

# Itzhak Maor, Ph.D., P.E., C.E.M.

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**Profile** Experienced HVAC & R and Energy engineer with strong design and construction experience in state of the art HVAC & R systems and equipment, combined with strong understanding of the theoretical aspects of design, indoor air quality and energy conservation.

- ◆ Highly skilled with Building Energy Simulation methodologies and software such as DOE-2.1 E and TRACE.
- ◆ Strong knowledge of Ventilation, Energy Recovery and Active Desiccant systems, applications, and equipment design.
- ◆ Highly competent with humidity control techniques and applications of specialized humidity control equipment.
- ◆ Experienced with development of software for analysis and selection of HVAC and energy systems.
- ◆ Experienced engineering manager with the ability to lead engineering teams performing engineering tasks on time and on budget.

**Professional Experience** 2000 - Present PWI Energy, Inc. Philadelphia, PA  
**Principal / Director of Engineering**

1998 - 2000 Fresh Air Solutions (Formerly Engelhard/ICC Technologies) Hatboro, PA

**Vice President of Engineering**

- Responsible for all engineering activities, such as product development, product engineering, and sales engineering support for specialized and custom Air Handling equipment for the commercial, industrial, and constitutional sectors.
- Developed and designed new product lines, such as large custom self-contained packaged air handling units, refrigeration systems, direct and indirect fired desiccant systems, air-to-air energy recovery, special filtration, and DDC control systems.
- Developed and designed state-of-the-art make-up air (100 % Outside Air) units utilizing enthalpy wheels, desiccants and sensible heat recovery with emphasis on Indoor Air Quality and Energy Conservation.
- Provided engineering support and training to inside and outside sales personnel.

1993 – 1998 Engelhard / ICC Technologies Philadelphia, PA

**Manager, Application Engineering (1994-1998)**

- Domestic and international technical support applying active desiccant based HVAC systems.
- Preparation of technical proposals, mechanical designs, submittals, feasibility studies, energy analyses, and software for HVAC applications.
- Designs for humidity treatment of outside air for virtually every type of commercial buildings, industrial facilities, hospitals, and schools.
- Evaluation and design of systems for varied industrial humidity controlled environments and clean rooms.

**Application Engineer (1993-1994)**

- Preparation of technical proposals, mechanical designs, submittals, feasibility studies, energy analyses, and software for HVAC applications.

1991 – 1993 Gershon Meckler & Associates, Consulting Engineers Herndon, VA

**Design Engineer**

- Designed state-of-the-art HVAC & R systems with emphasis on Indoor Air Quality and Energy Conservation utilizing ice storage systems, cold air distribution, air-to-air heat recovery and DDC systems for government facilities, such as the Social Security Administration buildings in Philadelphia PA, Chicago, IL, and Richmond, CA.

1988 - 1991 Itzhak Maor, Consulting Engineers Haifa, Israel

**Principal**

- Provided consulting engineering services.
- Designed HVAC & R systems for hotels, office buildings, retail establishments, places of assembly, and residential buildings from concept to final design.

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	1980 – 1987	Herouth Ltd., Electro-Mechanical Contractors	Haifa, Israel
	<b>Manager, Design Department (1984 – 1987)</b>		
	➤ Responsible for all the design/build engineering activities, including design of HVAC & R systems, design and selection of equipment such as chillers, boilers, pumps, air handling equipment, refrigeration systems, etc. Generation of submittal documents and O & M manuals.		
	<b>Design Engineer, Design Department (1982 – 1984)</b>		
	➤ Design of HVAC & R systems, design and selection of equipment such as chillers, boilers, pumps, air handling equipment, refrigeration systems, etc.		
	<b>Project Engineer (1980 – 1982)</b>		
	➤ Responsible for construction, balancing and commissioning of large scale HVAC&R systems.		
<b>Education</b>	2002	Drexel University	Philadelphia, PA
	<b>Ph.D. Civil Engineering</b>		
	1991	Technion – Israel Institute of Technology	Haifa, Israel
	<b>M. Sc. Civil Engineering</b>		
	1980	Technion – Israel Institute of Technology	Haifa, Israel
	<b>B.Sc. Mechanical Engineering</b>		
<b>Research Experience</b>	<hr/>		
	<b>Ph.D. Research - 2000 -2002</b>		
	➤ Conceptual design and selection of HVAC & R systems by combining knowledge based expert system with a building energy simulation program.		
	<b>ASHRAE RP-1051 (Co/PI) – 2003-2006</b>		
	➤ Procedures for Reconciling Computer-Calculated Results with Measured Energy Data.		
	<b>ASHRAE RP-1340 (PI) - 2006 - 2008</b>		
	➤ Intelligent Control of Combined Heat and Power Systems		
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<b>Academic Activity</b>	2003 - 2006	Drexel University	Philadelphia, PA
	<b>Ph.D. Committee Member</b>		
	➤ Committee member of a Ph.D. Candidates for the Ph.D. research dissertation.		
	1989 - 1991	Technion – Israel Institute of Technology	Haifa, Israel
	<b>Adjunct Teacher of Mechanical Engineering</b>		
	➤ Instructed senior students in their HVAC & R senior design projects.		
<b>Registrations / Certifications</b>	◆ Professional Engineer- State of Maryland and Commonwealth of Massachusetts		
	◆ Certified Energy Manager (CEM) – Association of Energy Engineers		
	◆ Green Building Engineer (GBE) - Association of Energy Engineers		
<b>Awards</b>	❖ 2004 Energy Engineer of The Year - Association of Energy Engineers Philadelphia Chapter		
<b>Memberships</b>	◆ American Society of Heating, Refrigeration, & Air Conditioning Engineers (ASHRAE)		
	- ASHRAE /IESNA Standard Project Committee 90.1 – Voting Member		
	- ASHRAE /IESNA Standard Project Committee 90.1, ECB subcommittee – Voting Member		
	- Technical Committee 9.7, Educational Facilities – Vice Chair & Handbook Chair		
	- Technical Committee 9.8, Large Buildings HVAC Applications –Voting Member		
	- Technical Committee 7.6, Systems Energy Utilization –Corresponding Member		
	- Technical Committee 5.5, Air to Air Energy Recovery - Corresponding Member		
	◆ Association of Energy Engineers (AEE)		
	◆ International Building Performance Simulation Association (IBPSA)		

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## Publications

- ❖ Literature Review of Artificial Intelligence and Knowledge Based Expert Systems in Buildings and HVAC & R Systems Design. ASHRAE Transactions 2003 (4599).
- ❖ Development and Implementation of HVAC-KBCD: A Knowledge Based Expert System for Conceptual Design of HVAC & R Systems-Part 1: General Framework - ASHRAE Transactions 2004 (4691)
- ❖ Development and Implementation of HVAC-KBCD: A Knowledge Based Expert System for Conceptual Design of HVAC & R Systems- Part 2: Case Study Application to Office buildings - ASHRAE Transactions 2004 (4692).
  
- ❖ Calibrating Detailed Building Energy Simulation Programs with Measured Data- Part I: General Methodology", HVAC&R Research Journal, March 2007 (Co/ Author)
  
- ❖ Calibrating Detailed Building Energy Simulation Programs with Measured Data- Part II: Application to Three Case Study Office Buildings", HVAC&R Research Journal, March 2007(Co/Author)