SPE SOUTHERN CALIFORNIA

The SPE Press

www.socalspe.org February 2016

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

Date: Thursday, February 25, 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!

Recent Advancements in Cemented Tungsten Carbide Tooling and Wear Parts for the Mold Making Industry

Tungsten carbide is used in the plastic injection molding industry for core pins, hot runner nozzle tips and other tooling applications that require reduced deflection and superior thermal conductivity. The use of tungsten carbide in these demanding operations will result in reduced core deflection, superior cooling, improved resistance to deflection, reduced cycle times and exceptional wear life.

The purpose of this presentation is to discuss the latest advancements in the cemented tungsten carbide industry which include; new binder systems for improved corrosion resistance and smaller grain sizes that result in harder more wear resistant grades with increased edge strength. This paper will also discuss two (2) process improvements; the sinter-hip process which is the latest advancement in sintering technology that results in a cemented tungsten carbide product with a more uniform microstructure and the relatively new advanced technology of injection molding of tungsten carbide for cost reduction of complex components.

Frank Rymas is a graduate of Wayne State University with a BS degree in Metallurgical Engineering. Frank's previous work experience includes extensive engineering, metallurgical research and engineering management roles with Walmet Cemented Carbide Company. He also had many years as an applications engineer with Sandvik Hard Materials before pursuing his most recent role as a technical consultant for Crafts Technology. During his 40+ years in the cemented tungsten carbide industry Frank has made numerous technical presentations to technical associations as well as major manufacturing companies. The most recent presentations have been made to International Nonwovens Technical Conference, the International Pipe & Tube Association, FMA's Metal Matters Conference, MoldMaking Expo, 2010 TAPPI PLACE Conference and the 2013 and 2014 ANTEC Conferences. Frank is the holder of seven (7) U.S. Patents related to cemented tungsten carbide.

PRESIDENT'S MESSAGE

We are in the first few weeks of January 2016 and I am sure that many of us made some New Year's resolutions. Some of us will start new commitments to join a health club or start a new diet or stop doing a certain habit. Most of these resolutions are like the jelly of the month club in that they are the gifts that just keep giving; either we find permanent benefit from these changes or we have the opportunity to start them all over again as next year's resolutions.

Professionally, we have the same opportunity to make commitments to better ourselves. We are in a working environment that provides us numerous opportunities to grow, develop, and add value to our customers. However, we need to invest in ourselves to maximize our potential and keep up with the growing demand of the profession. We grow when we take opportunities to put ourselves in growth situations. Sometimes those situations come in the form of taking on a new certification. Sometimes we grow best by actively participating in relevant learning events. Sometimes, we grow through enhancing our networking and attending professional social events.

As you think your career investments and commitments in 2016, I ask that you keep the SoCal SPE in mind. In February we will have a Tech Dinner at Jeagerhaus in Anaheim and our Education Night in March to recognize the winners of the "Wonder of Plastics" essay contest, and to encourage and inspire young students to explore the field of plastics. We invite you to attend these events and please visit our website for more details.

I look forward to meeting you at our events.

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

Register online NOW!

33rd Annual Golf Tournament for Plastics Education

Thursday June 23, 2016

The Southern California Society of Plastics Engineers is proud to host this event.

Our Golfers will enjoy our return to the exclusive Sierra Lavern Country Club. Located in the rolling foothills of the majestic San Gabriel Mountains, the course offers a cool climate surrounded by great natural beauty. We have an early morning shotgun start at 7:30AM. Event proceeds help support the SoCal SPE education and scholarship programs. **Join in after the tournament for the golf awards presentation and luncheon after golf.**

SPE will also formally present the George Epstein Scholarship
http://socalspe.org/Scholarships.html

New this year: Rusty Miller perpetual trophy (The Rusty). Be the first foursome to have your name engraved on the trophy.

Past SPE presidents are invited for our traditional informal past presidents meeting

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Any donations in the form of Raffle Prizes, Tee Sponsorship, Cash or Services for this fundraiser will be greatly appreciated. Your contribution will be recognized at the tournament.

registration: register online at www.socalspe.org
Event coordinators:
Kerry Kanbara 909 906 2332

Registration work sheet:
GOLF & CART+LUNCH /$99.00 ea _________
GOLF & CART only$ 75.00 ea _________
DINNER BANQUET only $45.0 ea _________
SPONSOR tee$100.00 / flag$250.00 _______
TOTAL _______________
Name of Participants (group contact as #1) Index (if used)
1-____ _________
2-____ _________
3-____ _________
4-____ _________
EDUCATION/SCHOLARSHIP donation $ ________
I plan to donate a raffle prize or other services *(NO REFUNDS FOR CANCELLATION AFTER 06/04/16)*

SoCal SPE Wants YOU to Become a Member

The SPE Southern California Section is, for a limited time, offering one FREE registration to a single, exclusive local technical event for those who sign up for an SPE Membership! To be eligible for this special offer, visit our website @ socalspe.org to check out the event calendar and register as an SPE Member! Once a member, you will be sent a voucher to bring to the SoCal SPE event of your choice! Offer also applies to expired memberships. Don't let this opportunity pass you by, become an SPE member today! For questions, contact Ashley Price at 562-217-1377 or aprice@ethorn.com.

SAVE THE DATE

Western Plastics TRADE FAIR
WPTF
Anaheim, CA

AUGUST 11, 2016
Hosted by The Southern California
Society of Plastics Engineers
SPE

George Epstein Scholarship Award

The **George Epstein Scholarship Award** was established in 1984 as a tribute to his many contributions to plastics both commercially and educationally. Since inception, the Southern California SPE Section has awarder over $33,000.00 in scholarships. The award is open to student members or son/daughter, grandsons/granddaughters of a member in good standing of the Society of Plastics Engineers, Southern California Section.

QUALIFICATIONS

1) Son/daughter or grandsons/ granddaughters of a member or a current student member in good standing of the Society of Plastics Engineers, Southern California Section.
2) Applicants must have a demonstrated or expressed interest in the plastics industry.
3) An Applicant must be in good academic standing at his/ hers school.
4) High School graduating senior accepted to a University or Jr. College.
5) Matriculating undergraduate student at a University College or Jr. College.
6) Matriculating graduate student at a University College.

APPLICATIONS

Applications must include the following minimum information:

- Name and relationship to the member of SPE
- Address, phone number and email address (if available)
- Institution attending and Student ID number
- GPA, SAT, Major, Goals, Awards, Clubs,Activities, Achievements, Hobbies
- Include any additional information that would assist the selection committee.

LATE APPLICATIONS

Late applications and those that do not include the above information as a minimum will not be considered.

$250 & $500 scholarships are available and will be awarded based on the above criteria and Scholarship Committee evaluation of the effort put into the application, format, grammar, spelling, etc., the applicants ability to express him/herself in writing and subjective evaluation of applicants activities in/out of school and awards and achievements. SoCal SPE reserves the right not to award a scholarship in a given year if it so chooses.

For more information email - socalspe@gmail.com
Entry Deadline: May 31st
Awards are presented at the banquet following our Annual Golf Tournament for Plastics Education

Additional scholarships are available through The SPE Foundation Scholarship Program.
For more information click here.

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.

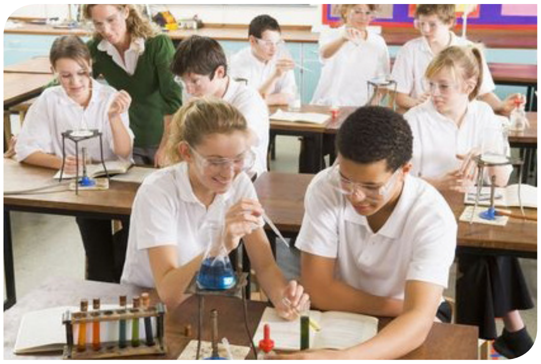
The essay topics are open to be chosen by the student, they just have to be related to the positive aspects of plastics in our world. Some topics have been the benefits of plastics in medicine, energy savings, plastics recycling, etc. Our goal is to expand the students' plastics knowledge by their submission 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.

For instructions and submission form, click on the PDF icon below.

Any questions, please contact Victor Okhuysen at vfokhuysen@cpp.edu and put **"Essay Contest"** on the subject line.

PDF



How precipitous Material Selection can lead to Premature Part Failures? *

Tech Tips by
Vishu Shah

Failures arising from hasty material selection are not uncommon in plastics or any other industry. In an application that demands high-impact resistance, a high-impact material must be specified. If the material is to be used outdoors for a long period, an ultraviolet (UV)-resistant material must be specified. For proper material selection, careful planning, a thorough understanding of plastic materials, and reasonable prototype testing are required. Plastics are viscoelastic materials. Viscoelasticity is defined as the tendency of plastics to respond to stress as if they were a combination of elastic solids and viscous fluids. This property, possessed by all plastics to some degree, dictates that while plastics have solid-like characteristics such as elasticity, strength, and form stability, they also have liquid-like characteristics (such as flow) depending on time, temperature, rate, and amount of loading. This also means that unlike metals, ceramics, and other traditional materials, plastics do not exhibit a linear stress–strain relationship. Designers accustomed to working with metals and other materials often make the mistake of selecting and specifying incorrect plastic materials. It is this nonlinear relationship for plastics that makes an understanding of creep, stress relaxation, and fatigue properties extremely important.

Typically, for most designers the material selection process begins by reviewing the plastic material data sheets generally provided by the material suppliers. A misinterpretation of the data sheets is one of the most common reasons for selecting and specifying the wrong material, for a given application. First it is important to understand the purpose of a data sheet. Data sheets are useful only for comparing property values of different plastic materials such as the tensile strength of nylon versus polycarbonate or the impact strength of polystyrene versus ABS. Data sheets should be used for initial screenings of various materials. For example, if a designer is looking for a material that is strong and tough, he may start out by selecting materials whose reported values are higher than 7000-psi tensile strength and impact strength values of better than 1.0 ft-lb/in. and eliminating materials such as general-purpose polystyrene, polypropylene, and polyethylene.

Data sheets are never meant to be used for engineering design and final or ultimate material selections. First, the reported data are generally derived from the short-term tests. Short-term tests, as the name suggests, are the tests conducted without consideration of time, and the values derived are instantaneous. Tensile test, Izod impact test, and heat distortion temperature are the examples of such short-term tests. Data reported on data sheets are also derived from single-point measurements. These tests do not take into account the effect of time, temperature, environment, chemicals, and so on. A single number representing one point on a stress–strain curve cannot begin to convey plastics' behavior over a range of conditions. The standardized tests used to measure data sheet properties contain data measured in a laboratory under ideal conditions (as specified by ASTM or ISO standards) on standardized test specimens that bear little resemblance to the geometry of real-world parts. These tests likewise take place at temperatures, stress rates, and strain rates that rarely correspond to the real-world conditions.

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The proper use of multi-point data for selecting the most appropriate plastic materials for the applications cannot be over emphasized. This point is well illustrated in a classic example of misinterpretation of published test data and the true meaning and usefulness of heat distortion temperature (HDT) values.

The heat distortion temperature test is a short-term test conducted using standard test bars and laboratory conditions. The temperature values derived from this test for a particular plastic material is simply an indication of the temperature at which the test bar shall deform 0.010 in. under a specified load. The reported values are further distorted by factors such as residual stresses in the test bars, amount of load, and specimen thickness. This reported value is of limited practical importance and should not be used to select materials for applications requiring continuous exposure at elevated temperatures. Continuous-use temperature data such as UL temperature index is a better indication of how plastic materials will perform for an extended period at elevated temperatures. Table below shows temperature data derived from two different test methods. If a designer were to select the material solely based on published heat deflection temperature data without understanding the true meaning of the test, test limitations, and how the values are derived, the result could be disastrous. Note that the continuous-use temperature for a commercial grade of 40% glass-reinforced Polyphenylene sulfide (PPS) is only 338°F, while the heat deflection temperature data derived from a short-term test is greater than 500°F, indicating that this material is not suitable in applications requiring continuous exposure to heat over 338°F.

HDT vs. Continuous-Use Temperature (UL Temperature Index)

Material	HDT	Continuous Use Temperature
Ryton R-4 (Polypropylene Sulfide)	➤ 500 °F	338 °F
Ultem 4000 (Polyetherimide)	412 °F	122 F

Material Selection Using Multi-Point Data

As discussed, material selection difficulties stem from limited availability of multi-point data from the material suppliers. Data sheets with single-point measurement data are readily available. However, with a little effort, the designers can find multi-point data from the sources such as CAMPUS and Prospector and from all leading material suppliers. Multi-point data are presented in the form of chart and graphs of shear modulus versus temperature, isochronous stress–strain curves, and creep data at a minimum of three different temperatures and four stress levels. While designing a product to withstand multiple impact loads, the designer must take into consideration the data generated from instrumented impact tests which can provide valuable information such as ductile-to-brittle transition and behavior of the specimen during the entire impact event. Modulus values are also often misinterpreted. The flexural modulus values which are derived from single-point measurement are frequently accepted as the indication of the stiffness of the material over a long period. Flexural modulus tests are conducted at a very low strain and generally represent only the linear portion of the stress–strain curve. The reported values do not correspond well with the actual use conditions, and they tend to over predict the stiffness of the actual part. Plastic parts often fail due to the lack of consideration of creep values in material selection process. Plastics can creep or deform under a very small load at a very low strain, even at room temperature. Creep or apparent modulus data for the plastic materials over a long period at several temperatures should be evaluated.

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Material Selection Process

The material selection should not be solely based on cost. A systematic approach to material selection process is necessary in order to select the best material for any application. The proper material selection technique involves carefully defining the application requirement in terms of mechanical, thermal, environmental, electrical, and chemical properties.

In many instances, it makes sense to design a thinner wall part taking advantage of the stiffness-to-weight ratio offered by higher-priced, fast-cycling engineering materials. Many companies including material suppliers have developed software to assist in material selection simply by selecting application requirement in the order of importance. The material selection process starts with carefully defining the requirements and narrowing down the choices by the process of elimination. The designer must identify application requirements including mechanical, thermal, environmental, and chemical. All special needs such as outdoor UV exposure, light transmission, fatigue, creep, stress relaxation, and regulatory requirements must be considered. Processing techniques and assembly methods play a key role in selecting appropriate material and should be given consideration.

Many plastics materials are susceptible to chemical attack, and therefore behavior of plastics material in chemical environment is one of the most important considerations in selecting material. No single property defines a material's ability to perform in a given chemical environment, and factors such as external or molded-in stresses, length of exposure, temperature, chemical concentration, and so on, should be carefully scrutinized. Some of the common pitfalls in material selection process are relying on published material property data, misinterpretation of data sheets, and blindly accepting material supplier's recommendations. Material property data sheets should only be used for screening various types and grades of materials and not for ultimate selection or engineering design. As discussed earlier, the reported data are generally derived from short-term tests and single-point measurements under laboratory conditions using standard test bars. The published values are generally higher and do not correlate well with actual use conditions. Such data do not take into account the effect of time, temperature, environment, and chemicals.

In order to assist designers with the material selection process, material supplier have developed a comprehensive checklist such as one illustrated in Figure 1.

Key considerations are as follows:

Mechanical Properties
• Tensile strength and modulus
• Flexural strength and modulus
• Impact strength
• Compressive strength
• Fatigue endurance
• Creep
• Stress-relaxation

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Both short- and long-term property data must be evaluated: Short-term data for quick comparison and screening of the candidates and long-term data for final material selection. Creep and stress relaxation data, which represent deformation under load over a long period, need to be scrutinized over the usable range of temperatures. Isochronous stress–strain curves are very useful for comparing different materials on an equal-time basis.

Multi-point impact data obtained from instrumented impact test which provide more meaningful information such as energy at a given strain or total energy at break must be taken into account. Plastic parts often fail due to the lack of consideration of sudden loss of impact in a very cold environment. Multi-point low-temperature impact data, although multi-point low-temperature impact data, although generally, not found on data sheets, is available from all major material suppliers.

New Application Checklist

This checklist includes critical considerations for new part development.
Its use will help provide a more rapid and more accurate recommendation.

Name ____________________ Date ____________________

Customer ____________________ Part ____________________

Project timing ____________________

Driving force ____________________

Current product ____________________

Its performance ____________________

Comments ____________________

***Part Function** — What is the part supposed to do?* ____________________

Appearance

Clear

☐ water clear

☐ very clear

☐ generally clear, maximum haze level: __________

☐ transparent color, maximum haze level: __________

Comments: ____________________

Opaque

☐ high gloss

☐ medium gloss

☐ low gloss

☐ from the plastic ☐ from paint ☐ from the mold

Comments: ____________________

Colors desired: ____________________

☐ from the plastic ☐ from paint ☐ from both

Criticality of color match: __________ %

☐ daylight ☐ tungsten light ☐ fluorescent light ☐ all (no metamerism allowed)

Comments: ____________________

***Critical appearance areas** — please attach sketch*

	None	Invisible	Minor	OK
gate blemishes	☐	☐	☐	☐
sink marks	☐	☐	☐	☐
weld lines	☐	☐	☐	☐

Comments: ____________________

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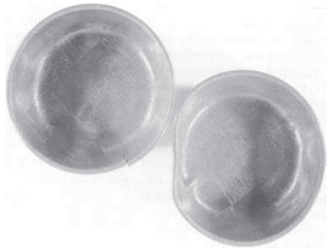
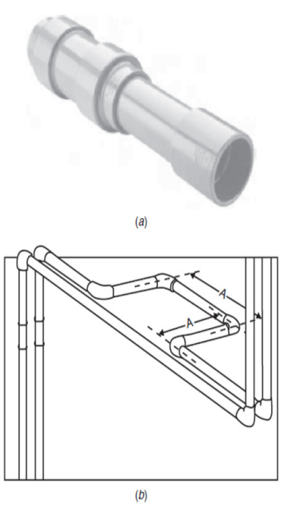
Thermal Properties



As discussed earlier in the chapter, short-term values such as heat distortion temperature and Vicat softening point should only be used for initial screening. Meaningful values derived from continuous-use temperature and coefficient of thermal expansion test are more helpful for final material selection. Figure 2 below shows the example of a failed part resulting from selecting incorrect material based on short-term thermal test data.



Plastic materials tend to expand and contract anywhere from seven to ten times more than conventional materials like metals, wood, and ceramics. Designers must be well aware of this, and special consideration must be given if dissimilar materials are to be assembled. The thermal expansion differences can develop internal stresses from push–pull effect along with internal stresses and cause the parts to fail prematurely. The restraining of the tendency of a piping system to expand/contract can result in significant stress reactions in pipe and fittings, or between the piping and its supporting structure. The allowing of a moderate change in length of an installed piping system as a consequence of a temperature change is generally beneficial, regardless of the piping material, in that it tends to reduce and redistribute the stresses that are generated should the tendency for a dimensional change be fully restrained. Thus, allowing controlled expansion/contraction to take place in one part of a piping system is an accepted means to prevent added stresses to rise to levels in other parts of the system that could compromise the performance of, or cause damage to, the structural integrity of a piping component, or to the structure which supports the piping. Figure 3 below illustrates a typical expansion loop and an expansion joint installed to compensate for expansion and contraction.

Exposure to Chemicals

One of the most important considerations in selecting the material is its resistance to various chemicals. As discussed earlier, resistance of plastics to various chemicals is dependent on time contact with chemicals, temperature, molded-in or external stress, concentration of the chemical. Part design and processing practices a major role in a material's ability to withstand chemical attack. example, the stress concentration factor increases significantly for parts designed with radius-to-wall-thickness ratio of less than 0.4. As a rule, crystalline polymers are more resistant to chemicals when to amorphous polymers (Figure 4); therefore, if the application the parts to be constantly exposed to chemicals, crystalline materials given serious consideration. Chemical exposure to plastic parts may physical degradation such as stress cracking, softening, swelling, discoloration, and chemical attack in terms of reaction of chemicals with polymers and loss of properties.

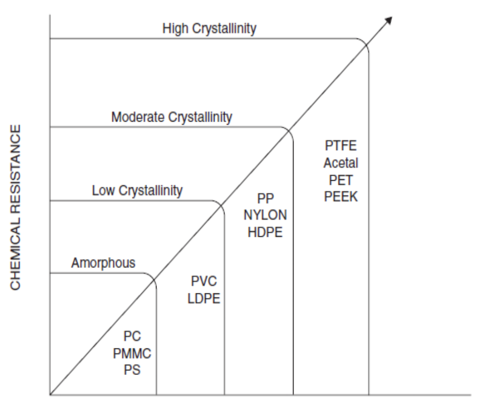


Figure 15-8. Effect of crystallinity on chemical resistance.

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Figure 5 shows premature failure of a part that was exposed to aggressive chemicals.

Environmental Considerations

Plastic materials are sensitive to environmental conditions. Environmental considerations include exposure to UV, IR, X-ray, high humidity, weather extremes, pollution from industrial chemicals, microorganisms, bacteria, fungus, and mold. The combined effect of various factors may be much more severe than any single factor and the degradation process in accelerated many times. It is very important to understand that the published test results do not include synergistic effects of various environmental factors, which almost always exist in real-life situations. Designers should consider exposing fabricated parts to environmental extremes much similar to the ones encountered during the actual use of the product.

Regulatory Approval Requirements

Material selection may be driven by the regulatory requirements put forth by agencies such as Underwriters Laboratories (UL), National Sanitation Foundation (NSF), and Food and Drug Administration (FDA) in terms of flammability, pressure ratings, and toxicological considerations.

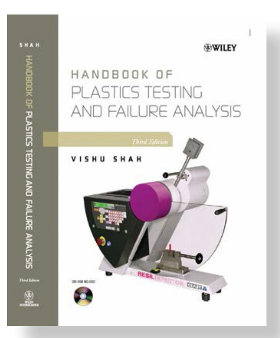
Economics

As discussed earlier, material selection should not be driven by cost alone. The most logical approach calls for choosing three to four top candidates based on requirements and selecting one of them with economic considerations.

Other Considerations

Material selection process must also address processing considerations such as type of fabrication process, secondary operations, and component assembly.

From Handbook of Plastics Testing Technology 3rd Edition, by Vishu Shah



For Your Information

Sustainability, free market should push industry

By: Don Loepp

"CLASSES START AS SOON AS THESE GUYS ARE DONE..."

Our editorial agenda is more than the foundation for our weekly opinion columns. It offers a blueprint for a prosperous and sustainable plastics industry. With the start of a new year, Plastics News updates and restates its editorial agenda.

• Safety must be every company's top priority. That includes keeping workers safe and making products that
consumers can use with confidence. Processors, suppliers, workers and regulators must work together to make the plastics industry a leader in worker and community safety.

Likewise, consumers, regulators and legislators have a responsibility to deal with plasticsrelated issues without bias. Bans and taxes that encourage replacing plastic products with less sustainable alternative materials must be discouraged.

• For too long, plastics have suffered from an image problem. The industry must combat misinformation by highlighting the benefits of plastics.

• Sustainability is a priority. Profitability and sustainability are not mutually exclusive concepts — true sustainability will result in long-term health for the plastics industry. Companies should consider sustainability when making decisions about resource utilization, including material selection and energy use.

• Recycling must be encouraged. Americans have become too comfortable in their habit of throwing away used plastics items. Products should be designed to take into account recycling, source reduction, health and pollution issues. Where practical, single use plastics should be recycled, incinerated for energy or at the very least landfilled — not become litter or marine debris.

The industry should support state and national bottle bills, since bottle deposit programs have proved effective in collecting a clean, valuable recycling stream.

• Companies and their leaders should take an active role in their communities and in trade groups. Local officials need to be aware of the plastics industry's size and importance, so they know that plastics are a significant employer and contributor to the local, national and global economies.

• The industry should speak with a unified voice. This requires cooperation at all levels of the leading trade associations, as well as international and regional groups, and with business, consumer and environmental organizations.

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• The free market is the best mechanism for raising the standard of living, encouraging democracy and rewarding hard work. Free trade encourages efficiency and inspires stability around the world. Government tax policies should motivate entrepreneurs and investors, help industry compete globally and strive for fairness.

• All sectors of the plastics industry must recruit and retain talented workers. Having a well trained and flexible workforce is a competitive advantage, so employers should support education and training. Employers also should strive for diversity in management.

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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Society of Plastics Engineers
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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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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
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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.

☐ Additives & Color Europe - D45
☐ Applied Rheology - D47
☐ Automotive - D31
☐ Blow Molding - D30
☐ Color & Appearance - D21
☐ Composites - D39
☐ Decorating & Assembly - D34
☐ Electrical & Electronic - D24
☐ Engineering Properties Structure - D26
☐ European Medical Polymers - D46
☐ 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