The
Product Safety Engineering Newsletter

IEEE PSES
Product Safety Engineering Society

What's Inside

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President's Message

I now find myself as the president of the Product Safety Engineering Society of IEEE. It is my duty to lead in building a strong IEEE society. What does that mean? Does it mean going with the flow and hoping for the best, or trying to define and then striving to reach some sort of goals and vision? In this, and perhaps the next few of these messages, I would like to discuss elements of our society and what they might mean to you.

I believe that a professional "society" should embody a dynamic concept. Members should be involved in give-and-take of information and give-and-take of career support. A society is built on a structure of its members. Their creativity and growth as a group are what makes the society. Society membership should make us all better professionals. These messages are primarily intended for those of you who may not appreciate fully what your IEEE society can offer to your professional career, making your progression more satisfying and providing dimensions beyond your immediate workplace. Our IEEE society provides the opportunity to fulfill this potential.

The most accessible and important society activity is the chapter meeting. I would like to encourage all members to go to their chapter meetings. If your area doesn't have a current chapter, try to form one. In areas where there are few product safety engineers, we should still try to find approaches to putting a chapter together. Perhaps a joint chapter can be developed, either with another IEEE society or even a different association. I and Thomas Ha, Membership VP, will work with you to help look for ways to have chapter meetings for every PSES member. The internet and teleconferences are great, but there is still no replacement for the face-to-face interaction of a chapter meeting.

Okay, let's assume you have an up-and-running chapter. That means more than just having presentations. Chapter meetings should take on a sense of camaraderie, a sense of professional

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Product Safety Engineering Newsletter

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family. You should be exposed to dimensions of our professional field that you'd never see or have time to appreciate during your regular occupation. Others at the meeting may be involved in periphery or even pretty far afield from product safety disciplines. Others might be just out of school starting their careers. Others may have vast experience. Most will be in the midst of their careers. Some may be looking for work; others in a fast growing company. The point is that diversity is an important part of the chapter experience, and provides a valuable element unavailable elsewhere on a regular basis. You never know when a contact you meet and get to know at a meeting might help you get an answer in the future or even get a job. Or that contact may be attracted to an opportunity at your own organization. You never know when a discussion on a field indirectly related to your work, might answer an issue you meet in the future.

Typically, chapter leadership (CL) will organize and run meetings. CL has varied formats in different chapters. Our chapters really run the gamut here: from a one-man-led show to a well-established process of electing officers. It's to everyone's benefit to have a program that develops leadership by electing officers, and moving along after a year or two. Emeritus status still provides chapter support and guidance, and provides a path for involvement at higher levels in the society. At first, you might feel outside the leadership group, but the process should draw participation from all members. One of my goals as president is to encourage the membership into a natural process of growth that includes chapter involvement—leadership. Technological and economic change demand that product safety engineers be aware of peripheral issues, and have communications skills that can be developed naturally through society and chapter leadership activities.

I can speak first hand that CL involvement provides a path to amazing levels within IEEE. I think that I had the most fun when I was VP in charge of the program for the chapter, with the resulting camaraderie and new contacts that I made setting up meetings. Each meeting was a positive experience that helped put the challenges and frustrations of my regular job into perspective. Over the years, I have seen the growth of my peers and their careers. It is fascinating to consider the turns and surprises that some colleagues have experienced. It's an evolutionary process that we are a part of. Similar evolutionary processes for organizations and technologies add dimensional complexity that regular chapter meetings help professionals to traverse. For example, consider how battery issues are and will continue to evolve. Do we want to wait until published guidelines are available, or be involved and aware of the issues in their development? Our society and regular chapter meetings are the first line in providing a forum for this. The same applies to global issues (i.e. politics), converging technologies, and environmental issues (for example, solar and wind turbine safety issues.)

With input from the membership, the program VP should build a program that provides answers to the questions of the day. Experienced speakers should come from diverse organizations: regulatory agencies, manufacturing companies, government bodies, sales organizations, and consultants should be encouraged to cover areas of their particular expertise. Ideally, the chapter environment makes the audience part of the presentation, helping to develop the theme being presented and focusing on the key issues.

Chapter meetings are a user-friendly way to build a more diverse professional base than your normal job would allow. Part of this is networking, part is leadership growth. In the paragraph above, I referred to "experienced speakers." How did those speakers become experienced? For many, it was by serving as chapter secretary, then program vice-chair, then chair; then moving on to a presentation about a technical activity or interest. Of course, many chapter speakers have already made many presentations, but they can still hone their skills to a friendly group. Most product safety engineers are risk-adverse. It's tough—and can be dangerous—to learn by taking risks in the product safety field. Your society provides an environment where we can risk doing and learning new things on a professional level. Chapters provide the most immediate venue for this experience. PSES provides a friendly entrée to gaining confidence and building a reputation as a leader in the field.

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Chapter Safety Probes

To see current chapter information please go to the chapter page at: http://www.ieee-pses.org/Chapters/index.html

PSES Toronto Chapter
Doug Nix - Chair

The Toronto Section formed the second Canadian Chapter in the last quarter of 2008, and formation activities took place in 2009. The Toronto Chapter is part of the joint Engineering and Human Environment Chapter, which includes:

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

You can find the E & HE Chapter web site at http://ewh.ieee.org/r7/toronto/chapters/humanenv.htm.

Our first meeting was held at the PSES Symposium in October. We have three meetings scheduled for 2010, one in each of the Winter, Spring and Fall. The dates are:

Winter Meeting, 13-March-2010
Topic - Writing a Technical Paper and Presenting It
Speaker - Doug Nix
Location - TBD

Spring Meeting, 19-June-2010
Topic - TBD
Speaker - TBD
Location - TBD

Fall Meeting, 2-October-2010
Topic - TBD
Speaker - TBD
Location - TBD

We are looking for new members, and for speakers for some of these events, so if you live in Ontario and would be interested in joining us for one or more of these meetings we hope you'll contact us.

Meetings will be 2 hours, with an opportunity to do some networking, a 45 minute presentation, an opportunity for Q&A and a little Chapter business at the end.

Presentation topics can include any subject that would be of interest to members. This includes the obvious technical topics, but might also include investing for retirement, technical writing, education, or any other topic you have an interest in presenting.

Outstanding presentations will be recommended to the Symposium, so it's a good opportunity to try out your presentation skills if you are thinking about presenting in Boston.

Need more information or have a question? Contact the Chapter Chair, Doug Nix, dnix@ieee.org.

The Central New England chapter had a joint meeting with the Northeast Product Safety Society on February 24th in Boxborough MA. A social hour with light refreshments followed by a technical meeting was held. Tom Savino, Senior Product Safety Engineer with Curtis-Straus, presented the topic on Laser Guards and Laser Safety based on IEC/EN 60825-1.

Tom Savino is a Senior Product Safety Engineer with Curtis-Straus, a subsidiary of Bureau Veritas, where he has been since 1998. He tests and evaluates various types of equipment and machinery, many of which have lasers. He had previously tested consumer products with Merchandise Testing Laboratories for nine years. He is a member of the IEEE Product Safety Engineering Society, and is a NARTE Certified Engineer.

Tom's presentation on Laser Guards and Laser Safety was based on IEC/EN 60825-1 (Safety of laser products Part 1: Equipment classification and requirements) and ISO/EN 11553-1 (Safety of Machinery-Laser Processing Machines). The first section, An Overview of IEC60825-4: Laser Guards, defines the scope of the standard; i.e. who should

comply, and provides basic definitions. The second section, How to Design Laser Processing Equipment With Compliance to IEC60825-4 in Mind, describes how to assess the foreseeable exposure limit (FEL) of Appendix B, as well as some of the testing that should be considered..

If you or anyone you know would like to give a product safety technical presentation, please contact Steve Brody by email at steven.brody@brooks.com. A technical presentation should be 45 to 60 minutes in duration and be related to product safety. Although the presentation may reference your company and its services, the presentation must not be simply company advertising. We would also appreciate any slides or handout materials be made available for posting on our web site. Releasing presentation materials for posting is desired but not a requirement to make a presentation.

The 2009 meeting schedule is available on the NPSS website at http://www.nepss.net/calendar.html.

The Santa Clara Valley chapter held a meeting on February 23rd. The topic was Medical Compliance Management for the Global Market presented by David McBrayer, P.E.

IEC 60601-1:2005 has been adopted by a number of countries and certification bodies. What does it mean to the product safety practitioner? Medical Device product safety can be a daunting concept, but when considered in an organized manner, it can be managed effectively. This presentation will provide an overview of what is considered in Medical Device product safety certification to the new Standard, for compliance in a multi-country market.

David McBrayer, P.E. has over 25 years of professional experience in Product Safety test and certification. Mr. McBrayer became involved when the requirements of each destination country had to be incorporated into a design specification and then harmonized such that the product could be built and marketed with minimal customization for each country. David has experience in telecommunications, ITE and Radiation therapy Medical Devices destined to the North American, European, China and rest-of-world markets. He pursued these efforts at ROLM, IBM and Siemens. Currently, Mr. McBrayer is a Project Engineer at Intertek ETL-Semko. He is a member of the EMC and Product Safety Engineering Societies. David is also a licensed Amateur Extra radio operator and a Certified Radiation Safety Officer.

People Looking To Start Chapters

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Evaluation of Fans Accessible to the User: K Factor Approach Brings Consistency

by Lal Bahra

Mechanical injury is caused by relative movement between the human body and moving parts of the equipment that are accessible. Injury can also be caused by moving body parts coming in contact with sharp edges and sharp corners; and also by parts ejected from the equipment; and body parts drawn into the equipment in areas where gears, rollers or other such parts are present.

A moving fan blade may be capable of causing injury to the body. Designers provide enclosures, barriers or guards to prevent access to moving fan blades. If the moving fan blade assembly is of small mass (such as CPU fans), low speed, and has well rounded, resilient blade edges, then test houses usually have not required a fan guard, as such a low-energy fan is not likely to cause any injury. Sometimes some test houses test the fan blade with an HB pencil, and if there is no damage to the pencil during the test, they do not require a guard over the fan. Figure 1 shows a typical fan and guard.

Figure 1. A typical fan and fan guard.

In addition, test houses have also not required a fan guard if the fan is not easily accessible, i.e., it is located behind some PWB, disk drive, or some internal cover (i.e., it is hard to reach).

But what is acceptable to one test house may not be acceptable to another test house, and that is where the problem comes. Fan guards cost anywhere from 50 cents to a dollar, but notebooks and desktops are shipped by the millions and cost can really add up. In addition, guards restrict the airflow which results in more heating and other unanticipated problems. A common approach needs to be developed that is well documented and acceptable to all the test agencies in order to avoid delays in approvals that result in delays in shipment and lost contracts. This article looks at the mechanical hazard from commonly used fans employed in electronic equipment and discusses the development of the K factor-based proposal.

The hazard from the accessible fan blade depends on the following factors:

- fan speed, mass and torque (they need to be low);
- Kinetic energy = ½ m V^2 (needs to be low);

- Sharpness of the edge (Edge should be round or blunt);
- Mass of the moving assembly (smaller the better);
- Peripheral speed (lower speed = lesser hazard);
- Plastic fan blade (metallic fan blades are more hazardous as they do not have the resilience of plastic fan blades).

Differing accepted practices

- Some hazardous fans have been accepted without guards. The reason for this acceptance is that even though the fan is accessible to the user, the user is not instructed to handle the fan in any way. But other test houses have not accepted such a construction.
- Hazardous fans behind internal covers—PWBs and drives—but accessible with a finger probe have been accepted by some test houses. Reason for acceptance was that user is not looking for hazards and has no business in that area. Other test houses have required guarding. Their argument is that people try to put their hands around to explore things and may touch the fan blade.
- There was a need to bring consistency to the evaluation of fans (keeping in mind that if presently accepted constructions required costly design changes, then any approach was not going to help and might not have been accepted).

Fans used in ITE and A/V products

Desktops and notebooks have modular constructions and the user is permitted to add or replace memory cards, graphic modules and other accessories. This area is declared by the manufacturer to be a user access area. There are fans used in this internal area and they become accessible to the user once he tries to go in to replace or add new accessories. The fans used in this area are usually box-type, small in size and usually not guarded. The fan blades are made of polymeric materials, and the edge is not sharp. Many test houses have accepted such constructions, but they may differ on their conclusion about a particular fan. Acceptance is based on the judgment of the test agency's engineer. It was felt that the approach to this matter should be standardized to enable test houses to accept each other's test data.

K factor is a property of the fan based on its moving mass, diameter of the moving mass, and speed. It is not kinetic energy.

Torque is the force that rotates the moving mass of the fan. Torque is calculated by T = rF where F is the force vector and r is the radius of the moving mass (in the case of the fan blade). Its unit is Nm. This is taken into account in the K factor equation.

Mass is the total weight of the moving mass, a determinant of how hard the fan blade will hit the body. Unit of mass is g or kg. A larger mass exerts a larger impact force when it hits the body than a smaller mass if they are both moving at the same speed. (Mass is included in the equation for the k factor.)

Kinetic energy is the energy of an object due to its mass when it is moving at a certain velocity. Kinetic energy = ½ mV^2 where m is the mass of the moving object and v is the velocity of the object. Unit of energy is Joules. A larger moving mass possesses greater

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kinetic energy than a smaller mass if both are moving at the same velocity. (This is taken into account because mass and the square of the speed are included in the K factor equation.)

Rotational Kinetic energy is the energy of a rotating mass rotating about a center line at an angular velocity. Unit of energy is Joules. The rotational kinetic energy = ½ Iù^2 where I is the moment of inertia (similar to mass in the kinetic energy equation) and ù is the angular velocity of the moving mass (similar to the linear velocity in the kinetic energy equation). A larger rotating mass possesses greater kinetic energy than a smaller mass if both are rotating at the same angular velocity. A fan blade having a large moving mass and a higher velocity requires a large force to stop it. Consequently when we touch the moving fan blade having a large mass or higher velocity, it is going to hit the body hard. (This is taken into account because mass and square of the speed are included in the K factor equation.)

Moment of Inertia is a measure of the resistance offered by an object to its rotation rate. Moment of inertia = rT where r is the radius of the moving object and T is the torque (T= rF). Its unit is kg m^2. (Mass and the radius square are included in the K factor equation.)

Angular momentum of an object rotating about some reference point is the measure of the extent to which the object will continue to rotate about that point unless acted upon by an external force.

Peripheral speed is the distance a given point on the perimeter of a rotating circular object travels in a given amount of time, expressed in meters per second. That is why diameter needs to be taken into account as the farthest point from the center has a higher peripheral speed than other points close to the center. The distance covered per minute is 2ðrN where r is the radius and N is the rpm. Therefore the distance covered per minute is highest at the farthest point from the center.

K factor requirements in UL 507 for fan motors

UL 507, *Electric Fans*, §8.2.5 describes a method to calculate K factor for fans as given below:

$$K = 6 \times 10^{-7} (W r^2 N^2)$$

Where W is the mass in kg; r is the radius in mm; and N is the speed in revolutions per minute.

The relationship of K factor to mass, radius of the rotating mass and speed has been explained in the definitions of given above.

UL 507 requires that K shall be less than 29264 and the finger probe shall not touch the leading edge of the fan if the fan is not guarded. If K is 29264 or higher, then the fan must be guarded. In addition UL 507 has other restrictions such as weight, thickness, diameter, etc.

No guard is required if the K factor is less than 732 and the speed does not exceed 2000 rpm. There are also restrictions on weight, mass, thickness and diameter of the moving part.

IEC HBSE standard development work

The IEC TC108 (Safety of electronic equipment within the field of audio/video, information technology and communication technology) Hazard Based Safety Engineering development team used the same UL 507 method to determine the K factor when they approached this issue, but they did not want to follow the other restrictions in UL 507. It was agreed to apply the above criteria to fans with plastic blades only and not to fans with metal blades, and not apply other criteria like thickness, weight limit, hardness of the material, etc. More research needs to be done for fans with metal blades.

IEC K factor for fan motors

TC108 calculates K factor as follows:

$$K = 6 \times 10^{-7} (m\, r^{2}\, N^{2})$$

Where

m is the mass (kg) of the moving part of the fan assembly (blade, shaft and rotor).

r is the radius (mm) of the fan blade from the centre line of the shaft to the tip of the outer area likely to be contacted. (In practice we use the maximum diameter.)

N is the rotational speed (rpm) of the fan blade (the actual speed).

This is the same relationship specified by UL 507, except that the symbol *m* is used for mass instead of the symbol W.

In the HBSE document (IEC62368-1, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*, Ed. 1.0, 2010-01), the mechanical energy sources from moving fan blades have been divided into three classifications as given below:

- MS1: Does not result in any cuts
  - – Does not exceed limits of MS1 under normal operating conditions; and
  - – Does not exceed limits of MS2 under single fault conditions.
- MS2: May result in a minor cut but does not require medical attention
  - – Does not exceed limits of MS2 under normal operating conditions and under single fault conditions; and
  - – is not MS1.
- MS3: Requires medical attention
  - – exceeds the limits of MS2.

The first proposal had criteria for MS1, MS2 and MS3 as follows:

Fan blade is MS1 if *K* d” 732 and speed d” 2 000 rpm.
Fan blade is MS2 if *K* d” 732 and speed > 2 000 rpm.
Fan blade is MS3 if *K* > 732.

The resultant requirements are as follows:

- An MS1 fan will not cause any harm and can be left unguarded.

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- An MS2 fan may result in a minor cut but does not require medical attention. Such fans must be provided with a marking safeguard or with a fan guard.
- An MS3 fan must be guarded.

Example of a marking safeguard for MS2 fans
The marking safeguard needs to be next to the MS2 fan blade and contain the following:

- The symbol of Figure 2 or a similar symbol, combined with the triangle shaped warning sign from ISO 3864-2;

Figure 2. Fan warning symbol.

or

- The following statement or equivalent text:

WARNING Hazardous moving parts Keep away from moving fan blade

Proposal based on UL 507
Figure 3 shows the MS1, MS2 and MS3 regions based on UL507.

Figure 3: Proposal based on UL507.

A problem with the above approach was that there would be many fans that were accepted by the test houses that will require guarding or marking under this proposal. Consider the following points.

- CPU fans are very small but they have speeds higher than 2000 rpm. That means guard or marking and instructions.
- Many fans that were accepted without guards would fall under MS3 and thus require guarding.
- Many fans are accessible with the finger probe. (Fans behind drives etc. would need guarding.)
- Cost of a fan guard is 50 cents to a dollar, but depending upon the number of units shipped per year, it can add millions of dollars to total cost.

Experimental work

Clearly there was a need to do some actual experiments. We felt that we had to do some testing to see if the imposed limits (K factor of 732 and speed of 2000 rpm) were appropriate. We needed to find out if such fans caused pain or injury. When we planned to do this testing, we could not reach a conclusion as to whether to use a pencil, soft rubber, or hot dog for contacting the moving fan. Agencies wanted testing with actual human fingers, but they were not ready to offer their own fingers to conduct the testing.

First set of Data

First we wanted to check if CPU fans can fall under MS1 (speed > 2000 rpm). Fans were tested with the bare finger. We were able to stop these fans without any cuts and bruises, but notice that K factors were low (see Table 1).

Table 1 – First set of data.

Fan	Mass kg	Radius mm	Speed rpm	K factor	Bare finger test
A	0.03	16.5	2450	29.42	Stopped easily, no mark
B	0.04	17.1	4500	142.11	Stopped easily, no mark
C	0.00835	28	4400	76.04	Stopped easily, no mark
D	0.013	30	4000	112.32	Stopped easily, no mark
E	0.0124	30	3000	107.136	Stopped easily, no mark

The above data were presented to TC108. Figure 4 shows the resulting proposal. It became apparent that fans with speeds higher than 5000 rpm and k factors of less than 200 may still fall under MS1. Likewise, fans with speeds lower than 2000 rpm and k factors higher than 732 may still fall under MS1. Therefore, logic led to the boundaries presented in Figure 4

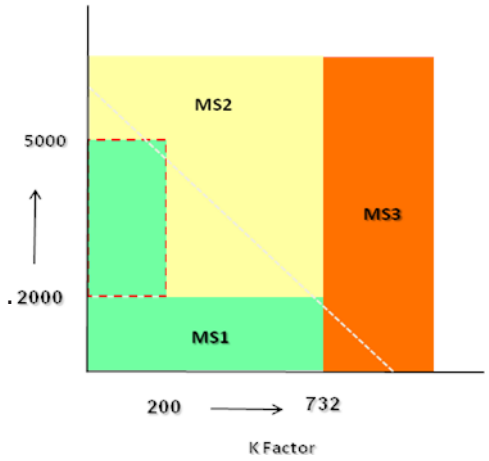

Figure 4. Proposal that resulted from first set of data.

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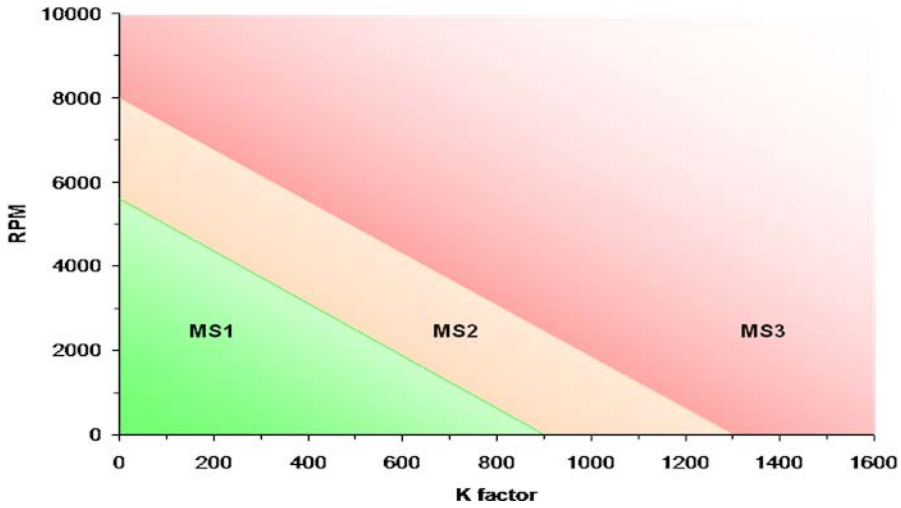

Figure 5: Second Proposal based on first set of data.

Based on figure 5, the equations for K factor become as given below:

A fan is MS1 if:

$$\frac{K}{900} + \frac{N}{5500} \leq 1$$

A fan is MS2 if:

$$\frac{K}{1800} + \frac{N}{10{,}000} \leq 1$$

A fan is MS3 if it is above MS2.

It became clear that if the line for MS1 is to be moved higher, more test data are needed at both higher speeds and higher K factors. The results of more testing using various fans are shown in Table 2. The tests were conducted using a work glove, a light cotton glove and then with a bare finger. We noticed that it is very difficult to obtain the data for a point which is at a low K factor and a very high speed in Figure 5. We took a variable power supply and increased the fan speed by raising the voltage. Instead of going higher up in the low K factor area, it moved to the right because a minor rise in speed increases the K factor. Therefore our testing focused on the lower-right area of Figure 5.

Table 2. Second set of test data.

Fan no.	Mass kg	Radius mm	Speed rpm	K factor	Tested with		
					Work glove	Light glove	Bare finger
9	0.13	57	2500	1584	Slight impact	Felt impact	Slight white mark and some numbing sensation
11	0.05	56	2200	455	No feeling	No feeling	No feeling
12	0.032	37.5	4000	432	No feeling	No feeling	No feeling
13	0.05	56	3000	847	No feeling	Slight impact	Slight white mark
14	0.072	46	3000	823	No feeling	Slight impact	Slight white mark
17	0.063	43	5000	1747	No feeling	Slight impact	Slight pain on impact, numbness for 30 s and red discoloration but no cut
25	0.039	37.5	4500	666	No feeling	No feeling	Some feeling, no mark
26	0.039	37.5	5500	995	No feeling	Slight impact	No mark, some numbing sensation

The above data resulted in a proposal shown in Figure 6. But still many fans accepted by the test houses remained in the MS2 or MS3 regions. We felt the need to do some more testing to extend the MS2 line.

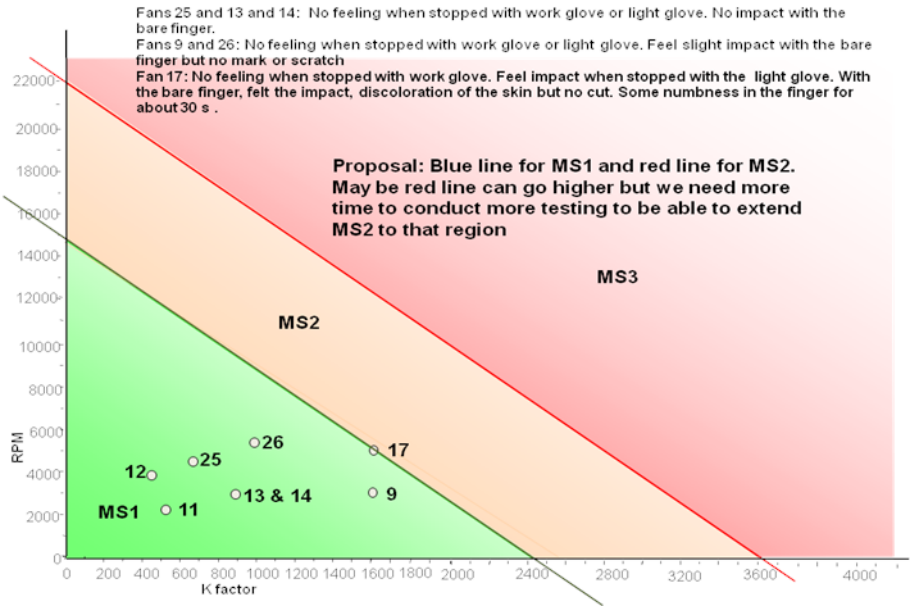

Figure 6. Proposal based on the second set of data.

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Based on figure 6, the equations for K factor become as given below:

A fan is MS1 if:

$$\frac{K}{2400} + \frac{N}{15{,}000} \leq 1$$

A fan is MS2 if:

$$\frac{K}{3600} + \frac{N}{22{,}000} \leq 1$$

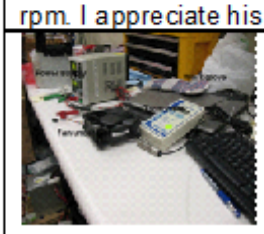
A fan is MS3 if it is above MS2.

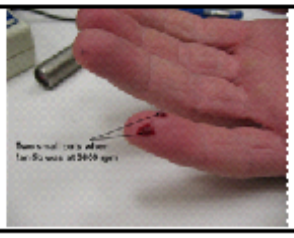
We needed further testing to extend the MS2 line. It was decided that MS2 fans need not be tested with the bare finger. They can be tested with the light cotton glove. MS2 may cause cuts and some bleeding, but such cuts do not require medical attention. Therefore, if with the cotton glove, no cuts were inflicted, that would be considered equal to a minor cut when testing with a bare finger. There is no need to get cuts all over and bleed your fingers unnecessarily. The third set of test data are given below.

Table 3: Third set of K factor data.

Fan no.	Mass kg	Radius mm	Speed rpm	K factor	Tested with	
					Work glove	Light glove
5	0.13	57	4000	4055	Did not test	Did not test
5a	0.13	57	3700	3469	Did not test	Did not test
5b	0.13	57	3600	3284	Strong impact, slight redness	Hits hard, two small cuts, drops of blood came out
5c	0.13	57	3500	3104	Strong impact	Strong impact, hurts but no blister*
5d	0.13	57	3400	2930	Felt impact	Strong impact, hurts but no blister
5e	0.13	57	3300	2760	Slight impact	Felt impact, some pain and a 0.5 mm dia blood blister

*Note – With the light glove, I felt a strong impact and a tiny blood blister. My colleague who helped me with this experiment wanted to test the 3600 rpm but I told him to stop as the next step will be a cut. He said he is becoming bold as we have not experienced any cuts and the cut it was with 3600 rpm. I appreciate his bravery.



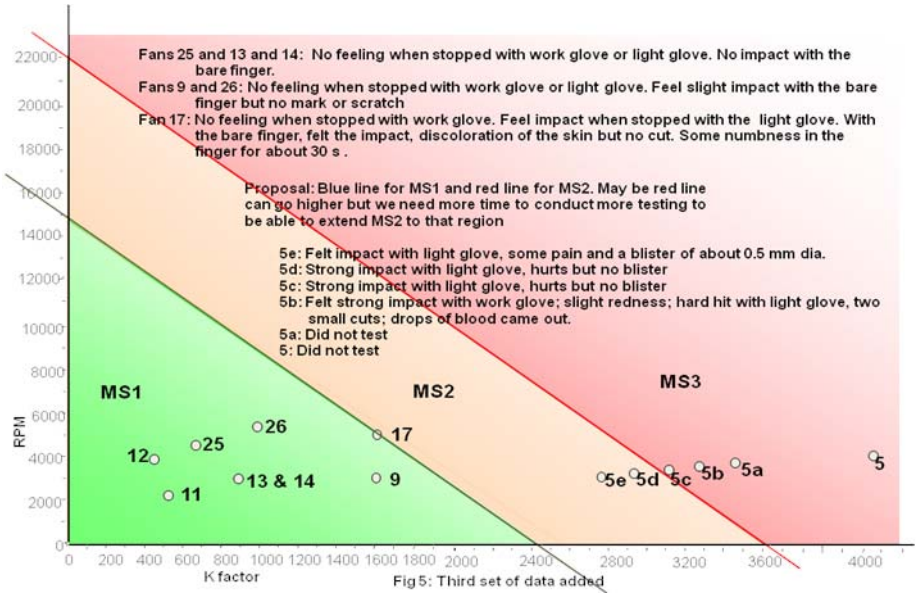


Figure 7: Proposal based on the third set of data

Based on figure 7, the equations for K factor remain the same as previously proposed from Figure 6.

Conclusions

- All fans visible from outside (located in the outer enclosure) need to be guarded.
- Internal fans in the Manufacturer's declared user accessible area:
- A fan can be considered MS1 if it just causes some short term numbness and reddish skin but causes no cuts.
- A fan can be considered MS2 if it just causes minor cuts but requires no medical attention. An marking safeguard needs to be provided for MS2 fans to warn the user against contact with the fan blades.
- An MS3 fan must be guarded or located behind other covers and components where the user has no business going.

Note—This proposal has been accepted and is now in the standards IEC62368-1 and Am no. 1 to IEC 60950-1, 2nd edition.

If you feel that the new proposed requirements are more stringent for no reason, you should be ready to do some testing of your own to demonstrate that the new proposed requirements are indeed more stringent. On the other hand, any new, more-stringent requirement should be supported by experimental and field data to prove the need for it. Many times more-stringent requirements are just based on personal thinking. Practical experience and field data may show no need for such more-stringent proposals. It proves beneficial to actually conduct tests

Continued on Page 16

and determine the criteria for acceptance of a proposal rather than accepting more-stringent requirements based on personal opinion or best guess.

Lal Bahra is a P. Eng. At Dell Inc.

References:
UL 507, *Electric Fans*, 9th Ed., 2007-9-27
IEC62368-1, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*, Ed. 1.0, 2010-01
Amendment no. 1 (2009-12) to IEC 60950-1, *Information Technology Equipment – Safety – Part 1: General requirements*, Ed. 2.0, 2005-12

Presidents Message Continued from Page 3

I hope we agree that dynamic meetings are fun and stimulating. How can the PSES help build great chapter meetings? The society & IEEE can provide funding for chapter activities based on meeting participation. This funding can cover hosting the speaker and snacks at meetings. The society is building a program to get experienced speakers for chapter meetings. The society is there to provide linkage between different chapters. The society has a website and other interactive activities for communications. If you have a technical or other professional issue, the society is a venue to get answers and information. When considering the cost of membership, keep in mind that there are background efforts supporting chapters. Meetings themselves are free and open to anyone, thus encouraging people of different backgrounds to get more involved.

Chapters can do more than have meetings. They can have socials and workshops. There are worthwhile outreach activities that promote product safety engineering. The chapter can send representatives to judge at local science fair, either as general judges or as product safety engineering representatives. Educational outreach is also worthwhile for the members having children of school age who might be interested in encouraging them with school projects. Chapters can become involved with student IEEE groups, presenting PSE issues to the student groups and having students present on product safety related topics at chapter meetings.

There is a converse to the value to you of having a professional society and regular chapter meetings: if you don't participate, many of your peers who do go to meetings and actively participle will get the benefits. So will their companies. They will learn about the state of the art, how to make presentations and how to network with colleagues. Nowadays you have internet social networks and the internet itself, but everyone has this access. PSES evolved out of the EMC Society TC-8, so I've seen first-hand how engineers and managers grow because of their involvement. The PSES exists solely to provide a forum for the product safety professional. The profession itself is defined by the PSES membership, differing in scope and outlook from any other organization. Regular chapter meetings provide our foundation.

Such are my rambling thoughts about PSES chapters and holding regular meetings. I'm sure many of you are aware of some of these observations, but I am trying to convey to those not yet exposed to chapter meetings what they are missing, and that it really isn't too difficult to get started. PSES is building a program of chapter support and Thomas and I would welcome your ideas and suggestions. In future Newsletters, I plan to discuss my perspective on conferences and publications. Your comments and suggestions are welcome. Let's work together to build a great IEEE society!

Murlin Marks
President IEEE PSES

The Electrical Safety Authority's Implementation of an Electrical Product Safety Scheme in Ontario

By Normand Breton, Mina Yousef, and Marc Sykes

Introduction

The Electrical Safety Authority (ESA) is a not-for-profit corporation that acts as a Delegated Administrative Authority of the Ontario provincial government. ESA is responsible for electrical safety in Ontario, which includes enforcing the Ontario Electrical Safety Code (OESC), regulating electrical utility distribution safety, and administering the licensing of electrical contractors and master electricians. As of 2007, ESA was also delegated enhanced responsibility to ensure that electrical products sold or used in Ontario meet safety requirements.

ESA's principal interest is public safety, and it acts as a leader, partner and educator in a continuous effort toward its goal of a safer province. Its mission is "to improve electrical safety for the well-being of the people of Ontario." ESA believes that all serious electrical incidents can be prevented with better codes, standards, information, products, and awareness. Its long-term vision is "an Ontario free of electrical fatalities and serious injury, damage, and loss."

Background

Prior to 2007, ESA approved electrical products for sale and use based on provisions contained in the OESC. ESA had limited statutory authority to address issues with potentially unsafe electrical products; there was no provision to compel corrective action, nor to stop sale of unsafe or unapproved products. Moreover, without a requirement for manufacturers, distributors, and retailers to report serious incidents or accidents, ESA often found itself unaware of potential product defects. It relied primarily instead upon reports from consumers, and on voluntary compliance from the supply chain with respect to recalling or ceasing distribution of products found to be unsafe.

In 2005, ESA was alerted of six suspected fires caused by defective refrigerators in Ontario (of 82 reported incidents in North America). The manufacturer conducted minimal public notification, sending a letter to consumers alerting them of a "safety upgrade" to certain refrigerators in the marketplace and in the hands of consumers. In conjunction with the Office of the Fire Marshal, ESA issued a press release urging owners of the affected models to unplug their appliances and immediately contact the manufacturer to schedule an in-home repair. Eventually, the manufacturer voluntarily recalled approximately 20,000 refrigerators in conjunction with ESA and the United States Consumer Product Safety Commission (CPSC). However, this incident had exposed gaps in ESA's regulatory authority with respect to product safety, led to a public loss of confidence in the current system, and spurred calls for increased regulatory oversight.

Regulation 438/07

The Ontario government responded in July 2007 with Ontario Regulation 438/07, which granted ESA greater authority to regulate electrical product safety. The objectives of the regulation are:

- To ensure that electrical products do not present a serious product hazard;
- To ensure that electrical products are properly approved, and that unapproved or counterfeit products are removed from the marketplace;
- To ensure accountability for the safety of

Continued on Page 18

products offered for sale;
- To ensure that the public is notified of unsafe products that many pose a risk to consumers; and
- To ensure that appropriate corrective action is undertaken when an approved product is subsequently found to be unsafe.

The regulation requires manufacturers, wholesalers, importers, distributors, retailers, certification bodies and field evaluation agencies that become aware of serious electrical incidents, accidents, or defects relating to electrical products to file a report with ESA. It also mandates all responsible parties to provide assistance with the investigation and assessment of accidents, incidents or defects. ESA is delegated the authority to suspend or revoke the approval of an electrical product, to order product to be retained or preserved, or to compel a variety of other corrective actions as appropriate.

Implementing the regulation

Broad strategies and guidelines for the new product safety regime were established through an extensive stakeholder consultation process. Constituencies represented included manufacturers, retailers, government agencies, certification bodies, industry associations, and consumer councils. Five working groups considered risk assessment methodology, accident and incident reporting guidelines, corrective action and public notification guidelines, revocation of approval and recognition rules, and funding model development. The outcome of the consultation was the Industry Guidelines for the Management of Electrical Product Safety, published June 2008 and revised July 2008. This guideline document is available free of charge on ESA's website.

Another result of the guideline development process was a proposed funding model that centered on mandatory registration of manufacturers of electrical products sold or distributed in Ontario. ESA notified manufacturers through several certification bodies in February 2009, and the online registration system became available April 1, 2009. In response to industry concerns ESA, in conjunction with the Ontario government, decided in July 2009 to postpone the proposed August 30, 2009 deadline for registration. ESA continues to work with the government to address identified issues. New developments will be posted on the ESA website, and manufacturers that have already registered will have the duration of their registrations extended as appropriate.

Between January and December 2009, ESA investigated 698 issues related to potential electrical product safety concerns. This represented a 47 percent rise from the 475 reports initiated in 2008. As Figure 1 demonstrates, over 25 percent of investigations opened in 2009 were received in accordance with Regulation 438/07's mandatory reporting requirement. This number is expected to increase as manufacturers and other industry members become aware of their mandatory reporting obligations.

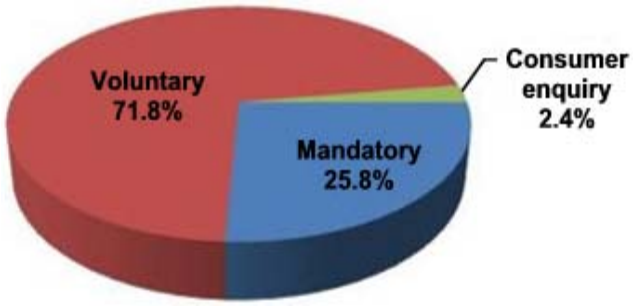


Figure 1. Electrical product incidents by report category, 2009.

Voluntary reports were submitted by a variety of constituencies including consumers, ESA field investigators and product safety staff, fire departments, other Authorities Having Jurisdiction (e.g. Office of the Fire Marshal), and other groups.

Since July 1, 2008, ESA has categorized its investigations into the following product categories:

- Certified products have been tested by an SCC-accredited certification body or field

Continued on Page 20

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.

IEEE | PSES Product Safety Engineering Society

E-Mail List: http://www.ieee-pses.org/emc-pstc.html
Virtual Community: http://www.ieeecommunities.org/emc-pstc
Symposium: http://www.ieee-pses.org/symposium/

Membership: The society ID for renewal or application is “043-0431”. Yearly society fee is US $35.

evaluation agency, but may subsequently experience safety issues;

- Unapproved products are not approved to Canadian standards and do not bear a recognized certification mark;
- Counterfeit products bear a counterfeit certification mark or field evaluation agency label.

In 2009, over 50 percent of investigations dealt with certified products, as shown in Figure 2.

Figure 2. Distribution of product safety investigations by product type, 2009.

In consultation with industry stakeholders, ESA developed targeted response strategies for products identified as unsafe based upon a customized risk assessment methodology that calculates both the severity and likelihood of the identified risk. Service Requests (SRs) are triaged into priority categories based upon the results of the risk assessment, as depicted in Figure 3.

Per the risk assessment methodology, high risk incidents are those that could cause death, need for permanent life support, permanent impairment of a body function, permanent damage to a body, chronic health effect or long-term psychological trauma. Even recoverable injuries requiring hospitalization or professional medical treatment can be categorized as high risk incidents if the likelihood of injury is very high. With regard to impact upon property, high risk incidents are those that could cause loss attributed to flame emitted from product, failure to contain an ignition source or hazardous material, partial or total loss of contents accompanied by structural damage to or total loss of building. Incidents causing partial loss to contents without structural damage to building may also be classified as high risk if the likelihood of damage is very high. Likelihood of injury or damage is estimated as the combination of the likelihood of the product being or becoming defective, and the likelihood of the negative effect materializing.

Both investigation type and priority category determine the proper response strategy and associated timelines. Based upon the results of the investigation, ESA may direct a range of corrective action plans to assure that no further serious electrical incidents or accidents occur, and that any defect that affects or is likely to affect the safety of any person or cause damage to property is corrected. Corrective actions could include recommending changes to applicable product safety standards, product recall (for replacement, refund, or disposal), withdrawing products from the supply chain, safety alerts (disseminating information and warnings about the hazard and/or additional information about correct use and maintenance), and other types of public notification.

In 2009, 118 public notifications, including 92 product recall notices and 26 safety alerts, were issued and posted on the ESA website. The Product Safety group worked directly with manufacturers, importers, retailers, certification bodies and government agencies (e.g. Health Canada) to issue and monitor product recalls. ESA also monitored and investigated recalls initiated by the U.S. CPSC.

Next steps

In 2008, the National Public Safety Advisory Committee formed a working group (including ESA, Health Canada, Standards Council of Canada, several provincial governments, certification bodies, consumer councils, and retail and manufacturing associations) to explore the creation of a national system to manage product safety issues. The group has retained a consultant

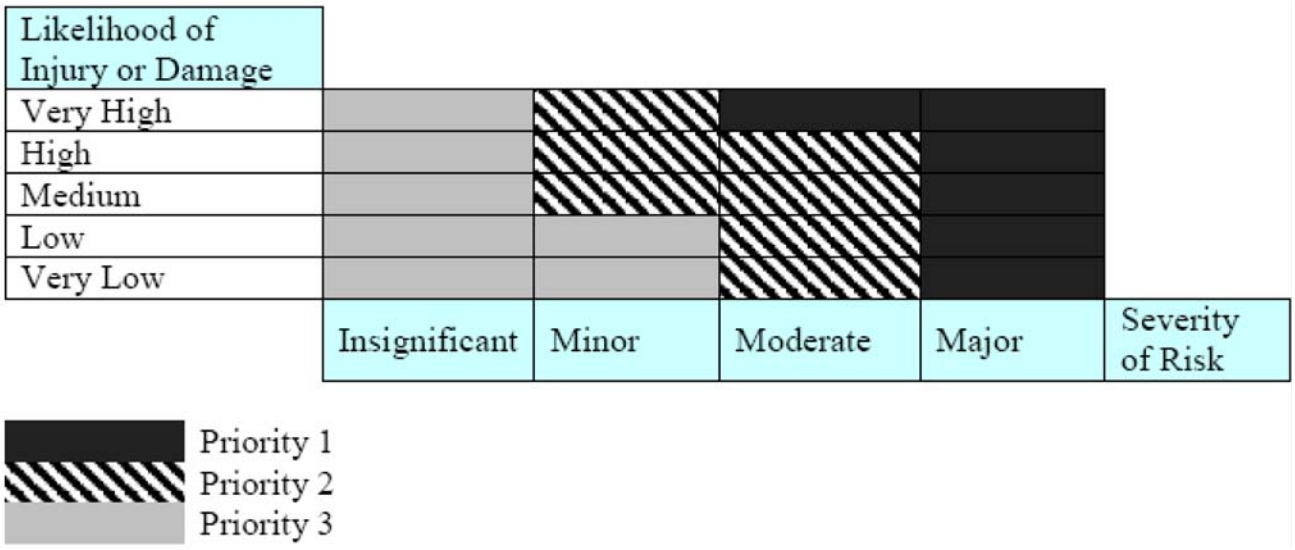


Figure 3. ESA product incident risk assessment methodology.

to study the merits of such a system, with the expectation of advancing recommendations by mid-2010. In the meantime, ESA is in the process of negotiating a Memorandum of Understanding with Health Canada in an attempt to streamline the reporting process and reduce dual reporting requirements.

To increase industry and public awareness, ESA's product safety staff continue to engage in outreach activities, including keynote presentation and sponsorship of the International Consumer Product Health and Safety Organization's International Consumer Product Safety Conference. ESA's Norm Breton (General Manager–Product Safety) has been elected by stakeholder representatives from across the country to lead Canada's delegation to the international committee (ISO PC 240) developing an international standard for product recall. ESA continues to work collaboratively with all stakeholders to collect their feedback, to establish a consistent understanding of Reg. 438/07 and its reporting threshold, and to identify opportunities to improve and streamline its investigative process.

Normand Breton is General Manager–Product Safety, Mina Yousef is a Product Safety Engineer, and Marc Sykes is a Project Specialist–Product Safety at the Electrical Safety Authority of Ontario, Canada.

News and Notes

PSES Risk Assessment TC

The PSES has a secret: Technical Committees. The TCs are groups of like-minded people who have special expertise or interest in a particular area of our field of interest. Unlike the standards development TCs that you may be familiar with, we aren't working on developing a particular standard or other documents, although our work may eventually include these kinds of activities.

The Risk Assessment TC (RATC) was formed to address the important subject of risk assessment and its application to the product safety field. A core group of members is meeting regularly to provide guidance and liaison between the PSES and industry. We want to encourage our members to write papers and present at chapter meetings and the symposium. We are also looking to support members who have an interest in becoming Distinguished Lecturers. Distinguished Lecturers are members with strong experience in the field whose speaking activities are available to all chapters, and who have their expenses covered by the Society.

The RATC is open to everyone, even non-IEEE members, so if you have an interest in this area, or would like to pose a question to our group of experts, we are here for you. We will be developing more specific activities going forward, so watch the Technical Activities Committee (TAC) web page on the Society web site, http://ewh.ieee.org/soc/pses/technical.html for new developments. You can also join us on LinkedIn at www.linkedin.com by finding the PSES Group and then looking under the Sub-Groups tab. We are using the Discussions feature in LinkedIn as an open communication channel between members and non-members. LinkedIn provides excellent professional networking opportunities. I use it daily as a means to stay in contact with my network.

Our meeting schedule is posted on the web and can be found by visiting the TAC web page. You can also find the calendar on Google Calendars by searching for PSES Risk Assessment TC, or by visiting http://www.google.com/calendar/embed?src=u69sdihvuin6f4au2f53vkmiv0%40group.calendar.google.com&ctz=America/Toronto

If you would like additional information, please contact the Chair, Doug Nix, dnix@ieee.org, or join us at our next meeting!

Warnings and Instructions course

The Department of Professional Development of the College of Engineering of the University of Wisconsin at Madison, Wisconsin will offer its highly regarded course "Using Warnings and Instructions to Increase Safety and Decrease Liability" April 20–22, 2010 at the Madison campus.

The topics to be covered by a team of lecturers include the following:

- Factors useful in evaluating manuals and warnings;
- Testing and revising instructions and warnings;
- Relevant ANSI standards (includes copies of Z535.4 and Z535.6);
- Safety issues in the global marketplace;
- International standards for warnings.

For detailed information, visit epd.engr.wisc.edu/webL470 or call 800-462-0876 or 608-262-1299.

PSES Board of Directors 2011-2013

We are looking for PSES members to be on the BoD for the term 2011 through 2013. If you are interested please contact Jim Bacher at j.bacher@ieee.org.

PSES Status

We are still short of having 1000 members. We need everyone to make an effort to help promote joining the society. We have till the end of May.

2010 IEEE-PSES China Product Safety Workshop

Agenda （2010 April 17th，9：00～17：00）

Location：International Education Communication Building

Address:（北京海淀区 北三 环66西路，理工大 学 北 门 ）

Sign in time ：8：30 – 9：00

Time	Speaker	Title	Topic
Morning	Host	Director of International Certification Division of CQC	Announce for the beginning of the meeting
9：00～9：15	Chen Wei	Vice Director of CQC	Deliver a speech
9：15～9：25		Director of CQC-TS	Deliver a speech
9：25～9：40	Murlin Marks	President of IEEE-PSES	PSES membership benefits
9：40～10：30	Richard Pescatore	Global Product Safety Standards Development and Certification Manager, Hewlett-Packard Company, USA	*IEC 62368-1, Why, How, and What's Next"*
10：30～10：45	Break		
10:45～11:35	Richard Nute	IEEE Product Safety Engineering Society, USA	*OFFICE EQUIPMENT Printer-Scanner-Copier-FAX and TV investigated to draft IEC 62368-1*
11:35～12:15	Eugene Heil	Member of the International Association of Electrical Inspectors (IAEI) and IEEE	*An introduction to the machine safety regulations of the United States and Europe*
12：15～13：15	Buffet		
Afternoon	Host Paul Wang		
13：15～13:35	A. G. Hessami	Professor of Systems Assurance, Vega Systems	*An advanced Framework for Systems Safety, Security & Sustainability*
13:35-14:15	Peter E, Perkins	Principal Product Safety & Regulatory Consultant	*TOUCH CURRENT measurement comparison: looking at IEC 60990 measurement circuit performance*
14:15～14:55	Peter Kelleher	Dell, Inc., Ireland	*European Compliance. It's just CE Marking……isn't it?*
14:55-15:35	Bob Griffin	IBM, Inc., USA	De-mystifying Requirements – Separating safety, certification and regulation
15：35～15：45	Break		
15:45-16:00	Mark Montrose	Founder and first president of PSES, Board of Directors of the IEEE as Division VI Director	PSES history
16:00-16:20	Thomas K Ha	VP of IEEE PSES	How to join PSES
16:20-16:50	Q&A		Questions and answers
16:50-17:00			Award certificates to attendees

Contact：

IEEE-PSES Paul Wang 010-67877845 paulwang@gmcompliance.com.cn

CQC-TS Ivy 010-67878006 wuhn@cqc-ts.com Fax：6786 3835

2010 IEEE Symposium on Product Compliance Engineering

Sponsored by the IEEE Product Safety Engineering Society

October 18 - October 20, 2010
Boston Massachusetts

Call for Papers, Workshops, and Tutorials

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:

Product Specific:	Medical, consumer, computer (IT), test and measurement, power supplies, telecommunication, industrial control, electric tools, home appliances, cellular and wireless, etc.
Hazard Specific:	Electrical, mechanical, fire, thermal, chemical, optical, software, functional safety, control reliability, product reliability, risk assessment, etc.
EMC / RF:	Electromagnetic emissions, electromagnetic immunity, regulatory, Introduction to EMC/RF for the safety and compliance engineer.
Components:	Batteries, insulation, optocouplers, capacitors, transformers, current-limiters, fuses, lasers, ferrites, cables, connectors, electromagnetic suppression & protection, surge protectors, printed wiring boards, etc.
Certification:	Product safety, electromagnetic emissions, electromagnetic immunity, environmental, processes, safety testing, regulatory, product liability, etc.
Standards Activities:	Development, interpretations, status, interpretations, country requirements, Laboratory Accreditation, etc.
Research:	Body physiological responses to various hazardous energy sources, unique safeguard schemes, electrically-caused fire, forensic methods, etc.
Environmental:	RoHS, WEEE, EuP (Energy-using Products), Energy Star, Packaging Directives, REACH (Chemical), CeC, etc.
Demonstrations:	Demonstrations of product safety testing techniques including mechanical, electrical, fire, etc.

Author's Schedule

Intent to present and topic	May 30, 2010
Draft e-paper	June 30, 2010
Notification of Acceptance	July 30, 2010
Complete e-paper	August 30, 2010

Prospective authors should submit e-papers using the on-line submission system accessible through the Symposium web site. Comprehensive submission instructions including paper templates are also available.

Technical Program
Bob Griffin, bobgriff@us.ibm.com
Gary Tornquist, garytor@microsoft.com

Conference Management/Registration
Chris Dyer, cdyer@conferencecatalysts.com

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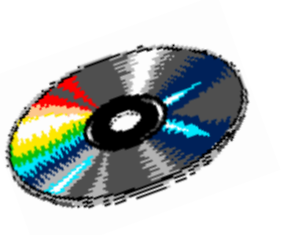
www.PSESSymposium.org

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:_____

Mailing address::_____

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IEEE member number:_____

Shipping and handling: $5 per CD

Payment: Check or money order.

Make Check or money order to: "IEEE Product Safety Society"

Quantity: ____ x $35 = _____ for IEEE members
Quantity: ____ x $50 = _____ for non-IEEE members
Specify what years you would like (2004 through 2008 are currently avalible):

_____

S&H: QTY_____ x $5 = _____

Total = _____

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 29 Decmber 2009 Through 29 March 2010

Our new members are located in the following countries: Argentina, Australia, Canada, Chile, Czech Republic, Egypt, France, Germany, Greece, Hong Kong, India, Iran, Israel, Japan, Malaysia, Nigeria, Poland, Romania, Serbia, Singapore, South Africa, Spain, Switzerland, Taiwan, Thailand, USA

Ali Masoomi
Alvaro Gonzalo Alvarez
Andrea Mirta Mendez
Andres Kipen
Angela L Wright
Anna Marie Klostermann
Antonios D Kouris
Arun Rajmohan
Benjamin Pulido
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Brodie C Pedersen
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Claude Barbier
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Eyal Zadok
Fabio Scotti
Fernando Silva Martinez
G Frank Belluccia
Gabriel Cristian Ilie
Gaspar Bibiloni Cruz
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Henry Robert Hofmann
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Tadeusz Florian Rudnicki
Thomas L Brenner
Thomas P Van Doren
William Elliott
William M Witt
Wladyslaw W Moron
Xianke Gao
Xiaoyun Hu

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

PSES Jobs Web Page

PSES has a new page on our web site for employers and job seeks 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. We currently have over half a dozen postings.

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.

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

Tthe 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 .

Tip: ***Best way to get your boss to approve your trip to the 2010 Symposium on Compliance Engineering is to submit a paper that gets accepted for the symposium! Or volunteer and tell him you have to be there!***

The
Product Safety Engineering Newsletter

Gary Weidner
GW Technical Services Inc.
2175 Clarke Drive
Dubuque, IA 52001-4125

CHANGE SERVICE REQUESTED