICA trade fair. This smart apparel can continuously monitor various body signals in mobile application scenarios. The shirt can be worn during daily routine, is washable and features integrated sensors that measure the pulse and respiratory rate simultaneously……

http://www.4spe.myindustrytracker.com/en/article/65954/two-shot-injection-molding-benefits-medical

SoCal People Watch

This is a newsletter feature where we will note changes of positions, opening of new companies, interesting facts about our plastics community and humorous stories told in good taste about our members.

So Cal SPE Honors Clarence Smith

Clarence receiving "Honored Service Member" (HSM) prestigious award. Only 316 members have been elected to this prestigious status.

According to SPE Bylaws, "To be elected an Honored Service Member, a candidate shall have demonstrated long-term, outstanding service to, and support of, the Society and its objectives".

Clarence served So Cal SPE section unflaggingly for over three decades.

In 1995 Clarence G. Smith became the Southern California Section President. Activity in the San Diego area had declined tremendously and Clarence was responsible for reactivating the San Diego Branch of the Section. He recruited new officers and attended their board and Technical meetings, supporting their needs. Working with Alex Mora the team set up programing which included bilingual programs for companies who had Maquiladora programs along the Mexican border. This connection helped to improve attendance at meetings and revitalize the San Diego Branch. Clarence Smith served on a pilot program sponsored by the state of California. The object of the program was to encourage High School dropouts to consider their future and offer them an opportunity of a lifetime. Classes were offered at Cerritos College to educate the students and help them obtain jobs in the plastic industry. All 50 students that participated in the program were hired by local industry or were promoted due to their renewed knowledge. This program won a Governors Education award and became a model for other industries in the state.

During Clarence's term as Section President he set up joint meetings with several Industry leaders such as SME, ASQ, SPI and the American Chemical Society to promote membership, networking and meeting attendance. That relationship continues today and is an example of Clarence's accomplishments and his leadership capabilities.

In addition to serving on all of the SoCal Section committees and several of the officer's positions, Clarence served as the Sections International Councilor from 2000 to 2006.

UPCOMING COURSES

The College of the Extended University Cal Poly, Pomona

COLLEGE OF THE EXTENDED UNIVERSITY CAL POLY POMONA

https://www.ceu.cpp.edu/courses/cert/EM/PET.html

Winter 2016
(Jan. 30 - Feb. 6, 2015)
Plastics: Theory and Practice

Spring 2016
Plastics Product Design and Tooling For Injection Molding

Comments Provided by Students

- *Great course, very instructional…love the PowerPoint notes*
- *The instructor uses examples that are relevant to my industry/field*
- *The overall explanation of the basics of Plastics was very clear and concise, explained in plain English without having to use big and sophisticated words to explain theory or function*
- *The course's major strength was instructor's ability to relate to real life experience*
- *Very Practical – I highly recommend to anyone new to plastics industry*
- *Hand-outs are great, I refer to them on regular basis*

PLASTICS 101 - Theory and Practice — Winter 2016

This course is designed to introduce students to basic concepts and techniques used throughout the plastics industry. The objective is to expose everyone to the fundamentals of Plastics, product design, basic processing techniques, secondary operations and tooling. The attendees will be given handouts showing How and Where to get more detailed information on variety of Plastics related-topics. This course would be valuable to all technical, scientific and engineering personnel, either entering field of plastics or interested in broadening their knowledge of materials and processing techniques. It is also suitable for individuals in plastics sales, marketing, purchasing, and

Plastics Product Design & Tooling for Injection Molding — Spring 2016

The first portion of this combined course provides an overview of the design process for injection molded plastics parts. The emphasis is on concurrent engineering practices, which leads to elimination of barriers between various engineering groups, toolmaker and manufacturer. The student will learn about importance of proper material selection, part design process, part design fundamentals, manufacturing (moldability) considerations, design for asembly, tooling considerations, rapid prototyping techniques and testing. Students are encouraged to share their knowledge of product design success/failure stories in a group discussion format. Design fundamentals discussed are applicable to parts designed for all plastics processing techniques. In the tooling portion of the course the emphasis is on, types of molds, mold material selection, various mold components, mold design principles, cooling, venting, draft considerations, shrinkage, mold polishing, and tool surface enhancements techniques. Topics such as use of simulation software to enhance mold design, how to improve productivity, reduce down time, and lower maintenance costs by optimizing tooling design will be covered in detail.

For more information call the college at 909-869-2288 or Instructor Vishu Shah at 909-465-6699.

SPE Southern California Leadership

SPE Leadership		
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Treasurer: Vishu Shah, Consultek	909-465-6699	vishu@consultekusa.com
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House Committee Chair: Skip Humphry, International Plastics Equipment	909-830-7010	intl.plasticsequip@verizon.net
Education Committee Chair: Victor Okhuysen, Cal Poly Pomona	909-869-2698	vfokhuysen@csupomona.edu
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sletter/Web Content Liaison: Vishu Shah, Consultek Consulting Group	909-465-6699	vishu@consultekusa.com
Awards Committee Chair: Markus Lettau, Engel	951-278-5660	Markus.lettau@engelglobal.com
Special Events Chair:Matthew Dauphinee, Mission Plastics	909-947-7287	mdauphinee@missionplastics.com

Society of Plastics Engineers
6 Berkshire Blvd., Suite 306
Bethel, CT 06801-1065 USA

Membership Application

PH: 203-775-0471 • Fax: 203-775-8490
www.4spe.org • membership@4spe.org

Contact Information *Please print clearly*

First Name (Given Name) Middle Name

Last Name (Family Name)

Company Name/University Name (if applicable)

Mailing Address is: ☐ Home ☐ Business Gender: ☐ Male ☐ Female (for demographic use only)

Address Line 1

Address Line 2

Address Line 3

City State/Province

Country Zip/Postal Code Phone

Preferred Email (This will be your member login and is required for usage of online member services)

Alternate Email

Date of Birth (*Required* for Young Professional membership)

Graduation Date (*Required* for Student membership) Job Title

Membership Types *Check one*

☐ **Student: $31** (Graduation date is required above)
☐ **Young Professional: $99** (Professionals under the age of 35. Date of birth is required above)
☐ **Professional: ~~$144.00~~ $129** (Includes $15 new member initiation fee)

Choose 2 *free* Technical Division and/or Geographic Section Member Groups. →

1. _____ 2. _____

Additional groups may be added for $10 each. Add Special Interest Groups at no charge.

1. _____ 2. _____
3. _____ 4. _____

Dues include a 1-year subscription to *Plastics Engineering* magazine-$38 value (non-deductible).
SPE membership is valid for 12 months from the date your membership is processed.

Payment Information Payment must accompany application. No purchase orders accepted.

☐ Check Enclosed Amount _____

Charge: ☐ Visa ☐ Mastercard ☐ American Express Expiration Date: _____

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Amount Authorized: _____ CSC#: _____ Last 3 digits from the back of MC/Visa. 4 digits from the front of AMEX.

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Signature of Cardholder: _____

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Please include the Member ID# and Name so we may apply payment to the correct person.

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ACCT #2681786097 ABA #121000248 SWIFT CODE #WFBIUS6S

The SPE Online Member Directory is included with membership. Your information is automatically included unless you indicate otherwise.

_____ Exclude my email address from the Online Membership Directory
_____ Exclude all my information from the Online Membership Directory
_____ Exclude my address from 3rd party mailings

By signing below, I agree to be governed by the Bylaws of the Society and to promote the objectives of the Society. I certify that statements made in the application are correct and I authorize SPE and its affiliates to use my phone, fax, address and email to contact me.

Signature _____ Date _____

Technical Division Member Groups - Connect with a global community of professionals in your area of technical interest.

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☐ European Thermoforming - D43
☐ Extrusion - D22
☐ Flexible Packaging - D44
☐ Injection Molding - D23
☐ Medical Plastics - D36
☐ Mold Making & Mold Design - D35
☐ Plastics Environmental - D40
☐ Polymer Analysis - D33
☐ Polymer Modifiers & Additives - D38
☐ Product Design & Development - D41
☐ Rotational Molding - D42
☐ Thermoforming - D25
☐ Thermoplastic Materials & Foams - D29
☐ Thermoset - D28
☐ Vinyl Plastics - D27

Geographic Section Member Groups - Network with local industry colleagues.

☐ Alabama/Georgia-Southern
☐ Asean*
☐ Australia-New Zealand
☐ Benelux
☐ Brazil
☐ California-Golden Gate
☐ California-Southern California
☐ Caribbean
☐ Carolinas
☐ Central Europe
☐ China
☐ Colorado-Rocky Mountain
☐ Connecticut
☐ Eastern New England
☐ France
☐ Hong Kong
☐ Illinois-Chicago
☐ India
☐ Indiana-Central Indiana
☐ Israel
☐ Italy
☐ Japan
☐ Kansas City
☐ Korea
☐ Louisiana-Gulf South Central
☐ Mexico-Centro
☐ Michigan-Detroit
☐ Michigan-Western Michigan
☐ Middle East
☐ Nebraska
☐ New Jersey-Palisades
☐ New York
☐ North Carolina-Piedmont Coastal
☐ Ohio-Akron
☐ Ohio-Cleveland
☐ Ohio-Miami Valley
☐ Ohio-Toledo
☐ Oklahoma
☐ Ontario
☐ Oregon-Columbia River
☐ Pennsylvania-Lehigh Valley
☐ Pennsylvania-Northwestern Pennsylvania
☐ Pennsylvania-Philadelphia
☐ Pennsylvania-Pittsburgh
☐ Pennsylvania-Susquehanna
☐ Portugal
☐ Quebec
☐ Spain
☐ Taiwan
☐ Tennessee-Smoky Mountain
☐ Tennessee Valley
☐ Texas-Central Texas
☐ Texas-Lower Rio Grande Valley
☐ Texas-North Texas
☐ Texas-South Texas
☐ Tri-State
☐ Turkey
☐ United Kingdom & Ireland
☐ Upper Midwest
☐ Utah-Great Salt Lake
☐ Virginia
☐ Washington-Pacific Northwest
☐ West Virginia-Southeastern Ohio
☐ Western New England
☐ Wisconsin-Milwaukee

*Asean: Indonesia, Malaysia, Phillipines, Singapore, Thailand, Cambodia, Laos & Vietnam

Special Interest Groups - Explore emerging science, technologies and practices shaping the plastics industry. Choose as many as you would like, at no charge.

☐ Advanced Manufacturing / 3D - 033
☐ Bioplastics - 028
☐ Failure Analysis & Prevention - 002
☐ Joining of Plastics & Composites - 012
☐ Marketing & Management - 029
☐ Non-Halogen Flame Retardant Tech. - 030
☐ Plastic Pipe & Fittings - 021
☐ Plastics Educators - 018
☐ Plastic in Building and Construction - 027
☐ Quality/Continuous Improvement - 005
☐ Radiation Processing of Polymers - 019
☐ Reaction Injection Molding - 032
☐ Thermoplastic Elastomers - 006

Recommended by (optional) _____ ID# _____

PE15