

## סמינר - SEMINAR

הנך מוזמנת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתקיים ביום ב' 15.05.2017 (יט' באייר, תשע"ז), בבניין דן קאהן, אודיטוריום 1, 14:30.

ירצה:

**Shlomo Rosenfeld, PE, ASHRAE Life Member**

Shlomo I. Rosenfeld & Associates, 1763 Broadway, Oakland, CA 94612 USA

על הנושא:

## 50 years of innovative energy conservation design

The seminar will be presented in English

להלן תקציר ההרצאה:

The intent of this talk is to describe several award winning innovative energy conservation Heating Ventilating and Air Conditioning (HVAC) design projects in order to inspire and attract students and faculty to this field .

The goals of HVAC systems are to provide a comfortable environment, better Indoor Air Quality (IAQ), improve productivity and be energy efficient with reasonable cost for the energy conservation design. Years ago, I coined the phrase "The-Use-Of-The-Available" for a design method for HVAC systems. A judge in an Energy Design Competition described the result as "Here is a very careful pairing of a simple energy-conserving design with sophisticated controls of conventional mechanical equipment."

Highlights of the presentation are:

1. Analysis of what is 'available' for each project from its unique climate and other characteristics.
2. Climate with high daily range temperatures with cool nights has an excellent potential for cooling water by evaporation. Cooling towers, which are idle at night, therefore are 'available', were used to cool water, at night, with no refrigeration. The cool water is stored for the following day air conditioning. (COP improvement from 3.9 to 22.)
3. Dry air climate at high altitude has the potential of providing air conditioning with no refrigeration. This design resulted in the largest ever central air system with two-stage evaporative cooling for a high rise building.
4. In evaporative cooling process, the temperature of the cooled media leaving the evaporative cooling process is limited by the ambient air Wet-Bulb (WB) temperature. The WB limit challenged HVAC engineers for years. This design shows how the ambient WB temperature limit was conquered and how water can be cooled by evaporative cooling below the ambient WB temperature.
5. An aquarium facility uses 2,000 gpm of ocean water to feed the kelps. The 'available' 2,000 gpm flow-back to the ocean is used as heat sink by three large (75 ton) heat-pumps to cool or heat the facility. This system is used also as a life safety system for the fish and kelp.
6. Patient nursing wing in a hospital is normally designed with 50% air exhausted from the patient bedroom toilet rooms and 50% return air. The conventional approach is that return air system is more efficient than 100% outside air system. Analysis shows that 100% outside air system with a 'Run-Around' Heat Recovery (RAHR) system, modified for each specific project climate, saves energy from the sum of exhaust and return air, resulting in the 'best of both worlds', saving more energy and saving initial cost over the conventional return air concept. At the extreme hot and humid Abu Dhabi climate, taking advantage of the hot climate, it allowed to design a 100% outside air with multi-level RAHR system which is more efficient than a conventional return air system while improving the IAQ, supporting the well-being of staff and patients, allowing the architect to accomplish the all-glass façade hospital design and win the first place at the Building Healthcare Awards 2015 in the following categories: Best Hospital Design, Best Sustainable Hospital Project and People's Choice.

בברכה,

פרופ' שמאל אלוזבסקי  
מרכז הסמינרים

מארח: פרופ' גרשון גרוסמן