

The Product Safety Engineering Newsletter



IEEE



Product Safety Engineering Society

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Vol. 8, No. 1 March 2012

President's Message

A Sad Reminder...

"Father, 5 children perish in Rehovot fire"

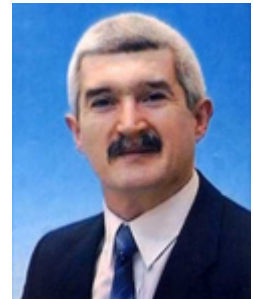
"Adult, children ages 2-11 killed in residential fire; several people lightly hurt. Police form special taskforce to probe blaze. 'They didn't stand a chance,' says Fire Department volunteer"

(Eli Senyor, Published: 03.26.12, 23:20 / Israel News, <http://www.ynetnews.com>)

"Estimates: Short circuit caused deadly Rehovot blaze"

(Eli Senyor, Shahar Chai, Published: 03.27.12, 15:43 / Israel News , <http://www.ynetnews.com>)

*"Fire Services investigators are checking the possibility that a **charger in the wall caused a short circuit**, igniting the Rehovot fire that killed a father and his five children."*



(Source: <http://cdn.timesofisrael.com/uploads/2012/03/F120327YZE01-635x357.jpg>)

*"The team said that so far, the evidence points to the possibility that **an electrical outlet connected to a charger overheated, causing a short circuit**. The team scouring the premises noted that the residence was **highly loaded with equipment**, causing an extremely large fire."*

(Gilad Morag, Published: 03.27.12, 16:57 / Israel News , <http://www.ynetnews.com>)

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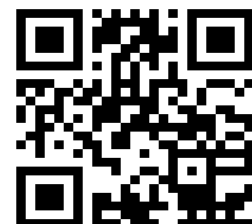
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IEEE PSES Web Sites

<http://www.ieee-pses.org/>
<http://psessymposium.org/>
<http://product-compliance.oc.ieee.org/>
<http://www.ieee-pses.org/emc-pstc.html>
<http://www.ieee-pses.org/newsletters.html>
<http://www.ieee-pses.org/pses.html>



The abovementioned tragedy, literally wiping out an entire family (father and 5 children) should serve as a constant reminder of the mission of the Product Safety Engineering Society.

Was it a short circuit that started the fire? No! It was a **product safety fault!** According to IEC60950-1, the power supply should form a Fire Enclosure and fire should not break out even in the case of short circuit. However, most power supplies/chargers are not “fire enclosures”, the charger should have a power limit (a.k.a. Limited Power Source (LPS)) as defined in IEC60950-1, section 2.5.

There is no doubt that the charger was tested to (mandatory) Israeli Standards (conforming to EN 60950) and was approved for use in Israel. With all certifications, no tragedy should have occurred... And yet – 6 people perished in the fire caused by the device!

Regretfully, this is not a singular case. In an article published in ConsumerReport “*Appliance fires: Is your home safe?*” electrical faults in consumer (“white”) electronics and home appliances were recognized as a primary cause for setting the home ablaze.

According to that article, “*manufacturers have made significant design enhancements in the past to improve safety, such as automatic shutoff on coffeemakers, for example, but much more could be done to improve appliance safety...*”

(Consumer Reports magazine: March 2012, <http://www.consumerreports.org/cro/2012/03/appliance-fires-is-your-home-safe/index.htm>).

Does the solution to such tragic cases lie in a “*product- safety law*” as suggested in that article? Such a law could help in limiting the use of secrecy in proceedings of civil cases involving safety concerns, but would it enhance product safety?

Human error may be the last bastion of system safety problems! Designer’s errors are significant contributors to accidents and undesirable events, but the irony is that designers still leave to the humans “*the tasks which the designer cannot think how to automate*” (source: Samaras, G.M., “Human-Centered Systems Engineering”, 2011 ISCSE, San Diego, CA)

I believe “regulatory measures” are not the answer and “safety engineering” should be the ONLY solution. Once the product leaves the shop or the dealer, regulations are considered as non-existent The equipment is in the hands of the user, and – “*you can never overestimate the stupidity of the*

average person”. In other words – if equipment is fool-proof, there will be the one who will prove it not to be so...

In my perspective, regulation should be the last resort - not the first. It should be used when there is no other alternative, or when the cost of engineering is prohibitive (**what is the cost of life?!?**)

The tragedy in Israel was not due to poor safety design. It was because no one anticipated that the charger would be left overnight on a mattress (on the bed the children slept!) and that it would overheat and set the house ablaze. Indeed, there was negligence, but – could its consequences be avoided by design?

No doubt, more safety measures could and should be built into appliances to help prevent fires. Standards need to be revisited, particularly taking into consideration the complexity of modern home appliances. EMC, reliability and safety now become part of the “deal”. **System safety** rather than **product safety** may become the keyword, considering the integration of software and hardware into consumer appliances and products.

How should we, in the PSES, address this issue? We are actually addressing this topic in two main routes in parallel: (a) we have formed an ad-hoc committee who will address the topic of safety of consumer appliances and home fires and other hazards. The committee is chaired by Rich Nute and it should come up with recommendations regarding the manner we, the Society, should tackle this and reflect it in our conference, technical activities and the press, and (b) we are working with the Consumer Electronics Society, with the intent of forming an inter-Society Technical Committee that will address this aspect, both from **product** and of course – the **safety** aspects.

If you are interested in getting involved or contributing to these activities, please contact me, and I will be glad to refer you to the Committee. Reach me at: eb.joffe@ieee.org.

The “Buzz-word” – Globalization

Sometimes the terms internationalization and globalization are used interchangeably but there is a slight formal difference. The term *internationalization* refers to the importance of

Chapter Safety Probes

To see current chapter information please go to the
chapter page at:

<http://www.ieee-pses.org/Chapters/index.html>

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Central Texas

Central Texas PSES Meeting – February 21, 2012

Representatives from Worldmark (www.worldmark.com) presented their innovative solutions for the security of labeling. A variety of hidden features are available which can be used to determine the legitimacy of labels and branding, using special lens, lights or sensors to reveal the secret portions of the label. Their solutions have broad applicability to reducing the incidence of counterfeit labeling.

Central New England

There was a CNEC Product Safety Engineering Society/Northeast Product Safety Society meeting on Wednesday, March 28th, at the Holiday Inn, Boxborough MA. A social hour with light refreshments began at 7:00 PM and the technical meeting started at 7:30 PM. Bob Johnson presented a talk about temperature measurement and product certification with

regard to thermal safety risks.

Bob has worked in the product safety field for over 30 years at Digital Equipment Corporation, Motorola, and currently as a consultant product safety engineer. He has participated in the development of product safety standards for information technology equipment IEC 60950, the new hazard based standard IEC 62368 and on several other standards technical panels. He is a member of National Electrical Code Making Panel 12.

Portland

The IEEE PSES Portland Chapter meeting was held Tuesday, March 20, 2012, 7PM at the University of Portland

Shiley Hall, School of Engineering. The topic was ISPCE 2011: Review of recent PSES technical papers by: Peter E Perkins, PE.

The ISPCE Symposium held in San Diego on 10-12 Oct, 2011 covered a number of topics of high interest to product safety professionals. This meeting reviewed significant papers in each of the tracks that were presented at that meeting. The tracks included: Forensics; Technical;

Continued on Page 28

News and Notes

New Name and Logo for CSA

Like other standards and certification organizations, the organization once known as CSA (Canadian Standards Association) has gradually diversified into a variety of activities. Reflecting this situation, the organization has come up with a new umbrella name, CSA Group, and a new logo. The new name and logo combine various divisional identities and logos into a single unified name and logo. There will be no changes for those who deal with the organization on a day-to-day basis; phone numbers and email addresses will remain the same.

CSA Group is an independent, not-for-profit membership association active in standards development; training and advising; and testing and certification in areas such as hazardous location, industrial, plumbing, construction, medical, technology, appliances, gas, alternative energy, lighting, and sustainability.

The IEEE 2012 International Symposium on Electromagnetic Compatibility is where you want to be on August 5-10, 2012. This year's host city Pittsburgh, PA offers the David L. Lawrence convention center located in the hub of Pittsburgh's culture, business and entertainment district. The symposium offers top-rated peer-reviewed technical paper sessions, workshops and tutorials, along with Global EMC University. Additionally, there are a wide variety of exhibitors showcasing the latest EMC products and services.

Around the World

Eurasia Economic Community

Six countries, including Russia, Belarus and Kazakhstan, are working to establish a common customs union known as the Eurasian Economic Community or EurAsEC. Moldavia, Ukraine, and Armenia are observers of EurAsEC.

The Union is expected to announce a common regulatory scheme and a EurAsEC certification Mark (EAC mark). The Low Voltage and EMC regulations that support the certification scheme

are expected to come into force by February 2013. This mark will replace current country certifications and marks for all new products. It is expected that existing national product certifications will be accepted until they expire.

More information about EurAsEC is available at <http://www.eurasian-ec.com/>

Customs Union Commission

Russia, Belarus, and Kazakhstan have united within the Customs Union Commission in matters of trade to form a single economic space.

The Customs Union Commission has delayed the implementation of the Technical Regulation on Safety of Low-Voltage Equipment per the Decision #884 on December 9, 2011. The implementation has been delayed until February 15, 2013.

The Technical Regulation on EMC has also been delayed to February 15, 2013 according to the Decision # 879 by the Customs Union Commission.

South Korea – Expanded Safety Regulation

The new safety certification regulation expanding the list of regulated products has not yet been published by Korea's KATS. Expected publication date is Q12012, with an estimated effective date of January 1, 2013.

Many details of the program have not been clarified, but is expected to include most IT products within its new scope. A Mark will be required on the products.



South Korea – EMC Test Measurements

Beginning January 1, 2012, the S. Korean authority, Korea Communications Commission (KCC), required the measurement of conducted disturbance at a telecommunication modem or network ports. Also required is above 1GHz radiated emissions disturbance for certain Information Technology Equipment and related ITE peripherals.

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Brazil – Product Safety, EMC, and Energy Regulation

On September 19, 2011, Brazil published the Portaria no. 368/2011 which approves the requirements for a voluntary certification of information technology equipment. Although published as a voluntary conformity evaluation, all bids to public offices must offer products which have INMETRO certification, as stated in the Decreto 7174/2010 from the Civil Office.

The final resolution was completed and is expected to be published within the next 30-60 days. The effective date is expected to be set as immediately after publication in the Official Gazette. Technical requirements include safety, electromagnetic compatibility and energy efficiency for some products, and only safety and EMC for a broader range of products.

The certification is expected to require use of a Mark.



Australia – RCM - A Consolidated Mark

The A-Tick and C-Tick marks are currently used to indicate compliance with Australian regulations. The A-Tick Mark is used for compliance with regulatory requirements for telecommunications equipment and cabling. The C-Tick Mark is used to show compliance with the EMC requirements.

The Australian Communications & Media Authority (ACMA) plans to implement a consolidated Mark to replace both the A-Tick and C-Tick marks. Implementation is planned for the RCM mark in July, 2012. The RCM Mark consists of the RCM and the supplier identification.



Further information is available at

http://www.acma.gov.au/webwr/aca_home/publications/reports/industry/manuals/emcbook.pdf

Tanzania – PvoC Program

The Tanzania Bureau of Standards implemented the Pre-Shipment Verification of Conformity (PVoC) program as a conformity assessment and verification procedure for all products listed on the Regulated Products List. The program was implemented for the specified products on February 1, 2012.

Each Shipment of imported goods containing these products should be accompanied by a Certificate of Conformity issued by a PVoC accredited Country Office, prior to the shipment.

The complete list of Regulated Products is available at http://www.intertek.com/uploadedFiles/Intertek/Divisions/Oil_Chemical_and_Agri/Media/pdfs/TanzaniaRegulated%20ProductsList.pdf

Germany – New PAH Substances Added

The German Regulator, ZLS, has approved a proposal to add benza[*jj*]flouranthene and benzo[*e*]pyrene to the existing list of 16 Polycyclic Aromatic Hydrocarbons (PAHs) which are currently evaluated for GS certification. The effective date is set at July 1, 2012. This expansion by the Central Department of the Federal States for Safety Features (ZLS) in document ZEK 01.4-08, was officially published on November 29, 2011.

India – Product Safety Proposal

A draft regulation is circulating implementing product safety certifications. The Department of Information Technology (DIT) is currently holding meetings with local industry associations in New Delhi. The regulation is intended to discourage importation of sub-standard products, safeguard consumer interests, and encourage domestic manufacturing. A plan for mandatory registration of certain electronic, household, and IT products to safety standards is outlined in the draft regulation. The Bureau of Indian Standards (BIS) is intended to be the certifying authority. It is likely that an in-country representative will be required, although the request for certification may be filed from any country. DIT has indicated that a transition period of six months is expected after the new regulation is published.

Standards Roundup

IEC 62368-1, 2nd Edition

A new Committee Draft for Vote (CDV), 108/479/CDV, for the 2nd edition of IEC62368-1, hazard based Standard covering Information Technology equipment and Audio Video Equipment was circulated to national committees for vote in December, 2011. The voting period of five months includes both votes and comments.

Continuing work in 2012 to likely to produce a proposed Final Draft International Standard (FDIS) by late 2012. The new standard is intended to replace both the ITE standard, IEC 60950-1, and the Audio-Visual standard, IEC 60065.

Adoption of IEC 60950-1, 2nd Edition

China –

China has announced their adoption plan for the 2nd Edition of IEC 60950-1 as their standard, GB 4943. Implementation will be March 2013. National deviations may include testing for high altitude of 5000m, and a test method for use in tropical environments. An option provided for products not meeting either or both of these new testing requirements is use of the following markings.

Not for use at >2000M Altitude



Not for use in Tropical Environments



A transition period is likely to be at least 6 months, and perhaps as much as 12 months. We may see this new edition to be effective as early as December 1, 2012.

USA –

Underwriters Laboratories has published Amendment 1 to the bi-national standard, UL/CSA 60950-1, 2nd Edition on December 19, 2011, to become effective on March 1, 2013

The amendment includes the IEC 60950-1, 2nd Edition amendment 1 plus the US and Canada national differences. Changes that will have considerable impact are for rotating solid media, such as CDs and DVDs, paper shredders, including the use of the UL finger probe, moving fan blades, and slide rail mounted equipment. An Impact Analysis by UL is available at <http://www.ul.com/global/eng/pages/offering/industries/hightech/informationtechnology/new/>

Taiwan –

BSMI continues with the announced transition to CNS 14336-1 (2010), as the adopted IEC 60950-1:2005; 2nd Edition, with the effective date of January 1, 2012. All new or renewed licenses after the effective date will need to comply with the new standard. Products declared under the DoC process will need re-declaration to the new standard.

CISPR 32, Ed 1.0-2012-01

Scopes under existing CISPR standards 13 and 22 were combined in creating CISPR 32 to establish the EMC emission requirements for multimedia equipment. MultiMedia Equipment (MME) includes information technology equipment (ITE), audio equipment (AV), video equipment,

Continued on Page 8

broadcast receiver equipment, entertainment lighting control equipment or any combination of these technologies. Manufacturers should anticipate CISPR 32 to become mandatory in an estimated 2 to 5 years as countries adopt CISPR 32 or the national equivalents. Technology providers should also monitor development and planned future release of CISPR 35 MME immunity requirement combining scopes of CISPR standards 20 and 24.

CISPR 32 is now available for purchase for the IEC webstore <http://webstore.iec.ch/>

EN 60950-1

Amendment A12:2011 to EN 60950-1 will become mandatory in January 2013. A European only amendment not impacting the IEC standard, the scope of A12 is the limitation of exposure to sound pressure from personal music players. It introduces requirements for user warnings and limits on the maximum sound pressure that the player can deliver. Although the scope of A12 is specific to certain products, it does form part of the standard EN 60950-1:2006 and it should be referenced in the DoC for all products applying that standard.

Energy Regulations

Israel – Standby Energy Regulation

The Israel Ministry of National Infrastructure (MNI) enacted a new regulation for Maximum Electric Power in Standby Mode for Home and Office Appliances. Measurement of the standby power will be conducted per the Israeli Standard IS 62301 - Household Electrical Appliance: Measurement of Standby Power, adopted from the IEC 62301 standard.

The standard will be enforced by the Standards Institute of Israel (SII). For Information Technology Equipment, a new paragraph and normative annex reference were added to the product safety standard, SI 60950 Part 1 dealing with the power supply consumption in standby condition.

Portable and desktop computers, monitors and printers are included in the scope along with audio equipment. Energy testing may only be accepted from an accredited laboratory. Currently, only SII is accredited for energy testing.

The enforcement date of the regulation is March 1, 2012.

South Korea – eStandby

South Korea has revised the effective date for computers for the new e-Standby Power Standards. The effective date for computers has been revised from July, 2012 to April 1, 2012 per the announcement of the Ministry of Knowledge Economy (MKE). The revised date will align with the Energy star 5.0 TEC criteria and adopt the ECMA-383 approach

The Warning Logo is mandatory for products which do not meet the criteria, while the Energy-Boy Logo is optional for those products which do meet the criteria

Warning Logo



Energy-Boy Logo



California Energy Commission – Battery Chargers

A regulation establishing energy efficiency standards of battery chargers was published on January 12, 2012 by the California Energy commission (CEC). The regulation defined a battery charger to include any system that charges a battery from an AC or DC voltage source. A tiered implementation schedule was included in the regulation.

Products manufactured on or after the appropriate date will need to meet the following requirements before being placed on the market:

Meet the technical requirements as outlined in the regulation

Tested at an approved laboratory (a list is maintained on the CEC website)

Information uploaded to the CEC's Appliance Efficiency Database

Data file and signed declaration form submitted to CEC

Appropriate labeling applied consisting of the

letters “BC” inside of a circle



The regulation is an addendum to the California Energy Commission Appliance Energy Efficiency Regulations. The latest standard is on the CEC website at:- <http://www.energy.ca.gov/appliances/>

PSES Jobs Web Page

PSES has a web page for employers and job seekers at <http://www.ieee-pses.org/jobs.html>. Employers may post jobs seeking regulatory or compliance-related personnel free of charge. Job postings will remain on this web site for a period of 6 months but may be removed earlier by request of the employer.

Society members who are seeking jobs may list a description of the position they are seeking free of charge. A resume in PDF format may also be posted if desired. The listing will remain on this web site for 6 months, but the owner may submit a request to renew the listing every six months, indefinitely. It may be removed earlier by request.

See <http://www.ieee-pses.org/jobs.html> for posting policy and how to submit requests.

Past Presidents Report

Elections and Awards: Past President Comments

As immediate past president, I head the nominations/elections committee for our society. It should be clear to everyone that we need society leaders. People who can build PSES into the professional society that rewards careers in product safety and compliance engineering. The IEEE PSES is our forum to provide depth to our professional life that most “jobs” do not. We need to be a productive part of our respective companies, but for many of us that means focusing on trees and missing the forest.

Please see the **Call for Nominations for PSES Directors** in this newsletter. If you’ve been active in the society and have ideas for how it can be run and improved, please submit your name and the biographical information. Please include a few words about your ideas for the society. Hopefully, we’ll have a good selection of candidates for PSES to select from in this year’s election.

Running for our board should be the culmination of society activities. I would encourage all our members to become active volunteers in our society, at your chapters, technical committees,

conferences, workshops, Newsletter, etc. IEEE offers great opportunities for professional growth of volunteers at all levels. By becoming active, you will be a leader in our field. I think that every experienced IEEE volunteer will tell you that such activities have been rewarding for them and their companies.

One of my goals for our Elections Committee this year is to have higher member participation in our election. Please help choose the best people to take our IEEE society into the future.

I also mentioned **Awards** in the title of this column. I would like to invite our membership to develop one or more society awards that will recognize excellence in our field. Years ago, the Santa Clara Valley Chapter had a Mike DeMartini Award that we gave annually to a chapter member who had made a special contribution to our field. The award memorialized an industry leader who passed much too early. The chapter funded and coordinated the award. For IEEE society awards, there is a process that must be followed and fairly significant financing is required. I would like to get the ball rolling on this, and would invite your ideas (murlinm@ieee.org). This would be a great way to remember someone who made an impact.

Technically Speaking

Air Gaps and Clearances in IEC 60950-1 Ed. 2.0

by Richard Nute

Introduction

A colleague identified an apparent conflict for requirements for clearances. On the one hand, sub-clause 2.1.1.1 specifies that an air gap between the test finger or test pin and an internal part at more than 1000 volts ac or 1500 volts dc shall meet the basic insulation clearance.

On the other hand, sub-clause 2.10.3.1 specifies that an air gap serving as basic insulation shall be at least 2 mm, and an air gap serving as reinforced insulation shall be at least 10 mm.

My colleague asked for an explanation and clarification of these apparently conflicting requirements.

Accessibility

Sub-clause 2.1.1.1

This sub-clause is entitled “Access to energized parts.” It requires “adequate protection against contact with” specified parts (not all of which are energized, e.g., basic insulation). It further states:

Protection shall be achieved by insulation or by guarding or by the use of interlocks.

Compliance is determined by the use of a test probe, which shall not contact the specified parts. Presumably, the “protection... by insulation” is by air insulation (air gap) between the test probe and the specified parts. In this sub-clause, the “adequate protection” requirement is that the specified parts shall not be accessible; no minimum distance between the test probe and the specified parts is required.

The standard has an exception for energized parts at more than 1000 volts ac or 1500 volts dc. In this case, it specifies a minimum air gap distance between the part and the test probe. Note the wording: The air gap distance is “a minimum length equal to the minimum clearance.” The text does not say that the air gap is a clearance! The air gap is required to be the *same distance* as

a clearance, but it is *not* a clearance.



Furthermore, a clearance is defined (1.2.10.1) as the “shortest distance between two *conductive* parts, or between a conductive part and the bounding surface of the equipment, measured through air.” The test probe is neither a “conductive part” nor a “bounding surface” as used by this standard. In this sub-clause, an air gap is not a clearance.

Clearances

Sub-clause 2.10.3

This sub-clause is entitled “General.” It requires that clearances withstand overvoltages that may otherwise break down the clearance (air insulation).

This sub-clause includes minimum clearance dimensions for two specific constructions. These minimum clearances supersede the minimum clearances specified in Tables 2K and 2J.

Construction 1

The first requirement applies to accessible conductive parts (and specifically enclosure parts) of:

- floor-standing equipment, or
- the non-vertical top surface of desk-top equipment.

The requirement applies only to the distance between a part at hazardous voltage and an accessible conductive part *of the enclosure*. Furthermore, it only applies if the construction is that of reinforced insulation.

For this specific construction, the minimum required clearance is 10 mm (which is the minimum required clearance for about 5000 volts peak).

IEC 60950-1, 2.1.1.1 Access to energized parts

The equipment shall be so constructed that in OPERATOR ACCESS AREAS there is adequate protection against contact with...

Compliance is checked by all of the following.

a) Inspection.

b) A test with the test finger, Figure 2A, which shall not contact parts described above when applied to openings in the ENCLOSURES after removal of parts that can be detached by an OPERATOR, including fuseholders, and with OPERATOR access doors and covers open. It is permitted to leave lamps in place for this test. Connectors that can be separated by an OPERATOR, other than those complying with IEC 60083, IEC 60309, IEC 60320, IEC 60906-1 or IEC 60906-2, shall also be tested during disconnection.

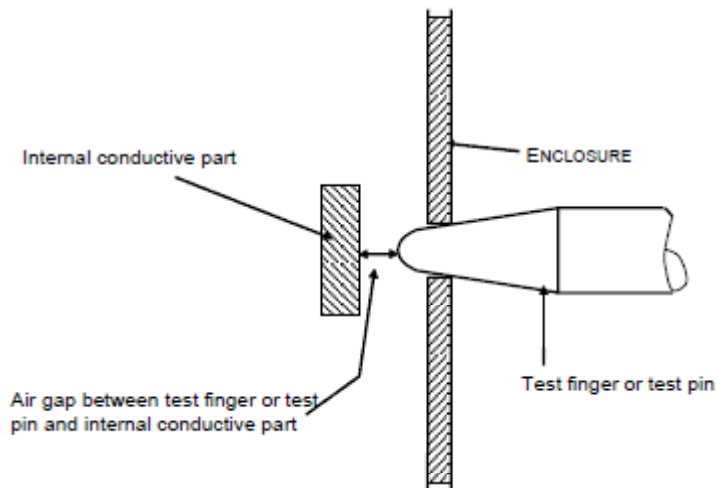
c) A test with the test pin, Figure 2B, which shall not contact bare parts at HAZARDOUS VOLTAGES when applied to openings in an external ELECTRICAL ENCLOSURE. Parts that can be detached by an OPERATOR, including fuseholders and lamps, are left in place, and OPERATOR access doors and covers are closed during this test.

d) A test with the test probe, Figure 2C, where appropriate.

...
...
...

Where contact between the test tool and the part is not permitted in the above tests, there is no requirement for a minimum air gap for voltages not exceeding 1 000 V a.c. or 1 500 V d.c. For higher voltages, there shall be an air gap between the part at HAZARDOUS VOLTAGE and the test finger, Figure 2A, or the test pin, Figure 2B, placed in its most unfavourable position. This air gap, see Figure 2D, shall either

- have a minimum length equal to the minimum CLEARANCE for BASIC INSULATION specified in 2.10.3 (or Annex G), or
- shall withstand the relevant electric strength test in 5.2.2.



There is no requirement for a minimum air gap between the test finger or test pin and the internal conductive part for voltages up to 1 000 V a.c. and 1 500 V d.c.

IEC 154605

Figure 2D - Accessibility of internal conductive parts

I assume that the 10 mm requirement is in anticipation of mechanical impacts to conductive enclosures that might result in permanent dents in the metal and reduced clearances within the equipment.

Construction 2

The second requirement applies to *earthed* accessible conductive parts (and specifically enclosure parts) of pluggable equipment Type A.

The requirement applies only to the basic insulation between a part at hazardous voltage and an accessible conductive part *of the enclosure*.

For this specific construction, the minimum required clearance is 2 mm. According to Tables 2K and 2J, this requirement would only apply where the hazardous voltage is 210 peak or less.

For the constructions described herein, the creepage distances cannot be less than the required clearances. Because the requirements specify clearance distances and not voltages, the required creepage distance is the same as the required clearance distance.

Conclusion

Air is a gaseous insulator. Whether treated deliberately or not, clearances and air gaps rely on air as an insulator.

According to Paschen's Law, air is always an insulator for voltages below 327 peak or d.c. For voltages more than 327, reliability (voltage withstand capability) of air insulation depends on voltage, electric field shape, distance, air pressure, and other parameters. In other words, for voltages more than 327, air insulation is subject to breakdown.

IEC 60950-1, 2.10.3.1, General

CLEARANCES shall be so dimensioned that overvoltages, including transients that may enter the equipment, and peak voltages that may be generated within the equipment, do not break down the CLEARANCE.

...
...
...

The specified minimum CLEARANCES are subject to the following minimum values:

- 10 mm for an air gap serving as REINFORCED INSULATION between a part at HAZARDOUS VOLTAGE and an accessible conductive part of the ENCLOSURE of floor-standing equipment or of the non-vertical top surface of desk top equipment;
- 2 mm for an air gap serving as BASIC INSULATION between a part at HAZARDOUS VOLTAGE and an earthed accessible conductive part of the ENCLOSURE of PLUGGABLE EQUIPMENT TYPE A.

Creepage distance

Every clearance has an associated creepage distance (and an associated solid insulation). Physically, the creepage distance can never be less than the clearance.

Failure (breakdown) of a clearance (air insulation) is a function of the value of the short-term peak voltage.

Failure (breakdown) of a creepage distance (surface of the solid insulation) is a long-term function of the value of the r.m.s. voltage. For higher voltages, creepage distances are greater than clearances.

For the purpose of determining whether a part is accessible or not, the "no touch" criterion is acceptable for all voltages up to 327 peak or d.c. No minimum distance is required to assure that the air insulation will not break down.

Furthermore, if the part is subject to transient overvoltages that would break down the air insulation between the part and a human finger, harmful electric shock is not likely. Short-duration, single-event body currents are not likely to interrupt heart rhythm. So, the "no touch" criterion is acceptable for all steady-state voltages up to 327 peak or d.c., and any transient overvoltages.

Some standards seem to treat *clearance* simply as a safety parameter without recognizing its

physical properties as an insulator. Likewise, some standards seem to treat air gaps simply as the means for determining that a part is not accessible.

In this standard, *accessibility* and *clearance*, both of which comprise *air gaps*, are separate requirements.

Confusion arises because requirements for both *accessibility* and *clearance* use the term *air gap*. If a part is not accessible, then the distance between the part and the test probe is described as an *air gap*. If two conductive parts are separated by air, then the distance between the two conductors is described as a *clearance*.

An air gap has no distance requirement, while a clearance has a minimum distance requirement. An air gap is not a clearance.

Every clearance has an associated creepage distance (and an associated solid insulation). Physically, the creepage distance can never be less than the clearance.

Failure (breakdown) of air insulation is a function of the value of the short-term peak voltage.

Failure of a creepage distance (surface of the solid insulation) is a long-term function of the value of the r.m.s. voltage.

For the constructions described herein, the creepage distances cannot be less than the required clearances.

Your comments on this article are welcome. Please address your comments to Richard Nute, e-mail richn@ieee.org.

Richard Nute, Product Safety Consultant, Vancouver, Washington, USA, is a Life Senior Member, IEEE, member of the Board of Directors, IEEE/PSES, and Chief Technical Officer, IEC TC108/HBSDT.

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TAC News

Forensics and Failure Analysis

The Forensics and Failure Analysis Technical Committee (FFATC) is currently looking for authors to publish papers and present in the Forensics Track at the 2012 IEEE Symposium on Product Compliance Engineering (ISPCE) taking place in Portland, Oregon on November 5-7, 2012. The deadline for abstract submittal is May 15, 2012. Please see <http://www.psessymposium.org/> for details.

The FFATC LinkedIn group has reached over 500 members! This online forum is a great place for failure analysis investigators to join and have discussions concerning failure analysis of new and mature components and circuits, rare failure modes not commonly seen in any given product line, and tools and techniques used, to name a few topics.

The leadership group of the FFATC is looking for interested and dedicated persons to join this leadership group to augment our efforts to grow the contributions and importance of this committee to the field of quality failure analysis and its ability to feed back findings to the improvement of electrical and electronic product safety. If you are interested in helping lead this effort, please join the LinkedIn group "Forensics and Failure Analysis" and contact Daren Slee.

Telecom Safety

Current topics being discussed at the monthly meeting include:

- Electronic fusing
- TC-108 National Committee activity
- New Telcordia GR-3171-CORE, Issue , Generic Requirements for Network Elements Used in Wireless Networks Physical Layer Criteria. Review draft.
- TSTC Proposal for IEC 60950-22– Battery Cabinet Ventilation (attached) - Submitted to US TAG
- TSTC Proposal for IEC 60950-22 – Outdoor Enclosure Metals (attached) – Submitted to US TAG
- For Meeting Votes on the following due March 30, 2012:
 - 108/477/CDV, IEC 60950-1-A2 Ed 2.0, Information technology equipment - Safety – Part 1: General requirements
 - 108/478A/CDV, IEC 60065 Ed 8.0, Audio, video and similar electronic apparatus – Safety requirements
 - 108/479/CDV, IEC 62368-1 Ed 2.0, Audio/video, information and communication technology equipment – Part 1: Safety requirements
- Smart grid issues
- 380Vdc power systems
- Lightning/Ground potential rise
- Solar panel integration

international, relations, treaties etc. Inter+national means between or among nations; hence internationalization refers to the increased importance of relations between nations – the basic unit remains *the nation*.

In contrast, the term *globalization* refers to integration on a global scale into a global society, which blurs national boundaries.

The term “globalization” is often used with negative connotation but within the IEEE, in general, and the PSE Society, in particular, it bares our mission and vision.

Mission of the IEEE and the PSE Society

IEEE’s Technical Activities’ (TA) core purpose is to foster the development and facilitate the exchange of scientific and technological knowledge that *benefits members, the profession and humanity*.

The mission of the Product Safety Engineering Society is consistent with the TA mission, while focusing on product safety: *“Our mission is to strive for the advancement of the theory and practice of applied electrical and electronic engineering as applied to product safety and of the allied arts and sciences.”*

But how can this mission be *put into practice*?

One Ring to rule them all, One Ring to find them, One Ring to bring them all and in the darkness bind them....

What has this line from the legend of the Ring (“Lord of The Rings”) got to do with it? Nothing and everything!

We live in the age of electro-technology, and our universe is getting ever increasingly complex. Contemporary technologies cannot exist on their own merit, but rather – the need for cooperation between different electro-technical disciplines is indispensable. As long as all electro-technologies rely on the electrical power, we, in the PSE Society, must be “in the picture”. Product and system safety are the *“one ring that brings them all (together) and in the darkness binds them”*. Safety comes first, and the above section is a sad but “living” proof of its place in everyday life. If anything *“benefits ... humanity”*, the work of PSES and its members comes #1.

Strategic Planning

“Vision without action is a dream; Action without

vision is simply passing the time; Action with vision is making a positive difference” (J. Barker)

What is the purpose and vision of the PSES? Yes, we have the mission and field of interest defined, but, where is our **vision** described?

In the June, 2012 BoD meeting, taking place in Atlanta, GA, a **strategic** planning exercise will be initiated, to be continued in subsequent BoD meeting series. This exercise will be held with the objective of looking deep into the essence of our Society, with the objective of defining our vision and core purpose. Take for example the **IEEE Technical Activities (TA) Core Purpose**:


“To foster the development and facilitate the exchange of scientific and technological knowledge that benefits members, the profession and humanity” while its vision is to *“Be the most recognized and respected global organization in our fields of interest.”*

When spelt out, the IEEE TA strives to be:

- The global information resource
- The place where innovators meet
- Essential to the global technical community and be universally recognized for contributions to improving world-wide conditions
- The home for all technical professionals in all disciplines of interest and be a global information resource
- Recognized globally, as the leading organization for forming new knowledge communities, delivering quality information and supporting technical professionals
- The preferred place to go for timely, relevant scientific information
- The technical Society that professionals join and stay active as volunteers throughout their careers

Does the PSES have a core purpose and vision? Sure we have, but – have we spelt it out? That is the objective of this strategic planning exercise: “rethinking” our core purpose and vision in light of recent years developments, through the following steps:

- Identify **goals** appropriate to the PSES
- Identify **resources** required to accomplish

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Advantages of Membership in the IEEE PSES

Makes you part of a community where you will:

- Network with technical experts at local events and industry conferences.
- Receive discounts on Society conferences and symposiums registration fees.
- Participate in education and career development.
- Address product safety engineering as an applied science.
- Have access to a virtual community forum for safety engineers and technical professionals.
- Promotion and coordination of Product Safety Engineering activities with multiple IEEE Societies.
- Provide outreach to interested engineers, students and professionals.
- Have access to Society Publications.



E-Mail List: <http://www.ieee-pses.org/emc-pstc.html>
 Virtual Community: <http://product-compliance.oc.ieee.org/>
 Symposium: <http://psessymposium.org/>

Membership: The society ID for renewal or application is “043-0431”.

those goals

- Identify **steps to complete** the goals
- Develop **metrics** – how will we know if we are successful
- Make a **commitment to success**

“However beautiful the strategy, you should occasionally look at the results” (W. Churchill)

In order to put the strategic planning into practice, the plans and implementation thereof will be, from now on, regularly reviewed in the BoD meeting. In addition, metrics will be developed for ensuring that an objective manner of evaluating the implementation of our plans is put into practice. This is an ongoing and difficult process, but rest assured, achievements will be visible, and measurable.

Where do Initiatives and Ideas come from?

To accomplish our goals, we must first... identify them. Goals are then supported by initiatives, in line with the goals, in order to accomplish our mission within our field of interest. But **where do initiatives and ideas come from?**

Essentially, from YOU! Many ideas emerged from meetings held across the Globe, in various occasions, conferences, chapter meetings, and other global events. That is why it is so important that you keep on communicating with us, letting us know of your needs and desires, of how we may improve our service to you. After all, our vision is to facilitate the exchange of scientific and technological knowledge that *benefits members, the profession and humanity.*

We cannot do it Alone... This is Truly a Global Issue

Now I get back to the item I began with – Globalization. Huge challenges face us in the age of technology. Meeting these challenges is not a matter of few. This is the power of the PSE Society of the IEEE as a global society: The capability to put together professionals spanning across regions, countries, blurring national boundaries.

In this age of information, it is not necessary to travel to take part in the activities of the Society: All you need is internet access and a few hours you are willing to contribute to this cause.

The PSES addresses technical activities through its technical advisory committee and its technical

committees (TCs). Take part, get involved, become a leader in your field! The Society needs you; Humanity needs you, and... yes – YOU need you!

Be Prepared... ISPCE'2012 in Portland, OR

While mentioning conferences and symposia mark your calendar. Time is running fast and the 2012 IEEE International Symposium on EMC is just behind the corner. Symposium Chair, Anna Klostermann, and her Committee are working hard to prepare rich technical as well as social programs, and this is truly an event not to be missed. EVERYONE SHOULD BE THERE! After all, that is the best place for networking, professionally and socially alike.

Planning 2012/2013 BoD Meetings

The PSES BoD just held its first meeting in 2012 in March, 2012 in Austin, TX. The next meeting will be held on June 24, 2012 in Atlanta, GA. The third meeting series will be held, of course in Portland, OR during the Symposium. In addition, monthly BoD telecons are regularly held on the first Tuesday of each month. You are more than welcome to attend any of those meetings. Just contact our Secretary, Daniece Carpenter, Daniece_Carpenter@dell.com for details. The meetings are open and any member of PSES may join.

I am now considering sites for holding the 2013 BoD meetings. Before making decisions as to the location of the meetings, I would like to solicit invitations from members and chapters to host the meeting. If you are interested in hosting the BoD meeting (we will make all arrangements, do not worry), possibly holding a chapter meeting or workshop (or starting a new chapter on site), we would be glad to consider your invitation. Simply write to me at eb.joffe@ieee.org and I will be glad to bring your invitation to the BoD for consideration.

Summary

This message covered only a few aspects of globalization and activities carried out to develop and implement a technology roadmap by the IEEE and the PSES. For a professional society like the IEEE and the Product Safety Engineering Society, globalization and technology development go hand in hand. Only through global outreach, membership and chapter development as well as through technology exchange can these goals be

Call for Papers, Workshops, and Tutorials

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The IEEE Product Safety Engineering Society seeks original, unpublished papers and tutorials on all aspects of product safety and compliance engineering including, but not limited to:

Forensics Track:

Papers and presentations detailing:

- The latest findings in failure analysis on new components and miniaturization of common products implemented by the electronics industry.
- Descriptions of failure analysis involving rare failure modes that are not commonly seen in any given product line.
- Developments in the general tools and techniques used for quality failure analysis of electronic and electrical products.
- Dominant failure modes for a given type of component, detailing causes and effects of these failure modes.

Large Format Lithium Ion Batteries Track:

Papers and presentations on large format lithium ion batteries will include:

- Battery technologies for vehicles.
- Current standards and activities around developing new standards for batteries.
- Potential failure modes and risks associated with large format batteries.
- Failure analysis techniques.
- What we can learn from past experience regarding battery safety.

EMC Product Compliance Track:

Papers and presentations on EMC product compliance will include:

- EMC Standards and Regulations
- PCB design for EMC compliance
- EMC shielding, grounding, filtering and layout considerations for compliance
- EMC Troubleshooting techniques
- EMC compliance and non-compliance case studies
- Smart Grid EMC considerations
- Transportation system EMC
- Electric Vehicle EMC
- Lightning Protection
- Electrostatic discharge protection

Medical Devices Track - More information coming soon!

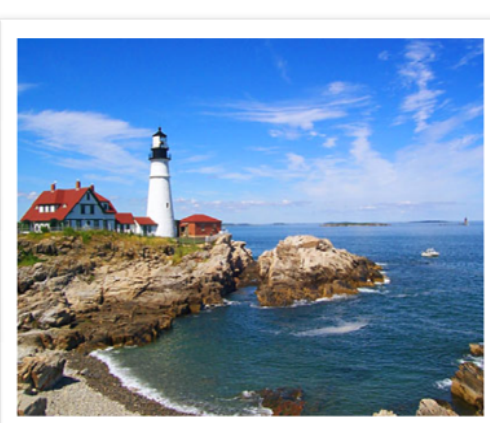
Risk Assessment Track - More information coming soon!

Author's Schedule

All dates require that the associated documents be loaded into EDAS by the due date

Abstract/Draft Formal Paper/Presentation Submission	May 15, 2012
Notification of Abstract Acceptance	June 15, 2012
Final Paper/Presentation submission	August 15, 2012

Please go to the Author's Kit page of the ISPCE web for comprehensive submission instructions including paper templates on the Authors tab at: www.psessymposium.org



achieved.

This is where we all come in...

I would be glad to hear from you with any suggestion, comment, or just a friendly message. Please do not hesitate to e-mail me at: eb.joffe@ieee.org.



Elya Joffe
President IEEE PSES

Call for nominations for Directors-At-Large of the IEEE Product Safety Engineering Society

If you are looking to be recognized by your peers and want to make a difference in your profession, consider running for the Product Safety Engineering Society Board of directors.

This is a Call for Nominations for election to a position as Director-At-Large IEEE

PSES (BoD) for the term of 2013 through 2015. If you know of a good candidate, including yourself, who possesses leadership qualities, can get things done, and is looking for a challenge, please send an Intention to Nominate to a Nominations Committee member listed below. The Intention should list the candidate's name, contact information and a brief description of their abilities.

Directors-At-Large are your representatives to the Board of Directors of IEEE PSES.

Terms of office are 3 years and the nominee must

– be a member of the IEEE and a member of the Society;

– possess technical and professional stature in the Product Safety Engineering field;

– have adequate financial resources, time to attend meetings, teleconferences and actively contribute in committee activities.

If you are interested in applying for nomination for any of these positions, please contact the Nominations Committee with a four paragraph biographical summary by June 11, 2012.

First paragraph: Name, title, place of employment, educational background

Second paragraph: Technical and professional experience

Third paragraph: PSES and IEEE service and activities including officer, committees, etc.

Fourth paragraph: Vision for PSES. Your mission as a director.

Nominations Committee:

Murlin Marks at murlinm@ieee.org, or

Jim Knighten at Jim.Knighten@Teradata.com

or Jim Bacher at j.bacher@ieee.org

For more details please review the society bylaws on our home page or contact anyone on the nominations committee.

Emergency Stop

Editor's note—This is the first in a series of articles reprinted through the courtesy of Doug Nix from postings on the Machinery Safety 101 blog (<http://machinerysafety101.com>).



Emergency Stop—What's so confusing about that?

by Doug Nix

I get a lot of calls and emails asking about emergency stops. This is one of those deceptively simple concepts that has managed to get very complicated over time. Not every machine needs or can benefit from an emergency stop. In some cases, it may lead to an unreasonable expectation of safety from the user, which can lead to injury if they don't understand the hazards involved. Some product-specific standards mandate the requirement for emergency stop, such as CSA Z434-03, where robot controllers are required to provide emergency stop functionality and work cells integrating robots are also required to have emergency stop capability.



Photo 1 – This OLD button is definitely non-compliant.

Defining emergency stop

So what is an Emergency Stop, or e-stop, and when do you need to have one? Let's look at a few definitions taken from CSA Z432-04:

Emergency situation — an immediately hazardous situation that needs to be ended or averted quickly in order to prevent injury or damage.

Emergency stop — a function that is intended to avert harm or to reduce existing hazards to persons, machinery, or work in progress.

Emergency stop button — a red mushroom-headed button that, when activated, will immediately start the emergency stop sequence.

and one more:

6.2.3.5.3 Complementary protective measures

Following the risk assessment, the measures in this clause either

Continued on Page 22

shall be applied to the machine or shall be dealt with in the information for use.

Protective measures that are neither inherently safe design measures, nor safeguarding (implementation of guards and/or protective devices), nor information for use may have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine. Such measures shall include, but not be limited to,

- a) emergency stop;
- b) means of rescue of trapped persons; and
- c) means of energy isolation and dissipation.



Photo 2 – This more modern button is non-compliant due to the RED background and spring-return button.

So, an e-stop is a system that is intended for use in Emergency conditions to try to limit or avert harm to someone or something. It *isn't* a safeguard, but is considered to be a Complementary Protective Measure. In terms of the Hierarchy of Controls, emergency stop systems fall into the same level as Personal Protective Equipment like safety glasses, safety boots and hearing protection. So far so good.

Is an emergency stop required?

Depending on the regulations and the standards you choose to read, machinery is not required to have an Emergency Stop. Quoting from CSA Z432-04:

6.2.5.2.1 Components and elements to achieve the emergency stop function

If, following a **risk assessment**, it is determined that in order to achieve adequate risk reduction under emergency circumstances a machine must be fitted with components and elements necessary to achieve an emergency stop function so that actual or impending emergency situations can be controlled, the following requirements shall apply:

- a) The actuators shall be clearly identifiable, clearly visible, and readily accessible.
- b) The hazardous process shall be stopped as quickly as possible without creating additional hazards. If this is not possible or the risk cannot be adequately reduced, this may indicate that **an emergency stop function may not be the best solution** (i.e., other solutions should be sought). (Bolding added for emphasis - DN)
- c) The emergency stop control shall trigger or permit the triggering of certain safeguard movements where necessary.

Note: For more detailed provisions, see NFPA 79.



Photo 3 – This more modern button is non-compliant due to the RED background.

In fact, if you read Ontario's Industrial Establishments regulation ([Regulation 851](#)), you will find that the only requirement for an emergency stop is that it is properly identified and located "within easy reach" of the operator. What does "properly identified" mean? In Canada, the USA and Internationally, a RED operator device on a YELLOW background, with or without any text behind it, is recognized as EMERGENCY STOP or EMERGENCY OFF, in the case of disconnecting switches or control switches. I've scattered some examples of different compliant and non-compliant e-stop devices through this article.

The EU Machinery Directive, 2006/42/EC, and emergency stop

Interestingly, the European Union has taken what looks like an opposing view of the need for emergency stop systems. Quoting from Annex I of the Machinery Directive:

1.2.4.3. Emergency stop
Machinery must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted.

Notice the words "...actual or impending danger..." This harmonizes with the definition of Complementary Protective Measures, in that they are intended to allow a user to "avert or limit harm" from a hazard. Clearly, the direction from the European perspective is that ALL machines need to have an emergency stop. Or do they? The same clause goes on to say:

The following exceptions apply:

- machinery in which an emergency stop device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken,
- portable hand-held and/or hand-guided machinery.

From these two bullets it becomes clear that, just as in the Canadian and US regulations, machines only need emergency stops WHEN THEY CAN REDUCE THE RISK. This is hugely important, and often overlooked. If the risks cannot be controlled effectively with an emergency stop, or if the risk would be increased or new risks would be introduced by the action of an e-stop system, then it should not be included in the design. Carrying on with the same clause:

The device must:

- have clearly identifiable, clearly visible and quickly accessible control devices,
- stop the hazardous process as quickly as possible, without creating additional risks,
- where necessary, trigger or

permit the triggering of certain safeguard movements.

Once again, this is consistent with the general requirements found in the Canadian and US regulations. The directive goes on to define the functionality of the system in more detail:

Once active operation of the emergency stop device has ceased following a stop command, that command must be sustained by engagement of the emergency stop device until that engagement is specifically overridden; it must not be possible to engage the device without triggering a stop command; it must be possible to disengage the device only by an appropriate operation, and disengaging the device must not restart the machinery but only permit restarting.

The emergency stop function must be available and operational at all times, regardless of the operating mode.

Emergency stop devices must be a back-up to other safeguarding measures and not a substitute for them.

The first sentence of the first paragraph [quoted] above is the one that requires e-stop devices to latch in the activated position. The last part of that sentence is even more important: "...disengaging the device must not restart the machinery but only permit restarting." That phrase requires that every emergency stop system have a **second discrete action** to reset the emergency stop system. Pulling out the e-stop button and having power come back immediately is **not OK**. Once that button has been reset, a second action, such as pushing a "POWER ON" or "RESET" button to restore control power is needed. **Point of Clarification:** I had a question come from a reader asking if combining the e-stop function and the reset function was acceptable. It can be, but only if:

- The risk assessment for the machinery does not indicate any hazards that might preclude this approach; and
- The device is designed with the following characteristics:
- The device must latch in the activated position;
- The device must have a "neutral" position where the machine's emergency stop system can be reset, or where the machine can be enabled to run;
- The reset position must be distinct from the previous two positions, and the device must spring-return to the neutral position.

The second sentence harmonizes with the requirements of the Canadian and US standards.

Finally, the last sentence harmonizes with the idea of "Complementary Protective Measures" as described in CSA Z432.

How many and where?

Where? "Within easy reach." Consider the locations where you EXPECT an operator to be. Besides the main control console, these could include feed hoppers, consumables feeders, finished goods exit points...you get the idea. Anywhere you can reasonably expect an operator to be under normal circumstances is a reasonable place to put an e-stop device. "Easy Reach" I interpret as within the arm-span of an adult (presuming the equipment is not intended for use by children). This translates to 500-600 mm either side of the center line of most work stations.

How do you know if you need an emergency

stop? Start with a stop/start analysis. Identify all the normal starting and stopping modes that you anticipate on the equipment. Consider all of the different operating modes that you are providing, such as Automatic, Manual, Teach, Setting, etc. Identify all of the matching stop conditions in the same modes, and ensure that all start functions have a matching stop function.

Do a risk assessment. This is a basic requirement in most jurisdictions today.

As you determine your risk control measures (following the hierarchy of controls), look at what risks you might control with an Emergency Stop. Remember that e-stops fall below safeguards in the hierarchy, so you must use a safeguarding technique if possible, you can't just default down to an emergency stop. **IF** the e-stop can provide you with the additional risk reduction, then use it but first, reduce the risks in other ways.

The stop function and control reliability requirements

Finally, once you determine the need for an emergency stop system, you need to consider the system's functionality and controls architecture. NFPA 79 is the reference standard for Canada, although you can find very similar requirements in IEC 60204-1 if you are working in an international market.

Functional stop categories

NFPA 79 calls out three basic categories of stop. Note that these are **NOT** reliability categories, but are functional categories. Reliability is not addressed in these sections. Quoting from the standard:

9.2.2 Stop Functions. The three categories of stop functions shall be as follows:

- (1) Category 0 is an uncontrolled stop by immediately removing power to the machine actuators.

- (2) Category 1 is a controlled stop with power to the machine actuators available to achieve the stop then remove power when the stop is achieved.
- (3) Category 2 is a controlled stop with power left available to the machine actuators.



Photo 4 – This E-Stop button is CORRECT. Note the Push-Pull-Twist operator and the YELLOW background.

A bit later, the standards says:

9.2.5.3 Stop.

9.2.5.3.1 Each machine shall be equipped with a Category 0 stop.

9.2.5.3.2 Category 0, Category 1, and/or Category 2 stops shall be provided where indicated by an analysis of the risk assessment and the functional requirements of the machine. Category 0 and Category 1 stops shall be operational regardless of operating modes, and Category 0 shall take priority. Stop function shall operate by de-energizing that relevant circuit and shall override related start functions.

Note that 9.2.5.3.1 does **NOT** mean that every

Continued on Page 26

machine must have an e-stop. It simply says that every machine must have a way to stop the machine that is equivalent to “pulling the plug.” The main disconnect on the control panel can be used for this function if sized and rated appropriately. The question of **HOW** to effect the Category 0 stop depends on **WHEN** it will be used, i.e. what risks must be reduced, or what hazards must be controlled by the e-stop.

You’ll also note that that pesky “risk assessment” pops up again in 9.2.5.3.2. You just can’t get away from it...



Photo 5 – Disconnect with E-Stop Colours indicates that this device is intended to be used for EMERGENCY SWITCHING OFF.

Control Reliability

Once you know what functional category of stop you need, and what degree of risk reduction you are expecting from the emergency stop system, you can determine the degree of reliability required. In Canada, CSA Z432 gives us these categories: SIMPLE, SINGLE CHANNEL, SINGLE CHANNEL MONITORED and CONTROL RELIABLE. These categories are being replaced slowly by Performance Levels (PL) as defined in ISO 13849-1:2007.

The short answer is that the greater the risk reduction required, the higher the degree of reliability required. In many cases, a SINGLE CHANNEL or SINGLE CHANNEL MONITORED solution may be acceptable, particularly when

there are more reliable safeguards in place. On the other hand, you may require CONTROL RELIABLE designs if the e-stop is the primary risk reduction for some risks or specific tasks.

Extra points go to any reader who noticed that the “electrical hazard” warning label immediately above the disconnect handle in Photo 5 is a) upside down, and b) using a non-standard lighting flash graphic. Cheap hazard warning labels, like this one, are often as good as none at all. I’ll be writing more on hazard warnings in future posts.

Use of Emergency Stop as part of a Lockout Procedure or HECF.

One last note: Emergency stop systems (with the exception of emergency switching off devices, such as disconnect switches used for e-stop) CANNOT be used for energy isolation in a Hazardous Energy Control Procedure (a.k.a. Lockout). Devices for this purpose must physically separate the energy source from the down-stream components. See CSA Z460-05 for more on that subject.



Photo 6 – Pneumatic E-Stop/Isolation device (on left)

Doug Nix, A.Sc.T., is Managing Director at Compliance InSight Consulting Inc. in Kitchener, Ontario, Canada.

This article is republished by permission from the Machinery Safety 101 blog (<http://machinerysafety101.com>), 06-Mar-2009.

Standards Referenced in this post:

1. CSA Z432-04, *Safeguarding of Machinery*
2. NFPA 79-07, *Electrical Standard for Industrial Machinery*
3. IEC 60204-1:2009, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*
4. ISO 13849-1:2007, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*
5. ISO 13850:2006, *Safety of machinery – Emergency stop – Principles for design*

**Have you written your paper for the
2012 Symposium on Compliance
Engineering yet?**

Environmental; Hazard Based standard; EMC; and Battery track. There was also a workshop on Human-Centered Systems Engineering. The sessions covered 2 ½ days.

Pete Perkins has been involved in product safety and regulatory activities for more than 30 years. For the first half of this career he was responsible for Product Safety and Regulatory Affairs at Tektronix, Inc, the oscilloscope manufacturer. Subsequent to that he continues to be an independent consultant in these areas.

He has a BS in engineering from the University Of Portland and a MSEE from Oregon State University. He is a registered Professional Engineer. He has participated in standards activities for 30 years. He is a member of IEC TC64/WG4 (IEC 60479; Effects of electric shock on the human body), US/TAG IEC TC64 and UL STP 101 (Leakage current of appliances). IEC TC 108 (IEC 60950, IT equipment; IEC 62368 Electronic Equipment) as well as convener of WG5 (IEC 60990, Measurement of Touch Current). He serves on US/TAGs for TC66 (Test & Measurement Equipment), TC108 (IEC 60950 & IEC 62368 HBStd) & TC109 (IEC 60664, creepage and clearances). He was an instructor in the Univ of Wisc Engineering Development course 'Getting your CE marking'. He has given papers at the PSES meetings from the beginning. Most are on electric shock issues. He is a recipient of the Michael J DeMartini award for work in the product safety area. He is a Senior member of the IEEE.

IEEE Toronto Section

Engineering & Human Environment Joint Chapter published their first newsletter. See next page.

**IEEE Toronto Section
Engineering & Human Environment Joint Chapter**

Winter Newsletter
2012-Q1

Chapter Chair's Message

Fellow IEEE members,



Thanks for taking the time to read the first Newsletter from the Engineering and Human Environment Joint Chapter for 2012! It's been a while since you may have received any communications from the Chapter, so I'd like to get you up to speed.

Our Chapter has been essentially inactive since 2008. I was recently appointed by Xavier Fernando, Toronto Section Chair, as Chapter Chair. I hope to revitalize our Chapter with your help. There is a lot to do, but with a few volunteers we can make it light work for everyone.

My background is in industrial machinery safety, and I currently belong to three Societies: Product Safety Engineering, Industrial Applications, and Reliability, two of which are part of our Chapter. I own a small consulting firm based in Kitchener, Ontario. I hope to have the chance to meet many of you at our events this year.

If you have any questions or concerns, please contact me!

Doug Nix, A.Sc.T. Chapter Chair
dnix@ieee.org
Skype: cic-inc

Contacting the Chapter

The Chapter can be contacted directly by emailing EHE_Toronto@ieee.org. Our Chapter Web Site is <http://toronto.ieee.ca/chapters/humanenv.htm>.

Who We Are

As a reminder of who we are, the Chapter is sponsored by:

- IEEE Education Society
- IEEE Professional Communication Society
- IEEE Reliability Society
- IEEE Society on Social Implications of Technology
- IEEE Product Safety Engineering Society
- IEEE Technology Management Council

If you are a member of any of these Societies or Councils and are a member of Toronto Section, then you are in our Chapter!

Chapter Committee Formation

We need to form a Chapter Administrative Committee immediately, so I am appealing to you to volunteer to help us get organized. I need volunteers to put together the team. The positions are listed on our Chapter Web Site, <http://toronto.ieee.ca/chapters/humanenv.htm>. Terms are for one year, running from 1-Jan through 31-Dec.

Continued on Page 30

Currently we have the following volunteers and vacancies:

Chair Emeritus – Walter Zessner
Past Chair – **Vacant**
Chapter Chair – Doug Nix
Vice-Chair – Rabiz Foda
Chapter Secretary – Dr. Muthana Al-Khisali
Chapter Treasurer – **Vacant**
Nominations Committee Chair – **Vacant**
Events Director – **Vacant**
Membership Director – **Vacant**
Communications Director – **Vacant**
GOLD Representative – **Vacant**
WIE Representative – **Vacant**
Education Society Representative – Jan Jekielek
Professional Communications Society Representative – **Vacant**
Product Safety Engineering Society Representative – Doug Nix
Reliability Society Representative – **Vacant**
Society on Social Implications of Technology – **Vacant**
Technology Management Council Representative – Rabiz Foda

We urgently require a volunteer to take on the important Treasurer's position. We need to draft our Budget and Chapter Business Plan immediately.

We also need an Events Director to develop a Technical Meeting Program for the Chapter, a Membership Director to work on recruiting new membership and retaining our current members and a Communications Director to handle Chapter marketing and communications, including this Newsletter.

If you are interested in volunteering with the Chapter, please contact me, Doug Nix, dnix@ieee.org. The committee must be formed by the end March, so time is of the essence!

Elections

The Chapter is required to hold annual elections for the positions on the Administrative Committee. This process starts through the formation of a Nominating Committee, and is completed by a secret balloting process in the fall. Newly elected volunteers will take their roles in January each year.

We need three volunteers to begin working on Nominations for this year's elections. If you are interested in volunteering on the Nominations Committee, please contact me, Doug Nix, dnix@ieee.org.

Annual General Meeting

The Chapter is required to hold an Annual General Meeting each year. I am proposing that we should hold our AGM each year in January, following our elections. The AGM will be an opportunity for the newly elected volunteers to be announced, and in future years we will be presenting awards and scholarships at the event. In addition, I see this as an opportunity for the new Chapter Chair to let the members know what the direction for the Chapter will be in the following year.

We will announce the date and location for the 2013 AGM as soon as it is set.

Events Calendars

Please note that there are two calendars on the Chapter web page, one for Chapter Committee Meetings, and one for Chapter Meetings. We will be updating these calendars as we develop the program.

PSES Collaborates with CE Society

Product Safety Engineering Society Collaborates with CE Society

Reprinted with permission of CE Society

by Murlin Marks

I'm very pleased to have been asked to write something about the IEEE Product Safety Engineering Society (PSES) and our overlapping interests with the Consumer Electronics Society. In our careers as professionals, some things come full circle, even when we've been retired for ten years! Forty years ago, as a UL (Underwriters Laboratories) engineer, I evaluated radios, televisions, accessories and other consumer electronics. I was an IEEE CE Society member. As my career evolved and I became a supervisor and manager I became involved with many other products, and no longer had a hands-on connection to consumer electronics.

I'm now a IEEE Senior Life member and finishing up my term as PSES president. For well over twenty years, I've been involved in the Product Safety Technical Committee (TC-8) of the IEEE EMC Society that became the IEEE PSES in 2004. Many of you have met me, either at the IEEE International Symposium on Consumer Electronics (ISCE) in Singapore in June or at IEEE International Conference on Consumer Electronics (ICCE) Berlin in September. You know how enthusiastic I am to have joint activities with the IEEE CE Society.

I think the developing relationship adds value for many Members of both IEEE societies. For example, CE Society members received our special Conference PSES Newsletter which provided details about our 10 - 12 October conference in San Diego, California. I think that the abstracts of many of the presentations are of interest to CE Society members. In addition to basic product safety engineering and compliance topics, there are presentations about the latest trends in convergence and global regulations.

WHAT IS PRODUCT SAFETY ENGINEERING?

The field of interest of the PSES is the theory, design, development, and implementation of PSE for electronic and electromechanical equipment and devices. This includes the theoretical study and practical applications of analysis techniques,

testing methodologies, conformity assessments, and hazard evaluations.

Product Safety Engineering has a history going back to the late 19th century. When electric lighting was becoming widespread and homes and offices were being electrified. For the better part of the following century, most countries did their own thing - or did nothing - to develop programs for products getting to the marketplace being reasonable safe for consumers, workers and their families. Over the years, a lot of research and new technological innovations occurred in the background for most people using the products. Reasonably safe products (purist PSEs will correct me if I say "safe products" - it's arguably impossible to have an absolutely safe product) are ubiquitous in the 21st century. Think of the photo of the African hunter in an open field with a spear, talking on a cell phone.

Since the mid-twentieth century, national and international committees have met and tried to put a global regulatory program together. Not an easy task, given the many different systems that had evolved over the previous half century and that technology has been and continues to be a fast moving target. A number of clever strategies emerged to be flexible and minimize the impact of developing product safety requirements. New technology and "natural evolution" interact - unsafe product designs don't survive. With good engineering, unsafe products don't make it to the marketplace. The few "unsafe" products that do make it to the market do not last very long for a number of reasons, but basically due to the very definition of being "unsafe."

THE FUTURE OF PSE - NEW CHALLENGES

That's why the vast majority of basic product safety issues have long-since fallen to modern design or extinction. New challenges arise. With increasing miniaturization, excessively high temperatures develop. With new energy efficiency standards, new designs may jeopardize product safety principles. PSES provides a forum to discuss research and developments at stages so early that they may be taken into account during product design and thus get factored into cost

Continued on Page 32

analysis and manufacturing.

To make our jobs more interesting, different countries often have different requirements. Often, a product complies with requirements in one country, but does not in another, and may or may not be sold legally in the latter. In some cases, there are safety issues in a different country, for example if the mains voltage is 220 volts instead of 120. In other cases, it's a procedural matter. Nevertheless, the issues need to be anticipated and worked through for the product to be marketed successfully in the new country.

For CE Society members who are academics doing various levels of research, there are opportunities in PSE. Operating frequencies are increasing, technologies are converging, power levels are being reduced, rare and costly materials are being replaced. We must find environmentally friendly ways to solve problems. We even need ways to communicate to users better. These are some of the areas I find interesting, and that will offer opportunities for research and study for many careers. It's the kind of thing that I would like to see more of at IEEE PSES conferences and workshops.

PROGRAM FOR COLLABORATION BETWEEN OUR SOCIETIES

Working with Stefan Mozar, we hope to put a program of joint conferences together. Ideally, we'll have a PSE track at CE conferences, and a CE track at PSE conferences. Hopefully, our members will cross the line and get information and background outside their respective specialties. Both societies have an amazingly wide area of interests, and we all benefit from the exposure. This will become increasingly important as global initiatives develop to protect the environment, use resources more carefully, and adapt to technological developments.

I'm sure that twenty years from now there will be consumer electronic products and product safety issues we cannot dream of now, e.g. think how the iPod and a plethora of accessories have replaced the walkman that replaced the transistor radio that replaced the "ac-dc portable radio" that I had as a kid. If the 90 volt battery didn't get you, the case could bite pretty good if the plug was in the wrong way. Twenty years from now, the biggest

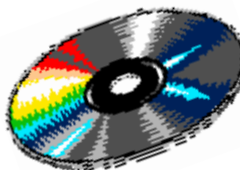
concern may be your (implanted?) cell phone interfering with software for someone's artificial arm or heart. Or the biggest problem may be how to find a replacement for a critical rare earth element that can no longer be mined. Again, think of the issues with lead being replaced in solder.

So, I hope you are pleased with our IEEE societies' efforts to provide new and useful information for you. There's great synergy that can't help but benefit all consumers - and that includes us! I would encourage you to contact me (murlinm@ieee.org) with ideas and suggestions.

Murlin Marks is the past president of the IEEE Product Safety Engineering Society. This article is reprinted with permission from the January 2012 IEEE Consumer Electronics Magazine.

Past IEEE-PSES Symposium Records

CD Purchasing Information



SYMPOSIUM PAPERS ON CD:

The Product Safety Engineering Society continues to offer past symposium records for sale on CDs. The cost for the CD is \$35 plus shipping and handling for IEEE members; \$50 plus shipping and handling for non-IEEE members. At this time, check or money orders are the means for payment. Please provide the following information:

CDs to be shipped to- (Please print or type.)

Name: _____

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Specify what years you would like (2004 through 2008 are currently available):

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Send payment to:

IEEE Product Safety Engineering Society
c/o Richard Georgerian, PSES Board of Directors
7103 Sioux Court
Longmont, CO 80504
U.S.A.

Depending on stock availability allow 2 to 3 weeks for delivery.

New PSES Members

from 1 January 2012 Through 24 March 2012

Our new members are located in the following countries: Argentina, Australia, Canada, Germany, Hong Kong, India, Singapore, Taiwan, USA

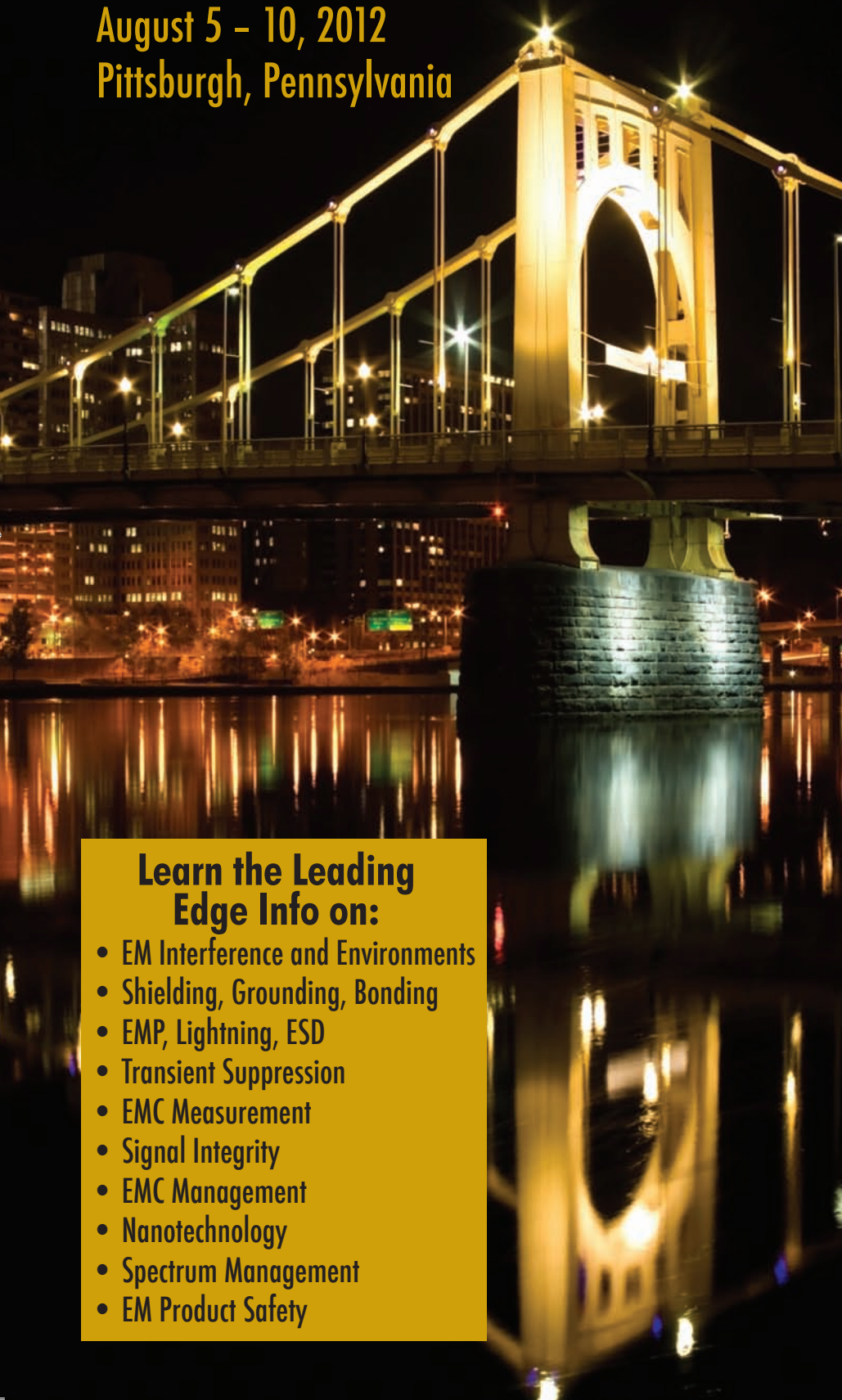
Laura Reyna Musso
Peter John Kroon
Dean I Jurgensen
Reinhard Stein
Alex Wong
George Lee
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Po Shan Siu
R Menaka Menaka
Samuel Angelson Rajeshkumar
Selvaraj Vaimthilingam
Veeran Haribalu N
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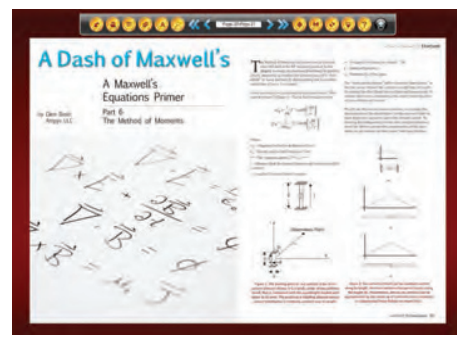
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Institutional Listings

We invite applications for Institutional Listings from firms interested in the product safety field. An Institutional Listing recognizes contributions to support publication of the IEEE Product Safety Engineering Newsletter. To place ad with us, please contact Jim Bacher at j.bacher@ieee.org

The Product Safety Engineering Society will accept advertisements for employment and place looking for work ads on our web page. Please contact Dan Roman for details at dan.roman@ieee.org.

The Product Safety Engineering Newsletter is published quarterly during the last month of each calendar quarter. The following deadlines are necessary in order to meet that schedule.

Closing dates for submitted articles:

- 1Q issue: February 1
- 2Q issue: May 1
- 3Q issue: August 1
- 4Q issue: November 1

Closing dates for news items:

- 1Q issue: February 15
- 2Q issue: May 15
- 3Q issue: August 15
- 4Q issue: November 15

Closing dates for advertising:

- 1Q issue: February 15
- 2Q issue: May 15
- 3Q issue: August 15
- 4Q issue: November 15

The
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