



Taylor Engineering

1080 Marina Village Parkway, Suite 501 ■ Alameda, CA 94501-6427 ■ (510) 749-9135 ■ Fax (510) 749-9136

MARK HYDEMAN, P.E., FASHRAE

Mr. Hydeman is a registered mechanical engineer with an MS and BS in Mechanical Engineering from Stanford University. He has over 20 years of experience in the design, commissioning, evaluation and optimization of HVAC systems for commercial and industrial buildings. He joined Taylor Engineering in July of 1999, a consulting firm specializing in energy efficient HVAC system design.

Mr. Hydeman is considered an authority on the design, evaluation and commissioning of energy efficient and cost effective HVAC and control systems. He is active in building science research and has developed software, guidelines and seminars to assist practitioners to optimize HVAC and control systems. For his contributions to the field, he was upgraded to Fellow in the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

Mr. Hydeman's design portfolio includes data centers, incarceration facilities, military facilities, manufacturing facilities, laboratories, underfloor air conditioning systems, educational facilities and central plants. He has extensive experience with new construction and retrofits as well as design/build and design/assist procurement. His designs are practical, cost effective, resource efficient and designed for ease of maintenance.

Mr. Hydeman is renowned for his chilled water plant, controls and commissioning expertise. He conceived and managed the CoolTools™ market transformation project for the optimization of chilled water plants. He has assisted in the analysis of thousands of tons of chilled water capacity and with one project alone producing electrical savings of 6.4 GWh/yr that were verified through field monitored data. His software tools have been incorporated in the eQuest and EnergyPlus simulation programs.

Mr. Hydeman has extensive hands-on experience with control systems. He has designed and commissioned systems from a multitude of vendors and has developed master controls procurement strategies for governmental, commercial and institutional clients. Mr. Hydeman co-teaches a popular U.C. Berkeley Extension Service Course on HVAC Controls, and is the Principal Investigator on a multiyear ASHRAE research project for development of standardized control sequences. He has contributed to ASHRAE's Technical Committee on controls and the BACnet Standards committee. He has also contributed to research on optimizing control algorithms and automated fault-detection and diagnostic (AFDD) systems.

During his tenure at the PG&E Pacific Energy Center Mr. Hydeman helped develop and manage the tool lending library services (<http://www.pge.com/pec/tooltoc/toollib.html>). During that time he tested field measurement equipment, assisted customers with field measurement projects, developed and presented hands-on measurement seminars and developed software to assist in measurement projects. He also conceived and developed the Universal Translator program (<http://www.utonline.org/>) which manages and analyzes data from data loggers and trend data from energy management and control systems (EMCS). His commissioning experience includes data centers, laboratories, chilled water plants and manufacturing facilities.

Mr. Hydeman has been very active in the development and promulgation of commercial building energy codes including ASHRAE/IESNA Standard 90.1 and California's Title 24. Over the past two decades he has authored a significant portion of the non-residential HVAC sections of these codes, been the lead contractor for development of the non-residential HVAC requirements for Title 24 over the past 4 updates and currently serves as Vice-Chair of SSPC 90.1.



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Education

1982 - 1983: Stanford University, M.S. Mechanical Engineering
1978 - 1982: Stanford University, B.S. General Engineering with distinction

Registration

1990 - present State of California: Mechanical Engineer, M26724
2006 - present State of Arizona: Mechanical Engineer, 44027

Experience

- 1999 - present: Taylor Engineering, Alameda, CA
Principal. HVAC and control system design; commissioning; retrocommissioning; building energy simulation; development of campus standards; building science research; energy standards and codes.
- 1993 - 1999: PG&E Energy Center, San Francisco, CA
HVAC Program Coordinator. Served as in-house mechanical, controls and field measurement expert; management of the data collection tool lending library; development of CoolTools™ toolkit for the evaluation of chilled water plants (<http://www.hvacexchange.com/cooltools/>); development of the Universal Translator™ software for field data management and analysis; development of rebate programs; and produced and taught educational design seminars for mechanical engineers, energy engineers and facility managers.
- 1990 - 1993: Eley Associates, San Francisco, CA
Project Manager, Management of firm's design assistance consulting services. Participated in firm's work developing energy codes and technical design guides.
- 1988 - 1990: Glumac Associates, San Francisco, CA
Project Engineer. HVAC design, control design and project management for military, large commercial and industrial projects.
- 1987 - 1988: Design Engineering, San Francisco, CA
Design Engineer. HVAC and plumbing design for small commercial and multifamily residential projects.

Teaching Experience

- 1993 - present: University of California Extension, Berkeley, CA
Instructor. For both the HVAC Controls and HVAC design course that are part of the core curriculum for an ASHRAE/UCB co-sponsored certificate program.
- 1993 - present: PG&E Energy Center, San Francisco, CA
Managed and presented HVAC programs for the PG&E Pacific Energy Center

Professional Associations

American Society of Heating, Refrigerating, and Air- Conditioning Engineers (ASHRAE):

Member 1990 to 2006, Fellow 2006

Distinguished Service Award 2005

Technical Committee 9.9, Mission Critical Facilities, Member

Technical Committee 1.5, Computer Applications, Past Chair

Electronic Communications Committee, Vice-Chair.

Professional Development Committee, Founding Chair

Course Development Committee, Past Vice-Chair

Served on several ASHRAE Presidential Ad-Hoc Committees including Building Labeling

SSPC 90.1, "Energy Code for Buildings Except Low-Rise Residential Buildings," Vice-Chair.

Region X past-webmaster and co-chair of the 2001 Region X Chapter's Regional Conference.

Golden Gate Chapter Past-President 1999-2000

Golden Gate Chapter/UC Berkeley cosponsored HVAC/R certificate program steering committee, founding member.

CoolSense National Forum on Integrated Chiller Plant Retrofits, Co-Chair 1997

Publications

Optimizing Chilled Water Plant Controls. ASHRAE Journal, June 2007.

Advanced Variable Air Volume System Design Guide. California Energy Commission Publication #500-03-082-A-11. October 2003, 2007.

The CoolTools™ Chilled Water Plant Design and Performance Specification Guide. PG&E 1999, 2007.

A Tale of Two Codes. ASHRAE Journal, April 2006.

ASHRAE Green Guide. ASHRAE. 2003, 2006. ISBN 1-931862-41-9.

Staying Online: Data Center Commissioning. ASHRAE Journal, June 2005.

Successful DDC System Retrofits. ASHRAE Journal, June 2004.

Development and Testing of the Characteristic Curve Fan Model. ASHRAE Journal, January 2004.

A Fresh Look at Fan Selection and Control. HPAC Magazine, May 2003.

Applications of Component Models for Standards Development. ASHRAE Transactions AC-02-09, 2002.

Measured Performance and Design Guidelines for Large Commercial HVAC Systems. ACEEE Conference on Energy Efficiency, August 2002.

Development and Testing of a Reformulated Regression Based Electric Chiller Model. ASHRAE Transaction, HI-02-18-02, 2002.

Tools and Techniques to Calibrate Electric Chiller Component Models. ASHRAE Transaction, AC-02-9-01, 2002.

Application of Cooling Tower Models for Standards Development: Life-cycle cost Analysis of 2-Speed Controls for ASHRAE/IESNA Standard 90.1-1989R. ASHRAE Transaction, AC-02-9-02, 2002.

An Improved Cooling Tower Algorithm for the CoolTools™ Simulation Model. ASHRAE Transaction, AC-02-9-04, 2002.

ASHRAE/IES Standard 90.1 User's Manual, HVAC and SWH sections ASHRAE 1993, 1999, 2001.

Economic Uncertainties in Chilled Water System Design. ASHRAE Transaction, SE-99-16-3, 1999.

Commissioning Tools & Techniques Used in a Large Chilled Water Plant Optimization Project.

Proceedings of the 7Th National Conference on Building Commissioning. PECE, 1999.

Effective Market Transformation from Energy Centers. ACEEE Conference on Energy Efficiency, 1998.

PG&E's CoolTools Project: A Toolkit to Improve Evaluation and Operation of Chilled Water Plants.

CoolSense National Forum on Integrated Chilled Water Retrofits. Lawrence Berkeley National Laboratories, 1997

Designing Chilled Water Plant Retrofits with DOE-2. CoolSense National Forum on Integrated Chilled Water Retrofits. Lawrence Berkeley National Laboratories, 1997

Guide to Energy-Efficient Commercial Equipment. American Council for an Energy-Efficient Economy (ACEEE), 1997.

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Taking a Building's Vital Signs: a Lending Library of Handheld Instruments. ACEEE Conference on Energy Efficiency, 1996.

Chiller Monitoring Protocols. PG&E, 1995.

WLHP Systems - Volume 1 Engineering Design Guide & Volume 2: California Compliance Guide. EPRI, TR101-134 V1 &2, December 1992.

Representative Design and Consulting Projects

Oracle Headquarters	Office Park and Data Center	Redwood Shores CA
Kaiser Permanente	Data Center and Training Facility	Napa CA
Kaiser Permanente	Data Center	Corona CA
Kaiser Permanente	Data Center	Pleasanton CA
Lawrence Berkeley Nat. Labs.	Data Centers	Berkeley CA & Oakland CA
Lawrence Berkeley Nat. Labs.	Laser Laboratory	Berkeley CA
County of Alameda	Office, Data Center & Jail	Oakland CA
Symantec Corporation	Data Center	Tucson AZ
Siebel Corporation	Data Center	Salt Lake City UT
Sun Microsystems	Data Center & Central Plant	Santa Clara CA
Stanford Stauffer I & II	Laboratory	Stanford CA
Stanford Cantor Arts Center	Museum	Stanford CA
Stanford Keck Science	Laboratory	Stanford CA
Stanford Beckman CM/GM	Medical Laboratory	Stanford CA
Stanford Gilbert Hall	Animal Laboratory	Stanford CA
Marin Academy	Performing Arts Center	San Rafael CA
100 First Street	Office	San Francisco CA
388 Market Street	Office/Retail	San Francisco CA
DiCon Fiberoptics, Inc	Industrial Facility	Richmond CA
Palm, Inc. Corporate Campus	Office	San Jose CA
IBM/Toshiba Cottle Road	Industrial Park	San Jose, CA
IBM Almaden	Research Center	San Jose, CA
PG&E ACT ²	Office	San Ramon, CA
PG&E TES	Research Laboratory	San Ramon, CA
State of California	Central Plant	Sacramento CA
UC Davis	Central Plant	Davis CA
UC Davis Briggs Hall	Laboratory	Davis CA
UC Davis Mrak Hall	Office	Davis CA
UC Davis Tupper Hall	Animal Lab.	Davis CA
UC Davis Hutchinson Hall	Chemical Lab.	Davis CA
CSUB Math and Sciences	Classroom	Bakersfield CA
CSU Maritime	Campus	Vallejo CA
Sonoma State University	Central Plant	Rohnert Park CA
Genentech	Central Plant	Vacaville CA
Ventura County Jail	Jail	Ventura CA
Santa Ana Sherriff's Facility	Sherriff's Facility	Santa Ana CA
Bank of America	Office	San Francisco CA
UCSC Earth and Marine Sci.	Laboratory	Santa Cruz CA
Forensic Science Facility	Laboratory	Martinez CA
Beale Air Force Base	Flight Training Campus	Marysville CA
Alameda Naval Air Station	Turbine Coating Facility	Alameda CA

Representative Building Science Research

Data Center Research. Participated in a variety of research projects sponsored by US DOE, the California Utilities and ASHRAE including: data center benchmarking tools; analysis tools for HVAC systems and central plants; fundamental research on the need for humidification of data centers; airflow management research; and testing of high density liquid cooling systems.

PIER Sponsored Research for Code Compliance. Member of a research project to develop a simulation kernel and rules generator that will automatically create and run compliance models (proposed and budget models) for a variety of rule sets including: Title 24's Performance Method, ASHRAE/IESNA Standard 90.1's ECB Method ASHRAE/IESNA Standard 90.1's Appendix G Rule Set (for LEED compliance) and ASHRAE/IESNA/USGBC Standard 189.

ASHRAE Research Project 1455. Principal Investigator for multiyear project to develop standardized energy efficient control sequences with automated fault detection and diagnostics.

CoolTools™: Designed and managed a \$4,000,000 market transformation project to develop a suite of chilled water plant design and evaluation tools. Designed, program and tested modules for cooling towers, chillers and integrated central plant simulations.

PIER Sponsored Research for Built-Up VAV Systems: Principal Investigator in a 3-year research project on optimization of the design airside VAV systems. The program developed new simulation tools, energy code requirements, standards for testing VAV boxes and a popular design guide.

Universal Translator™: Designed and developed a prototype for a tool that imports and manages data from data loggers of different manufacturers. The application has routines that resample data from multiple channels for analysis.

PG&E Energy Center Tool Lending Library Automated Applications: Developed automated VBA applications to analyze data for a range of studies including: performance of air-side economizers; evaluation of time-based lighting controls; evaluation of occupant sensor lighting controls; runtime analysis of compressors; and statistical correlation of current to true rms power.

Representative Educational Programs

Chilled Water Plant Design: Mr. Hydeman has taught a variety of programs on the procurement, optimization, instrumentation and design of chilled water plants. He and Steve Taylor are the authors of ASHRAE Professional Development Series Course on chilled water plant design.

Non-Residential Energy Code Compliance: Mr. Hydeman has taught courses on compliance with both ASHRAE/IESNA Standard 90.1 and Title 24 including ASHRAE's Professional Development Series Course on 90.1.

Controls: Topics include retrofit of control systems, application of web-based control interfaces, application of EMCS systems for field monitoring and DDC system commissioning.

Simulation and Optimization: Topics include case-study based compliance with LEED and utility rebate programs, advanced modeling techniques using eQuest and DOE-2, comparison of simulation and load calculation tools, and optimization of control sequences using VBA code.