

SCANFAX

February 2002

Volume 54, Issue 2



IEEE

Networking the World™

A publication of the
Institute of Electrical & Electronics Engineers
— Chicago Section —

SmartSignal

**Taking On New Importance
as Demand for Equipment
Condition Monitoring Takes Off**

U.S. POSTAGE PAID
NON-PROFIT ORG
Permit No. 53
Columbus, Wisconsin

Patten

POWER SYSTEMS



**SALES
PARTS
RENTAL
SERVICE**



5 LOCATIONS

GRAYSLAKE • OGLESBY
ROCKFORD • HAMMOND, IN
& OUR HEADQUARTERS:

615 W. LAKE STREET
ELMHURST, IL 60126
630.530.2200
www.pattenpower.com

Your Complete Source for POWER!

Diesel & Gas Powered Generator Sets Complete System Responsibility

- ◆ Automatic Transfer Switches
- ◆ Paralelling Switchgear
- ◆ Trailerized Rental Units
- ◆ Sound Attenuated Enclosures
- ◆ Fuel Tanks
- ◆ Distribution Equipment
- ◆ 24-Hour Emergency Service

Emergency/Standby
Load Management

Cogeneration
Peak Shaving



OLYMPIAN™



IEEE
Networking the World™

A publication of the
Institute of Electrical & Electronics Engineers
— Chicago Section —

Chairman

Pat Murphy, E.E., P.E.
Phone 312-733-7000 ext. 6805
Fax 312-432-7118
E-mail: patmurphy@IEEE.org

Editor

Gerry Ryan
Phone 773-380-7955
Fax 773-380-7979
E-mail: gryan@hdrinc.com

Published for IEEE by
Slack Attack Communications

Publisher

Barbara Slack

Advertising Sales

Beth Vander Grinten
Phone: 608-222-7630
E-mail: bethv@slackattack.com

Printed By

Town & Country Printers
Columbus, WI

SCANFAX (ISSN #0018-1297) is a monthly publication (except July and August) of the Chicago Section Institute of Electrical and Electronics Engineers, 8196 Cass Ave., Darien, IL 60561, (800) 898-4333 or (630) 493-4333. It is published by **Slack Attack Communications**, 5113 Monona Drive, Madison, WI 53716, (608) 222-7630. Printing is by **Town & Country Printers**, Columbus, WI 53925. For advertising information, contact Slack Attack Communications.

Subscriptions included in IEEE membership dues; non-member subscriptions: \$25 per year.

Address corrections should be sent to the IEEE office, 8196 Cass Ave., Darien, IL 60561.

Meeting notices should be sent to graphics@slackattack.com

©Copyright 2001 by the Chicago Section Institute of Electrical and Electronics Engineers. Permission to reprint must be secured in advance of publication and credit given to author and SCANFAX.

SCANFAX

February 2002
Volume 54, Issue 2

Feature

- 4 **SmartSignal**
Taking On New Importance as Demand for Equipment Condition Monitoring Takes Off

Departments

- 10 **Advertiser Index**
11 **Professional and Business Directory**
11 **Employment Opportunities**

Upcoming Events

- 8 **Chicago Chapter of the IEEE Power Engineering Society**
MEDIUM VOLTAGE PROTECTION AND APPLICATIONS
Wednesday, February 13, 2002
- 8 **Chicago Chapter of the IEEE Power Engineering Society**
POWER ENGINEERING: CAREER ADVICE FOR THE YOUNG ENGINEER
Wednesday, March 27, 2002
- 9 **IEEE EMC Society Chicago Chapter**
EMC MODELING AND SIMULATION-PRACTICAL APPLICATIONS
Wednesday, February 20, 2002
- 10 **IEEE-IAS Chicago Chapter**
INDUSTRIAL AND COMMERCIAL LIGHTING DESIGN
Saturday, February 23, 2002

CHICAGO SECTION EXECUTIVE COMMITTEE MEETING

Tuesday, February 12, 6:30 pm
DeVry DuPage, Room TBA, 1221 N. Swift Rd., Addison, IL
No Registration Needed

Statements or opinions expressed herein are those of the author's and not necessarily those of the IEEE Chicago Section, its members, officers, or staff, or the editors of this publication. Readers using any information or materials described in this publication do so at their own risk. In no event will IEEE Chicago Section, its members, officers, or staff be liable for any damages resulting from use of this material and hereby expressly disclaim such liability. The publication of any advertisement is not to be construed as an endorsement of the product or service offered unless the advertisement specifically states that there is such an endorsement or approval by the organization.



Weldy/Lamont & Associates

Manufacturers Representative
Engineered Products and Services

AC distribution equipment 600V thru 35KV (50 or 60Hz)

- Transformers
- Distribution switchgear
- Busway
- Automatic transfer switches (mechanical and static)
- Metering

DC power systems

- Switching Controlled Ferro, Mag-amp and SCR rectifiers
- DC to AC inverters
- Free standing rack systems
- Batteries

Uninterruptible Power Supplies and Frequency converters

- Rotary and static type

Weldy/Lamont Assoc., Inc. / 1008 East Northwest Hwy, Mount Prospect, IL 60056 / 847-398-4510

SmartSignal



**Taking On New Importance
as Demand for Equipment
Condition Monitoring Takes Off**

By Sandy Ryan

Recently named one of the top 50 emerging technology companies in Chicago, SmartSignal Corporation is blazing a trail in the field of equipment condition monitoring technology. SmartSignal is privately held and was founded by Dr. Alan Wilks and the University of Chicago to commercialize technology and to improve early warning systems in nuclear power plants. The company received initial venture capital funding in March of 1999. The company holds 32 issued or licensed patents pending/owned and broad foreign coverage. During a time when venture capital can be hard to come by, SmartSignal closed a second round of funding in September 2001 totaling \$14.1 million.

SmartSignal

SmartSignal is led by Gary Konkright, president and CEO; Martin Koehler, vice president of finance and CFO; Dr. Alan Wilks, vice president of technology; David Brochu, vice president of sales and marketing; George Turanchik, vice president of client services; R. Matthew Pipke, vice president of strategic development and David Bell, vice president of business development.

The technology detects faults in equipment early, allowing repairs to be made before the fault is a major problem. The software began attracting diverse attention long before September 11. However, the technology has found increased relevance in industries such as aviation and power since the attack, according to John Kerastas, SmartSignal's director of marketing communications.

"We have seen a ground swell of interest in what we do because we can give early warning of problems," Kerastas said. "We have just signed up three major power companies and have interest from aviation that is more related to what is going on since September 11. Certainly the airlines are currently under duress—every time there is a flight full of people you want the flight to take off. The airlines lose money every time a flight

has to be cancelled. What our technology does is give very early warning, sometimes from a few days to several weeks in advance, of a deteriorating condition. This allows the airline to do a pre-emptive fix that may be as non-committal as saying let's not send this plane off the continent and keep it here to do the repairs instead of remotely. Remote international repair teams are very cost prohibitive and out of pocket expenses can be from \$500,000 to \$1 million depending on the problem."

SmartSignal's software technology analyzes sensor signals and posts information to a secure website that individual clients have access to. The company is currently monitoring 350 jet engines.

Just as the SmartSignal technology has increased relevance in the aviation industry today, the same is true for manufacturing and power related industries.

"If you are involved with a power generator and using the technology, essentially you would get an alarm for keeping people safe within the plant," Kerastas said. "Power is an area where people are looking for an increase of availability. Since power cannot be stored, we are a terrific solution for companies who are capacity driven. If a piece of equipment is deteriorating, we can give the knowledge to correct it ahead of time and it can allow a power plant to repair something at two in the morning when demand is not as great."

Kerastas said the technology helps increase return on assets and works very well in turbines.

"Whether they are flying around on Delta Airlines or on the ground in generators, blowers or pumps, it is no surprise that the technology is effective. Dynergy is using the technology on peaker plants that only produce 20 to 25 percent of the year. The rest of the time peakers are maintained but the value proposition for the companies is so huge during peak times that they

want to be absolutely certain the plants can produce."

SmartSignal's Remote eCM is custom-designed for owners and operators of remote and mobile assets and helps diminish the cost of downtime by providing early warning of developing problems. The early warning allows companies to reduce unplanned downtime, minimize planned downtime and increase return-on-assets.

The Remote eCM provides single source review of remote and mobile equipment fleets and allows users to access information at multiple locations. The system also recognizes the unique performance of each individual asset by developing a personalized monitoring system for each asset as built (or on wing) for increased sensitivity and accuracy.

Jet engine data from four fleets of Delta jet engines is received and analyzed by the Remote eCM and results are posted on a secure website for 24/7 monitoring. The system works with existing sensor data and has wide application while being sensor independent.

The Plant eCM is designed to provide real-time factory floor asset health monitoring and provides manufacturers early warning of developing problems in sensors, equipment and production processes. This system is currently being used in a wide variety of factory floor applications including boilers, distillation columns, combustion turbines, steam turbines and generators.

Plant eCM provides early detection of deteriorating equipment conditions leading to failure and earlier notice lets operators fix developing problems during planned maintenance cycles. It provides sensor validation, monitors a variety of equipment and can provide enterprise systems with real-time information.

The system is OEM and sensor independent allowing wide application and monitors and analyzes correlated data set from sensors and control systems—including vibration sensors. As with the Remote eCM, the system recognizes performance of each asset by developing a personalized monitoring system, works with existing sensor data, is non-invasive and has wide applications.

The systems are easily integrated and allow data access from OPC, PI, ARINC or other control systems. Users interface an output to standard databases or server interfaces for display. It requires no additional wires or sensors,

is an Empirical configuration and uses sensor data from normal period of operation.

Run-time operation accommodates sampling rates ranging from per second to per day rates and standard screen displays include WatchList of equipment exhibiting abnormal performance and trend charts of estimated signals, actual signals, residuals and alerts. The system is able to send results (alerts) to email, pagers, existing alarms systems and outputs to other systems through standard interfaces.

The systems adapt easily to operational changes, training, technical service personnel and software maintenance. Upgrades are provided by SmartSignal.

Like any new company, Kerastas said

SmartSignal is experiencing growing pains and is currently in the market to hire some new people.

"We are hiring to serve our increasing number of clients. We are hiring software developers and application engineers to go in and make installations for clients. We need engineers who understand rotating equipment who can not only install the software, but also work with our clients. We are not IBM and hiring tons of people but right now we currently employ 38 people and will probably double that within the next year—people will be hired as new clients come in."

According to Kerastas, the biggest challenge to be faced during the company's growth will be its focus.

"There are applications in many different areas regarding this technology and we get new people and industries calling us about it all the time," Kerastas said. "Right now we are focusing on aviation and power. The power markets are interesting to us because they have problems; they have money to get those problems fixed and are acutely aware of down times that cost them money. We are delighted with recent reception and are starting to get our initial international feelers out there and may soon have a first international client in the nuclear power field."

Technical information for this article provided by SmartSignal. Information is available on www.smartsignal.com or contact the company at info@smartsignal.com. ■

Equipment Condition Monitoring: How SmartSignal Technology Works

For each installed as-built equipment system, the administrator uses SmartSignal wizards off-line to set up the software. Set up is begun with a reference data set that consists of observations of measured or calculated signal values representing the normal range of equipment operating conditions.

Through a variety of wizards, the reference data set is processed by the administrator—both to select those signals that will be included in the software and to generate a subset of observations called the D-Matrix.

This characterizes the dynamics of the monitored system.

The software uses the D-Matrix to create a run-time engine called the signal engine. During real-time operation of the equipment system, the signal engine generates an estimated signal value for each monitored signal. The signal engine contains a high-fidelity mathematical representation of the relationships—linear and non-linear—among all monitored signal values over

the full range of equipment operating conditions.

The administrator also sets up a second run-time engine called the alert engine. The alert engine compares each monitored signal value with the corresponding estimated signal values, calculates a residual—the difference between each monitored and estimated signal value—and generates alerts when statistically significant deviations are discovered between the monitored and estimated signal values.

Then the administrator sets up the diagnostics engine for deciding when equipment or a sub-system should be put on the WatchList. Acting on the embedded expert knowledge of the equipment, the diagnostics engine makes automated decisions for putting a monitored equipment system on the WatchList, prompting the analyst to take corrective actions on the equipment or sub-systems requiring attention.

Detailed technical information is available by request from SmartSignal by emailing info@smartsignal.com.

DuPage Area Engineers Week at

Illinois Institute of Technology
Daniel R. and Ada L. Rice Campus
201 East Loop Road
Wheaton, IL 60187

February 22, 2002
7:00 PM

Dr. Albert Karvelis, Packer Engg.
"Accident Investigation—
Never Trust Your Assumptions"

February 23, 2002
12:30 to 5:00 PM

Open House with Presentations and
Demonstrations for the Entire Family

For Additional Information Contact
Barbara Kozi

E-mail - kozi@iit.edu Phone - (630) 628-6040

LUNCH MEETING

Chicago Chapter of the IEEE Power Engineering Society Medium Voltage Protection and Applications Wednesday, February 13, 2002

Jerry Josken, Cooper Bussman

About the Topic:

The presentation will include what's new, what's coming, and applications of Medium Voltage protection from 4KV through 34.5KV. The protection discussed will include overvoltage (lightning) protection and overcurrent protection using fuses, reclosers, breakers, and fault interrupters.

About the Speaker:

Jerry Josken is a graduate of Milwaukee School of Engineering with a BS degree in Electrical Engineering Technology. He earned a Masters in

Business Administration from North Central College. During his career at Cooper, Jerry has held a variety of positions including Design Engineer of Distribution Switchgear, Marketing Engineer for Distribution Switchgear, Sales Engineer and currently, Apparatus Engineer for the Mid East Region. Jerry is a member of IEEE.

Location:

Chicago Bar Association, 321 South Plymouth Court (Near Jackson & Dearborn), Chicago, IL 60604

Time:

11:30 AM Social
12:00 PM Lunch (optional)
12:15 PM Presentation
1:00 PM Adjourn

Reservations:

Lunch tickets can be purchased in the lobby bookstore (\$11.00). Please call the IEEE Business Office at (800) 898-IEEE to make your reservation.

For more info, visit the Chicago Chapter IEEE PES web site: www.ece.iit.edu/~flueck/chicago_pes/

EVENING MEETING

Chicago Chapter of the IEEE Power Engineering Society Power Engineering: Career Advice for the Young Engineer Wednesday, March 27, 2002

Panel Session- Industry Representatives

About the Topic:

The "Careers in Power Engineering" session will relate power engineering to motors and drives, software companies, computer companies, engineering firms, industrial applications, and electric utilities. Electrical professionals will provide college students with advice on various engineering topics including: selecting the right electives; making time for a co-op; keeping up with the technology; honing communication skills; pursuing advanced degrees; and finding the right mentor. **Students: Bring your resumes to include in our IEEE/PES career program book!**

Moderator & Coordinator: Angeline S. Schaefer-Senior Project Electrical Engineer, OWP&P Engineers, Electrical; Northwestern University, Evanston, BSEE, 1986; Chair/Student Liaison of IEEE-PES, Chicago Chapter, 2000-2001, aschaefer@owpp.com

Sponsor: Power Engineering Society, Chicago Chapter

Engineers: Edwin C. Lennox, P.E.-Management Consultant, Arthur Andersen Business

Consulting; University of Illinois, Urbana/Champaign, BSEE 1990, MSCE 1992, MSEE 1997; University of Chicago, MBA, 1998; Recipient of the 1997 Grainger Award for Power Engineering Excellence.

Paul Bearn, P.E.-Project Electrical Engineer, OWP&P Engineers; Pennsylvania State University, University Park, Pennsylvania, BSEE; The Lake Forest Graduate School of Management, Lake Forest, Illinois, MBA.

Clifton Muhammad-Energy Consultant, Deloitte Consulting; Illinois Institute of Technology, Chicago, BSEE, 1987; University of Chicago, MBA, 2001.

IEEE/PES Member: Maureen Barrera, Electrical Engineering, Junior at UIC, OWP&P Engineers, Electrical Designer, mbarrera@owpp.com

UIC/IEEE Officers 2002:

President: Dawn Fuller
Vice-President: Ben Wu
Treasurer: Preetha Thomas

Secretary: Jhoanna Conde
Public Relations: Grigoriy Titiyevskiy
Tech Projects: Iyaz Khan
Web Manager: John Olenczuk
Senior Advisor: Omar Shamsi
UIC/IEEE Website: www.ece.uic.edu/~ieee

Time:

4:30 PM Main Speaker/Free Refreshments
5:00 PM Topic Careers and Q&A with Students
5:30 PM Mixing with Power Engineers
6:00 PM Adjourn

Location:

University of Illinois - Chicago; Chicago Circle Center (CCC), Rathskellar, (Parking: Halsted/Taylor Parking Structure - HTTPS)

Directions:

UIC's web site www.uic.edu/depts/avcad/eastmap.htm has a map of campus. For more information, please visit the Chicago Chapter IEEE PES web site: www.ece.iit.edu/~flueck/chicago_pes/

EVENING MEETING

IEEE EMC Society Chicago Chapter EMC Modeling and Simulation - Practical Applications Wednesday, February 20, 2002

Jerry Meyerhoff, Motorola, Inc.

Objectives:

Mr. Meyerhoff will explain the application of computer modeling, simulation, and EMC analysis techniques to better understanding the EMC behavior of electronic systems. He will present his experiences in EMC troubleshooting and demonstrate the useful and practical application of computer modeling and simulation techniques. The discussion will draw on examples from automotive electronics, however the techniques have wide applicability to electronics in all industries.

About the Topic:

The academic community has been at the forefront of developing computer models to predict EMC behavior. These simulations involve highly advanced mathematical analysis, powerful computational equipment and detailed validation efforts.

Commercial CAE products using the technology can be daunting as well. The key in any case, is cleverly setting up the basic problem statement. Mr. Meyerhoff will bridge the gap between these complex software systems and more near-term applications of computer simulation techniques.

About the Speaker:

Jerry Meyerhoff is a Principal Staff Engineer in his 31st year at Motorola and currently contributes EMC know-how to multiple design and development teams working on automotive electronics modules. Jerry's early experience in the design of 2-way radios and wireless equipment sensitized him to EMC issues and technology. He participates in Society of Automotive Engineers EMC committees. He earned his BSEE from the University of Illinois at Chicago (UIC).

Time:

6:30 PM Social Hour
7:00 PM Meeting Start

Location:

Elite Electronic Engineering, Inc.
1516 Centre Circle
Downers Grove, IL 60515

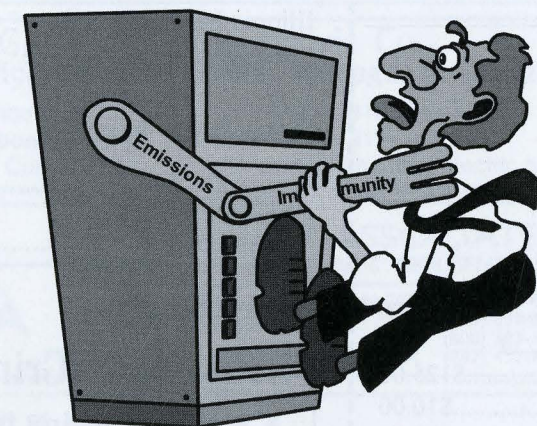
Directions:

<http://www.elitetest.com>

Reservations:

Steve Laya (Elite Electronic Engineering, Inc.)
Phone: 630-495-9770

Introduction to Electromagnetic Compatibility Design Practices* - April 25-26 Design Techniques for Controlling Radiated Emissions* - April 29-30



Is getting your product to pass its EMC test sometimes frustrating?

Learn the inside information on EMC and how to design for it from the initial stage through final production. Be part of over 2000 who have taken these classes.

Donald L. Sweeney, with 15 years experience teaching EMC design classes and 30 years experience in the EMC & Electrical Engineering fields, will be offering two courses at the Hilton in Northbrook, IL on April 25-26 & 29-30, 2002.

For students to apply what they have learned from the classes to their specific products, they are encouraged to bring a product, or a schematic of it, to a free personal consultation offered by the instructor or his associate on April 27 or May 1.

For more information or to receive a brochure, call D.L.S. at 847-537-6400 or find us on-line at www.dlsemc.com.

*These are the same classes formerly offered by Don Sweeney through the University of Wisconsin.

DLS
ELECTRONIC SYSTEMS, INC.
1250 Peterson Drive
Wheeling, IL 60090

IEEE-IAS Chicago Chapter
Industrial and Commercial Lighting Design
Saturday, February 23, 2002

February Technical Seminar 2002

Presenters:

Mike Bereece
Lighting Designer, Line Associates, Inc.
Siva Haran, PE, LC
Electrical Engineer,
WMA Consulting Engineers, Ltd.
Rick Kellen, PE, LC
Sr. Commercial Engineer,
Osram Sylvania, Inc.
Darrell Line
Lighting Designer, Line Associates, Inc.
Dave Mertz, PE
Electrical Engineer, HOH Engineers, Inc.
Peter Perkins
Vice President, Advance Transformer Co.
Russ Straub
President, Sure-Lite

Presenters Continued:

Howard Wolfman, PE
Senior Manager, Osram Sylvania, Inc.
Dennis Yates
Manufacturer's Representative,
Lighting Control Systems

Agenda:
7:30 am
Registration and Continental Breakfast
8:00 am
Session I:
Basic Definitions and Terms; Light Sources
and Lamp Types;
9:45 am
Break
10:00 am
Session II: Ballast Types; Standards, Guides.

And References; Energy Conservation and
Efficiency Regulations
12:00 pm
Lunch
12:30 pm
Session III: Emergency and Egress Lighting;
Lighting Control Systems; Computer
Modeling and Rendering
2:00 pm
Break
2:15 pm
Session IV: New Lighting Technologies and
Applications; Typical Applications; Ques-
tions; Seminar Evaluation

Location:

Holiday Inn, Willowbrook, 7800 Kingery
Hwy (IL 83 & I-55), Willowbrook, IL

Registration Form

NAME: _____

COMPANY _____

ADDRESS _____

CITY, STATE, ZIP _____

*Bus. Phone: (____) _____-

*Home Phone: (____) _____-

*e-mail _____

* Please provide these so we may contact you if there is a cancellation.

Fees:

IEEE Member Registration \$75.00
(To receive the member rate, provide your IEEE member No. _____)
IEEE Non-Member Registration\$125.00
Late Registration (after 16 February 2002).....\$10.00
Continuing Education Unit (CEU) Registration\$10.00

TOTAL.....\$.....00

Please make checks payable to "IEEE-IAS Chicago Chapter," and mail with this completed
registration form to IEEE-IAS Chicago Chapter Attn: David E. Mertz, PE, HOH Engineers,
Inc., 180 North Wabash Avenue, Chicago, IL 60601. Registrations will not be accepted with-
out payment. Attendance limited to the first 75 registrants.

ADVERTISER INDEX

DLS Electronic
Systems, Inc.9

Elmhurst CollegeBC

Illinois Institute
of Technology, DuPage6

Patten Power SystemsIFC

Weldy/Lamont
& Associates.....IFC

Contact

Beth VanderGrinten

for Advertising in

SCANFAX

magazine

(608) 222-7630

PROFESSIONAL AND BUSINESS DIRECTORY

Support these fine businesses that support **SCANFAX**.

Automatic Switch Company

ASCO

CHICAGO DISTRICT SALES OFFICE
747 Church Road, Suite 3E
Elmhurst, IL 60126

TEL: (630) 832-5900
FAX: (630) 832-7988

Transportation Engineering • Water Resources Engineering

CTE ENGINEERS

CONSOER TOWNSEND ENVIRODYNE ENGINEERS, INC.
303 East Wacker Drive, Suite 600, Chicago, Illinois 60601
(312) 938-0300 www.cte-eng.com

ELECTRONIC INSTRUMENT ASSOCIATES

Chicago 630-924-1600 • Milwaukee 262-677-1600
Manufacturer's Representative info@electronicinstrument.com

Electromagnetic Compatibility Test Equipment

Power Amplifiers, Transient Generation Equipment, Shielded Rooms,
Anechoic Chambers, EMC Antennas, Turntables, Field Probes, etc.

Electrical Parameter Measurement Instrumentation

AC & DC Current, Voltage, Watt, VAR Transducers, Sensors, Signal
Conditioning, Energy Monitoring Instruments, Demand / Submetering

ELECTROSWITCH
180 King Avenue, Weymouth, MA 02188
TEL : (781) 335-5200 • FAX: (781) 335-4253
WWW.electroswitch.com

Gus Berthold Electric Co.
1900 W. Carroll Ave., Chicago, IL 60612

Switchboards Ph: (312) 243-5767
Panelboards Fax: (312) 243-5811
Motor Controls sales@bertholdelectric.com

LEE BUTTER & ASSOCIATES
ELECTRICAL MANUFACTURERS REPRESENTATIVES
1125 W. LUNT AVE. PAGER (630) 255-4340
ELK GROVE, IL 60007 RES (630) 837-0733
847/437-7600 (800) 323-1802
FAX (847) 437-7609

LEHMAN COMPANY

Electrical Manufacturers Representative

PHONE: 630-942-1900 FAX: 630-942-1955

Power Quality Solutions Including:

► UPS Systems 250VA-4500kVA
► Power Conditioning Equipment
201 Hansen Ct., Ste. 121
Wood Dale, IL 60191 (800) 438-8002

M G E
UPS SYSTEMS

PANATROL

Automation and Controls

www.panatrol.com
info@panatrol.com

7481 S. Sayre Ave. • Bedford Park, Illinois
Phone: 496-3080 • Fax: 496-2770

• PLC and Computer Programming
• Electrical Design and Drawings
• Engineered Factory Automation
• Custom Control Panels
• Motor Controls
U/L Listed
CSA Certified



SQUARE D
Schneider Electric

Your source for electrical distribution, control, and automation
products, systems and services. Visit us at www.squared.com

Chicago Sales Office
500 East 22nd Street
Lombard, IL 60148
PHONE: 630-916-9550
FAX: 630-792-7085

T&D Products, Inc.

Manufacturers Representatives - Transmission & Distribution Electrical Equipment

650 East Diehl Road, Suite 107
Naperville, IL 60563
Web: www.tdproducts.com

Phone: (630) 245-9130
Fax: (630) 245-9135
email: info@tdproducts.com

ABB Power T&D Company Transformers, Switchgear, Breakers, Relays
ABB Control LV Capacitors, Harmonic Filters
Atkinson Industries Prefabricated Electrical Buildings
Cyberex Inc. UPS Systems, Static Transfer Switches
Hamby Young Substation Design and Supply
IPC Power Resistors Power Resistors
Shallbetter Inc. MV Cap Banks, Synchronizing Switchgear
Technibus/Simelectro Non-Seg Bus Duct / Iso-Phase Bus

Employment Opportunities

Nationwide engineering firm is expanding its Chicago office. We
are seeking both entry level and experienced **ELECTRICAL**
ENGINEERS to assist us in our growth. Must have BSEE and
excellent communication skills. PE or EI would be a plus.

Experienced Electrical Engineer position requires back-
ground in 480-volt power distribution for motors, equip-
ment, and lighting systems integral to water, wastewater,
commercial, and transportation projects. Experience in
SCADA controls and instrumentation systems is helpful.

We offer an attractive salary, professional growth potential,
immediate ESOP eligibility, no-interest computer loans, and
other outstanding benefits.

If you are interested in working with a dynamic, professional
team, send your resume to:

**Consoer Townsend Envirodyne
Engineers, Inc.**

303 E. Wacker Drive, Ste. 600 Chicago, IL 60601

Attn: Human Resources, Dept. S.A.

Or fax to: (312) 938-1109

EOE

M/F/D/V

In graduate study at Elmhurst, you'll

learn more.

Master of Science in Computer Network Systems

Our master's program in computer network systems provides professionals with state-of-the-art technical knowledge and a lot more. You will learn the ins and outs of WANs, LANs, Visual BASIC, distributed databases, VB script, Active Server Pages, and client server systems. You also will sharpen your communication skills, develop your management competencies, and explore the ethical issues of a fast-moving profession.

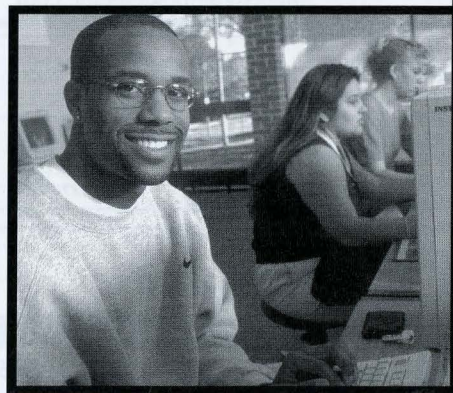
Elmhurst takes a distinctive approach to graduate study. We keep classes small, so each student works closely with our talented faculty. What's more, because you go through the entire program in cohorts, you will gain team-building experience and build a key professional support network.

All classes are scheduled part-time, in the evening. Challenging, innovative, intensely practical: at Elmhurst, you will get more than a master's.



Elmhurst College

More than a master's...



For information or to arrange a campus interview, call us at (630) 617-3030, or e-mail us at gradadm@elmhurst.edu. The College is located at 190 Prospect Avenue, Elmhurst, Illinois 60126.