THE S F PEN

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NOTE: Please pass this on to interested non-PES members

PUBLIC AFFAIRS 2002 SPRING BANQUET

By Julian Ajello

This year's San Francisco Power Engineering Society's Spring Banquet will be Thursday, June 20th at Sinbad's Pier II Restaurant in San Francisco. (Note: This is a change from the last article in *The SF PEN*. It was originally scheduled for June 21.)

This banquet is a Public Affairs event where the IEEE SF PES tries to attract people who are not IEEE members and choose a topic to illustrate the contributions made by Electrical Engineers. This year's topic is "The Electric Environment (Can Electricity and the Environment Co-Exist?)". Please invite your friends and neighbors who are interested in the environment and how we can reduce pollution with our personal actions and purchases. We have invited a panel of three speakers to talk about widely differing subjects that can have a bearing on electricity and the environment.

- Dr. Raymond Neutra with the California Department of Health Services will bring us up to date on the long-running research to determine if magnetic fields associated with electric transmission can affect human health.

- Ed Smelloff, assistant general manager of the San Francisco Public Utilities Commission, will describe the environmental benefits of including renewable resources in the electric generation mix.

- Kent Harris of Pacific Gas and Electric returns to update us on how using electricity in vehicles can have beneficial effects on air quality.

The reception starts at 5:00 P.M., dinner will be served at 6:00 P.M., and the presentation starts at 7:00 P.M. Look for the registration form in the mail or contact Jenny Diego at (415) 973-3351 for more information.

REVITALIZATION OF IEEE STUDENT CHAPTERS AT SAN FRANCISCO STATE & STANFORD UNIVERSITIES

By Dan Sparks

SF PES would like to thank the IEEE Student Chapter at San Francisco State University (SFSU) for catering the May 11th Short Course (see article on page 3). The food was plentiful, delicious and received compliments from the attendees.

The spring semester marked a resurgence of IEEE activity at SFSU. Led by current Treasurer Laura Yee, the SFSU student chapter has re-staffed its officer ranks and is once again very active. Activities include supporting the Micro Mouse competition and the student solar car project for the World Solar Challenge in Australia, active participation on the San Francisco Section Executive Committee, and promotion of the engineering profession through campus activities.

At Stanford University, IEEE Student Chapter Chair Clara Shih has presided over a successful semester. The Stanford Chapter has sponsored several meetings where industry representatives spoke to the students, hosted social events, and promoted student job searches.

Kudos to Laura and Clara!

Wendy Phelps, a recent graduate of SFSU, joined the SF PES Adcom. She will be working with Jenny Diego on Student Activities. Wendy brings tremendous energy to the Student Activities Committee, along with some unique ideas to spread the knowledge and awareness of power engineering to all grades of students.

AUTUMN TECHNICAL MEETING TENTATIVE SCHEDULE

By Julian Ajello

Traditionally, after the Spring Banquet, the PES shuts down for the summer, but we plan to hit the ground running in the fall. In August we hope to have Dev Paul from Earth Tech talk to us about Overvoltage Protection and Grounding of DC Power Systems. In September we will invite a speaker on either Regional Transmission Organizations or Congestion Management. October's topic will be health effects of Electric and Magnetic Fields and in November, we plan a speaker on Biodiesel fuel. This should make for a busy and interesting season.

The SF PES Adcom Programs and Arrangements and PACE Committees recently have been strengthened by Bhaskar Ray and Xuguang Leng respectively. Bhaskar and Xuguang have several years of industry experience and bring a new perspective and network to the SF PES.

EXTENDING THE LIFE OF SWITCHGEAR

By Dan Sparks

On April 9th, Keith Gray of Pacific Breaker Systems presented "Life Extension Solutions for Low and Medium Voltage Switchgear" to the SF PES.

Aging switchgear, such as circuit breakers, present many challenges: reduced reliability, difficulty in obtaining replacement parts, and expensive and difficult maintenance. Often it makes more sense to overhaul aging equipment. Overhauling old switchgear has many benefits including improved reliability, improved safety, reduced outage time, and shortened maintenance intervals. Overhauling techniques are classified in three broad categories: replace, retrofit, and conversion.

Replacement costs are typically the most expensive and can be prohibitive. Two useful alternatives are retrofit and conversion. Retrofitting involves replacing obsolete equipment with newer, insulated equipment and modern electronics. Common retrofit solutions include installing solid-state trip devices or vacuum interrupters. Conversion usually refers to replacing smaller components of the switchgear with newer, more efficient models. Conversion is the least expensive overhauling technique.

Mr. Gray proceeded to present case studies of some of the life extension projects that Pacific Breaker Systems had performed. This included projects on switchgear from 600 V to 38 kV at nuclear power plants and utility distribution substations. Finally, Mr. Gray demonstrated a circuit breaker that had been built by Pacific Breaker Systems.

HOW TO GET THE MOST OUT OF A TRANSMISSION LINE

By Julian Ajello

At the March meeting, Dr. Aty Edris from EPRI talked about EPRI's project to increase power transfer capability for existing transmission lines. Dr. Edris is the Target Leader of EPRI's Transmission and Substation Asset Utilization Group. He earned his PhD from Chalmers University of Technology in Sweden.

Dr. Edris pointed out that to control power flow in the grid you must control transient, dynamic, and voltage stability. You control power flow to insure that all lines in the grid are fully utilized and to improve power factor.

Every megavar that can be handled by transmission system devices adds up to half a megawatt in generating capacity because generators don't have to make reactive power. A good measure of stability is Surge Impedance Loading (SIL) because it combines elements of real and reactive power. You control loading to get close to SIL without exceeding it. You also add capacitance or inductance to raise SIL closer to the thermal limit of the line.

Devices that combine solid-state switches with capacitors and inductors can increase the power handling capacity of a transmission line close to its thermal limit while maintaining stability. One such device is a Voltage Source Converter (VSR). A VSR installed at Marcy Substation in Upstate New York increased upstate to downstate power transfer capability by 240 MW out of 1600 MW. A Unified Power Controller consists of two VSRs connected back-to-back. One of these is used to interconnect Arizona with Mexico.

The demands on solid-state switches are intense. Some improvements that are being tried to increase capacity are the use of silicon carbide in place of silicon and water-cooling.

As use of power controllers raises loading to the thermal limit, other strategies come into play. A system of tension sensors, temperature sensors, and weather stations linked by satellite can be used for dynamic monitoring of the conductor to insure it is not overheated. New types of conductors are being developed that resist sagging better that conventional types.

MAILING LIST ADDITIONS

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GENERATION ISSUES FOR TODAY

By Kris Buchholz

On May 11th more than 30 SF PES members participated in the Spring Course on generators and generation issues. The operative word was "participation." The SF PES has held many courses, but this was the most interactive course that can be remembered. The excellent speakers and their relaxed, cooperative styles provided an atmosphere such that the audience not only learned a lot about generators, but was able to ask pertinent questions about "real life" situations and experiences.

The first speaker, Dr. ShyShenq Liou, SF State University, reviewed the basics of generators, including how the generator operates, and how the operator can change the power produced by the generator. This introduction was appreciated by many who benefited from this refresher on generator theory. We also learned about some problems that might be inherent in poorly designed generators, such as harmonics. Dr. Liou summarized the different generator designs which are typically associated with specific systems or power plants.

Ken Bollinger, ADEC Systems, began with a discussion of the workings of a power plant, the control systems and how the generator reacts with the other power system components. The presentation was not only very easy to understand, but the terminologies used were entertaining, making it easy to understand and remember. The members began asking so many questions regarding "real world" examples, Mr. Bollinger agreed to discuss these situations and the members agreed to read the course material later.

Mr. Bollinger reviewed some of the regulations currently in effect. He related the system impacts of the 1996 WSCC outage, how the system was affected and why some of the requirements changed. This led to good discussions about the WSCC requirements for testing, how to interpret the regulations, and what the ISO is requesting. For example, there was general confusion regarding the requirement for the power system stabilizer (PSS) or equivalent excitation control. The members also had questions about the WSCC testing in conjunction with the stabilizer tuning. Finally, Mr. Bollinger discussed the various types of stabilizers which are available in conjunction with the voltage regulators.

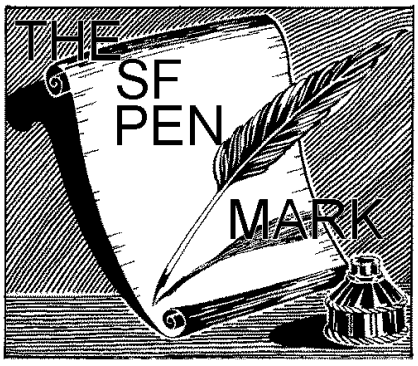
Kevin Kozminski, Pacific Gas and Electric, started with the practical differences between generators and their usage (hydro vs. steam or combustion). Next, Mr. Kozminski walked us through the simple ABCs of manufacturing and WHY each aspect of the design is critical. He brought many pictures and several examples of parts of a generator to show us how the generator theory is put into practice. He also provided very practical advice to use when modeling your system. For example, be aware that the generator maximum may not really be your system maximum due to the limitations of your turbine or other components. Kevin concluded his presentation with questions regarding operating conditions, including case studies on subsynchronous resonance and supersynchronous resonance, how to mitigate the effects and correct the problems.

Mr. Kozminski was the third *and fourth* speaker on the agenda. The fourth agenda topic covered generator failures, their causes, what happens when a failure occurs (gradual degradation and/or catastrophic), and how you can tell proactively if a failure is imminent. The class saw many pictures of past failures. Mr. Kozminski also provided guidance and awareness of operation and maintenance situations that should be done to avoid some types of failure.

The last speaker, Keene Matsuda, CH2M HILL, took a different point of view. Keene provided an approach from the customer's decision-making aspect. What are some of the factors that business developers and industrial owners consider if they want to install their own distributed or central generation? Some factors are: cost of energy, reliability, and legal requirements. In addition, power quality can be an issue. The utility has normal operating procedures that can cause voltage fluctuations, such as circuit switching. Frequently customers create their own harmonics with their internal plant equipment. Mr. Matsuda also provided comparisons of the different types of generation – including Distributed Generation (DG).

At the end of the presentation, Mr. Matsuda discussed several case studies showing the varying reasons that customers decided to install generation, what they installed, and related interesting stories, including challenging drives, scary generator buildings, and military security. The members that attended the course now know the answers to "How did Keene get a project in Hawaii??!!" and "Who is Chloe?"

THANKS to Ben Williams for coordinating this course. GREAT JOB! Also a BIG THANKS for the coordination of the facilities and refreshments to the Student Branch at San Francisco State University. There was lots of GOOD food. It was also great for everyone to see friends who they haven't seen for awhile. (One last question… did Jenny ever get the thermostat in the room to work properly? The room was freezing.)



By Kris Buchholz

The summer is quickly approaching, and so is the IEEE Summer Power Meeting. If you have NOT registered yet, recognize that the LAST day for early registration is (or was) May 31st. The meeting will be held in Chicago, from July 21st through July 26th. This meeting will be the last with this title as the IEEE PES changes to a single "General" meeting each year.

The next meeting for the Transmission & Distribution Committee will be in Las Vegas, Nevada in conjunction with the Substation Committee meeting. An ***unconfirmed*** rumor says that the meeting will be held the last week of January 2003.

There is also a date change to the ESMO Conference for 2003. Due to a scheduling conflict in Orlando, Florida, we were asked to change the dates for our meeting to April 6th through April 10th. Remember this event only occurs every two to three years, with presentations, indoor exhibits, ***and outdoor demonstrations***.

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2002
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