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POWER ELECTRONICS SOCIETY NEWSLETTER

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News Items should be sent to: Dr John M. Miller, PELS Newsletter, Editor-in-Chief, 4022 W. Creedance Blvd., Glendale, AZ USA; TEL:+1 623 518 4438; EMAIL: pelsnews@ieee.org. Deadlines for copy are March 15, June 15, September 15 and December 15. Email submission of items in MS-Word or plain-text format are preferred. MS-Word and plain-text (straight ASCII) submissions on CDROMs are welcome and should be accompanied by a backup hardcopy. Fax submissions are acceptable, but are least desirable. Include caption with all photos identifying event and individuals in a back-row, left to right, front-row, left to right, etc method. Full-page calls for papers and announcements of PELS-supported conferences are welcome and should be sent as both high-quality hardcopy and MS-Word files. Please indicate all trademarked items, such as INTELEC®, APEC® with the registered trademark symbol, "®".

Technical items should be sent to: Prof Babak Fahimi, PELS Newsletter Associate Editor, University of Texas at Arlington, 416 S. College St., Arlington, TX 76019 USA; TEL: +1 817 272 2667; FAX: +1 817 272 5040; EMAIL: fahimi@uta.edu

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The Newsletter in PDF format is posted at the PELS website approximately three weeks sooner than paper copies can be delivered. To receive email notification when the internet version is available, go to http://www.pels.org/Mailing/MailForm.html and provide your email address. Additionally, the email notification sometimes includes timely announcements that are not in the printed newsletter.

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From The Editor

John M. Miller

I trust everyone had an enjoyable and restful holiday and are entering the new year with renewed vigor. There is much to be thankful for and I offer wishes for a safe and healthy and successful 2009. We have to look at the positive in these globally stressful times, where, with the near collapse of the worlds financial markets, the automotive industry in the U.S. teetering on the brink of extinction, war, problems in the housing and banking industries and on and on there is hope. Sounds like a parallel to the story line of the 1950's movie *It's a Wonderful Life*. Today, as in that story, perseverance and trust in friends across the globe will see all of us across these trying times. So, as these enterprise level course corrections are going on, its time for all of us in the power electronics industry to plan forward to new and perhaps totally different applications for electronics in power conditioning, energy storage and renewable energy.

In this issue our president, Prof. Hiro Akagi, gives his farewell address as PELs outgoing president and welcomes in our president elect, Prof. Deepak Divan. We all thank Prof. Akagi for his leadership and guidance for the past two years and at the same we time look forward to a successful society in the coming years.

Lastly, along with the usual meeting announcements and call for papers we have an excellent technical topic in this issue, a commentary on the cost of quality, and an excellent article on the recent acquisition of Ansoft by the Ansys Corporation. This in particular has a very direct bearing on all of us as professionals in the power electronics community. So, onward, into the new year and success in all we do.

John M. Miller, EIC
pelsnews@ieee.org

APEC 2009
February 13-21, 2009
Washington, DC

President's Message

Dear PELS members:

The year 2008 is ending, and my two-year term as the President is also expiring. This will be my last President's message in the PELS Newsletter.

First of all, I would like to express my appreciation and gratitude to all of you for what you have done for our society; acting as committee members, organizing conferences and meetings, attending conferences and workshops, submitting papers to the PELS Transactions/Letters, writing articles to the Newsletter, reading papers/articles in the PELS periodicals, as well as regional activities. Among these activities, in my opinion, attending a PELS-sponsored conference is one of the most important activities as a PELS member, because such a conference is a mechanism for a unique form of personal interchange and networking that are not readily available elsewhere.

As we all know well, activities in our society, as well as the IEEE, rely on private individuals who are interested in power electronics in a broad sense, although the unseen support from our company or university is indispensable for these activities. In addition, team sprit and teamwork is required for managing the PELS AdCom (Administrative Committee) as a collective form of private individuals, just like winning a baseball or football game. I have always seen effective teamwork done by the AdCom members over the past two years. If this teamwork had not existed, our society could not have completed the 37-page report for submission to the TAB society-review committee in May 2007, as I described in the first quarter 2008 Newsletter. I deeply thank all the AdCom members for their wonderful teamwork, as well as individual activities and dedications to our society.

As the President, I had the privilege of gaining valuable experiences by being in the company of power electronics professionals through networking at meetings and conferences in many countries. I was invited as a keynote speaker at the 9th Brazilian Power Electronics Conference in Blumenau, SC, Brazil, in the beginning of October 2007. PELS supported it in the form of technical co-sponsorship. After attending the 2007 IAS Annual Meeting in New Orleans, I flew to Blumenau with a stopover in Rio de Janeiro. I had fantastic opportunities to meet many Brazilian power electronics people and to exchange information on power electronics technology and its applications. PELS will keep supporting in the same form the 10th Brazilian Power Electronics Conference that will be held in the end of September 2009.

All the IEEE Society/Council Presidents are responsible for attending the IEEE TAB (Technical Activity Board) meeting in February, June and November. The latest IEEE TAB meeting was held in New Brunswick, NJ, on November 14-15, 2008. It was my last participation in the TAB meeting as the PELS President. The photo included here was taken on Nov. 14 at the meeting site, together with Tom Habetler (Division II Director), Deepak Divan (President-Elect), Donna Florek (Senior Administrator), and myself. The meeting hotel is very close to the IEEE Headquarters Office. It takes about 30 minutes from the station near the hotel to the Newark Liberty International Airport by train. The TAB meeting lasted two days, from morning to evening, discussing common issues among more than 40 Societies and Councils formally, and specific topics between two or three societies informally.

I will take this opportunity to report an important motion about the so-called "no-show" papers to PELS members and conference organizers. The motion was submitted from the IEEE Conferences Committee to the TAB, and it was carried through after discussions. Here, no-show papers mean that neither the author nor the co-author of a paper included in the conference CD-ROM makes oral or poster presentation at the conference. As I described in the third quarter 2008 Newsletter, the number of no-show papers was 36 (19 in oral and 17 in poster sessions) among 763 papers at the last PESC in the Island of Rhodes, Greece, in June 2008. This means that the no-show rate was 4.7% (=36/763). It was an extremely low rate at such a large international technical conference. However, IEEE conferences suffer from many no-show papers. No-show papers can make the participants who attended feel disappointed in the conference, and in the worst case will cause some participants to be absent from the next conference. The motion carried through the TAB on Nov. 15, 2008 has approved conference organizers to remove no-show papers from IEEE Xplore. To do so, the conference organizers must notify authors prior to, or at the time of, paper submission that the IEEE reserves the right not to upload no-show papers on IEEE XPLORE.

from left to right: Hiro Akagi, Donna Florek, Tom Habetler, and Deepak Divan.

In addition, PELS has decided to start the ECCE (Energy Conversion Congress and Exposition) in the US, Europe and Asia, and will keep holding existing conferences and workshops in cooperation with other IEEE Societies, along with regional conferences in various countries. Cosponsoring with PELS will make regional conferences better in terms of not only reducing no-show papers but also improving the quality of the papers presented at the conferences.

I am pleased to inform you that the PELS membership was 6412 as of Nov. 1, 2008 with a steady growth year by year, under the leadership of Membership & Publicity Chair, Dushan Boroyevich, and Regional Liaisons. All the PELS members including myself expect that our society will keep growing by leaps and bounds as power electronics is a key technology for mitigating global warming and climate change.

From 2009, our President-Elect and VP (Vice President) Operation, Prof. Deepak Divan at Georgia Institute of Technology will become the new PELS President. As the outgoing President from Region 10 (Asia and Oceania), I think it is timely to have Deepak succeed to the Presidential position from Region 3 in the US. I am convinced of his strong leadership to the AdCom and our society even in these difficult time of a sharply-falling market and a world-wide recession after the prosperity of the last five or six years.

Finally, my special thanks go to the two VPs, Deepak Divan and Ralph Kennel, Treasurer, Braham Ferreira, Publication Chair, Ron Harley, Transactions Editor-in-chief, Frede Blaabjerg, and Newsletter Editor-in-chief, John M. Miller for their individual and teamwork contributions to our society. Last but not at least, I greatly thank the two immediate Past-Presidents, Dean Patterson and Rik De Doncker, and Division II Director, Tom Habetler for their valuable advice and suggestions that were extremely helpful in managing the AdCom and PELS.

Although I will step down from the position of the President soon, I hope to see you at future power electronics conferences sponsored by PELS.I hope you had a Merry Christmas and a Happy New Year!

Tokyo, December 2008

Hirofumi Akagi 赤木泰文

Hirofumi (Hiro) Akagi
IEEE PELS President
Professor, Tokyo Institute of Technology
E-mail: akagi@ee.titech.ac.jp

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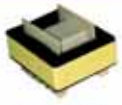

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ANNOUCEMENT AND CALL FOR PAPERS

The IEEE International Electric Machines and Drives Conference provides an international forum for sharing experience, new ideas, and developments in design, operation, analysis, and practical application and optimization of electric drive systems and their components. IEMDC is a venue for users, designers and manufacturers, and analysts of electric machines and drives and their related power electronics and controls. The conference is jointly sponsored by the IEEE Power Engineering, Industrial Electronics, Industry Applications, and Power Electronics Societies.

In addition to the subjects identified above, the conference will have plenary presentations by recognized experts to highlight various aspects of electric machines and drives, such as automotive applications, renewable energy applications, permanent magnet motor drive systems, fault tolerant operation and survivability, sensorless methods, and turbogenerator operation and maintenance. Papers addressing these topics are encouraged.

Information for Authors

Authors wishing to submit papers are invited to submit an abstract of 200 words single spaced and a digest of five pages, including text, tables, and figures, at the conference website: http://www.iemdc2009.org. The style for the abstract, digest and the final version will be posted on the website. The Abstract and Digest should be in a single-column pdf format in 12 point serif text, such at Times New Roman and double spaced on either A4 or US letter-size pages. These format requirements are necessary for the peer review stage. Contact information for the corresponding author should be indicated on the abstract. No author information should appear on the Digest. Submissions should indicate a preference for oral or poster presentation in case of acceptance however, the final decision on the presentation format will be decided by the technical program committee. All submissions will be made through a web-based system

Acceptance notification will contain instructions for final paper preparation.

Registration and payment of fees by at least one author is required for inclusion in the conference proceedings.

Contact Information

Contact information is posted on the conference website: http://www.iemdc2009.org. The preferred mode of contact is e-mail. For general conference information, please address comments and questions to:

Professor O. A. Mohammed
General Chairman, IEEE IEMDC'09
Chair@iemdc2009.org or O.Mohammed@ieee.org

IEEE IEMDC-2009 Conference Secretariat
Department of Electrical & Computer Engineering
10555 W. Flagler Street, Room EC-3960
Florida International University
Miami, Florida 33174 USA
iemdc09@iemdc2009.org

Conference Record

The papers presented during the conference will be posted on IEEE Xplore and be cited in EI (Engineering Index).

Important Dates

Submission of Abstracts and Digests November 30, 2008
Notification of Acceptance January 16, 2009
Submission of Final Papers March 2, 2009

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2009 IEEE 6th International Power Electronics and Motion Control Conference — ECCE Asia

MAY17-20, 2009, Wuhan, China

IPEMC 2009 Wuhan China

The launching spot of the Asian track in the global Energy Conversion Congress and Expo (ECCE) series
The first implementation of the long-expected power electronics conference rotating among China, Japan and Korea

All the papers in the Proceedings will be included in the IEEE Xplore database and indexed by EI Compendex

CALL FOR PAPERS

The 6th International Power Electronics and Motion Control Conference (IPEMC 2009) is sponsored by China Electrotechnical Society (CES), IEEE Power Electronics Society (PELS), and National Science Foundation of China (NSFC). It is also for the first time in cooperation with The Institute of Electrical Engineers of Japan (IEEJ)-Industry Application Society and Korea Institute of Power Electronics (KIPE). This conference will be held in Wuhan, China on May 17–20, 2009. With a history of 3500 years, Wuhan is the 3rd biggest science and education center in China. The Yangtze River and its largest branch Han river meet here. East Lake, the China's biggest downtown lake with an area of 33 km is also located in Wuhan. The conference will include regular sessions on major aspects of the theory, analysis, design, and applications of power electronics and motion control, the following catalogs provide you referenced, but not limited topics:

Devices, Packaging and System Integration
- ☐ Active devices
- ☐ Passive components, system integration and packaging
- ☐ Power system integration

Power Converters and Their Control
- ☐ DC/DC, DC/AC, AC/AC, AC/DC converters
- ☐ Soft switching converters
- ☐ Power factor correction and harmonic mitigation
- ☐ Modulation and control strategies
- ☐ EMI reduction for power electronic systems

Motor Drive and Motion Control
- ☐ Induction motor drives
- ☐ Permanent magnet motor drives
- ☐ Synchronous and reluctance motor drives
- ☐ Special motors and electromechnical actuators
- ☐ Applications of motor drive systems

Renewable Energy Generation
- ☐ Photovoltaic power sources
- ☐ Wind generation
- ☐ Fuel cell
- ☐ Energy storage systems

Power Electronics in Power Engineering
- ☐ Static shunt compensators (SVC, STATCOM, APF, etc.)
- ☐ Static series compensators (TCSC, SSSC, DVR, etc.)
- ☐ Combined compensators (UPFC, UPQC, etc.)
- ☐ Power quality analysis and enhancement
- ☐ Distributed generation and utility interface issues

Other Applications of Power Electronics
- ☐ Uninterruptible power supplies
- ☐ Lightning engineering
- ☐ Induction heating
- ☐ Others

Paper Submission:All authors worldwide are invited to submit their digests through the conference website www.ipemc2009.com.
-An abstract of 300 words maximum. The abstract should contain the title, author's name(s), affiliation(s), contact author and his/her mailing address, and telephone and fax numbers. Abstracts exceeding the maximum length will not be considered.
-Digest requirements: five-page length, A4 size, 1.5 space, Times Roman of font size 10, one column, pdf format, outlining the work to be presented, the objectives of the paper and the goals achieved. Key equations, figures, tables and references should be included within the page limit (reference list should be submitted as a separate page).
Paper submissions will be accepted electronically. Detailed instructions will be available on the IPEMC2009 website: http://www.ipemc2009.com.

Important Dates:
Deadline for abstract and digest submission: December 10, 2008
Notification of acceptance: January 10, 2009
Deadline for final manuscripts submission: March 10, 2009

CES IEEE pels NSFC IEEJ KIPE

2009 NEWLY ELEVATED FELLOWS
By Region & Section

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	Brandstein	Michael
	Daum	Frederick
	Economou	Nicholas
	Freeman	William
	Greenwood	Darryl
	Kaertner	Franz
	Lombardi	Fabrizio
	Schindall	Joel
	Tarokh	Vahid
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	Zhang	Aidong
Connecticut Section		
	Reed	Mark
Green Mountain Section		
	Tonti	William
Ithaca Section		
	Hemami	Sheila
	Schneider	Fred
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	Ben-Zvi	Ilan
	Likharev	Konstantin
	Yang	Yuanyuan
Mid-Hudson Section		
	Sinharoy	Balaram
Mohawk Valley Section		
	Kohler	Ralph
New Hampshire Section		
	Kotz	David
New Jersey Coast Section		
	Baxter	Leslie
	Choudhury	Gagan
	Chraplyvy	Andrew
	Gnauck	Alan
	Winzer	Peter
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	Mishra	Bhubaneswar (Bud)
	Nowick	Steven
	Simoncelli	Eero
North Jersey Section		
	Ansari	Nirwan
	Baeyens	Yves
	Elwalid	Anwar
	Woo	Thomas
Princeton/Central Jersey Section		
	Mandayam	Narayan
Providence Section		
	Tamassia	Roberto
Rochester Section		
	Luo	Jiebo
	Moore	Duncan
	Rao	Raghuveer
Springfield Section		
	Krishna	C
	Lesser	Victor
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	Gao	Yuqing
	Kang	Sung
Worcester County Section		
	Kane	Richard
	Mukherjee	Shubu

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	Carter	Gary
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	Arora	Anish
	Bhatt	Navin
	Zhang	Xiaodong
Dayton Section		
	McManamon	Paul
Delaware Bay Section		
	Xia	Xiang-Gen
Northern Virginia Section		
	Brown	Dennis
	Jabbari	Bijan
	Zolper	John
Philadelphia Section		
	Pappas	George
	Udupa	Jayaram
Pittsburgh Section		
	Blanton	Ronald
Washington Section		
	Blessing	Gerald
	Cooperstein	Gerald
	Wang	Yicheng

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	Hu	Xiaoping
	Tannenbaum	Allen
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	Iwasaki	Tetsuya
East Tennessee Section		
	Eriksson	Lars
Eastern North Carolina Section		
	Brady	David
	Ozturk	Mehmet
	Singh	Munidar
	Snyder	Wesley
Evansville-Owensboro Section		
	Silliman	Thomas
Hampton Roads Section		
	Joshi	Ravindra
	Laroussi	Mounir

Melbourne Section		
	Ham	Fredric
Montgomery Subsection		
	Dai	Fa
Orlando Section		
	Hua	Kien
	Hurley	Joseph
Palm Beach Section		
	Wu	Jie
Tallahassee Area Section		
	Baldwin	Thomas
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	Forsyth	David
	Han	Jiawei
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	Bashir	Rashid
	Ebert	David
	Wasynczuk	Oleg
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Chicago Section		
	Khokhar	Ashfaq
	Wang	Albert
Madison Section		
	Hagness	Susan
	Ramanathan	Parameswaran

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	Hwang	Lih-Tyng
	Zdunek	Kenneth
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	Ginsberg	Myron
	Kempel	Leo
	Lin	Feng
	Moghaddam	Mahta
	Radha	Hayder
	Stefanopoulou	Anna
	Tilbury	Dawn
	Weng	Juyang
Twin Cities Section		
	Roychowdhury	Jaijeet
West Michigan Section		
	Zhang	Zheng
Central Texas Section		
	Cases	Moises
	de Veciana	Gustavo
	Evans	Brian
	Kurian John	Lizy
	Su	Lisa
	Touba	Nur

REGION 5

Dallas Section	**Last Name**	**First Name**
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	McPherson	Joe
	Staszewski	Robert
	Wallace	Robert
Denver Section		
	Milligan	Thomas
Houston Section		
	Datta	Aniruddha
	Goswami	Jaideva
	Knightly	Edward
	Miller	Scott
	Vardi	Moshe
Ozark Section		
	Mantooth	Homer
Saint Louis Section		
	Ho	King Choi (Dominic)
Tulsa Section		
	Yen	Gary

REGION 6

Albuquerque Section	**Last Name**	**First Name**
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	Suri	Subhash
	York	Robert
Coastal Los Angeles Section		
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	Christofides	Panagiotis
	Fujii	Roger
	Jensen	Joe
	Sievenpiper	Daniel
	Yuille	Alan
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	Effros	Michelle
	Narayanan	Shrikanth
	Pinkston	Timothy
	Sample	Steven
	Yueh	Simon
Oakland-East Bay Section		
	Banerjee	Uptal
	Fall	Kevin
	Luby	Michael
	Phillips	Joel
	Tse	David
Orange County Section		
	Goodrich	Michael
	Toh	Chai
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	Borkar	Shekhar
	Ghani	Tahir
	Maiz	Jose
	Moon	Un-Ku
	Taylor	Gregory
	Von Jouanne	Annette
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	Akay	Metin
	Mahalingam	Mali
	Passlack	Matthias
San Diego Section		
	Chrisikos	George
	Grow	Robert
	Knighten	James
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On the efficiency of the fuel cell vehicles with onboard hydrogen generation

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I. INTRODUCTION

Considering the rising price of petroleum and environmental concerns fuel cell powered vehicles are now considered seriously by the automotive industry. This is primarily due to the fact that fuel cells are relatively efficient and clean. In particular proton exchange membrane (PEMFC) type fuel cells have received considerable attention for automotive applications. The major problem in application of PEMFC is related to generation and storage of hydrogen which forms one of the main reactants [1],[2]. These problems can be classified as:

- Low efficiency in production of hydrogen.
- Safety issues related to onboard storage, transportation, and handling of hydrogen

Fig. 1 illustrates a potential architecture for a fuel cell-powered vehicle. This system shows a typical electric vehicle that incorporates a Fuel cell along with an onboard fuel reformer. Ethanol and water are fed into the fuel reformer as main ingredients. Similar arrangements have been investigated in which methane and other hydrogen-rich fuels have been used. In order to harvest hydrogen from the molecules of ethanol and water, there will be a need for additional energy. This additional energy has been represented by $P_{reformer}$. The hydrogen harvested from this process will be then be stored and used as a reactant in the PEMFC to generate the necessary electric power for the adjustable speed motor drive (ASMD) which provides propulsion force. Although in reality there would be a need for separate energy storage such as battery in such configuration (especially during start-up), it is assumed that in steady state, fuel cell can generate the necessary power for the fuel reformer. According to the architecture shown in Fig. 1 one can state:

$$\begin{aligned} P_{H2} &= \eta_r.(P_{Eth} + P_{reformer}) \\ &= \eta_r.(P_{Eth} + \eta_{PS}.P_{PS}) \end{aligned} \quad (1)$$

In which η_r, η_{PS}, P_{eth} and $P_{reformer}$ represent efficiency of the reformer, efficiency of the power supply, chemical power of the incoming fuel (i.e. Ethanol), and input power to the power supply respectively. The power supply is necessary to condition the output of the fuel cell (usually an unregulated dc voltage) into the desired waveform. Furthermore, the output mechanical power can be expressed as:

$$\begin{aligned} P_{out} &= \eta_{ASMD}.(P_E - P_{PS}) \\ &= \eta_{ASMD}.(\eta_{FC}.P_{H2} - P_{PS}) \end{aligned} \quad (2)$$

Where η_{ASMD}, η_{FC} and P_{H2} denote the efficiency of the adjustable speed motor drive (including those of the complimentary power converters), efficiency of the fuel cell, and chemical power of the hydrogen respectively. As a result, the overall relationship between the input (chemical) and output (mechanical) powers can be expressed as:

$$P_{out} = \eta_{ASMD}.(\eta_{FC}.\eta_r(P_{Eth}) + (\eta_{FC}.\eta_r.\eta_{PS} - 1)P_{PS}) \quad (3)$$

Assuming that the power consumed by the fuel reformer will ensemble the following expression:

$$P_{PS} = \gamma P_E \quad (4)$$

In which P_E represents the output electric power of the fuel cell. The overall efficiency of the system can be approximated as follows:

$$\frac{P_{out}}{P_{Eth}} = \eta = \frac{\eta_r.\eta_{ASMD}.\eta_{FC}.(1-\gamma)}{1-\gamma.\eta_r.\eta_{PS}.\eta_{FC}} \quad (5)$$

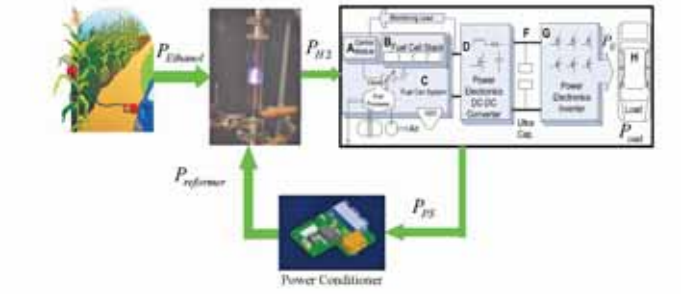

Figure 1: conventional FC vehicle with onboard fuel reformer

As can be noted the efficiency of the hydrogen generation plays a central role in overall efficiency of the vehicular power train. It is also notable that introduction of hydrogen-fueled vehicles into the automotive market would only transfer the above problem (i.e. reforming hydrocarbons to harvest hydrogen) to the utility grid. In other words, generation of hydrogen from hydrogen rich fuels (especially renewable fuels such as Ethanol) will remain a technical challenge in an overall optimal policy for energy consumption.

Over the years a wide variety of research has been done to invent efficient methods of hydrogen generation. The common denominator among all these methods has been to use a hydrogen rich fuel as the main ingredient and harvest its hydrogen by means of external electric/thermal energy. The energy required for this process can be provided from conventional thermal power plants, nuclear reactors, solar, and wind energy sources. Regardless of the primary source of the energy, development of a conservative energy policy demands maximum harvest of hydrogen for a minimum cost (i.e. maximize productivity (η_r) while minimizing the input electric energy to the chamber (γ) per unit of output energy from the reformer). This is a multifold problem in which selection of the most appropriate fuel, the optimal reformer architecture, and the optimal form of electric excitation will be the main design criterions. To shed some light on the overall efficiency of a PEMFC-powered vehicle with an onboard fuel reformer a case study has been presented here. The fuel reformer used in this case study comprises of a cold plasma chamber which is excited by impulses of voltage. A flyback converter along with a high voltage/high frequency transformer form the foundation of the power conditioner used in this plasmatron.

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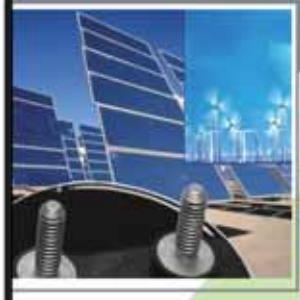

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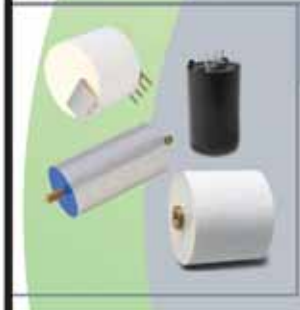

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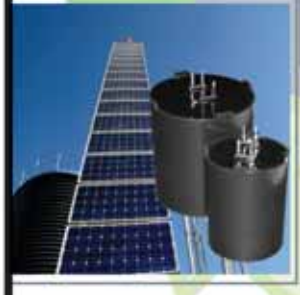

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II. COLD PLASMA FOR HYDROGEN HARVEST

Cold plasmas have been used for fuel gas treatment and are very promising for organic synthesis because of non equilibrium properties, low power requirements and its capacity to induce physical and chemical reactions within gases at relatively low temperatures [3]. The electrons in Cold plasma can reach temperatures in the range of $10^4 - 10^5$ ^oK so they would be very energetic while the gas temperature could remain at room temperature. High electron temperature and so high energy, determines the unusual chemistry of Cold plasmas [3]. This removes the necessity to preheat feed streams. Different types of cold plasma arise from the generation mechanism, applied pressure and the electrode geometry.

In this section, results of an experimental test incorporating a pulsed cold plasma chamber are reported. The chemical reaction within the chamber using ethanol as fuel can be summarized as:

$$C_2H_6O + 3H_2O \rightarrow 2CO + 4H_2 + 2H_2O \rightarrow 6H_2 + 2CO_2 \qquad (6)$$

Assuming this ideal conversion, one mole of ethanol and three moles of water produce 6 mole of hydrogen and one mole of carbon dioxide. Given the fact that the molar weight of ethanol and water are 46 and 18 respectively, the weight proportion of the ethanol in the initial mixture is 46%. Furthermore, the burn energy of the alcohol (LHV) in air equals 18kJ/gram. Therefore the complete burn of one mole of ethanol creates 828 kJ of energy. The burn energy of hydrogen (LHV) is 120kJ/gram which corresponds to a total burn energy of 1440 kJ for a total of 6 moles. As a result the ideal, no energy consumption, fuel conversion process can increase the heat production of a unit volume of ethanol fuel by 75%. It must be noted that the choice of HHV or LHV does not alter this figure significantly. It is notable that the hydrogen harvested through this conversion process may be used directly in a PEM fuel cell or alternatively be used for partial enrichment of fuel in Diesel and gasoline engines to improve fuel economy. Figure 2 illustrates a summary of the chemical reaction in the cold plasma chamber.

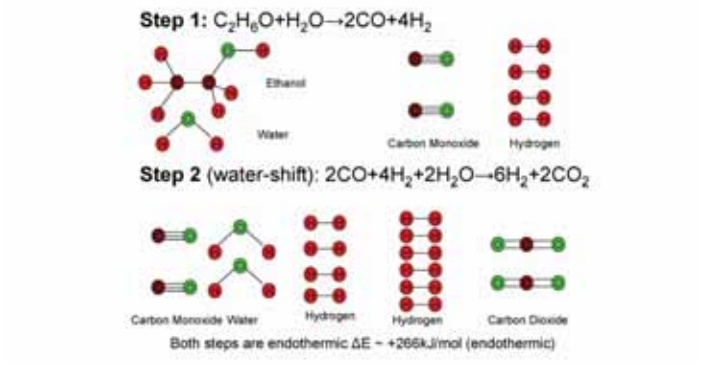

Figure 2: breakdown of the chemical reaction in the cold plasma chamber

As one can note by taking into account the balance between both sides of (6) and the respective bond energies at the end of the process there is need for 266 kJ of external energy per one mole of ethanol.

However, the ethanol and water must be heated from 20ºC to 80ºC (100ºC for water) to the evaporation temperature. The required power for conditioning of one mole of fuel is about 650W. Following the Maxwellian distribution of speeds at low degree of ionization the plasma atoms move and collide. If the energy is lower than the activation energy, the collision is elastic, if higher the collision is inelastic and a quanta of activation energy is absorbed, however the excess of the collision energy is released in the mechanical motion. Therefore, for a ethanol flow rate of 0.21mole /min there would be a need for approximately 800W to sustain plasma ((0.21mole/60) 6 10^{23} 1.6 * 10-^{19}*2). Therefore, under ideal condition, 800W needs to be spent electrically to maintain the "chemically loaded" plasma. This crude stationary model serves the simple purpose of energy balance calculation and did not explain why the simple heating of the gas will not make the same effect as plasma. Also it did not include the inherent generation and recombination of photons in plasma which are the important part of energy balance. In simple words to produce 5kW of hydrogen the ideal device have to spend *800W* of electrical power on plasma sustaining and 600W on fuel conditioning which corresponds to a total external energy of 1400W. The heat required for conditioning of the fuel can be retrieved from the fuel cell so the necessary power in generation of 5kW of hydrogen power is close to 800W. Using (5) and assuming an efficiency of 80% for the ASMD, 90% for the power conditioner, and 45% for the PEMFC variation of the overall efficiency with respect to γ has been computed and plotted in figure 3. As can be seen from Fig. 3 assuming somewhat ideal figures for the efficiency of various blocks in a system including an onboard fuel reformer, the overall efficiency will be very close to those of internal combustion engine. This observation suggests that to make this technology competitive, a much higher efficiency in the main propulsion electric drive and the power conditioner used in plasmatron has to be sought.

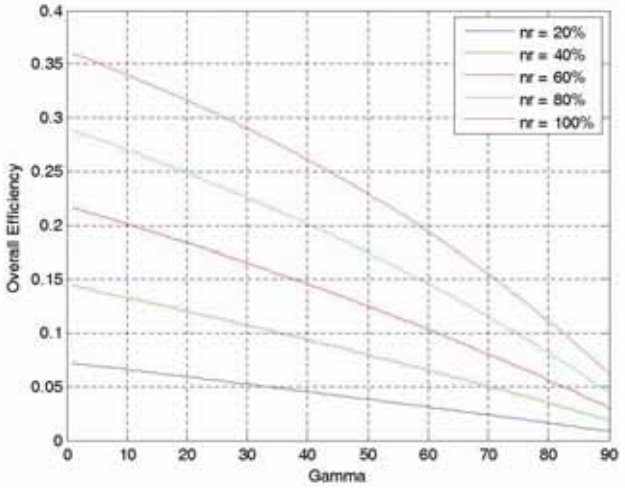

Figure 3: Overall Efficiency versus γ curves for η_{ASMD} =0.8, η_{PS} = 0.9, η_{FC} =0.45 while η is variable

Figure 4 illustrates the overall efficiency of the power train assuming an efficiency of 80% for the fuel reformer (very close to the theoretical limit) as a function of γ for various values of the fuel cell efficiency. One can note that efficiencies of 60% or better in fuel cell can make a case for feasibility of the FC-vehicles in comparison with the conventional automobiles.

Figure 5 illustrates an example of the plasmatron and terminal measurements for the current and voltage in our experimental setup. The power supply was comprised of a front end buck converter followed by a flyback converter and a high frequency/high voltage transformer capable of creating high voltage impulses with a magnitude of 25kV within a frequency bandwidth of 30kHz. The slew rate of the voltage across the terminal was measured at $1\frac{kV}{\mu sec}$. With an airgap length of 15 mm between the electrodes, it would take about 15 μsec to develop the breakdown voltage. Once the gap

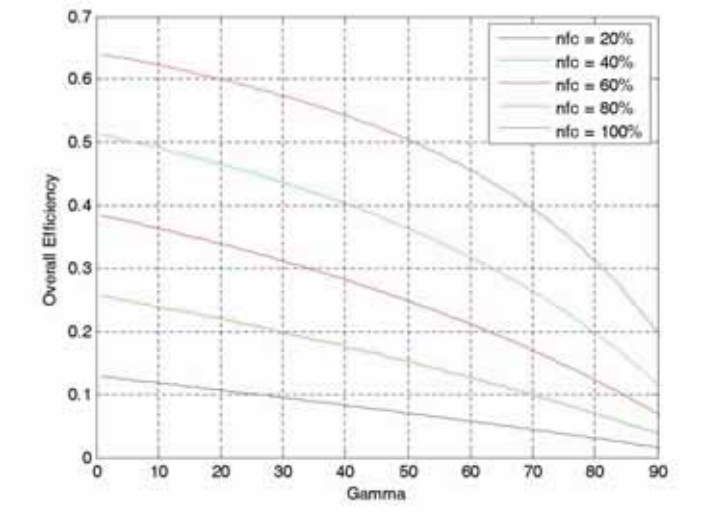

Figure 4: Overall Efficiency versus curves for while is variable

discharge occurs, within 200 ηsec the voltage is cleared. However, to obtain the optimal residence time and to achieve a chemical equilibrium the frequency of the pulse trains was set at 2kHz. Our experimental measurement indicates that for an input electric power of

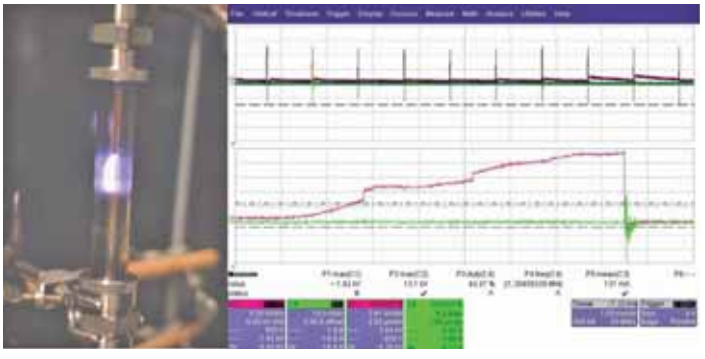

Figure 5: Voltage and current waveforms obtained from a 200 W cold plasma Hydrogen chamber using ethanol as fuel

27W a net hydrogen power of 121W was generated. As expected this is somewhat less efficient than the theoretical limit.

III. CONCLUSIONS

The ultimate success and sustainability of the fuel cell powered vehicles depend on efficient generation of hydrogen. In considering an onboard fuel reformer, and given the theoretical limits and state-of-the technology, it seems that the additional complexity, cost, real estate required for introduction of the FC-powered vehicles does not result in a tangible leap as far as the overall efficiency of the power train is concerned. A breakthrough in development of highly efficient fuel cells can change this conclusion!

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BIOGRAPHY

Dr. Babak Fahimi is an Associate Professor of Electrical Engineering and Director of Renewable Energy and Vehicular Technology Laboratory at University of Texas @ Arlington. He has co-authored more than 160 articles on various aspects of Adjustable speed motor drives and power electronic converters. He holds 5 US patents and has several pending. Dr. Fahimi is the recipient of the Office of Naval Research Young Investigator award, IEEE Richard M. Bass power electronics young investigator award, as well as Ralph Teetor Educational Award from the society of Automotive Engineers. Dr. Fahimi has been the chairman of IEEE Vehicle Power & Propulsion Conference (VPPC) in 2007 and is the upcoming general chair of IEEE Applied Power Electronics Conference & Exhibition (APEC) in 2010. His Areas of interest include numerical analysis of electromechanical energy converters, advanced harvest and storage of energy, and automotive electronics.

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RE4-b: Wind/waterfall energy systems
RE4-c: Geothermal/solar energy systems
RE4-d: Biomass/solar energy systems

REV1: Marketing and Economical Impacts
REV1-a: Market analysis, research and prediction
REV1-b: Employment market expansion
REV1-c: Economic benefits in short and long terms
REV1-d: Demonstration, training and maintenance

REV2: Regulations
REV2-a: National programs
REV2-b: Public policies and facilities
REV2-c: Public education and youth programs
REV2-d: Safety, recycling and standardization

Submission

Prospective authors are invited to submit comprehensive abstracts of 2 to 3 A4 pages each, written in **English**, including author name(s), mail and e-mail addresses, and the **preferred topic**. Abstracts should be submitted electronically through the website: http://cfp.evermonaco.com/login.php

Deadlines:	**September 26, 2008**	**submission of abstracts**
	November 14, 2008	**notification of provisional acceptances**
	December 19, 2008	**reception of full papers**
	January 23, 2009	**notification of final acceptances**

2nd EPE Wind Energy Chapter Seminar
The Royal Institute of Technology
Stockholm, Sweden
23 and 24 April 2009

Call for papers

Aim of the Seminar

As wind has become the most technically and commercially advanced as well as most promising source of renewable energy, the European Power Electronics and Adjustable Speed Drives Association (EPE) dedicated a special chapter on this issue: the EPE Wind Energy Chapter. After the successful gathering at the 1st EPE Wind Energy Chapter Seminar held in Delft on 27 and 28 March 2008, it has been decided to organize a second EPE Wind Energy Chapter seminar where experts can discuss various electrotechnical aspects related to the development of wind energy. This seminar will take place on 23 and 24 April 2009 in Stockholm, Sweden. The aim is to meet, discuss and get acquainted with the latest development of this fast developing technology, in an informal and friendly atmosphere.

Organisation and venue

The seminar will take place on 23 and 24 April 2009 at the KTH, Stockholm, Sweden. Plenary sessions, lecture and dialogue sessions will be organized in the best EPE tradition to provide maximum networking opportunities. Worldwide experts in the field are expected to take part in the event to exchange best practice and learn from experience with a special focus on industry and technology.

List of topics

1. Wind Energy Conversion Technologies
   - 1.a. Permanent magnet generators for large turbines (also offshore)
   - 1.b. MW-class wind generator-converter technology (also offshore applications)
   - 1.c. MW low-speed generator solutions
   - 1.d. Small wind turbine systems for standalone and grid-connected applications
   - 1.e. Geared and gear-less solutions for wind energy conversion. Gear-box issues.

2. Grid Compliance and wind power technology
   - 2.a. Interconnection standards for distribution and transmission levels
   - 2.b. Interconnections issues for wind turbines
   - 2.c. Grid Interface: Grid connection for large wind farms. Reactive power/Voltage control
   - 2.d. Ride Through Standards and Technical Solutions for Offshore Wind Farms
   - 2.e. Ride-through capability of wind turbines with power electronic systems
   - 2.f. Certification of Low Voltage Ride Through LVRT
   - 2.g. Laboratory tests of LVRT
   - 2.h. Stability analyses: small signal stability, transient stability, stability margin
   - 2.i. Frequency control, active power control, runback schemes
   - 2.j. Standardisation of simulation models for stability studies

- 2.k. Grid synchronization under grid disturbances
- 2.l. Active and reactive power control issues during grid disturbances

3. Energy storage technologies
- 3.a. Short term: flywheel, super capacitors, batteries
- 3.b. Long term: pumped storage, dispatchable generation
- 3.c. Other storage

4. Wind System Coordination
- 4.a. Wind Farm Control
- 4.b. Real time information exchange required for harmonious operation of wind farms
- 4.c. Planning and configuration of wind farm power systems
- 4.d. Operation and control of doubly fed induction generator systems for wind turbines
- 4.e. Coordination between power electronic conversion characteristics and standard protection equipment characteristics
- 4.f. Fault monitoring and predictive maintenance of power electronic based wind turbine systems

5. Power electronics for integration and control of wind turbines in power systems
- 5.a. Power electronic interface including control for permanent-magnet and field excited synchronous generators
- 5.b. Topologies of Power Electronics Converters for wind turbines
- 5.c. Modelling and simulation of power electronic systems with wind turbines and wind farms
- 5.d. Protection of power electronic systems for wind turbines
- 5.e. Control of power converters for future dispersed generators with high degree of wind integration
- 5.f. Dedicated HVDC for wind power transmission

6. Future trends of wind energy conversion and power electronic applications
- 6.a. Reinforcement of power system for tapping wind power: FACTS, FACDS
- 6.b. Offshore wind turbines: floating and fixed
- 6.c. Power collection and integration of offshore wind farms

Presentations from companies supplying wind turbines, wind turbine equipment, developers, utilities, etc.. are most welcome.

Presentation of papers

Contributions to the EPE Wind Energy Chapter must be presented either as a lecture presentation or as a dialogue presentation. As the aim of the seminar is orientated towards exchange of practical experience and discussion of the latest development, there will be no formal proceedings publication. Contributions to the seminar will be made available to the participants on the EPE Website with a password after the seminar.
Lecture presentations will be selected on the basis of wide audience appeal, ease of understanding and potential stimulation of broad ranging discussion.
Dialogue presentation will take place in the afternoon. No lecture session will be organized during the dialogue sessions. Contributions for dialogue presentation will be selected on basis of potential for detailed discussion and networking.
Lecture papers will be presented in Power Point or pdf format, Dialogue papers will be presented as posters in pdf format.

Content of synopses

Authors intending to present a contribution to the EPE Wind Energy Chapter must submit a proposal that will be evaluated by the EPE Wind Energy Chapter Advisory Board.
The proposal should consist of one of the followings:

- A Power Point/pdf presentation to be presented as such during the seminar;
- A poster project to be presented as such during the seminar;
- A one page synopsis presenting the main lines of the proposed contribution that will be either a Power Point/pdf presentation or a poster;

The proposal will include full coordinates of the contact author, the topic number and indication of the preference for dialogue or lecture presentation.

The synopses will be submitted electronically to phamache@vub.ac.be.
A selection of the best conference papers will be published afterwards in the EPE Journal, which is an ISI registered journal.
Best papers will be selected for presentation at EPE 2009.

Proceedings of the seminar will be available to the participants on the EPE Website with a password after the seminar.

Deadlines

Intending authors should note the following deadlines:

Receipt of synopses	14 November 2008
Notification of provisional acceptance	February 2009
Receipt of full typescript IEEEXplore ready, ppt or pdf presentation	on-site

Working Language

The working language of the conference is English, which will be used for all printed material, presentations and discussion.

EPE Wind Chapter Committees

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Cost Savings at the Expense of Quality, Safety, and the Environment. A Plastic Molding Example.

By Richard H. Barden
Lodestone Pacific

A Difficult Choice in a Competitive Market

In order to provide the lowest price and remain competitive in the electronics industry, a company may need to decide between:

A) Quality Components, or Lower Cost
B) Product Safety, or Lower Cost
C) Environmental Compliance, or Lower Cost
D) All of the above

It is easy to say that there is no compromise, and a successful company must provide a product that does not compromise. The reality of today's electronics industry is that the pursuit of low cost components is driving the market, thus significant trade-offs are being made. Components that cut corners or contain inferior materials are generally less expensive, but can come with hidden costs.

While the above question applies to many segments of the electronics industry, the providers of bobbins, headers and toroid mounts to the magnetics segment offer a unique look at this dilemma and highlights the difficult choices being made in a competitive market.

To achieve lower costs, companies are making quality, safety and environmental trade-offs in favor of lower component costs. The trade-offs are often made without understanding the cost and risks being transferred from purchasing to more costly portions of the product manufacturing process, or to the customer.

Lower priced components will always be available that will compromise quality, safety, or the environment. But the compromise comes with risk of additional costs that are difficult to measure, so companies usually don't. In many cases, cheaper components only transfer costs to a more expensive portion of the manufacturing process, and since the risks assumed are not well understood, they may not be worth the cost savings.

Component Cost vs. Quality Compromise

For companies buying and using plastic moldings, quality is a relative term based on the demands of the application. The quality of a low cost, somewhat disposable product does not require the same quality as critical component in a medical or aerospace device. But quality is not just a product attribute; quality extends to include on-time delivery, consistent raw materials, predictable production, responsiveness, accurate records, and transaction ease. The cost of delayed production due to a new vendor's late components, or components that fail inspection can quickly overcome any component cost savings.

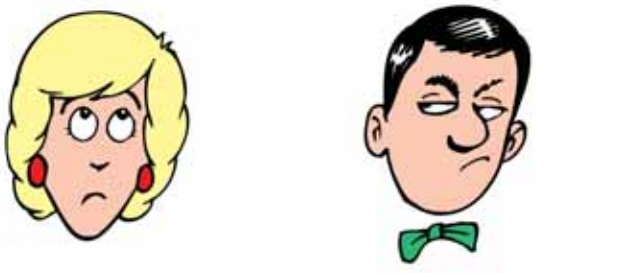
A $.01 cost reduction on a $.08 bobbin is a 12.5% savings; which sounds as though the purchasing group is doing a great job. Over 50,000 bobbins, the savings is $500. As long as the transaction for the $.07 component goes as smoothly as the $.08 component would have, the saving will be realized.

If the transaction doesn't go as well as the previous vendor, additional overhead expenses will be incurred. Quality or delivery problems will add the costs of modifying delivery methods, adjusting production schedules, extra inspection, extra payroll, and QC documentation. This does not include the cost of lost production time, or customer dissatisfaction, which are difficult costs to measure. A $500 savings can evaporate very quickly.

The manufacturer should also consider the cost of the $.08 bobbin compared to the cost of the entire component or assembly. If the bobbin is less than 10% of the cost of a transformer, and the transformer is 10% of the cost of the power supply, the $.01 savings on the bobbins would be 0.125% of the potential cost of the power supply. If a delivery or quality problem delayed the shipment of 50,000 systems for even a

week, the actual costs could be many times more than $500 in component savings.

When you consider all these costs, a company may be eroding profitability while they think they are improving it. Costs aren't being cut in purchasing, they are being transferred to the more expensive operations in the manufacturing processes.



This assumes you discover a quality issue before the systems are built and shipped to the customer. If the problem occurs after the customer gets the system, that $500 savings will easily be buried under the cost of replacing defective parts and repairing a damaged customer relationship.

It is easier for a company to measure the savings from buying cheaper components than the potential costs to operations of poor quality or late delivery, so companies measure the former and ignore the latter.

So the company is taking a gamble, and they don't know what it will cost them if they lose. This is what we call 'reverse roulette'. When you play regular roulette in Las Vegas or Macau, you risk a known amount for a chance to win a larger known amount. The odds of success are evident and the greater the risk, the larger the winnings. In component gambling, you win a known amount up front (savings on the component), and assume the risk of losing a larger unknown amount later through production problems and customer dissatisfaction. If you later lose more than you saved, it was a bad gamble.

Reverse Roulette

Most companies that play reverse (component) roulette have no idea of the risks and the costs. Imagine standing at the roulette table and placing a bet without knowing how much you could lose. The dealer says, "I will give you $500, spin the wheel, and then we will know how much money you need to give back." You ask, "What are the odds I will have to give back over $500?" "Don't know," says the dealer, "it could cost you anywhere from zero to millions of dollars, let's spin the wheel and find out."

We can illustrate this point with a real-life example. Micrometals Inc. produces T106-52, which is an iron powder toroid that is one inch in diameter and costs $.10 (HK$.78).

Micrometals has been supplying this high quality part to the industry for over 15 years and it was designed into a power supply used in a high-end server made by a well known computer company. Another core manufacturer was willing to sell an "*equivalent*" part for $.08 (HK$.62) to get the business. The requirement was for 20,000 power supplies with two cores each. At 40,000 cores, this is a savings of $800, (HK$6,240) or 20% for the power supply manufacturer. However, this is only .02% savings of the cost of the power supply, and a .002% savings on each server.

The high end server manufacturer was unaware that the power supply manufacturer had changed core vendor. The substitute part was not equivalent in one important attribute; thermal aging. Micrometals products have superior thermal aging properties so they tolerate higher operation temperatures longer. The substitute vendor's cores did not perform as well as the Micrometals cores. As a result they ran hotter. As they got hotter, the poor thermal aging properties made the parts even less efficient, so they ran hotter, and-so-on until component and power supply failure.

The servers that failed in the field had to be recalled and replaced. The computer manufacturer will receive over $1,000,000 in damages from the power supply manufacturer to cover the tangible costs of the server recall, but not the intangible cost of lost future sales, insurance claims, distribution channel displeasure, and bad press.

Using our reverse roulette example, the power supply manufacturer took a chance on saving $800, but lost the gamble by losing $1 million, plus an important customer. In hindsight, since the upside was very

small ($800) compared to the downside ($1 million), it was a bad gamble. Had the power supply manufacturer known the true cost, they would not have spun the wheel.

In this particular case, the reason for the failure was discovered and the company making the gamble had to make good on their wager gone bad. Many times the cause of a problem or cost increase is difficult to discover, and those making the gamble pocket the savings, but don't end up paying when the gamble goes bad. In other words, they enjoy the savings, but the risk gets transferred to others up the product value chain.

The Cost vs. Safety Compromise

Various agencies have developed rules and regulations to keep companies from pursuing profit at the expense of public safety. For plastic molded bobbins, headers and toroid mounts, these regulations center on insulation properties that reduce the threat of fire or user injury.

Underwriters Laboratory (UL) is a non-profit private agency that regulates public safety for a variety of products that include electronic devices. In plastic moldings for the transformer and inductor segment, UL regulations are focused on maintaining the integrity of the insulation system so a short circuit does not occur. This is done by first ensuring the insulation is sufficient, and then it will not degrade over time.

UL conducts extensive testing under UL Standard 1446 that insures the insulation is sufficient, and stable over time. Transformer components like wire insulation, bobbin or winding forms, tape, ferrite, iron powder, varnish, epoxy, and glues each have their own unique chemistry. Often the chemistry of one component, or several components in combination, will have an adverse effect on another component.

UL testing evaluates whether specific transformer components will interact chemically over an extended time at elevated temperature and degrade wire insulation. For example, some phenolic molding compounds include ammonia, which can degrade magnetic wire insulation over time and may contribute to a short circuit that can cause fire or injury.

Transformer tape is an important part of an insulation system. A tape manufacturer like P. Leo in Hong Kong will invest months in expensive UL testing to have their products included in a UL approved insulation system. Once tested and approved, the tape, plastics, and varnish become part of a UL recognized insulation system specific to an operating temperature or class. Using the sub-components listed in a recognized insulation system will insure a reliable insulation and proven sub-component compatibility.

Unfortunately the drive for lower cost has encouraged substitution of untested or lower grade materials. Many times the vendors who offer these 'equivalent' materials have not invested the time and money to have UL test compatibility. As a result, the integrity of the insulation system may be compromised.

Once a bobbin or toroid mount is molded, it is difficult to tell if the plastic material used was UL recognized or not. Often a plastic material is molded from an untested, less expensive material, but is passed on as the other recognized plastic. This practice was so wide spread UL had to develop UL746D, which is a molder certification program that requires documentation and the inspection of lot records to verify the source of molding materials.

Still, manufacturers are driven by a competitive market place so inferior or untested materials are being substituted. The buyers have component specifications prepared by their design engineers that require certification from the molder, but companies are less than diligent at verifying component integrity if it may spoil a perceived bargain.

While these untested components can result in unintended quality or operational cost, the risk of gambles with safety regulations are usually transferred to the customer, where the cost can be quite high.

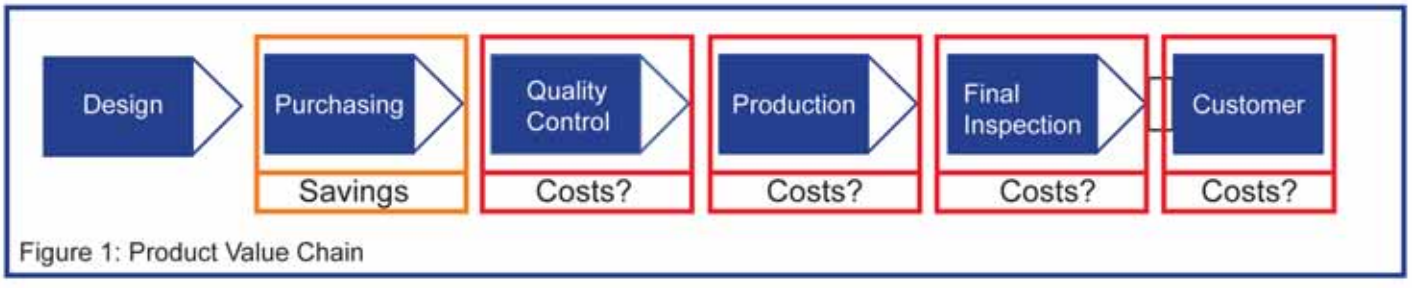


Figure 1: Product Value Chain

Fortunately in the previous example with the inferior cores in the server power supply, the component failure did not compromise the insulation system and product safety. If the gamble had resulted in property loss or personal injury, the cost would have been much higher than $1 million. Usually the company making the gamble is not the company having to pay for expensive product liability insurance.

Cost vs. The Environment Compromise

For plastic moldings, environmental issues have been relatively insignificant in the past. That has now changed. The industry worldwide has developed several programs that limit or eliminate elements and compounds that are harmful to the environment.

The most significant directive is the Requirements on Hazardous Substances, or RoHS. This directive seeks to eliminate or reduce 6 harmful elements or compounds. These elements are;

1. Lead (Pb)
2. Cadmium (Cd)
3. Mercury (Hg)
4. Hexavalent Chromium (Cr6+)
5. Polybrominated Biphenyls (PBB)
6. Polybrominated Diphenyl Ethers (PBDE)

Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE) are flame retardants used to improve a plastic's flammability rating, which is the plastic's ability to self extinguish once it starts to burn. A plastic's flammability rating is determined by UL's specification UL94. Since new RoHS compliant flame-retardants could affect the chemistry of the plastic compound, (and the insulation system) they need to be retested. During the transition, both RoHS compliant and non-compliant versions are available. There will be a tendency to use cheaper non-compliant material until they are no longer available.

Unlike quality or safety gambles, using a non-compliant flame retardant will not make the component or system more dangerous, just illegal.

The next stage of this directive will expand the list to eliminate over 30 elements and compounds. This trend towards environmentally safe products is often delayed, but is unlikely to be reversed. So more time and emphasis will be diverted to the verification of component ingredients.

The most significant banned element in the RoHS directive is not the flame-retardants in the plastic molding, but is the lead that is used in the plating and solder on terminals.

Lead has a melting point of 620.6˚F, (327.5˚C). Tin has a melting point of 450˚F, (231.9˚C). However when they are combined in an alloy of approximately 60% tin and 40% lead, this alloy has a melting point of approximately 361˚F (183˚C). Combined, the melting point is 25% less than tin alone. (See Figure 2)

A combination of elements that create this phenomenon is called a Eutectic Mixture. While it seems like alchemy, it has allowed billions of solder connections to be efficient, inexpensive, and done at a temperature that was not too harsh on the components being soldered. When you "get the lead out", the fundamentals of solder connections change significantly. Solder alloys that are more than 95% tin have a melting point of approximately 450˚F, (230˚C). Components, including the plastic moldings, must now tolerate this 90˚F, (50˚C) increase during manufacturing.

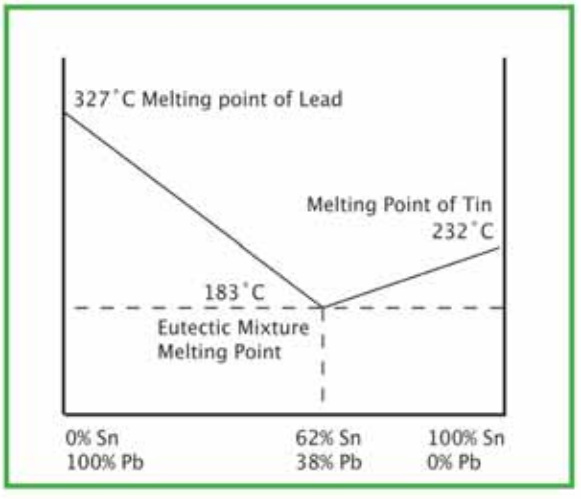


Figure 2: the Tin-Lead Eutectic Mixture

Thermoplastics like nylon, Pet, PPS will start to become soft above 450˚F, (232˚C), especially when heat is transferred up a terminal. If the heat is not managed well and the plastic experiences these temperatures for an extended time, the plastic will begin to get soft around the terminals, which can cause those terminals to "float" out of alignment. Thermoset plastics, like phenolic and DAP, will tolerate higher solder temperatures, but are more expensive and difficult to mold in small or thin sections.

Plastic compound suppliers have been working to provide cost effective materials that are easy to mold and will tolerate higher solder temperatures. Dupont has developed several thermoplastics that will tolerate higher solder temperatures and are very cost effective when the entire molder process is considered. Dupont's Zytel HTN FR52G30LX and Zenite LCP 7130, 5145L, or 5130L offer excellent moldability, especially in narrow and small part sections or walls. These cost effective materials will tolerate higher solder process temperatures and these materials are incorporated into many popular existing insulation systems. For more information, go to, www2.dupont.com/Plastics/en_US/

Using substitute plastics that are not properly engineered for process temperatures, or do not meet the requirements of agency regulations, will once again shift the risk and the cost to another segment of the manufacturing process.

Component Cost vs. Process Costs

In China over the last 5 years, significant savings in labor and component cost have been realized. But there is a limit to how far components can drop in price. Once the cost approaches the cost of quality raw materials, the only way to reduce price is to substitute low quality cheaper raw materials. While the savings in labor and components are approaching the lowest practical limit, substantial savings in process costs and transaction cost are still available. Unfortunately as companies continue to chase lower component costs, they are transferring additional costs into the process. Cost that usually out weighs the component savings.

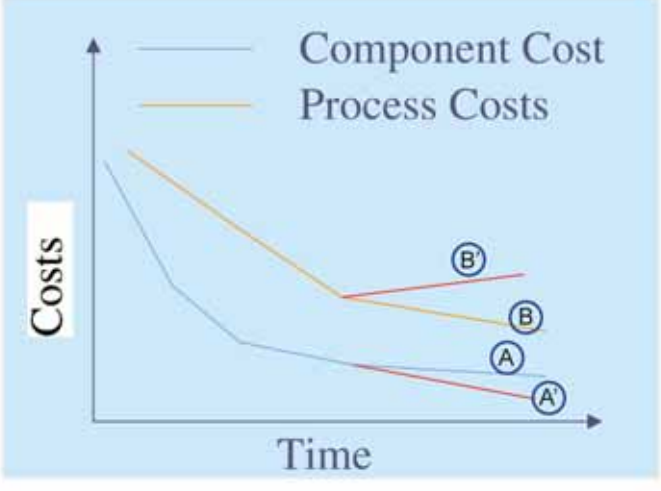


Figure 3: Component Tradeoffs

Figure 3 shows component costs have been going down over time, but the rate of decline slows as the cost of approach the cost of quality raw materials. (A) Companies are still demanding price decreases, so some vendors find ways to get costs below the cost of quality raw materials, which will involve compromises with quality, safety and environmental regulations. (A')

Process costs have also been declining. (B) However as vendors gamble with component quality, their process cost will increase, (B') as risk and cost is transferred to other parts of the process, or to the customer.

The cost of the entire process must be considered in order to ensure a switch to lower cost components do not just transfer the cost and risk to other segments of the Production Value Chain. Elevated solder temperatures and agency regulations require design engineers to evaluate cost and performance trade-offs of plastic moldings more closely, and to set limits for purchasing decisions within performance specifications.

Companies need to develop a way to measure these trade-offs so that quality, safety and environmental considerations are not compromised in the pursuit of purchasing savings. Without knowing the true cost that result, an organization may be penny wise, but pound-foolish.


EPE 2009
8 -10 September. Barcelona, Spain
13th European Conference
on Power Electronics
and Applications
Receipt of synopses:
Monday 3 November 2008
Receipt of full papers:
Monday 11 May 2009
EPE
EUROPEAN
POWER
ELECTRONICS
AND
DRIVES
UPC
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www.epe2009.com

Organization and Venue

The European Power Electronics and Adjustable Speed Drives community will gather in Barcelona, Spain in September 2009 to exchange views on research progresses and technological developments in the various topics described hereunder. The EPE 2009 conference is sponsored by the EPE Association and will be held in the Palau de Congressos / Fira de Barcelona from 8 to 10 September 2009. It is hosted by The Centre of Technological Innovation in Static Converters and Drives (CITCEA) of the Technical University of Catalonia (UPC). Spain has an increasing quantity of windmills and photovoltaic plants. This is because of the well known sunny weather. An ideal place for real application of power electronics.

Aims of Conference

EPE is the place for specialists in power electronics, systems and components, to present papers and attend sessions on state-of-the-art technology in this challenging and evolutionary sector. The conference aims to be a meeting forum for researchers, developers and specialists from the industry. Papers are encouraged on all topics described hereunder for interdisciplinary discussions of new ideas, research, development, applications and the latest advances in the field of power electronics and adjustable speed drives.

Topics

Advances in Energy Conversion and Conditioning Technologies (ECCT), exploiting new power electronic systems, energy conversion devices and system control regimes, are all fundamental and crucial to the development of the clean, efficient and sustainable technology of the future. Over 50 % of the European, Japanese and North-American electric energy consumption passes through electronic conversion and conditioning equipment. This exploitation of ECCT increases steadily. Next to the improved behaviour of systems, the reduced energy consumption is a key factor, helping to achieve the Kyoto requirements and to address key issues related to the reduction of Greenhouse gases and pollutant emissions in industrial processes and transport; to increase the use of renewable energy sources and to allow their integration in the grid. Most of the electricity production based on alternative energy sources must undergo conditioning through ECCT equipment before use. ECCT is also a major means to achieve enhanced competitiveness of all industrial processes. Basic ECCT technologies alone constitute a world market estimated at multi-billion Euro value of which the EU has a 40% share. Significantly, ECCT is a core enabling technology providing the central electrical, control, diagnostic and management systems. The EPE 2009 conference will offer a wide discussion forum on all topics related to these aspects under the special motto "Power Electronics and Adjustable Speed Drives for industrial applications".

The list of topics hereunder holds only the headlines. A detailed list of subtopics is available at: http://www.epe2009.com

A. DEVICES, PACKAGING AND SYSTEM INTEGRATION
- **Topic 1: Active devices**
- **Topic 2: Passive components, system integration & packaging**
- **Topic 3: Power system integration**

B. POWER CONVERTERS TOPOLOGIES AND DESIGN
- **Topic 4: Soft switching converters and control**
- **Topic 5: Hard switching converters and control**

C. MEASUREMENT AND CONTROL
- **Topic 6: Modulation strategies and specific control methods for static converters**
- **Topic 7: Application of control methods to electrical systems**
- **Topic 8: Measurements and sensors**

D. ELECTRICAL MACHINES AND DRIVE SYSTEMS
- **Topic 9: Motion control and robotics, communication in drive systems**
- **Topic 10: Electrical machines**
- **Topic 11: Adjustable speed drives**
- **Topic 12: High performance drives**
- **Topic 13: Energy saving electrical drives**

E. APPLICATIONS OF POWER ELECTRONICS IN GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY
- **Topic 14: Electrical energy generating systems, renewable energy systems**
- **Topic 15: Transmission and distribution of electrical energy**

F. APPLICATIONS OF POWER ELECTRONICS IN USERS DEVICES / PROCESSES
- **Topic 16: Power supplies**
- **Topic 17: Electrical systems in aerospace, space, surface and marine transport**
- **Topic 18: Operating quality of systems**
- **Topic 19: Industry specific energy conversion and conditioning technologies**
- **Topic 20: Energy saving technologies**
- **Topic 21: Energy conversion and conditioning technologies in physics research and related applications**

G. EDUCATION
- **Topic 22: Education**

Presentation of Papers

Contributions to EPE 2009 must be presented either as a lecture presentation or as a dialogue presentation. A manuscript must be submitted in English in both cases for inclusion in the Conference Proceedings (CD-ROM). Papers for lecture sessions will be strictly limited and selected on the basis of wide audience appeal, ease of understanding and potential stimulation of broad ranging discussion. Dialogue presentation will take place in the afternoon. No lecture session will be organized during the dialogue sessions.

Tutorials - Call for Proposals

Several tutorials will be held prior to the conference. Authors willing to propose a tutorial at EPE 2009 are invited to send a proposal to the scientific secretariat (EPE Association, c/o VUB-IrW-ETEC, Pleinlaan 2, B-1050 Brussels, Belgium, e-mail: epe-association@vub.ac.be) before January 15, 2009. The proposal will consist of a three-page summary including tutorial title, name and affiliation of the lecturer(s), tutorial objectives and audience, topical outline and provisional schedule of the tutorial. The tutorials will be organized on Monday September 7th, 2009. The location where the tutorials will take place will be communicated later on via the website www.epe2009.com

Tutorial proposals are particularly welcome in the following topics, although other topics may be proposed as well:
- New Devices for Sustainable Energy Applications
- Understanding the Electrical Grid Behaviour and Management
- Building and Connecting Wind Energy Sources
- Building and Connecting PV Energy Sources
- Connecting Fuel Cells to the Electrical Applications
- Power Electronics and Adjustable Speed Drives for Clean Road Transport
- Application of Drives
- New Topologies for Sustainable Energy Applications
- Storage of Electrical Energy in the Electrical Grid
- Storage of Electrical Energy for Transport Applications
- Education issues, and more…

Content of Synopses

The synopses should consist of:
- a 2 to 3 pages **summary**, including an **abstract** with no more than 50 words; topic number and indication of the preference for dialogue or lecture presentation. These must be clearly mentioned;
- key diagrams;
- a references list.

The synopses will be submitted using the host of the conference on the internet. A link to the site will be available from **http://www.epe2009.com**, a link from **http://www.epe-association.org** will be available as well. Detailed information and guidelines can be downloaded from the site to help you preparing the needed material for submitting a synopsis. The site will be open for upload from 1 September 2008 onwards.

Authors of papers provisionally selected for presentation will receive a notification and can download the instructions for preparing the dialogue papers and/or the lecture papers from the internet site. Final selection will be based on the full paper. The paper will only be included in the Conference Proceedings after receipt of one full registration fee per paper in due terms. Student registration fee is only valid for student participants, not for authors. One single author may not present more

IEEE 2009 Vehicle Power and Propulsion Conference (VPPC'09)

Aisha Yousuf – VPPC'09 Publicity Chair

The 5th International IEEE Vehicle Power and Propulsion Conference (VPPC'09) comes to Dearborn, Michigan, the heartland of automotive industry, from September 7-11, 2009. The theme for this conference is 'Sustainability: Hybrid, Plug-in, Fuel Cell and Battery Technology'. This conference is co-sponsored by the IEEE Power Electronics Society and the IEEE Vehicular Technology Society. More details about the conference can be found on the conference website: www.vppc09.org.

VPPC'09 will feature keynote speakers from top executives of major automotive companies. The venue for the conference includes the Ritz-Carlton Hotel and the University of Michigan - Dearborn in Dearborn, MI. In addition, a special banquet will be held at the Henry Ford Museum. A Ride-n-Drive will be provided for the convenience of the attendees.

VPPC'09 will feature five technical tracks, special sessions, technical forum for authors who would like to present their work without contributing full papers, tutorials, and an exhibit. Regular papers and abstracts for technical forums must be submitted through the conference website by March 1, 2009. The proposal for tutorials, however, must be submitted directly to the tutorials chair. Similarly, companies wishing to display their products at the exhibit and sponsoring the conference should contact the exhibit chair directly. More information is available in the call for papers: http://www.ieee-sem.org/VPPC09/cfp.pdf.

The organizing committee is working very hard to make this a successful conference, as well as, the conference of choice for people in this field. Please show your support by participating and promoting this event. For more information about the conference, please contact Aisha Yousuf at ayousuf@ieee.org or Chris Mi at mi@ieee.org. Also, please refer the conference website for further updates.

CALL FOR PAPERS

VPPC09

The 5th IEEE Vehicle Power and Propulsion Conference
September 7-10, 2009, Ritz-Carton Hotel
Dearborn Michigan, USA

www.vppc09.org

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Founder and Former President of Ovonics

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Energy Policy Panel Organizer
James Gover, Kettering University
jgover@kettering.edu

The 2009 IEEE Vehicle Power and Propulsion Conference (VPPC09) will be held in Dearborn, Michigan, USA. The conference is co-sponsored by IEEE Power Electronics Society (PELS) and IEEE Vehicular Technology Society (VTS). This year the conference will feature the theme of sustainability: hybrid, plug-in, fuel cell and battery technology. The conference also features keynote speakers from top executives of the major automotive companies, and a banquet at the Henry Ford Museum.

Conference Tracks

	Chair
Vehicular Electric Power Systems and Loads	Abul Masrur
Vehicular Power Electronics and Motor Drives	Taehyung Kim
Advanced Vehicles	Fang Z. Peng
Energy Storage Components/Systems	Sonya Gargies
Modeling, Simulation, Dynamics, and Control	David Gao
Special Sessions (Proposals are accepted)	Fang Z. Peng

Important Dates

Abstract and digest (optional full paper):	March 1, 2009
Notification of acceptance:	May 1 , 2009
Camera ready copy due:	July 1, 2009
Author Registration:	July 15, 2009

Submission Guidelines of Regular Papers

Prospective authors are asked to submit their paper through the conference website (http://www.vppc09.org/). Papers should make a timely contribution to state-of-the-art technology, be of high technical and editorial quality, and be devoid of commercialism. Each paper proposal must include: technical track number and name, paper title, name(s) of author(s), business affiliation(s), mailing address(es), phone and fax numbers, and e-mail address(es) and corresponding author.

An abstract of **50-100 words** and a digest of 3-5 pages (including figures and tables) stating the objective of the paper, outlining the problem requiring solution or the method of approach to research, being explicit with respect to the type of data to be included in the full paper, and summarizing the conclusions being made. Author may optionally choose to submit a full paper for review.

Technical Forum

Authors who would like to present their work but do not wish to contribute a regular paper may select to do so. The abstract deadline is the same as the regular paper **(50-100 words)**. Authors must indicate so during the process of submission of their abstracts.

Research still in early stages and doctoral research proposals can choose to submit their work to this technical forum. A regular paper is not required.

Tutorials

Proposals for tutorials must be submitted directly to the Workshop Chair no later than April 15, 2009. The workshops and tutorial will be open to all conference registrants (including students) free of charge. Please email to kravi@kettering.edu.

Exhibition and Ride-n-Drive

An exhibition and ride-n-drive will be featured at the conference. Companies wish to display their products and sponsor the conference should contact the sponsorship/exhibition chair. Please contact Bob Mitchell of Kettering University for ride-n-drive opportunities (bmitchel@kettering.edu).

International Program Committee/ VPPC Steering Committee

For more information, please see conference web site:

www.vppc09.org

IEEE ECCE 2009 Call For Papers

The first annual IEEE Energy Conversion Congress and Exposition (ECCE2009) will be held in San Jose, California, USA, September 20-24, 2009. This new conference combines the former IEEE Power Electronics Specialists Conference (PESC) with the technical sessions of the Industrial Power Conversion Systems Department (Electrical Machines Committee, Industrial Drives Committee, Industrial Power Converter Committee and the Power Electronics Devices and Components Committee) previously presented at the IEEE Industry Applications Society Annual Meeting. More information about the conference and exposition can be found at http://www.ecce2009.org .

Papers are solicited on any subject pertaining to the scope of the conference that includes but is not limited to the following major topics:

Energy Conversion Systems

- Renewable and Alternative Energy Systems
- Control Issues
- Thermal Management and Efficiency
- Electrical Power Systems
- Power Quality
- Grid Interface and EMI
- Reliability and Diagnostics
- Modeling, Analysis and Simulation

Components, Subsystems, and Applications

- Power Converters
- Power Electronics Components and Packaging
- Electric Machines and Actuators
- Electric Drives
- Applications

More detailed description of the topic areas may be found at http://www.ecce2009.org/CallforPapers.htm

ECCE 2009 Author Deadlines:

January 15, 2009: A digest of proposed papers must be submitted via the ECCE web site
May 25, 2009: Notification to authors of acceptance or rejection of papers selected for presentation
July 20, 2009: Completed papers and IEEE copyright forms received.

Approximately 600 papers will be presented at the conference in either oral or poster format. Authors are requested to submit a digest summarizing each proposed paper. The digests will be reviewed via a double-blind peer review process in order to ensure that the final program has the highest possible technical quality.

Each digest must be no longer than five (5) pages including key equations, figures, tables, and references, but no author names or affiliations. The digest must state the purpose of the work, the manner in which it advances engineering and/or science, and specific results and their significance in sufficient detail to enable a thorough and fair review process. More detailed instructions regarding the digest format and access to the digest submission web site can be found at http://www.ecce2009.org/DigestUpload.htm .

For further information, please contact the ECCE Technical Program Co-Chairs at Tech_Prog_Chairs@ecce2009.org

Prof. Thomas Jahns, UW-Madison
Prof. David Perreault, MIT
Dr. Brian Welchko, GM Adv. Tech. Center

IEEE Joint IAS/PELS/IES German Chapter meets on mini and micro electrical drive systems

Dr. Omid Forati Kashani

The last meeting of the IEEE Joint IAS/PELS/IES German Chapter in 2008 took place on 16th and 17th of October in Schönaich, Germany. The host of the meeting was Dr. Fritz Faulhaber GmbH & Co. KG, one of the companies specialized in the field of mini and micro electrical drive systems world wide. The first day of the meeting began with a get-together dinner party in Lago restaurant in Böblingen, Germany, sponsored by Dr. Fritz Faulhaber Company. That was a good opportunity for the participants to talk and discus their fields of interests with each other enjoying a multiple course menu in a friendly atmosphere.

The second day of the meeting began with the welcome presentation of Dr. Thomas Bertolini, the managing director of the Dr. Fritz Faulhaber Company. He introduced the history of the Dr. Fritz Faulhaber Company, its field of activities and the diverse mini and micro electrical drive systems manufacturing there, e.g. systems with coreless DC-motors and very small gears. Dr. Fritz Faulhaber Company is able to manufacture electrical DC-motor with a diameter of 1.9 mm.

As the second lecturer Mr. Herbert Wallner of Dr. Fritz Faulhaber Company introduced the functionality of some types of rotor position or speed sensors for mini and micro drive systems and some criteria for choosing the proper sensor for each application. The next lecture was presented by Dr. Andreas Wagener and Mr. Achim Haag of Dr. Fritz Faulhaber Company, who presented together the control strategies for the high performance positioning drives such as the one applied in Surface Mounted Device (SMD) mounting machines.

The audience listening to the lecturers at Dr. Fritz Faulhaber Company

After coffee break in the IEEE-business part of the Meeting Prof. Heinz van der Broeck, the IEEE Joint IAS/PELS/IES German Chapter Chairman, gave some information about the activities of the Chapter in 2008 and upcoming related events. He was handed over the IAS Outstanding Continued Performing Chapter Award 2008 by Past Chapter Chairman Dr. Peter Magyar, who had represented the Chapter and had become this award during the 2008 IEEE Industry Applications Society Annual Meeting in Edmonton, Canada. Honoring long-standing Chapter members Prof. Ingo Hahn, the IEEE Joint IAS/PELS/IES German Chapter Vice Chairman, mentioned the names of the Chapter members, who have their decades anniversary of IEEE membership in 2008, and congratulated them. In the next part of the IEEE-business Mr. Peter Schuster of Wittenstein electronics GmbH presented the invitation for the next Chapter meeting in 2009. The last part of the IEEE-business was the Chapter board election for 2009-2010 term. The new elected officers are Prof. Ingo Hahn of the University of Erlangen-Nuremberg as Chairman, Dr. Edwin Kiel of Lenze AG as Vice Chairman, Prof. Axel Mertens of Gottfried Wilhelm Leibniz Universität Hannover as Secretary and Dr. Mark Bakran of Siemens AG as Treasurer.

After IEEE-business part of the meeting the next lecturer before lunch was Mr. Thomas Fuchs of Dr. Fritz Faulhaber Company, who presented his field of activities about measurement, analysis and damping of noise and vibration of electrical drive systems.

Meeting participants in the Dr. Fritz Faulhaber Company site

After business lunch Mr. Claus Herrmann of Dr. Fritz Faulhaber Company gave some information about the site and the production lines there. After that the participants had the opportunity to visit the production lines of coreless electrical motors, mounting of very small gears and testing of drive components.

The meeting participants visiting production lines at Dr. Fritz Faulhaber Company

As the last lecturer after production line visit Dr. Jens Haug gave some Information about innovation management at Dr. Fritz Faulhaber Company. He described, how the knowledge and innovation will be directed to the production in a structured and systemized manner at Dr. Fritz Faulhaber Company.

Continuing the activities of our Chapter the first IEEE Joint IAS/PELS/IES German Chapter meeting in 2009 will be held on 19th and 20th of March at Wittenstein electronics GmbH in Igersheim, Germany. For more information please visit our website at: http://www.ewh.ieee.org/r8/germany/ias-pels/index.html.

Dr. Omid FORATI KASHANI, IEEE Joint IAS/PELS/IES German Chapter
omid.foratikashani@ieee.org

Meetings of Interest

24th Annual IEEE Applied Power Electronics Conference and Exposition, APEC'09, will be held 15-19 Feb. 2009 at the Marriott Wardman Park Hotel, Washington, D.C. For further details please visit www.apec-conf.org

International Electric Machines and Drives Conference, IEMDC2009, will be held 3-6 May 2009 in Miami, FL. For more information please visit the conference website: http://www.iemdc2009.org or contact the General Chair, Prof. O.A. Mohammed at Chair@iemdc2009.org

IEEE 7th International Symposium on Diagnostics for Electrical Machines, Power Electronics & Drives, SDEMPED2009, 31 August to 3 September 2009 in Cargese, France. For more information visit the website: www.sdemped09.iut-amiens.fr

IEEE Vehicle Power and Propulsion Conference, VPPC2009, will be held 7-10 September 2009 at the University of Michigan-Dearborn, Dearborn, MI. For more information visit www.vppc09.org or contact the General Chair, Prof. Chris Mi at mi@ieee.org

European Power Electronics, EPE2009, is planned for 8-10 September 2009 in Barcelona, Spain. Call for papers to be released in May 2008 with deadline for receipt of synopses Nov. 2008. For more information visit: http://www.epe2009.com

1st Annual Energy Conversion Congress and Exposition (ECCE2009) is announced for 20-24 September 2009 at the Double Tree Hotel at 2050 Gateway Place in San Jose, CA. For more information on ECCE2009 visit the conference website: www.ecce2009.org

44th Industry Applications Society annual meeting is announced for 4-9 October 2009 in Houston, Texas. This will be a new meeting format following the transition of IAS committees to ECCE2009 with more emphasis on tutorials and workshops. For more information visit the website at: www.ieee.org/ias2009

A big step forward for simulation software

The acquisition of Ansoft by ANSYS, Inc. expands the breadth of multiphysics capabilities from ANSYS and gives engineers a powerful range of simulation tools for power electronic and electromechanical design.

In July 2008, ANSYS, Inc. acquired Ansoft, a leading developer of high-performance Electronic Design Automation (EDA) software. With this combination of two world-class engineering companies, ANSYS is poised to address the continuing convergence of the mechanical and electrical worlds, across a whole range of industry sectors. The collective depth and breadth in simulation technology that ANSYS now possesses will enable the company to provide very comprehensive multiphysics solutions, by tightly integrating these critical simulation domains previously assessed separately.

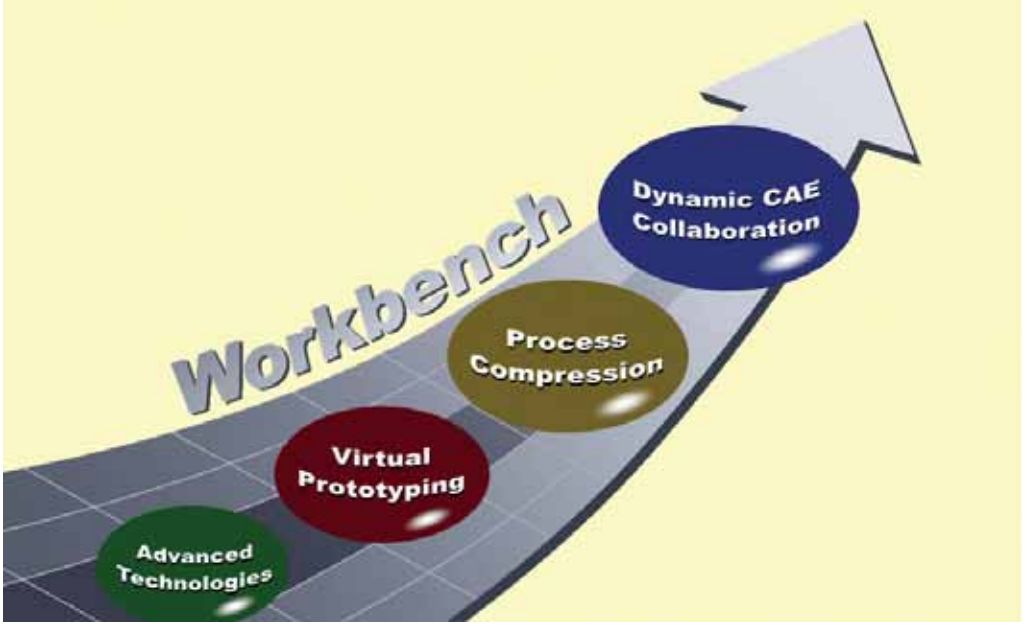
The Ansoft-ANSYS combination will address the exploding global demand for more automated and functional products in a wide range of industries: alternative energy, wireless technology, high-speed digital devices, automotive, and aerospace. The combined company will deliver an unprecedented range of simulation technology, from electromagnetics to thermal, fluid flow to structural, physical to behavioral. Together the product portfolio will deliver simulation driven product development across the entire spectrum of engineered products.

This entry of ANSYS into the electronic design software industry broadens the company's range of simulation solutions. Furthermore, adding Ansoft electromagnetics and electromechanical functionality to ANSYS technologies for structural and fluid dynamics simulations greatly expands the range of multiphysics simulations that can be performed.

With these comprehensive multiphysics solutions, electronics engineers can readily evaluate stresses, as well as assess reliability of devices undergoing shock and vibration. They can study various cooling strategies for electronics and better understand heat flow. All of this can be accomplished while also optimizing the design of electromechanical components or studying signal and power integrity of high-performance electronics. The various simulations can be tied together within the ANSYS Workbench framework for a smooth exchange of data between various field solvers and design tools, and also with ANSYS Engineering Knowledge Manager (EKM) software for managing simulation data.

Such a unified approach, breadth of engineering solutions and depth of multiphysics technologies gives development teams the tools they need in a competitive environment, where the ability to design power electronic systems and electromechanical components better and faster will likely be decisive for a growing number of companies in the coming years.

The product suite will advance the vision for Simulation Driven Product Development. Some benefits of this depth of solution will be realized immediately; even more value will be revealed in innovative ways throughout long-term product development. The Ansoft technology integration to the ANSYS products will allow users to



perform simulated tests that would otherwise not be possible, a process that is critical to customers exploring and expanding operational boundaries in developing leading-edge products and processes.

The ANSYS vision involves a solid base of advanced technologies that enables virtual prototyping. Process compression speeds up the simulation effort. And finally, dynamic collaboration results in innovative products. The ANSYS Workbench platform provides the framework for the process, combining the steps in a truly coupled fashion.

Delivering world-class technologies has been part of the ANSYS strategy for developing — and acquiring — new capabilities. Ansoft solver products HFSS and Maxwell, for high- and low-frequency simulation, add two leaders in their respective physics areas.

The ANSYS vision for virtual prototyping targets the simulation of complete systems. To date, the company provides comprehensive multiphysics, meshing and high-performance solvers for high-fidelity 3-D product simulation. Ansoft brings a new concept to the portfolio with the Simplorer product for simulating 1-D systems modeled through a schematic, or circuit, interface. Future development efforts at ANSYS have the opportunity to link 1-D circuit and 3-D high-fidelity simulation applications through reduced-order models and co-simulation techniques. Ultimately, this will provide a tightly integrated environment for simulating complete systems that include both control and hardware elements.

Historically, Ansoft has shared the ANSYS vision for multiphysics simulation by creating straightforward ways for solvers to exchange data. For upcoming releases, the combined development team will consider ways to harmonize that exchange mechanism and deliver true multiphysics integration between all of the core solver products.

Unifying these ANSOFT and existing ANSYS technologies will create a dynamic CAE collaboration environment that defines and communicates the process for electronics simulation. For example, in an electric motor drive system application, this solution will allow one engineer to model the power control system, another to develop the motor hardware, and both together to understand the effects of the physics coupling.

As the Ansoft technologies are fully integrated into the product suite from ANSYS, customers will find that they can simulate their products in ways never imagined possible before.

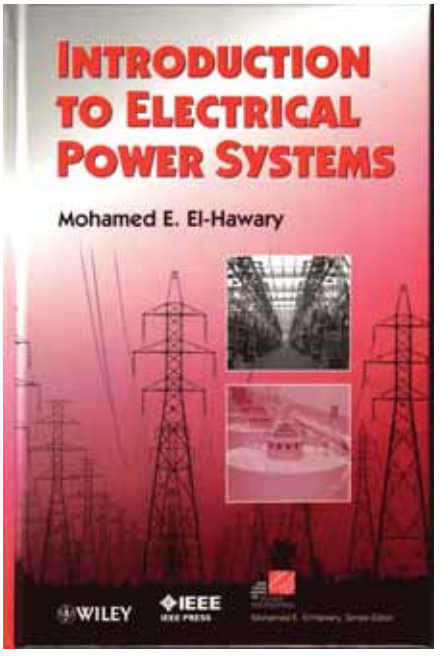
Contributed by:
H. Mark Ravenstahl, Director, Marketing Communications, Ansoft, LLC.
John Krouse and Barry Christensen of ANSYS Corp.
www.ansoft.com

Book Review: Introduction to Electrical Power Systems

Mohamed E. El-Hawary
Copyright © IEEE
John Wiley Publishers, 2008, pages 394
ISBN: 0470408634

The nine chapters of this book lay out the fundamentals of power systems in a very readable and understandable manner without extensive use of mathematics. This makes it a good introduction text for power engineering but also for students in all engineering disciplines who wish a broader perspective on the engineering field. In reviewing this text I have in mind the material and presentation manner of other authors on the same subject, including Charles A. Gross's Power System Analysis from J.Wiley & Sons that covers generation, transmission, machines and system protection. Also, the McGraw Hill text by William D. Stevenson, Jr. Elements of Power System Analysis conveys much the same materials. And more recently the text from J. Wiley edited by Michel Crappe, Electric Power Systems that translates the earlier work of two French books published in 2003 into English and then expands on these. This most recent work also covers similar material but conveys it to the reader with a more personal style, more conversational as it were, with worked examples to assist in grasping the content and a wide assortment of problems at the end of each chapter.

The analysis of electric machines, the transmission line, and transformer are well



done and very readable. As a reviewer I appreciated the treatment given to fault protection and the present and future status of our legacy power generation, transmission and distribution infrastructure. To learn that in the U.S. alone electricity consumption has grown some 400 times during the twentieth century and that on average the generating capacity of the U.S. is 3kW per capita are striking statistics. Given the growing penetration of renewable sources into our power systems the concerns with stability and security of the networks are becoming severe. In the final chapter El-Hawary takes the reader through 2003- the year of the blackout by laying out in chronological order the events that transpired prior to and during the bleakest moments of power delivery.

NINE CHAPTERS

Chapter 1: Introduction
Chapter 2: Basics of Electric Energy System Theory
Chapter 3: Power Generation and the Synchronous Machine
Chapter 4: The Transformer
Chapter 5: Electric Power Transmission
Chapter 6: Induction and Fractional Horsepower Motors
Chapter 7: Faults and Protection of Electric Energy Systems
Chapter 8: The Energy Control Center
Chapter 9: The Present and Future of Electric Energy Systems

The Power Electronics Society is calling for Nominations for the following two awards.

Using the provided form, please submit your nominations no later than January 31, 2009 to the following address or you may go online and email the form to the PELS office at IEEE.

Kevin Fellhoelter, PELS Awards Chair
c/o Donna Florek
IEEE Power Electronics Society
445 Hoes Lane
Piscataway, NJ 08855
Phone: +1 732-465-6480
Fax: +1 732-562-3881
k.fellhoelter@ieee.org:
CC: d.florek@ieee.org

Richard M. Bass Outstanding Young Power Electronics Engineer Award (established in 1994)

Description: To recognize outstanding achievement in the field of Power Electronics by an engineer less than 35 years of age.

Prize: $1,500, a Certificate, and reimbursement for transportation expenses up to $500 to attend the annual PELS Awards Banquet.

Funding: Funded by the IEEE Power Electronics Society.

Eligibility: Open to all IEEE members of any grade active in the field of Power Electronics and less than 35 years of age as of January 1 of the year of the award.

Basis for Judging: Outstanding contribution in the multidisciplinary field of power electronics. Outstanding contribution encompass a broad range of activities including research, innovative product design, teaching, and project management. The technical disciplines which encompass the field of power electronics include the analysis, design, development, simulation and application of electronics devices, magnetics, controls and power circuits for inverters, converters and motor drives ranging in power levels from fractions of a watt to megawatts.

Presentation: Annually, at the PELS Awards Banquet customarily held at the annual Energy Conversion Congress and Exposition (ECCE).

IEEE Power Electronics Society Distinguished Service Award (established in 1996)

Description: To honor long and distinguished service to the welfare of the IEEE Power Electronics Society at a level of dedication and achievement rarely demonstrated.

Prize: $3,500 and a suitably engraved Plaque.

Funds: Funded by the IEEE Power Electronics Society.

Eligibility: Open to all members of the IEEE Power Electronics Society.

Basis for Judging: Outstanding contributions over a substantial time period encompassing creative and invigorating leadership of the Society, exceptional administrative and managerial accomplishments on behalf of the Society, identification of new technologies within the scope of the Society and nurturing activities to support these emerging technologies, initiation of innovative programs to encourage wider participation in the full spectrum of Society activities, and the general communication and advocacy of power electronics technology to the technical community as a whole.

Presentation: Annually, at the PELS Awards Banquet customarily held at the annual Energy Conversion Congress and Exposition (ECCE).

Book Review:
Introductory Circuits

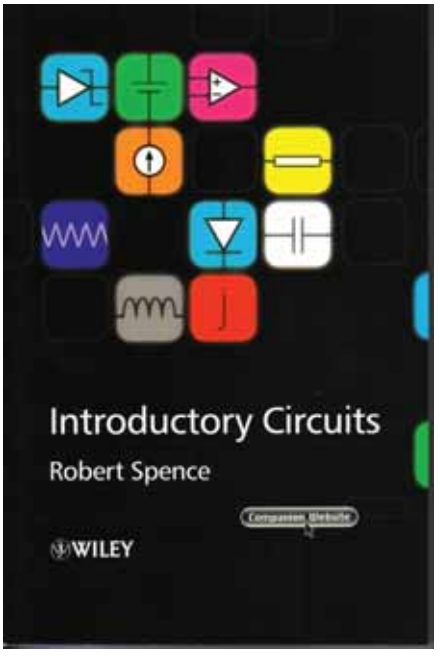
Robert Spence

John Wiley Publishers, 2008, pages 240

ISBN: 0470779713

The author, Robert Spence has taught electronic circuits for the past 45 years at Imperial College London, now puts his class notes into a first year circuits course. Those familiar with classical circuits texts such as William H. Hayt and Jack E. Kemmerly's Engineering Circuit Analysis will find the Spence book a new perspective on linear, passive component, circuits. Introductory Circuits leaves the mathematical developments to his math colleagues and the underlying physics to that department and focuses on the engineering and application aspects of circuits. Doing so leaves time in a 20 lecture semester to include nonlinear components such as diode and zener diode fundamentals as well as three full chapters on operational amplifiers and their engineering applications. The OP AMP theory provides excellent fundamentals for students who will pursue analog circuits in more depth, or study these components to the level one would encounter in reading the text: Operational Amplifiers Design and Applications edited by Tobey, Graeme and Huelsman published by McGraw Hill for Burr-Brown. The book consolidates circuit theory taught to some 4000 students over the years by Prof. Spence.

Two aspects of this book caught my attention, one, the practical nature of the many worked examples and second, the intentional focus on the design process. Both of these tactics underlie a strong commitment to engrain the fundamentals of engineering into students of circuits. Having worked through some of the examples in the book I find them to be



very thought provoking and exemplars of what engineering students will encounter in their professional experience.

THIRTEEN CHAPTERS

Chapter 1: The Design Process
Chapter 2: Electronic Circuits
Chapter 3: Circuit Laws and Equivalences
Chapter 4: Circuit Analysis
Chapter 5: Controlled Sources and Nonlinear Components
Chapter 6: The Operational Amplifier
Chapter 7: Linear Operation of the Opamp
Chapter 8: Mixed and Dynamic Opamp Circuits
Chapter 9: Ac Circuits and Phasor Diagrams
Chapter 10: Complex Currents and Voltages
Chapter 11: Frequency Domain Behaviour
Chapter 12: Change Behaviour
Chapter 13: Small-signal Analysis
Appendix and answers to problems

John M. Miller, Ph.D.
Vice President, Systems Applications Integration

John Miller joined Maxwell in December 2005, assuming primary responsibility for world wide applications engineering that includes development of Maxwell University training for field application engineers. He remains active in the development and promotion of ultracapacitor-based solutions for the automotive and heavy vehicle industries. Previously, he spent 18 years in a series of engineering and research and development positions with the Ford Motor Company, where he led several Ford automotive electronics and electric and hybrid drive train development programs before taking early retirement in 2002. Immediately prior to joining Maxwell, he spent three years as an industry consultant, author and guest lecturer. He holds 53 patents and has written more than 150 scientific and technical papers and three books, including Hybrid Vehicle Propulsion Systems, which was published in 2003. He holds a BS degree from the University of Arkansas, an MS degree from Southern Methodist University and a doctorate from Michigan State University, all in electrical engineering.

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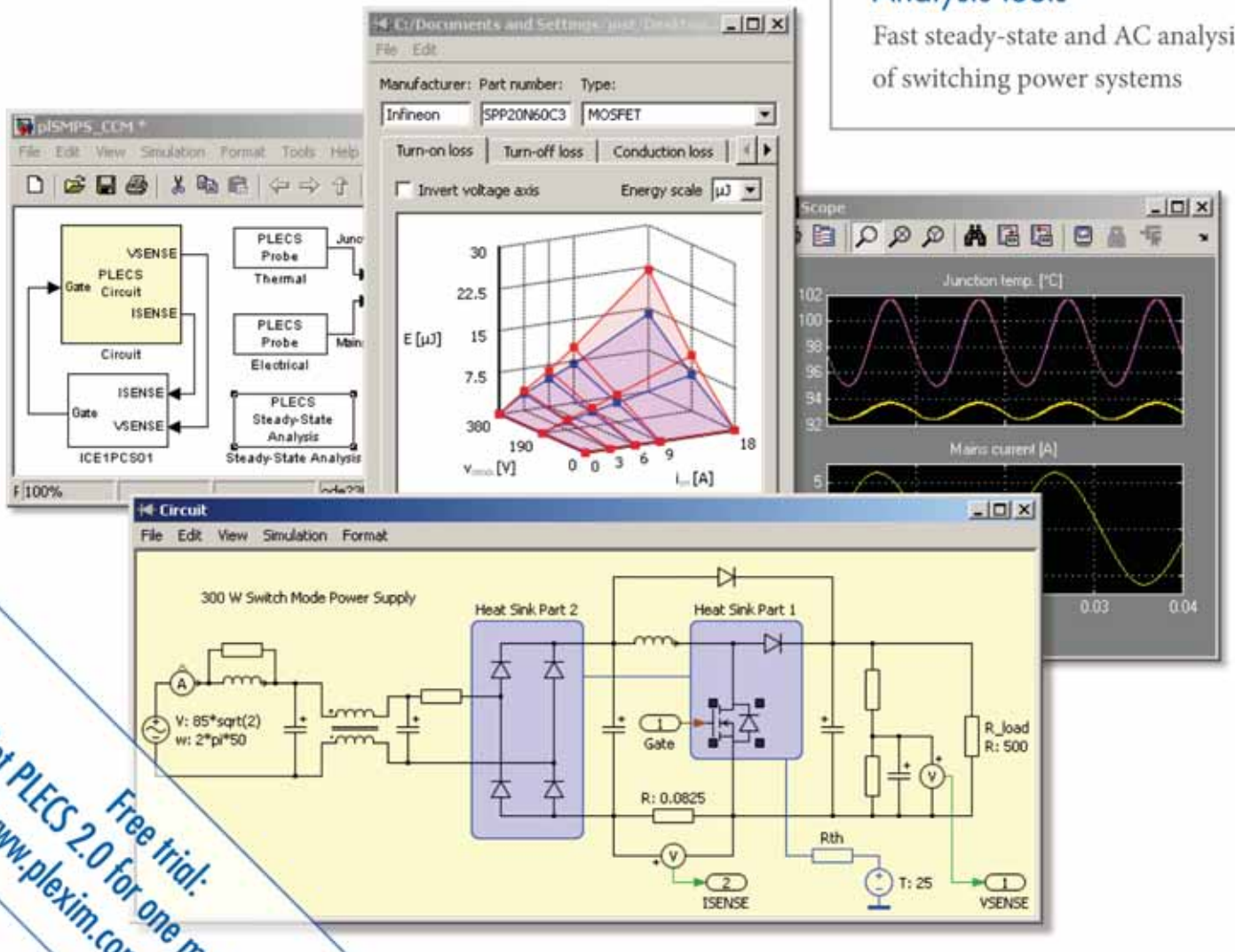

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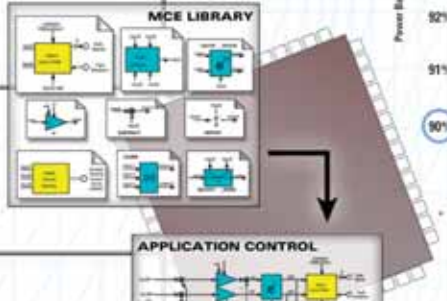

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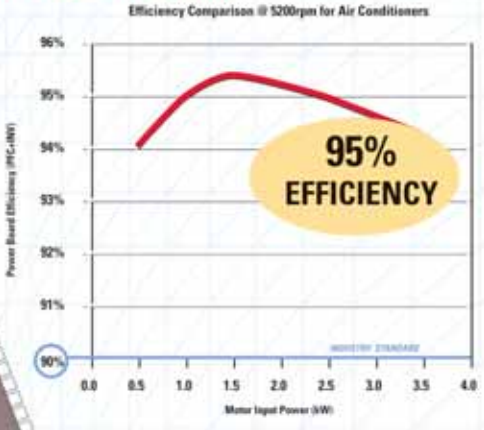

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