

Sol Air

Newsletter of the Southern California Chapter: American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
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MARCH 4, 2003 MEETING INFO: ASHRAE RESEARCH PROMOTION

Les Freres TAIX
 1911 Sunset Blvd., Los Angeles, California

5:30 Tech Forum

6:05 Social Hour (Fun Time!)

6:45 Dinner
 \$25 with reservation
 \$30 without reservation
 \$10 student member

7:45 Main Program: Geoexchange Presentation
Speaker: Mr. Karl Fisher,
L.K. Fisher & Assoc.

9:00 Meeting Ends

Reservations: Dale Au or Brenda Montmarquet (626)
 961-9640, Fax (626) 961-9041 by Mon., March 3, 2003.

design and installation of geoexchange systems, by both the International Ground Source Heat Pump Association (IGSHPA) and Water Furnace International and has been responsible for the design and installation of numerous geoexchange systems.

An ASHRAE member, Mr. Fisher draws on an extensive design/build construction background as a California State Licensed Contractor since 1976. During the last eight years, he has also specialized in HVACR system design with particular emphasis on geoexchange systems. As an experienced instructor, he spends a portion of his time training HVAC contractors in the design and installation of these systems and serves as a geoexchange consultant for West Coast architects, mechanical engineers and HVAC contractors.

FEBRUARY MEETING PHOTOS



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MARCH MAIN MEETING: GEOEXCHANGE PRESENTATION

by: *Bob Woods*

Karl Fisher, an Association of Energy Engineers' "Certified Geoexchanger Designer" (CDG), has been a major influence in the growth of the geoexchange industry on the West Coast. He is also accredited in the



From the President's Desk

*Ralph Panting, President,
Southern California Chapter,
ASHRAE*

Our February meeting was a great success with 65 people in attendance. For those of you who were not able to attend, our evening speaker Terry Sun gave a great review of load calculation methods used by ASHRAE. Did you know that there are four methods used today and that there are problems associated with all methods. They are either too hard, too easy or too cumbersome to use. Some are more accurate than others. Larry did a fine job explaining the differences. ASHRAE is striving to improve on load calculation techniques by reviewing data in an ASHRAE sponsored technical committee. How exciting it is to know that we are a part of an organization that contributes to the advancement and improvements in our engineering field.

Its time for 2003-2004 elections, time to choose our new officers and committee people. A committee has been formed to review possible individual candidates to fill various offices and committee positions in our chapter. If you have a desire and are interested in serving in some capacity, please contact Phil Trafton or Clay Lampman and convey your desire.

See you at our March 4th meeting.

ASHRAE RESEARCH PROMOTION NIGHT

By Carmen Urenda, PE

ASHRAE Research develops HVAC&R technology that provides us with healthier environments to live and work in. Research addresses environmental issues such as microbial contamination, stachybotrys chartarum, global climate changes, ozone generators, indoor human-generated pathogens, latex allergens and the economics and modeling of IAQ. Research has fostered safer food processing, storage and delivery methods, assisted in the development of computer chips, and continues to influence our design projects, product lines and methods of installation.

There are currently 93 active research projects valued at approximately \$9 million and another 13 projects valued at over \$1.3 million being evaluated for contracting. Funding for these and future projects depends on our contributions. No matter what part of the industry you work in, manufacturing, consulting or sales, ASHRAE Research is a part of your profession. Tuesday, March 4th, is designated as ASHRAE Research Promotion Night. Please come hear about the new developments in Research and remember that your contributions count.

We are proud to recognize the following chapter members for their contributions to Research Promotion. Without the backing of these generous individuals and companies, achieving our research goals would not be possible.

Wayne D. Adams
Joseph Barker
Craig Barnett

FEBRUARY MAIN MEETING RECAP: RECENT LOAD CALCULATION RESEARCH RESULTS FROM TC 4.1

by: Cindy Callaway



Larry Sun, P.E. of Tsuchiyama & Kaino (pictured on the left with Bob Woods on the right) and a member of TC-4.1 Load Calculations Data and Procedures presented the results of recent research completed by

TC-4.1. In order to understand the future load calculation methodology a review of load calculation methods is necessary.

In the early 1960s the Heat Balance Method was introduced. This method calculates the conductive, convective and radiative heat balance for each room surface and performs a convective heat balance for the room air. Since this method is very rigorous it is also accurate, suitable for energy simulations and teachable

in theory. Its major disadvantages are that it requires intensive calculations, is typically limited to a single room and does not give a breakdown of the load components. To date there is limited software available for this method.

Effort was then put into developing a method that would be more usable. The 1967 Handbook unveiled the Total Equivalent Temperature Difference/Time Averaging (TETD/TA) method. TETD/TA breaks the load calculation into two steps. The convection portion of the load is taken to be instantaneous while the radiant portion is delayed using time averaging. This requires the user to determine the time factor to be used for the time averaging. Even though this new method involved logical steps using stated equations and was tailored to construction assemblies it still had major disadvantages. The calculations were time consuming, tedious and required a computer (remember this is 1967). More importantly it requires judgment on the user's part to select the time factor resulting in a non-scientific (approximate) depiction of the load phenomenon.

The next round of research attempted to remove the subjective time averaging factor. The Transfer Function Method (TFM) was introduced in the 1972 Handbook. It was based on response factors that accounted for the interplay of heat exchange between various surfaces and sources of heat. Thermal storage and radiant loads were accounted for. A 24-hour load evaluation could be obtained that accurately defines the load phenomenon that is occurring. However, 36 to 120 hours of consecutive analysis is required to stabilize the calculation. This did not lend itself to hand calculations – once again a computer is required. In addition, the results are typical loads, not peak loads, which are more suitable for energy analysis rather than load analysis. At the time this method could not be widely used by the practicing engineers.

Efforts were focused on developing a method that did not require a computer. The result was the Cooling Load Temperature Differentials/Cooling Load Factors (CLTD/CLF) method that made its debut in the 1977 Handbook. CLTD/CLF uses a single step calculation. The factors utilized were based on the TFM calculations previously developed. Data was presented in a tabular format that was easy to use and lent itself to manual calculations. Overall this method was simple to use and easy to teach. However, the method has a limited range of application that was not defined. This can result in underestimating the cooling load in nonstandard conditions.

Recent research has resulted in the Radiant Time Series (RTS) method. In the 2001 Handbook only Heat

Balance and RTS are the recognized load calculation methods. RTS is a “simplified” method relative to Heat Balance. It has a scientific basis since it is derived from the Heat Balance method. RTS assumes steady, periodic conditions to calculate peak design loads. It is not suitable for energy simulations. Conduction and radiant delays are accounted for by using a 24-hour time series to characterize the “curve” of the delay. The time series is calculated using Heat Balance. RTS is a rigorous, accurate calculation method capable of quantifying cooling load components and is easy to teach. A computer is still required but with one on every employee's desk this is not the limiting factor it used to be. Currently the major drawback is a lack of software. A demonstration spreadsheet is available through the ASHRAE on-line bookstore. Of the four major software vendors three have definite plans to incorporate RTS in their next major software revision. The fourth vendor is waiting on customer demand.



Bob Woods (left), Gregg Arnold (middle) and Jeff Mann (right)





E-WEEK ACTIVITY RECAP

by David Kuo, P.E.

Southern California Chapter of ASHRAE took part in National Engineers Week by organizing and sponsoring an outreach activity on February 20th. The E-Week activity targeted secondary-school students to promote a career in engineering. The event was hosted by the National Fuel Cell Research Center, a component of the Henry Samueli School of Engineering at University California, Irvine. Over 30 attendees participated in this fun-filled event, comprised primarily of students from Chemistry and Engineering classes at Valencia High (William S. Hart Union High School District) and the Engineering Academy from Los Altos High (Hacienda La Puente Unified School District).

The activity began with a presentation about UCI delivered by Bob Cassidy, Manager of Undergraduate Student Affairs. An

interactive discussion followed regarding University admissions, incoming-student profiles, and the various engineering disciplines. Kim Bergland, Outreach Director of NFCRC, gave an overview of the Research Center and its history. Together with Josh Mauzey, Senior Research Engineer, they presented fuel cell basics and discussed fuel cell applications in stationary power plants and Zero Emission Vehicle automobiles. Did you know UCI has two fuel cell vehicles?

The day proceeded with a tour of the overall UCI campus. Guided by engineering students, the tour included a stop at the Mousetrap Dragster competition that is part of the on-campus Engineers Week activity. Upon returning to the NFCRC, the students toured a number of research laboratories manned by graduate students. The students got an opportunity to see the world's one-of-a-kind fuel cell-microturbine hybrid power plant. Did you know that such a hybrid system can achieve an electrical efficiency of 70 percent?

Towards the end of the day, Larry Sun from Tsuchiyama Kaino Sun & Carter, past Regional Vice Chair for Student Activities, and

Clay Lampman from C.A. Lampman Associates, Chapter Chair for Student Activities, teamed up and introduced ASHRAE. A short video about ASHRAE was shown followed by a discussion about the organization and its impact on society.

In summary, the students had lots of fun and learned something in the process. Mission accomplished!

Special thanks to the following sponsors for their contributions which made this event possible:

- Air Treatment Corporation – Jerry Conklin
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SOUTHERN CALIFORNIA CHAPTER PROGRAM SCHEDULE

March 4, 2003

Main Program: Underground Thermal Storage/Heat Pumps
 Speaker: Karl Fisher
 Tech Forum: Complying with SCAQMD for Boiler Emissions
 Speaker: Greg Danenhower

April 1, 2003

Main Program: IAQ-Tech 62
 Speaker: Vicken Arabien
 Tech Forum: Modular Cooling Towers
 Speaker: TBD

May 6, 2003

Main Program: Acoustics
 Speaker: Mark Schaefer
 Tech Forum: VAV Turndown
 Speaker: TBD

June 2003

Installation Dinner/Dance

Western Section Programs

- ❖ March 11, 2003 (Ventura)
- ❖ April 8, 2003 (Santa Barbara)
- ❖ May 13, 2003 (Ventura)
- ❖ June 10, 2003 (Santa Barbara)

HELP WANTED

Anybody wishing to place an ad in this column for an engineering or other position, please submit your request to:

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