The **Product Safety Engineering Newsletter**

IEEE PSES
Product Safety Engineering Society

What's Inside

Vol. 4, No. 4   December 2008

President's Message

As we come to then end of 2008 I want to thank our outgoing PSES Board of Director members: Murlin Marks and Ken Thomas. Both opted not to run for the PSES BoD for 2009–2011. Ken is also exiting as VP of Member Services, but he will continue to volunteer to assist the society, and he will be assisting the new VP of Member Services.

I also would like to congratulate Murlin Marks on his election to be President of the Society in 2010–2011 and Thomas Ha for his election as VP Member Services. During 2009, Murlin will continue as Treasurer and as the President Elect. I would like to thank these men for their support over the last three years and for their continued support.

Congratulations to the following for their being elected to the PSES BoD:
Jim Pierce and Ivan L. VanDeWege as new members of the BoD, and returning members Jack M. Burns and Richard L. Pescatore. I look forward to working with the new BoD members, the returning BoD members, and Thomas Ha and Murlin Marks. If you know someone who would be a good match for the Treasurer position, let me know—we have to fill that position before the end of 2009.

The IEEE has put into place a requirement that we have a non-voting member on the BoD to represent GOLD members. GOLD stands for "Graduates Of the Last Decade." This is a term used by the IEEE for those who have graduated from College during the last 10 years. To meet that requirement I have appointed Sanne Cubberley as the GOLD Member Ex Officio BoD member.
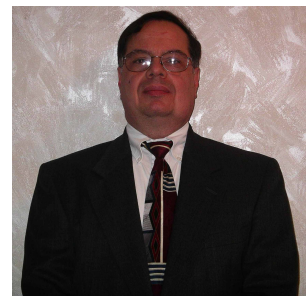
The year 2008 was rough for the PSES, however we did have some bright spots as well. Just like everyone else, we had a significant negative impact by the stock market. We are required to have 50 percent reserves against our expenses. At the first of this year we finally achieved the required reserves and expected to be removed from the IEEE TAB Fin Com (Technical Activities Board Financial Committee) watch list. We do not know what the final result will be for 2008, but

Newsletter Committee

Editor:
Gary Weidner   1-563-557-0717 (v)   1-563.557.0725 (fax)   gweidner@ieee.org
Co-Editors:
Michael S. Morse Ph. D.   mmorse@sandiego.edu
Richard Nute   richn@ieee.org
Nosh Medora   nmedora@exponent.com
Lal Bahra   Lal_Bahra@Dell.com
Lingfeng Chen   gzclf2-ieee@yahoo.com.cn

News & Notes:
Your name here
Chapter Acitivities:
Stefan Mozar   s.mozar@ieee.org
Page Layout:
Jim Bacher   1-937.865-2020(v)   1-937.865.2048 (fax)   j.bacher@ieee.org

IEEE PSES Officers

Executive Committee	Name	Term
President	Jim Bacher	(08-09)
Past President	Henry Benitez	(08-09)
President Elect	TBD	
Secretary	Daniece Carpenter	(07-08)
Treasurer	Murlin Marks	(07-08)
Vice President - Communications	Dan Roman	(07-08)
Vice President - Member Services	Ken Thomas	(07-08)
Vice President - Technical Activities	Jack Burns	(07-08)
Vice President - Conferences	Richard Georgerian	(07-08)

Directors At Large

Term Expires 12/08	Term Expires 12/09	Term Expires 12/10	Ex Officio (without vote)
Jack Burns	Daniece Carpenter	Jim Bacher	Chapter Chairs
Murlin Marks	Richard Georgerian	Mark Montrose	Standing Committee Chairs
Richard Pescatore	Elya Joffe	Doug Nix	IEEE HQ
Ken Thomas	Daniel Nachtigall	Peter Tarver	IEEE TAB Division VI Director
			GOLD Member: Sanne Cubberley

IEEE PSES Web Sites

http://www.ieee-pses.org/
http://www.ieee-pses.org/symposium/
http://www.ieeecommunities.org/emc-pstc
http://www.ieee-pses.org/emc-pstc.html
http://www.ieee-pses.org/newsletters.html
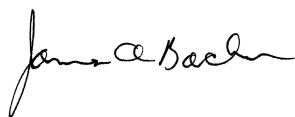http://www.ieee-pses.org/pses.html

current estimates have us still above the required level. That also means we can start considering adding benefits to being a member of our society, something we have not been able to do.

Our Symposium was a success (see Doug Nix's article on it in this newsletter). While most IEEE Symposiums saw a decrease in attendance, we were above last year's attendance, making it one of the better performing symposiums for 2008. At the symposium Jack Burns was successful in getting more committees running and interest in some other possible new committees.
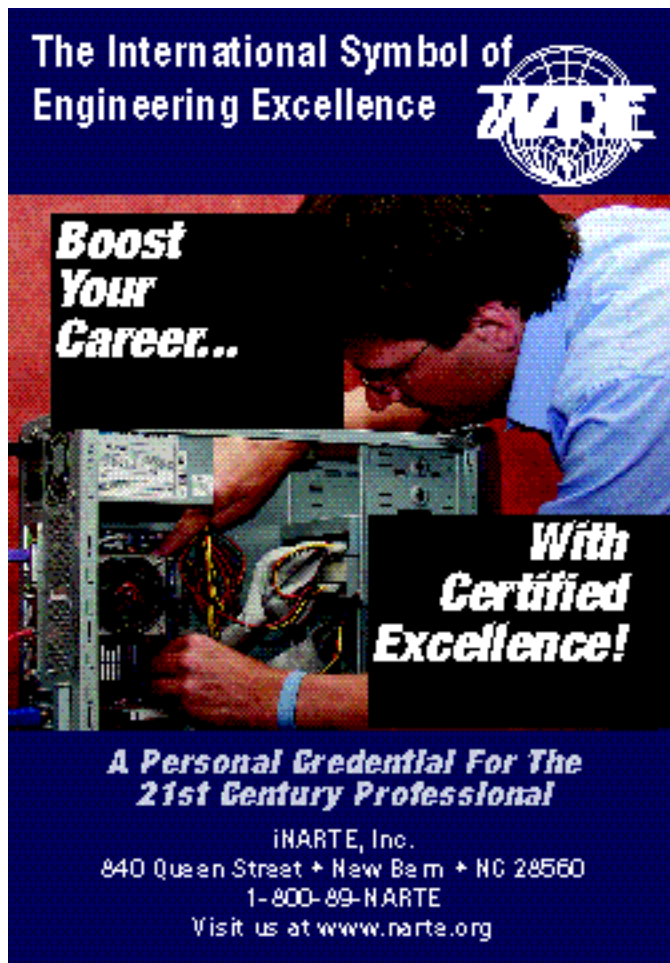
We have to once again go through the Society Review Committee. Normal societies go through it once every five years, however as a provisional society we have to go through it yearly. We have finished the survey they sent us and will be submitting it in the next few days.

We need to enlarge our membership by about 400 people during 2009. You can increase the value of your own membership by promoting the society any time you get a chance. For someone who is not a IEEE member and is not interested in all of the IEEE benefits, they can join the IEEE as Affiliates and then become a member of the PSES. (About two-thirds of our members joined the IEEE in order to join our society!)

I wish all of you a Happy New Year and a successful 2009. For those who are looking, there are job postings on our website.

[signature]

James A. Bacher
President IEEE PSES

Tip: *Best way to get your boss to approve your trip to the 2009 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!*

Chapter Safety Probes

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

People Looking To Start Chapters

Denver Colorodo

Richard Georgerian
voice: (303) 833-2327
e-mail: richardg@ieee.org

Toronto Ontario

Doug Nix
dnix@ieee.org
voice: (519) 729-5704
FaX: (519) 653-1318

North Carolina

Warren Fields (ncps@bellsouth.net).

Dallas Texas

Mike Cantwell, PE
Sr. Account Representative
Intertek ETL SEMKO
420 N. Dorothy Dr.
Richardson, TX 75081
Tel: 972-238-5591 x107
Fax: 972-238-1860
e-mail: mike.cantwell@intertek.com
or
Bill Paschetag b.paschetag@verizon.net

Southern California

Charles Bayhi (bayhi@cpsm-corp.com).

News and Notes

IEC announces dues deferral plan for national committees

The IEC recently announced that, "As a result of the global economic slowdown, IEC Council approved an initiative to allow members to reschedule their dues payments for 2009, with 60 percent of the respective fees due by June 2009 and the remaining 40 percent deferred for up to five years against a promissory note.

"According to IEC General Secretary and CEO Ronnie Amit, this exceptional move is a direct response to changing market conditions.

" 'Our National Committees may well be facing a challenging year ahead, and this deferral offers some flexibility for them to focus on their immediate priorities in 2009,' he said."

Dues are assessed on the basis of a country's average Gross National Income, electricity consumption, and population. Annual IEC dues range from approximately $778,600 for the largest and most developed economies to approximately $21,250 for the smallest and least developed members.

OSHA revisits SDoC issue

Following upon the rejection of a 2005 proposal from the Information Technology Industry Council (ITIC) that the U.S. Occupational Safety and Health Administration (OSHA) accept Supplier's Declaration of Conformity (SDoC) for compliance of IT products with safety standards, OSHA is once again exploring acceptance of SDoCs, this time for many electrical and electronic products used in the workplace.

In October OSHA published a Request for Information (RFI) and comments from the public in the Federal Register. The deadline for responses is January 20, 2009. To view or download OSHA's RFI, submit a comment, or see comments submitted, visit www.regulations.gov and enter the OSHA docket number (OSHA-2008-0032) in the search box.

The present proposal for acceptance of SDoCs came from the European Commission in July 2007. The proposal seeks SDoC coverage for all electrical products that come under the EC's Low Voltage Directive. In essence, that means almost all ordinary electrical products.

At the request of OSHA, the EC submitted a formal rationale for its proposal in June 2008. In its rationale the EC again claimed that OSHA's third-party certification requirements cause an "imbalance in market access" for "transatlantic trade in electrical products." In its rationale the EC contends that "European consumers and workers experience a high if not higher level of electrical safety as their counterparts in the U.S."

The EC rationale, which makes various claims about levels of consumer and workplace electrical safety within the EU, is summarized in OSHA's RFI. OSHA says it is looking for factual data, and notes regarding the EC's claims, "To date, OSHA has received no data to support any of these statements." Perhaps with the old saying in mind, "That which is stated without proof may be refuted without proof," OSHA says that it "believes that its current system facilitates trade."

In its information request, OSHA describes several market surveillance studies conducted within the EU. The studies found a considerable proportion of CE-Marked products in the marketplace that did not comply with applicable requirements.

Tooting its own horn, OSHA says, "One measure of the effectiveness of OSHA's current system is recalls issued by the Consumer Product Safety Commission (CPSC). The OSHA NRTL Program staff reviews these recalls, and for those involving products that have been certified by an NRTL, the staff has not identified a recall that was due to improper testing by an NRTL."

Unfortunately a description of the other half of the U.S. product safety compliance scene is missing from OSHA's otherwise well-written RFI. What is missing is any mention of or data concerning safety problems in the workplace caused by products that were supposed to have been certified by an NRTL, but in fact carried no certification. (In the U.S., it is permitted to manufacture, sell, purchase, or own, including ownership by employers, most products even if a given product bears no certification of compliance to safety standards.)

It is not unheard of for an employer to purchase a non-certified product for employee use. This sort of activity might be thought of as roughly the counterpart to CE-marked products that do not actually comply with applicable safety standards.

Although the OSHA RFI comprises 13 pages of fine print, it is very well written and provides good background reading for product safety professionals.

CSA Updates Appliance Standard

CAN/CSA C22.2 No. 68, *Motor-Operated Appliances (Household and Commercial)*, has gone through two rounds of commenting, the latest of which closed December 23, 2008. Depending upon the nature of responses received, the next step will be either another round of commenting, or else balloting.

Election Results for IEEE PSES for 2008

Excom:

    Murlin Marks - President Elect
    Thomas Ha - VP Member Services

Board of directors:

    Jim Pierce
    Ivan L. VanDeWege
    Jack M. Burns
    Richard L. Pecatore

Correction for previous issue

The September 2008 issue of PSEN contained an error in the article "Touch Current Measurement Comparison: Looking at IEC 60990 Measurement Circuit Performance, Part 2: Electric Shock." Figure 3 was inadvertently repeated as figure 31. The correct version of Figure 31 is shown below.
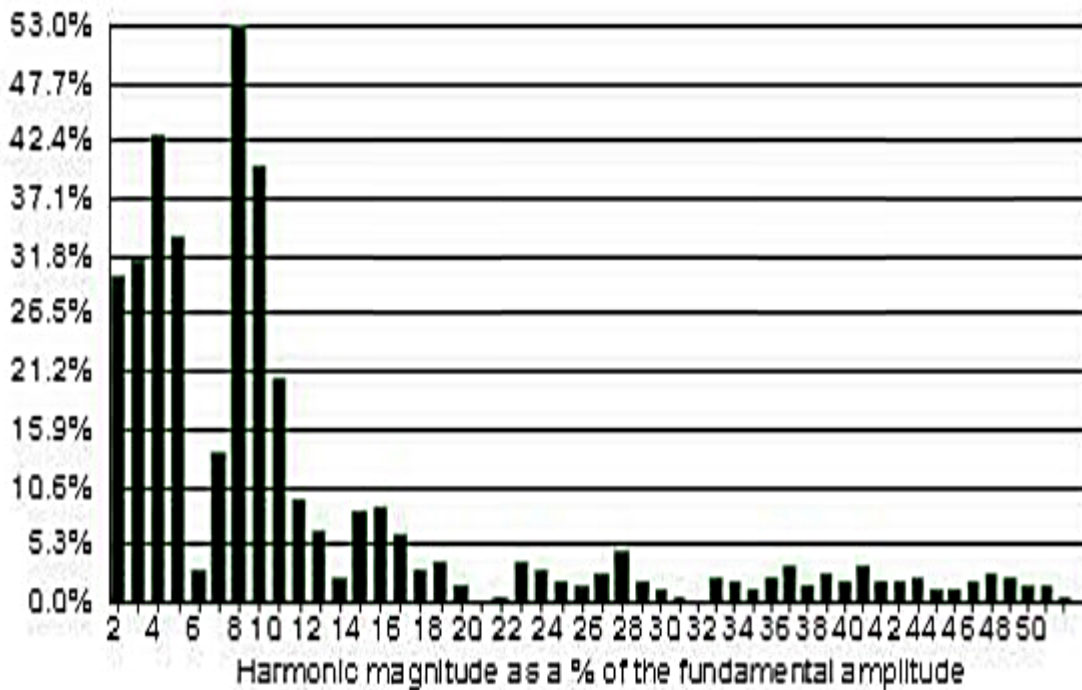
Voltage:
Current: Ref A
Harmonics: 51
Type: Current Magnitude

Technically Speaking

by Richard Nute
Product Safety Consultant
San Diego

DETERMINING THE R-C DISCHARGE TIME CONSTANT FOR X- AND Y-CAPACITORS

Introduction.

Since the introduction of Sub-clause 2.1.1.7, "Discharge of capacitors in equipment," in IEC 60950-1, questions continually arise as to how to measure the R-C discharge time constant. The objective of this article is to describe how to measure and determine the discharge time constant.

EMC filters.

EMC filters in equipment are circuits comprised of inductors and capacitors arranged so as to limit the emission of RF energy from the equipment into the mains supply line. In EMC filters, capacitors connected between the supply conductors (i.e., between L1 and L2) of the mains are designated as X capacitors. Capacitors connected between a supply conductor and the PE (protective earth or grounding) conductor are designated as Y capacitors. (Safety requirements for X and Y capacitors are specified in IEC 60384-14 and similar national standards.) The circuit of a typical EMC filter is shown in Figure 1. C_X is the X capacitor, and C_Y are the Y capacitors.
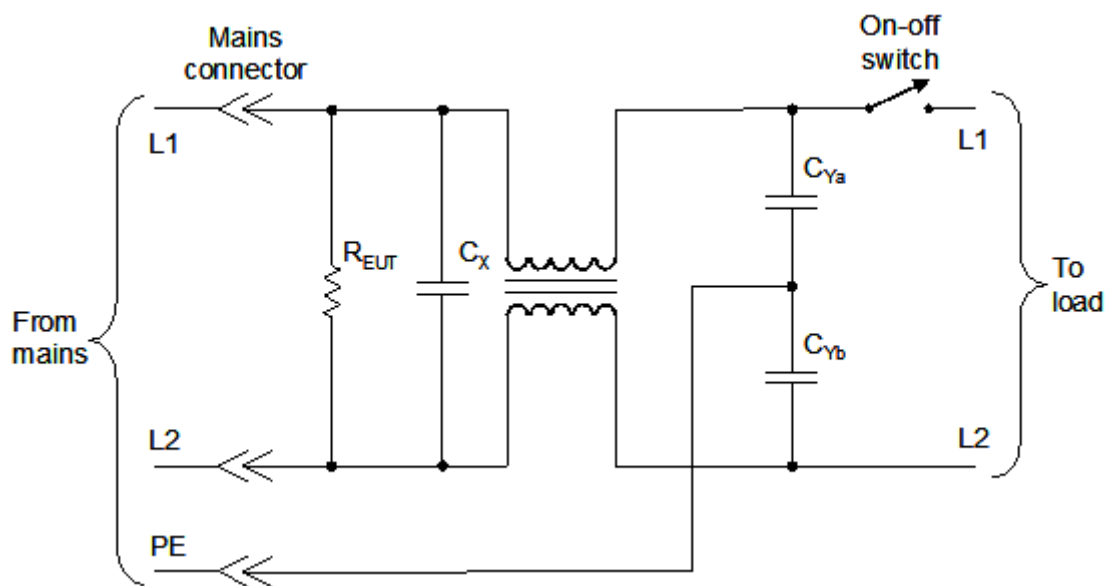

Figure 1
Typical EMC filter schematic

The safety issue and solution.

When an EMC filter is disconnected from the mains supply line, both the X (C_x) and the Y (C_{Ya} and C_{Yb}) capacitors remain charged to the value of the mains supply voltage at the instant of disconnection.

Due to the nature of sinusoidal waveforms, more than 66% of the time (30° to 150° and 210° to 330° of each cycle) the voltage is more than 50% of the peak voltage. For a 230-volt mains (325 volts peak), the voltage is more than 162 volts for more than 66% of the time of each cycle. So, the probability of the voltage exceeding 162 volts at the time of disconnection is 0.66. This probability represents a good chance that the charge on the X and Y capacitors will exceed 162 volts.

If a hand or other body part should touch both pins (L1 and L2) of the mains supply plug at the same time, the capacitors will discharge through that body part. If the total capacitance exceeds about 0.1 uF, the discharge will be quite painful.

To safeguard against such a painful experience, safety standards require that the capacitors be discharged to a non-painful voltage in a short period of time. The short period of time is taken as the time from the disconnection from the mains to the time when contact with both pins is likely. Usually, this time is in the range of 1 to 10 seconds, depending on the standards and the type of attachment plug cap installed.

The requirement

The IEC 60950-1 requirement is specified in Sub-clause 2.1.1.7:

2.1.1.7 Discharge of capacitors in equipment

Equipment shall be so designed that, at an OPERATOR-accessible external point of disconnection of a MAINS SUPPLY, the risk of electric shock from stored charge on capacitors connected in the equipment is reduced. No test for shock hazard is required unless the nominal voltage of the MAINS SUPPLY exceeds 42,4 V peak or 60 V d.c.

Compliance is checked by inspection of the equipment and relevant circuit diagrams, taking into account the possibility of disconnection of the supply with any on/off switch in either position.

Equipment is considered to comply if any capacitor having a marked or nominal capacitance exceeding 0,1 μF and in a circuit connected to the MAINS SUPPLY has a means of discharge resulting in a time constant not exceeding:

– 1 s for PLUGGABLE EQUIPMENT TYPE A; and

– 10 s for PLUGGABLE EQUIPMENT TYPE B.

The relevant time constant is the product of the effective capacitance in microfarads and the effective discharge resistance in megohms. If it is difficult to determine the effective capacitance and resistance values, a measurement of voltage decay at the point of external disconnection can be used. When conducting the voltage decay measurement, the result is referred to an instrument having an input impedance consisting of a resistance of 100 MΩ ± 5 MΩ in parallel with an input capacitance of 20 pF ± 5 pF.

NOTE   During an interval equal to one time constant, the voltage will have decayed to 37 % of its original value.

An amendment to this requirement appears in 108/297/CDV:

2.1.1.7 Discharge of capacitors in equipment

Modify the last sentence of the last paragraph of the compliance as follows:

When conducting the voltage decay measurement, the ~~result is referred to~~ measurement is made with an instrument having an input impedance consisting of a resistance of 100 MΩ ± 5 MΩ in parallel with an input capacitance of ~~20 pF ± 5 pF~~ 25 pF or less.

The time constant must be measured with an oscilloscope. The time constant and its parameters are defined elsewhere.

The significant parameters specified in the requirement are the capacitance exceeding 0.1 microfarad and the time constant of 1 second or less (for pluggable equipment type A) or 10 seconds or less (for pluggable equipment type B). These values bound the measurement. This discussion addresses pluggable equipment type A and the 1-second time constant requirement. The discussion applies to pluggable equipment type B if the time constant is changed to 10 seconds.

(Pluggable equipment type A is intended for connection to a mains supply via a non-industrial plug and socket-outlet. Pluggable equipment type B is intended for connection to a mains supply via an industrial plug and socket-outlet.)

Also, the standard presumes that measurements made with an instrument having an input resistance of 95 to 105 megohms and up to 25 picofarads in parallel with the resistance and capacitance of the equipment under test (EUT) will have negligible effect on the measured time constant. The effect of probe parameters on the determination of the time constant is discussed elsewhere in this paper.

The requirement specifies a time constant rather than a discharge down to a specified voltage within a specified time interval. If the standard required a discharge to a specific voltage, then the start of the measurement would need to be at the peak of the voltage. This would mean that the switch (see Figure 5) would need to be opened almost exactly at the peak of the voltage waveform. This would require special switching equipment. The time constant is specified because it can be measured from any point on the waveform (except zero). See Figure 4b.

100 megohm probes.

Table 1 is a list (in alphabetical order) of readily available oscilloscope probes with 100 megohms input resistance and their rated input capacitances. (The list is not exhaustive.) Also included is a 400-megohm input resistance probe and a 50-megohm input resistance probe.

Table 1
100-megohm oscilloscope probes

Manufacturer	Model	Input Resistance megohms	Input Capacitance picofarads
Agilent	N2771A	100	1
ezprobe, Tyrosys Corp	TEX250HV	100	6.5
LeCroy	PPE20KV	100	3
Northstar	PVM series	400	10-13
PROBETRONIX, LLC	PHV 4002-3	100	2.5
PROBETRONIX, LLC	PHV 621	50	5.5
TECPEL CO., LTD.	HVP-15HF	100	3
Tektronix	P6015A	100	3

Note that the input capacitances of the 100-megohm probe input capacitances are very much less than the maximum capacitance of 25 picofarads. This article will discuss the effect of the probe capacitance and the maximum capacitance elsewhere.

100-megohm probes are meant for measuring high voltages, typically 15 kilovolts and more. These probes are quite large, and are awkward to connect to the pins of a power plug.

Figure 2
100-megohm oscilloscope probes

General purpose oscilloscope probes have 10 megohms input resistance and 10-15 picofarads input capacitance. General-purpose probes are easier to connect to the pins of the power plug. Both the 100-megohm and 10-megohm probes are discussed in this paper. This paper shows that a 10-megohm, 15-picofarad probe can be used in place of a 100-megohm probe.

The R-C time constant and its parameters.

Capacitor charge or discharge time can be expressed by the R-C time constant parameter. One time constant is the time duration for the voltage on the capacitor to change 63%. In five time constants, the capacitor is discharged to almost zero.

Table 2
Capacitor discharge

Time constant	Percent capacitor voltage (or charge)	Capacitor voltage (230 V rms, 331 V peak)
0	100	325
1	37	120
2	14	45
3	5	16
4	2	6
5	0.7	2

The values in Table 2 are given by:

$$V_t = V_0 e^{-(\frac{t}{RC})}$$

where:

V_t is the voltage at time t

V_0 is the voltage at time 0

R is the resistance, in Ohms

C is the capacitance, in Farads

t is the time, in seconds

The time constant is given by the equation:

$$T_{EUT} = R_{EUT} \times C_{EUT}$$

where:

T_{EUT} is the time, in seconds, for the voltage to change by 63%

R_{EUT} is the EUT resistance, in ohms

C_{EUT} is the EUT capacitance, in Farads

In the equipment under test (EUT), the EUT capacitance, C_{EUT}, in the line filter (Figure 1) includes both the X-capacitor and the Y-capacitors.

The two Y-capacitors, C_{Ya} and C_{Yb}, are in series. The resultant value of two capacitors in series, C_Y, is:

$$C_Y = \frac{C_{Ya} \times C_{Yb}}{C_{Ya} + C_{Yb}}$$

Assuming the two Y-capacitors have the same value, their L1-L2 value is one-half of the value of one of the capacitors.

The X-capacitor is in parallel with the two Y-capacitors. The EUT capacitance is:

$$C_{EUT} = C_X + C_Y$$

The EUT resistance is the resistance, R_{EUT}, in the EUT that is used for discharging the capacitance.

The time constant, T_{EUT}, in seconds, is the product of the EUT capacitance in Farads and the EUT resistance in Ohms. More useful units are capacitance in microfarads and resistance in megohms.

Two parameters of the time constant equation are given by the requirement: EUT capacitance is 0.1 µF or larger and the EUT time constant does not exceed 1 second. Solving the time constant equation for EUT resistance:

$$R_{EUT} = T_{EUT} / C_{EUT}$$

Substituting the values:

$$R_{EUT} = 1s / 0.1\mu F$$

$$R_{EUT} = 10 megohms$$

This means that the EUT resistance must be no greater than 10 megohms if the EUT capacitance is 0.1 µF or greater. The combinations of EUT resistance and EUT capacitance for EUT time constant of 1 second are shown in Figure 3.
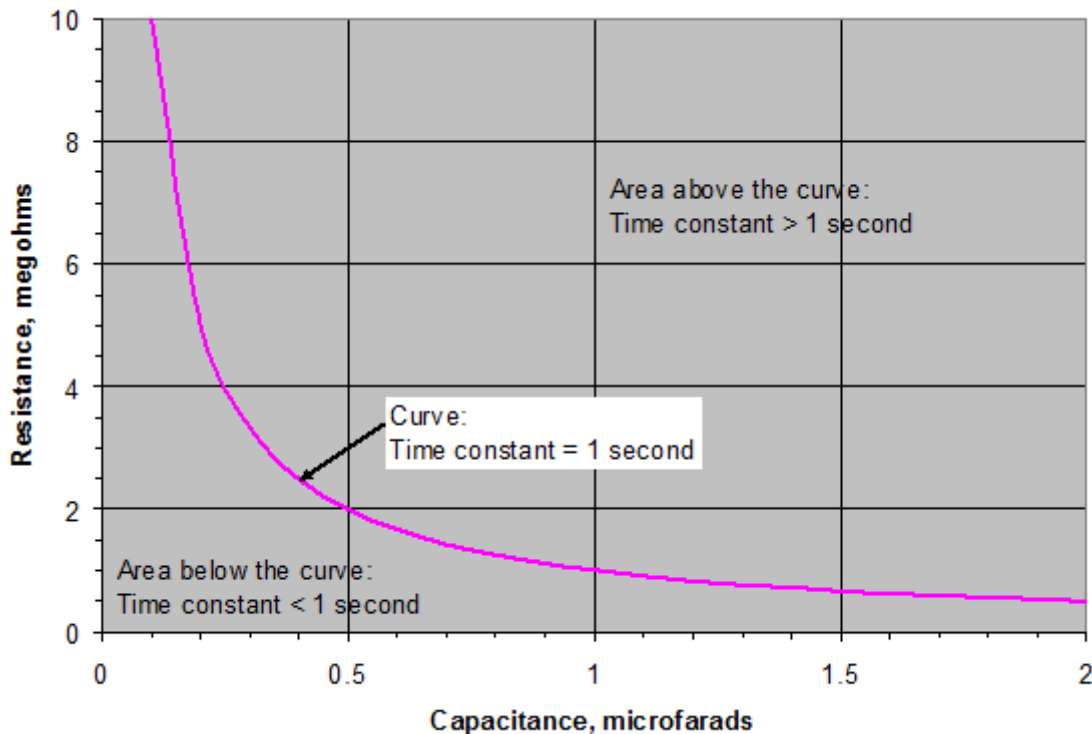

Figure 3
Combinations of EUT resistance and capacitance for 1-second time constant

Time constant measurement.

The objective is to measure and determine the EUT time constant.

Measurement of the time constant is done with an oscilloscope connected to the mains input terminals of the equipment under test (EUT). Mains is applied to the EUT, the EUT is turned off, and then the mains is disconnected from the EUT. (The EUT is turned off because the load circuits of the EUT may serve to discharge the EUT capacitance.) The resulting oscilloscope waveform, the ac mains voltage followed by the discharge of the total capacitance, is shown in Figures 4a and 4b.
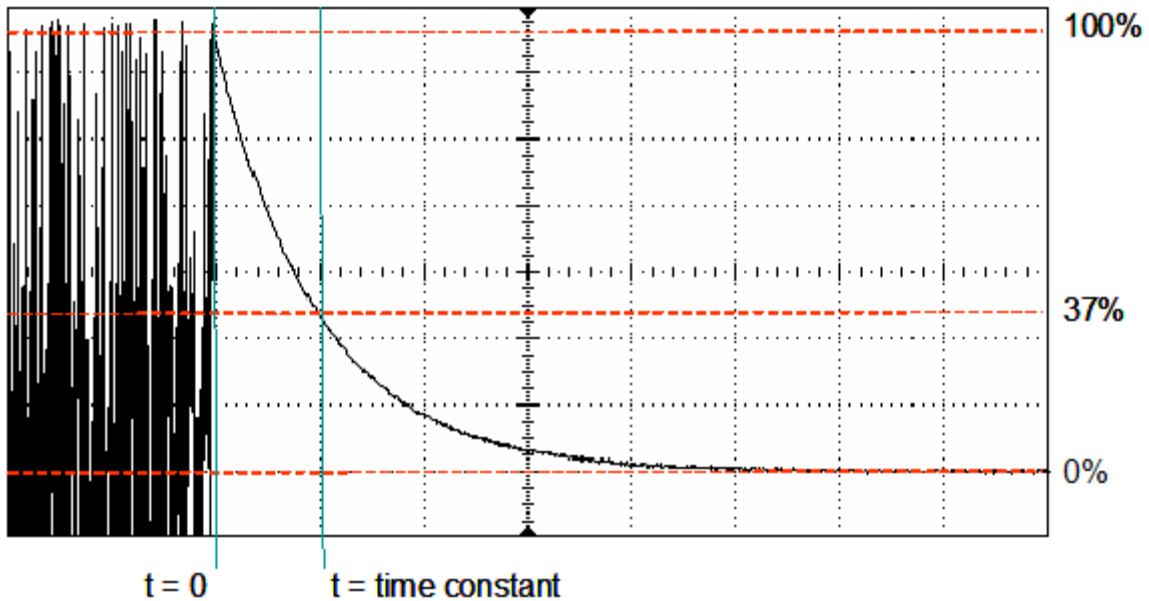

Figure 4a
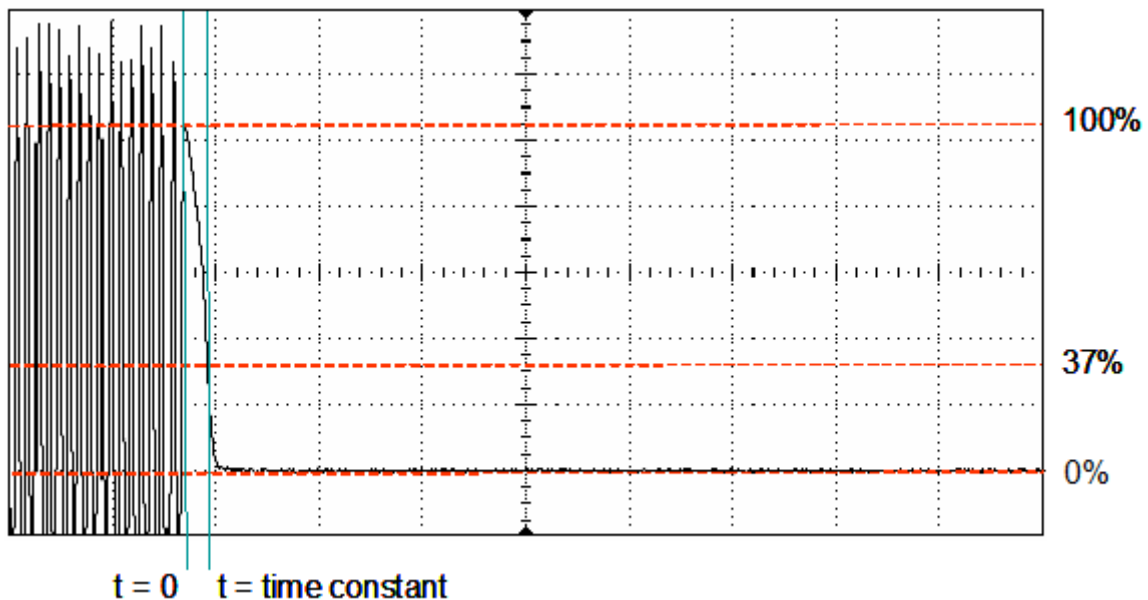240 V mains followed by capacitor dischargeV = 50 V/div, H = 1 sec/div

Figure 4b
240 V mains followed by capacitor discharge V = 50 V/div, H = 0.2 sec/div

The time constant is the time duration measured from the instant of disconnection to a point that is 37% of the voltage at the instant of disconnection.

The problem is that the process of measurement affects the measured time constant. This is because the oscilloscope probe has a finite resistance and capacitance. See Figure 5.
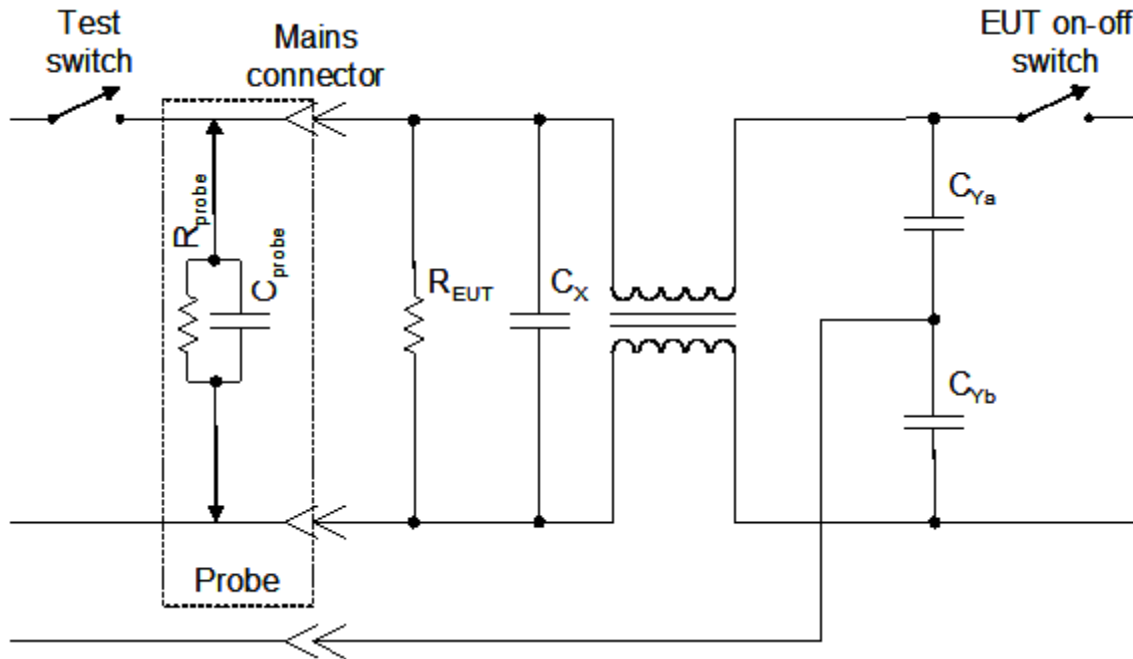
Figure 5
Time constant measurement schematic

The probe resistance, R_{probe}, is in parallel to the EUT resistance, R_{EUT}. And, the probe capacitance, C_{probe}, is in parallel with the EUT capacitance, C_{EUT}.

The measured time constant, $T_{measured}$, is a function of the Thevenin equivalent circuit comprised of R_{total} and C_{total}. The measured time constant is given by:

$$T_{measured} = R_{total} \times C_{total}$$

where:

$\quad T_{measured}$ is the measured time for the voltage to change by 63%

$\quad R_{total}$ is the total resistance, both the probe and the EUT

$\quad C_{total}$ is the total capacitance, both the probe and the EUT

R_{total} is:

$$R_{total} = \frac{R_{probe} \times R_{EUT}}{R_{probe} + R_{EUT}}$$

C_{total} is:

$$C_{total} = C_{probe} + C_{EUT}$$

Combining terms, the measured time constant is:

$$T_{measured} = (\frac{R_{probe} \times R_{EUT}}{R_{probe} + R_{EUT}}) \times (C_{probe} + C_{EUT})$$

In this equation, $T_{measured}$, R_{probe}, and C_{probe} are known. $T_{measured}$ is measured with a given probe. R_{probe} and C_{probe} are determined from the probe specifications (see examples in Table 1). Elsewhere, we shall see that C_{probe} is very small and can be ignored.

$$C_{total} = C_{EUT}$$

The measured time constant can now be expressed as:

$$T_{measured} = (\frac{R_{probe} \times R_{EUT}}{R_{probe} + R_{EUT}}) \times C_{total}$$

Effect of probe resistance

As has been shown, the EUT discharge resistance, R_{EUT}, must be 10 megohms or less in order to achieve a 1-second time constant with a 0.1 µF capacitor or larger.

R_{total} is comprised of both the EUT discharge resistance R_{EUT}, and the probe resistance, R_{probe}.

If R_{EUT} is 10 megohms and C_{EUT} is 0.1 µF, then we know that T_{EUT} must be 1 second. If we measure the time constant with a 100-megohm probe, the parallel combination of R_{EUT} and R_{probe}, is about 9.1 megohms and the measured time constant, $T_{measured}$, will be:

$$T_{measured} = R_{total} \times C_{total}$$
$$T_{measured} = 9.1 megohms \times 0.1 \mu F$$
$$T_{measured} = 0.91s$$

So, for a C_{EUT} of 0.1 µF capacitance and a R_{EUT} of 10 megohms, a measured time constant (using a 100-megohm probe), $T_{measured}$, of 0.91 second would indicate a EUT time constant, T_{EUT}, of 1 second.

If we substitute a 10-megohm probe for the same measurement, then R_{total}, the parallel combination of R_{EUT} (10 megohms) and R_{probe} (10 megohms), is 5 megohms. The measured time constant, $T_{measured}$, will be:

$$T_{measured} = R_{total} \times C_{total}$$

$$T_{measured} = 5 megohms \times 0.1 \mu F$$

$$T_{measured} = 0.5s$$

So, for a C_{EUT} of 0.1 µF capacitance and a R_{EUT} of 10 megohms, the measured time constant (using a 10-megohm probe), $T_{measured}$, is 0.5 second and would indicate a EUT time constant, T_{EUT}, of 1 second.

Effect of probe capacitance

According to the standard, C_{EUT} is 0.1 µF or more. Also, according to the standard, C_{probe} must be 25 picofarads or less. Assuming the worst case for C_{probe}, the total capacitance is:

$$C_{total} = C_{probe} + C_{EUT}$$

$$C_{total} = 0.000025 uF + 0.1 uF$$

$$C_{total} = 0.100025 uF$$

The worst-case probe capacitance is extremely small (0.025%) compared to the smallest C_{EUT} capacitance (0.1 µF) and can be ignored. We can say that:

$$C_{total} = C_{EUT}$$

Determining the time constant.

According to the standard, T_{EUT} must not exceed 1 second.

$$T_{EUT} = 1$$

$$1 = R_{EUT} \times C_{EUT}$$

where:

R_{EUT} is 10 megohms or less

C_{EUT} is 0.1 microfarads or more

The problem is to determine the values for R_{EUT} and C_{EUT}. Once these values are known, the equipment time constant, T_{EUT}, can be determined by calculation.

As shown in Figure 1, R_{EUT} can be measured directly with an ohmmeter applied to the mains input terminals, i.e., between L1 and L2. Care must be taken that the capacitances are fully discharged when the resistance measurement is made. Any residual charge will affect the ohmmeter and its reading. Of course, if the circuit is provided with a discharge resistor, then the capacitances will be fully discharged. If the circuit does not have a discharge resistor, then the ohmmeter will provide the discharge path, and the reading will continuously increase.

C_{EUT} can also be measured directly with a capacitance meter. Depending on the particular capacitance meter, R_{EUT} may prevent accurate measurement of C_{EUT}. For the purposes of this paper, we assume that the capacitance

meter cannot measure the C_{EUT}. In this case, we must measure the time constant and compensate for the probe resistance.

So, the time constant must be measured, and the probe resistance must be accounted for.

Since probe resistance is more-or-less standardized, we can calculate curves for 100- and 10-megohm probes for all maximum values of R_{EUT} and C_{EUT}. The maximum values for combinations of R_{EUT}, C_{EUT} (C_{total}), R_{probe}, R_{total} and $T_{measured}$ are given in Table 3. (R_{probe} and R_{total} values are rounded to 2 significant digits.)

Table 3
Maximum $T_{measured}$ values for combinations of R_{EUT} and C_{EUT}
for T_{EUT} of 1 second

T_{EUT} seconds	C_{EUT} (C_{total}) microfarads	R_{EUT} megohms	R_{probe} megohms	R_{total} megohms	$T_{measured}$ seconds
1	0.1	10	100	9.1	0.91
1	0.2	5	100	4.8	0.95
1	0.3	3.3	100	3.2	0.97
1	0.4	2.5	100	2.4	0.97
1	0.5	2	100	2.0	0.98
1	0.6	1.7	100	1.6	0.98
1	0.7	1.4	100	1.4	0.99
1	0.8	1.25	100	1.2	0.99
1	0.9	1.1	100	1.1	0.99
1	1.0	1	100	1.0	0.99
1	0.1	10	10	5.0	0.50
1	0.2	5	10	3.3	0.67
1	0.3	3.3	10	2.5	0.75
1	0.4	2.5	10	2.0	0.80
1	0.5	2	10	1.7	0.83
1	0.6	1.7	10	1.4	0.86
1	0.7	1.4	10	1.25	0.88
1	0.8	1.25	10	1.1	0.89
1	0.9	1.1	10	1.0	0.90
1	1.0	1	10	0.91	0.91

For each value of R_{EUT} and R_{probe} we can calculate the worst-case measured time constants, $T_{measured}$ for a T_{EUT} of 1 second. These are shown in Figure 6.

The process is:

1) With the unit disconnected from the mains and the power switch "off," measure the resistance between the poles of the EUT. Repeat with the power switch "on" as the filter may be on the load side of the power switch. Select the higher value as R_{EUT}.

2) Connect the oscilloscope probe between L1 and L2 as shown in Figure 5. For safety during this test, use a 1:1 isolating transformer between the mains and the EUT. Set the scope sweep speed to 0.2 milliseconds per division (2 seconds full screen).

3) When the display is about 1 or 2 divisions from the start, turn the test switch off, and measure the time constant as shown in Figures 4a and 4b. This step may need to be repeated several times to get a

suitable waveform on the oscilloscope. This step should be performed twice, once with the EUT power switch "off" and once with the EUT power switch "on." Select the maximum value. This value is $T_{measured}$.

4)   Plot R_{EUT} and $T_{measured}$ on the chart, Figure 6.

If the point is below the curve of the probe that is used to measure the time constant, then the EUT time constant, T_{EUT}, is less than 1 second.
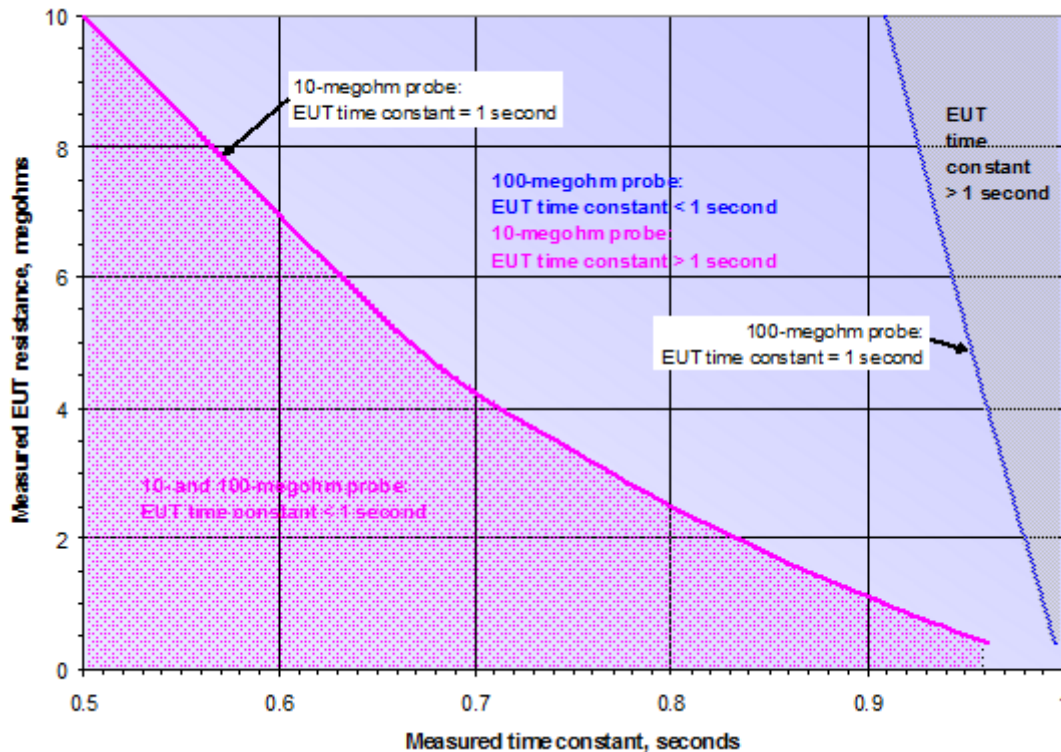

Figure 6
Worst-case measured time constant values for 100- and 10-megohm probes

Conclusion

Measurement of the time constant can be made with any probe, not just a 100-megohm probe. Ideally, the probe input resistance should be at least equal to the worst-case EUT discharge resistance (10 megohms for pluggable equipment type A) or higher. The effect of the probe input resistance is given by the equation for R_{total}. 100-megohm probes, while approaching ideal in terms of the effect on the measured time constant, are bulky and expensive and not necessary.

The standard is a bit misleading by ignoring a 9% error when a 100-megohm probe is used to measure the time constant associated with a 10-megohm discharge resistor (see Figure 5).

*****

If you have any comments or questions about this article, please send them to Richard Nute, richn@ieee.org.

If you have a question about safety, and would like to see the answer published here, or if you would like to see a topic discussed here, please send the question or topic to Richard Nute, richn@ieee.org.

2008 Symposium Report

by Doug Nix

The year 2008 was a special year for the Product Safety Engineering Society—we passed our fifth year as an IEEE Society and held our fifth annual Symposium in Austin, TX. There were 180 attendees this year, a nice growth since last year's meeting in Denver. We had great Texas weather, with temperatures in the mid-80s F and clear skies, also a nice change from Colorado's early October snow!

The meeting was a huge success, thanks in no small part to Dell, Inc. who were Super Platinum sponsors this year! The support of our patrons, including CSA, UL, Microsoft, Intertek, IHS, and Nemko make it possible to present cutting edge thinking on product safety in great venues like the Austin Marriott North hotel in Round Rock, TX.

The meeting featured a great keynote presentation given by Dr. June Andersen of IBM. Dr. Andersen is a Distinguished Engineer and manages IBM's global corporate staff responsible for product safety and hardware compliance in more than 260 markets. Dr. Andersen told some great war-stories as she explained how her group manages to ensure that IBM product meets and exceeds global safety requirements. A very personable speaker, Dr. Andersen got our symposium off to a great start.

Technical sessions ran for 2-1/2 days and covered diverse areas including the origins of some of the technical requirements that may seem more like 'black art' than engineering, the benefits of standards in general, a Medical Devices track that looked at the new edition of IEC 60601-1, and an atypical electrocution case study regarding the failure of an AC grounding system which resulted in a chain-link fence becoming energized. Other presentations included a discussion of electrical touch current measurement effects on human subjects and an interesting track dealing with EMC and Functional Safety, including the new IEC TS 61000-1-2 and the implications of its application on EMC testing. With more than 45 sessions this was a packed symposium!

The exhibit hall had booths from 14 key companies in the product safety marketplace, including such well-known names as Haefley, TUV Rheinland and TUV SÜD America, long-time PSES supporters iNarte, DLS and ED&D.

Special thanks needs to be given to Gary Schrempp who chaired the 2008 Symposium Steering Committee and the dedicated team of volunteers who made it all happen!

Next year's Symposium will be our first outside of the USA. Come and join us at the Hilton Suites Toronto/Markham Conference Centre & Spa in Toronto, Ontario, Canada, October 26–28, 2009. We look forward to seeing everyone there! More information including registration and paper submissions can be found on our web site. You can also contact the Symposium Chair, Doug Nix, by email at dnix@ieee.org, or by phone at 519-729-5704.

Doug Nix, A.Sc.T. is a member of the IEEE Toronto Section

IEEE PSES Membership savings

UL University Offers
IEEE PSES Members
15 Percent Discount

UL University (ULU) has established a discount code which will provide all IEEE-PSES members with a 15 percent discount off the price of all ULU instructor-led workshops, online programs, videos, books, and other services/products offered under the ULU brand. The discount is automatically applied during registration or purchase of ULU products. Registration or product purchase can be accomplished online at www.uluniversity.com or by calling 888-503-5536 in the U.S. or the country-specific number posted on the ULU website.

To receive the discount, members must enter or mention the discount code found in the Members Only section of the PSES website.

If you or any member has specific questions regarding ULU products or services, please call or email me or call the local country specific number posted on the UL University website.

Tony Robertson
Manager – Customer Training

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://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.

New PSES Members from 30 September 2008 Through 30 December 2008

A G Hessami
Alberto Rafael Moyano
Ali Karim Kuba
Andrew Lyon
Anton (Tony) J Nikolassy
Azim U karimi
Bill Bekdash
Blair Steeves
Chad Michaelis
Chahal G Singh
Christopher Michael Sanchez
Daniel J Toffolo
Daren T Slee
Dennis Jon Beaumont
Dimitrios H Englesos
Donald J Umbdenstock
Edmund Kienast
Frank West
Gargee Chatterjee
George M Correia
Guy Benjamin
Henk Visser
Henrik Poulsen
Hung Chun Yu
James Dogul
James H Townsend
James Poore
Jeremy William Maxwell
John R Ryan
Jose Galvan
Jose Soto
Justina A Gutierrez
Ken Neltnor
Kenan D. Davila
Kenton L Clark
Kitty Tam
Kwok Hung Chan
Lemrabott O Habiboullah
Leung C Fung
Mandy Zhao
Mark Edward Edge
Mark R Chase
Michael P Connolly
Michael V Bolden
Nicholas Scott
Nick Kobrosly
Parvez Masood

Paul J Van Den Biggelaar
Peter S Leung
Ramon J Torres
Regan Arndt
Robert G Styles
Robert Schick
Saul Rodriguez
Shu Lun Mak
Sieunarine Ramkumarsingh
Snehalkumar B Dalal
Son Bang La
Sotiris Pispas
Stefan Vosskuehler
Stephen A Goyette
Stephen J Miesiak
Steve Campolo
Steven Heng
Vincenzo Alterio
Walter E Hyde
Wan-Juang T Foo
William F Parsons
Wing Kwong Leung

Our new members are located in the following countries: Australia, Canada, France, Germany, Greece, Hong Kong, India, Malaysia, Netherlands, New Zealand, Senegal, Singapore, Taiwan, Trinidad and Tobago, United Kingdom, USA

The Next Generation

An article in the September 2008 issue of *electroindustry* says, "A major competitive challenge facing the U.S. is that an estimated 50 percent of standards practitioners will retire within the next three to five years." The article quotes Don Purcell, chairman of the Center for Global Standards Analysis, saying "no 'significant effort is being made to train and educate the next generation,' Purcell says, noting that only three of the approximately 2500 U.S. colleges and universities offer a graduate course on standards." Standards training varies in other countries, ranging from situations similar to that of the U.S. to that of South Korea and China, where standards education is an integral part of engineering education.

I'd guess that training for product safety engineering is in even worse condition, and I still think that an ideal mission for the PSES, a cause that might unite members and draw others into our society, would be for the PSES to develop course modules on product safety engineering to offer to engineering schools. The modules could initially be for only a couple of hours, with later evolution into day, week, or semester length. Work could be divided among volunteers.

Outside funding is not out of the question. The National Electrical Manufacturers Association (NEMA) recently received $9.5 million in funding from the federal government to develop standards for traffic control ("intelligent transportation"). Perhaps the government would be quite happy to dish out a grant for training in standards and product safety engineering. Perhaps NEMA, which itself spends several million dollars per year on standards work, might be a funding source.

The point is that for strong, vibrant, continuous PSES growth, we might consider targeting those who are studying to enter our various industries.
—*GW*

New PSES Jobs Web Page

PSES has a new page on our web site 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. 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.

Why be a Member of the IEEE and Why Join the IEEE Product Safety Engineering Society

Why be a Member of the IEEE, and Why Join the Product Safety Engineering Society (PSES) of the IEEE?

by Elya B. Joffe

Some people make things happen,
some watch things happen,
others wonder what has happened…

If you are reading this article, you are most likely already a member of the IEEE and the PSES. Here, Elya Joffe gives a thorough and colorful overview of the rationale for belonging to these organizations. It is a wonderful resource for talking with prospective members.

A boy asked once a wise man, "Is the butterfly I am holding in the palm of my hand alive or dead?" If the wise man said "alive" the boy would crush the butterfly and show it dead, but if the wise man said "dead," the boy would laugh and let the butterfly fly away. The wise man was cleaver enough not to offer either of the those replies, instead answering the boy, "As you will, my lad, as you will."

Advantages of IEEE Membership

Whenever I am asked, "What is the advantage of IEEE membership?" I believe the wisest reply would be similar: "As you will, my friend, as you will."[1]

In my many years of IEEE membership and professional career, spanning decades, I have learned that the benefits of belonging to any professional society, and for that matter—to any social group or association, vary from person to person. Mostly, the efforts an individual puts into a society are multiplied ten-fold in the benefits that person enjoys. Therefore, the value of the "membership benefits" is really determined by the individual member's values, needs, and, particularly, his personal involvement.

The IEEE is a diverse organization, encompassing more than 374,000 members active in almost 40 technical societies. Therefore the interests of our members are projected in a wide variety of technical issues and professional concerns that provide value to each member.

In a presentation made during the Membership Development Retreat, which took place in April 2005, New Brunswick, NJ, USA, the reasons for joining and the reasons of members for continuing their membership in the IEEE were presented (see Figure 1). Interestingly, "traditional" financial benefits are no longer the driving factor for IEEE membership.

Easy access to IEEE technical publications (the IEEE publishes a major portion of all technical publications worldwide), which used to be a traditional reason for membership, still constitutes a major, yet not the leading motivation for belonging to the IEEE. This should be of no surprise since in our digital age the IEEE digital libraries have become easily accessible to all at low cost through libraries in the universities and in the industry.

From Figure 1 it is evident that the key words are *networking and professional advancement*. Those include the ability to stay current in one's profession and be competitive in the field, to network with colleagues and professionals, and to find career opportunities.

It should be clear to each IEEE member that his or her personal advantages lie in their active professional involvement, development, and growth with outstanding opportunities for career satisfaction. Involvement can take many forms, and along the way you will build a worldwide community of colleagues with similar interests.

Attending one or more of the 300 annual IEEE major conferences or 3000 IEEE major seminars, workshops and tutorials around the globe will no doubt keep you current in your profession. IEEE members also plan and organize conferences in their community—a

rewarding experience of its own merit. In those conferences (which, by the way, you attend at a reduced rate as an IEEE member), not only will you have the opportunity to broaden your professional knowledge, but you will also have the opportunity to meet and interact directly with the leaders, the true "cedars of Lebanon" in your field, who are always open to the fellow attendees, novices and experienced alike. Such meetings allow you to share your opinion and insight, and help spur new ideas.

utilized, the most renowned probably being the IEEE 802.11 LAN standard. Imagine—you can personally contribute to the development of such standards! Would that not be a reward of its own merit?

Your local IEEE Section or Chapter will welcome and encourage your involvement in its activities, whether you want to actively serve on one of its committees, help in organizing a technical or social event, or mentor a promising young engineer or student.
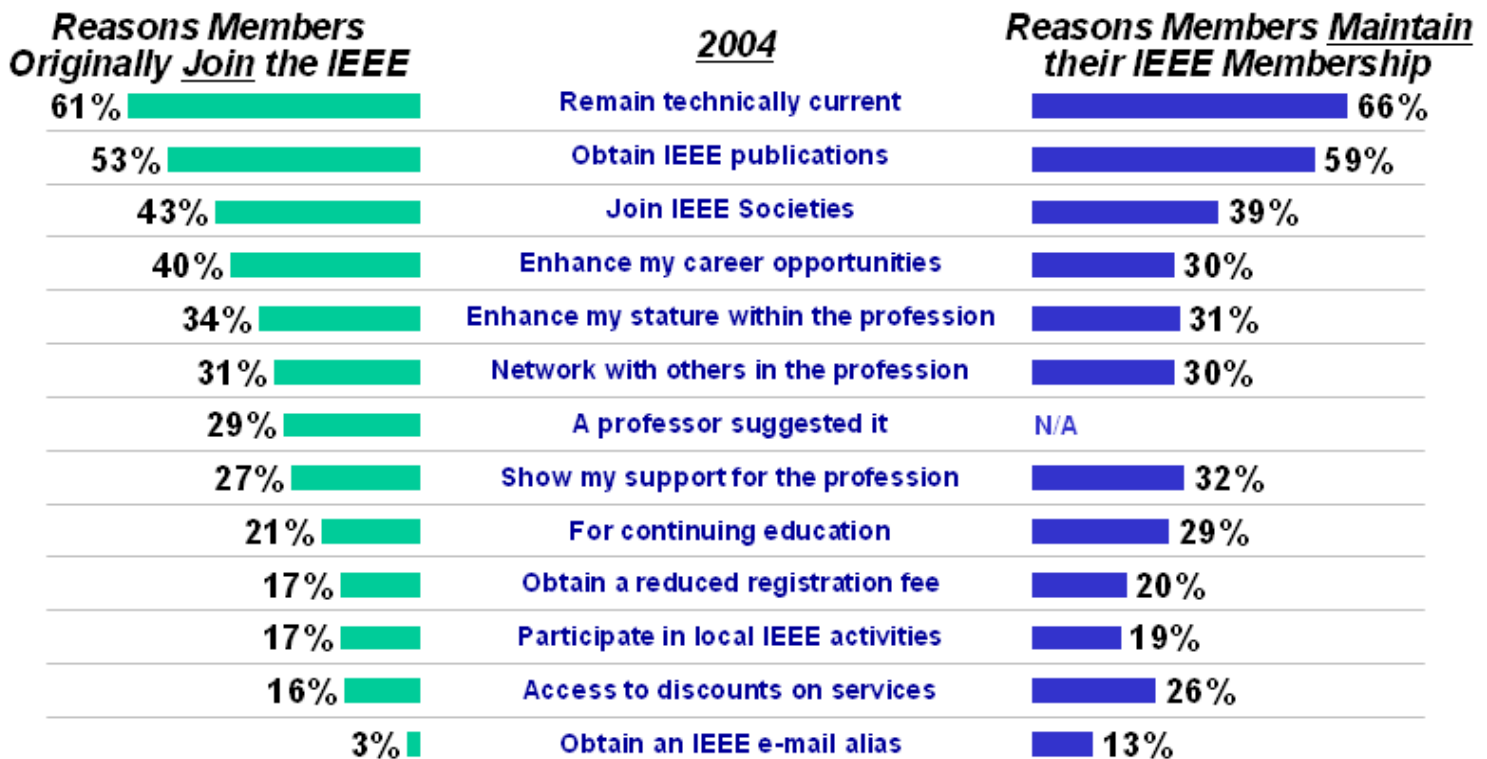

Figure 1. Reasons for Members Joining the IEEE vs. Members Remaining in the IEEE Source: Binder M., Gerstmann, E., *IEEE Membership Research*, a presentation made in the Membership Development Retreat, 30 April 2005, New Brunswick, NJ, USA[2]

Involvement in IEEE standardization activities, through one or more of the working groups sponsored by your society, is also a superb way to obtain the latest information in your field and allows you to influence the development of future standards. Currently, more than 15,000 IEEE members are involved in the work of hundreds of such working groups with topics ranging from radiation hazard safety to nanotechnology. As a result, many well-known IEEE standards are globally

Even simply participating in regional and local activities (e.g. chapter meetings), offers an outstanding chance to exchange professional opinions. In those meetings, you will meet IEEE distinguished lecturers and other knowledgeable speakers from academia and industry who present high quality professional talks, socialize in a relaxed and friendly environment, and even make a presentation of your own. You would not

believe how a successful presentation satisfies the speaker himself.

All of the above activities will help in enhancing your career because through them you acquire vital skills that are not taught in the classroom but are essential for your professional advancement. These skills include leadership, finance, project planning and communications. Often, this will be your first opportunity to experience them. While you are at that, you will also gain access to individuals at all tiers of the profession and become a more valuable asset to yourself, your associates and your employer.

Many IEEE members who began their IEEE career in the local activities have found their way to leadership positions, in their professional societies and in their personal careers. But remember, as stated at the beginning of this article, the advantages you gain from your IEEE membership are "*as you will…*"

The benefits you may obtain from your membership will most probably vary along the different stages of your professional career, and hence you may find that the IEEE membership advantages encompass a wide variety of services that may not all seem to you of importance to you at first glance. Many of those benefits may be found on-line. The most recent of all is the *MyIEEE* members-only portal customized to *your* own interests and needs.

As an IEEE member you are entitled to your personalized your_name@ieee.org portable IEEE e-mail alias, providing you, free of charge, high-level computer security services including anti-virus and anti-spam protection. You will also gain access to more than 80 "virtual communities" dealing with technical and career issues, as well as to on-line continued education training programs available by several IEEE societies and educational partners.

But above all, there is one overarching member benefit—the respect and competitive edge associated with your belonging to a high-quality professional organization. Your access to the IEEE information resources and your affiliation with other members underscore the worldwide renown the IEEE enjoys for its vision, its leadership and its innovation spanning more than a century.

Advantages of Society Membership: Focus Your Career!

IEEE membership is only the first and fundamental step in your profession. As a practitioner in your particular field, you should focus your career on those aspects which directly contribute to your technical interest. Society membership is the key! Society membership enhances the benefits you receive as an IEEE member, tailored to your discipline.

Through your Society, you will enjoy *networking opportunities without equal*, providing you with direct access to innovators and practitioners around the world—people you may have never otherwise met in the course of your daily practice. Through the Society's activities, conferences, workshops and local chapter meetings, you will meet the top minds in your field "on the level" and broaden the support structure you need to succeed in your career development.

Your Society is, first and foremost, a source of information and professional know-how. *This is where we learn our trade!* Society technical and standards committees, which are open to all members regardless of their experience and expertise, deal with the evolution of new aspects of technology by helping document their characteristics and spread the information through education and training within the technical community. Through active participation in Technical and Standards Committees, not only will you be able to contribute to the evolution and advancement of your profession, but also of your own professional skills. Furthermore, those committees provide you easy access to the technical experts within the Society. These experts are often glad to provide guidance and consultation for individual questions. Seek them out when you need assistance.

The Society is also a place for *professional education and advancement*. In the Society you will find members who provide education and instruction in the elements of the Society's technology. As a member of the society you will learn who these valuable resources are and how to contact them.

And of course, the Society membership may create *job opportunities*. It enables you to become acquainted with other colleagues working in your field or related fields. This acquaintance may provide early information on new job opportunities as the industry grows and changes. It will also provide you with valuable insight when openings become available within your own organization that would be a good fit for someone you have met and whose skills you have come to know

2009 IEEE Symposium on Product Compliance Engineering

Sponsored by the IEEE Product Safety Engineering Society
26-28 October 2009 Toronto Ontario Canada
Hotel TBD

Chair
Doug Nix
dnix@ieee.org

Co-Chair
Steve Brody
steven.brody@brooks.com

Treasurer
Murlin Marks

Secretary
Brian Greaney
brian.a.greaney@hp.com

Technical Program
Bob Griffin
bobgriff@us.ibm.com

And

Gary Tornquist
garytor@microsoft.com

Product Safety 101
Technical Program
Rich Nute, richn@ieee.org

Exhibits/Promotions
Thomas Ha
tom@gmcompliance.com

Exhibitor Manager
Sue Kingston
s.kingston@ieee.org

Registration
Diana Krynski
d.krynski@ieee.org

Arrangements/Logistics
TBD

Communications,
Webmaster and Program
Records
Dan Roman
Dan.Roman@ieee.org

At-Large Members
Jim Bacher
Jack Burns
Daniece Carpenter
Elya Joffe
Henry Benitez
Ken Thomas

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 are not limited to:

- **Product Safety:** Consumer, medical, computer (IT), test and measurement, power supplies, telecommunication, industrial control, electric tools, home appliances, cellular and wireless, etc.

- **Product Safety 101:** Papers / presentations intended for new safety engineers. This will include certification processes, product evaluation and testing, report writing, and working with designers to get it right the first time.

- **Safety Subjects:** Electrical, mechanical, fire, thermal, chemical, optical, software, functional, reliability, etc.

- **EMC / RF:** Electromagnetic emissions, electromagnetic immunity, regulatory, Introduction to EMC/RF for the safety engineer and compliance engineer.

- **Components:** Grounding, insulation, opto-couplers, capacitors, transformers, current-limiters, fuses, power line filters, ferrite, environmental, electromagnetic emissions, electromagnetic immunity, regulatory, etc.

- **Certification:** Product safety, electromagnetic emissions, electromagnetic immunity, environmental, processes, safety testing, regulatory, etc.

- **Standards Activities:** Development, interpretations, status, interpretations, country requirements, Laboratory Accreditation, etc.

- **Safety Research:** Body physiological responses to various hazardous energy sources, unique safeguard schemes, etc.

- **Environmental:** RoHS, WEEE, EuP (Energy-using Products), Energy Star, Packaging Directives, REACH (Chemical), CeC, etc.

Mark your calendars to attend the
2009 IEEE Symposium on Product Compliance Engineering.

Author's Schedule

Intent to present and topic (e-mail) April 29, 2009
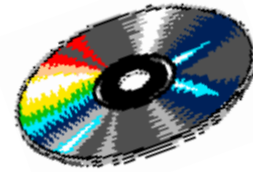Draft e-paper June 1, 2009
Notification of Acceptance July 6, 2009
Complete e-paper August 17, 2009

See http://www.ieee-pses.org/symposium/index.html#CFP for more details on requirements and dates.

www.ieee-pses.org/symposium

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::_____

_____

_____

_____

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.

through the Society activities.

In summary, Society membership offers many opportunities to volunteer and grow. Whether you volunteer to serve on technical or standard committees, edit a journal, or get involved in other ways, the experience you gain puts you on the career path for continued success in your particular discipline.

Introducing the Product Safety Engineering Society (PSES) of the IEEE

A safer tomorrow through technology today

Safety is everywhere! Any product, from the smallest electrical toy to the largest of electrical machines, must comply with applicable product safety requirements, whether by law or for the manufacturer to minimize liability. Systems carrying out critical missions may also require that functional safety aspects be addressed in their design and testing. In recognition of the importance of product safety engineering, on the one hand, and its unique interdisciplinary nature on the other, the IEEE approved the founding of the Product Safety Engineering Society (PSES) in 2004, making it one of the youngest professional societies of the IEEE. Consistent with its goals and charter, the PSES addresses the theory, design, development, and implementation of product safety engineering for equipment and devices used in the scientific, engineering, industrial, commercial and residential arenas.

The Society provides a forum for product safety professionals and design engineers to discuss and disseminate technical information, to enhance personal product safety skills, and to provide product safety outreach to engineers, students and others with an interest in the field. It also serves as a platform cooperative activities, both internal and external to IEEE, such as the promotion and coordination of product safety activities among IEEE entities.

What does the PSES offer its Members?

As a member of this unique group of product safety professionals, you become part of a professional community offering you multiple personal, career, and business benefits. First and foremost, you have opportunities to network with technical experts in your field of interest. Conferences, workshops, and local chapters, as well as on-line services, provide you with numerous opportunities to work alongside the industry's top experts.

First and foremost, the PSES provides a forum for addressing product safety engineering as an applied science, through networking with your peers and colleagues, as well as for your personal education and career professional development. Product safety engineering is multidisciplinary, and as such, requires networking and interfacing with professionals across a broad spectrum of associated disciplines (e.g. EMC, reliability, power engineering, to list a few). This is best achieved through cooperative coordination of product safety engineering activities with other IEEE Societies and non-IEEE professional societies and organizations. The PSES also provides a platform for outreach to interested engineers, students and professionals who may not be product safety engineers per se' but may be closely interfacing with product safety engineering and related disciplines. As it is an interdisciplinary field, members of PSES can greatly benefit from these outreach and networking opportunities.

In particular, members of the PSES receive discounted fees available for Society members only at UL University seminars, where you have the opportunity to enhance and broaden your knowledge in product safety. You may also receive special member-only discounts when registering to the *International Product Safety News*.

The PSES sponsors the IEEE International Symposium on Product Safety and Compliance Engineering, giving you the opportunity to be part of the latest developments in your field and network with leaders. The Symposia feature technical papers on current product safety engineering topics, a series of progressive educational tutorials, and workshops designed to introduce those new to product safety and compliance engineering to the technical aspects of the discipline, and technical exhibits presenting a variety of product safety and compliance hardware, software, and design and test services. In addition the PSES cooperates and co-sponsors a number of related conferences worldwide. You can attend the PSES symposia at a member's reduced rate.

This quarterly on-line PSES Newsletter is available for PSES members only, and helps keep you abreast of technical, professional and membership activities within the society. The Newsletter provides current information on professional events, Society developments, product information, local activities and full text technical articles. Whenever you look for

information on what is happening in the PSE Society, the Newsletter is the place to find it.

The IEEE PSES sponsors a number of awards to recognize the efforts of its volunteers who have made significant contributions to the society and/or the product safety engineering profession. Each year, awards ranging from certificates of appreciation for outstanding service to the Society, whether at the local chapter or the society level and local activities, up to awards for outstanding technical achievements in the field of PSE, serve as a token of appreciation and recognition by peers. The PSE Society awards are proudly presented and displayed by the members, and well recognized by their employers.

Much of the work of the PSES takes place locally in our chapters worldwide. A listing of the chapters and their chairpersons may be found on the web site. The chapters provide a local center for product safety engineering activities by hosting presentation meetings, workshops, tutorials, colloquia, and social gatherings. I strongly encourage you to contact your local Chapter Chair, and find out how you can participate. If no chapter exists in your local area, why not consider starting one?

Where do YOU Fit In?
All professional activities of the PSES are performed by volunteers who are members like you, mostly in our Board of Directors and the Society's Technical Committees (TCs). Meetings of the Technical Committees and the Education Committee take place in central locations, via teleconference calls, electronic communications, and through e-mail discussions. Distance is no longer a constraint in joining and benefiting from any of those activities.

Surely you can find interest in one or more of them. In close ties with the EMC Society, those committees play an important role in the overall success of the PSE Society by promoting activities in their fields and providing expert knowledge and assistance to generate and review technical papers, organize and operate sessions at symposia, develop standards, and evaluate "state of the art" technology and EMI control measures. These *committees and their meetings are open to all members*, the expert and the novice alike. Whether you come to contribute from your knowledge and experience, or to learn from the experience of others you are welcome!

You can find information about each of the committees on the PSE Society web site by clicking on the "Committees" button in the side bar and following the associated links. You are encouraged to investigate each of the committees listed there and to contact the chairman of any that interest you for a further explanation of the committee, its functions and options to participate in their activities.

Of course, the PSES Chapter in your area will always be glad to have you as an active member. You can give a talk, or actively participate in a discussion following a talk by others. If there is no chapter in your area, maybe you could start one yourself. You will receive all the support you need, and will find out how rewarding this can be.

And finally, you may wish to join the governance of the Society: You can "run" for a position on the Board of Directors of the PSES Society. The way is open to ANY member of the Society. Who knows, one day you may even be the President of the PSES Society. "*The achievement of your goal is assured the moment you commit yourself.*"

Summary
In every stage of your professional career, explore your IEEE, and PSES Society membership opportunities, make the best of it for your career advancement, and use it both for your advancement and/or making the world a better place to live in.

Where to get More Information
For more information, please visit the IEEE PSES web site at: www.ieee-pses.org.
You can also write personally to Jim Bacher, the President of the PSES, at: j.bacher@ieee.org. You WILL receive a reply! Guaranteed! Hope to see you among our active members! Remember—to the question, "What is the advantage of IEEE PSES membership?" I reply, "As you will, my friend, as you will."

Elya B. Joffe, is a member of the Board of Directors, IEEE Product Safety Engineering Society.

References:
[1] Anderson, C., "The Advantages of Membership," *The Institute*, June 2005
[2] Binder M., Gerstmann, E., "IEEE Membership Research," a presentation made in the Membership Development Retreat, 30 April 2005, New Brunswick, NJ, USA

Stay Connected with IEEE

We know you work hard to get where you're going and that IEEE membership is essential to your career. **Renew your membership for 2009** and stay connected to valuable benefits and services to help advance your career. No matter what your interests are—IEEE membership provides benefits to help you go further.

IEEE memberNet™

Build your professional network with the only online web site that connects IEEE members across the globe.

www.ieee.org/membernet

IEEE.tv™

Access exclusive, special-interest programming in a variety of engineering and technology fields.

www.ieee.org/ieeetv

IEEE Mentoring Connection™

Initiate a partnership with another IEEE member to gain experience and insight.

www.ieee.org/mentoring

31 December is the end of the membership year.
Don't let your IEEE benefits expire—Renew Today!
www.ieee.org/renew

IEEE Membership: **Connecting** Professionals, **Advancing** Technology

IEEE
Celebrating 125 Years
of Engineering the Future

The Product Safety Engineering News-letter 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

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 .

Seeking Nominations for IEEE Medals and Recognitions

The IEEE Awards Board is seeking nominations for IEEE Medals and Recognitions and encourages the use of its online Potential Nominee Form. This form allows a preliminary review of a nominee by the selection committee and an opportunity to obtain feedback prior to submitting an official nomination form. The Potential Nominee Form is available on the IEEE Awards Web Page at:

http://www.ieee.org/portal/pages/about/awards/noms/potnomform.html

The deadline for submission of an official nomination form for any of the IEEE Medals and Recognitions is 1 July 2008. For questions concerning the Potential Nominee Form, please contact awards@ieee.org.

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

CHANGE SERVICE REQUESTED