James Howard Arthur, PhD, PE
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Education

PhD Mechanical and Aerospace Engineering	University of Virginia	May, 1988
MS Mechanical Engineering	University of Virginia	August, 1982
BS Mechanical Engineering with Distinction	University of Virginia	May, 1980

General Background

Dr. Arthur has more than 24 years experience in energy system simulation. He has developed a computer model to simulate air-conditioner performance using alternative refrigerants. He has done extensive model development for the United States Army Fort Belvoir Research, Development and Engineering Center. His most recent model development is a transient heating and cooling model of portable shelters and tents for the US Army. His experience in the Nuclear Industry provides valuable insight into the problems, limitations and benefits of Nuclear Power.

Dr. Arthur has worked as a consultant for the Virginia State Energy Office, for the Electric Power Industry (Virginia Power), private energy consultants, and the United States Army. He has written or co-authored more than 39 papers and reports.

He has served as a member of Virginia Power/North Carolina Power's Planning Advisory Committee. The mission statement is "The advisory group will include customers representing a variety of personal and professional perspectives. The advisory group will be afforded opportunities to participate in various stages of the planning process including forecasting, DSM potential assessment, DSM program design, integration and risk assessment."

Dr. Arthur teaches instrumentation theory at VMI and has substantially modified his instrumentation laboratory during the past 6 years. He also teaches classes in Heating, Ventilation and Air-Conditioning Design, Energy Conversion Design (Heat Exchanger Design and Energy System Simulation), Heat Transfer, Fluid Mechanics, Flight Mechanics, Thermodynamics, Energy Laboratory, Statics, Computer Programming (FORTRAN, Basic), and Fundamentals of Aerodynamics.

Current research and teaching interests include model simulation development in the areas of solar energy and energy conservation techniques.

In April 1997 Dr. Arthur was presented The VMI Foundation, Inc. Award for Distinguished Teaching.

Experience

VIRGINIA MILITARY INSTITUTE, Lexington, VA, 1988-present

* Teaching and advising undergraduate students
* I teach courses in Energy Conversion Design (Heat Exchanger Design, Energy System Simulation), HVAC Design, Heat & Mass Transfer, Flight Mechanics, Fluid Mechanics, Thermodynamics, Instrumentation Laboratory, Energy Laboratory, Statics, Computer Programming (FORTRAN, BASIC) , and Introduction to Computer Topics
* Independent research and consulting in the energy area
* Received the VMI Foundation, Inc. Award for Distinguished Teaching in 1997

ASSOCIATED ENVIRONMENTAL CONSULTANTS, Charlottesville, VA, 2001-present, Research (Energy) Consultant, joined as a Partner in 2005

* Developed and verified a heating and cooling simulation model for army shelters. This work was supported by the United States Army Fort Belvoir Research, Development and Engineering Center.

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1997-1997, Research Consultant, Graduate Advisor

* Continued research on a simulation model for an air conditioning system. Worked with a graduate student (as an advisor) at the University on experimental verification of our computer simulation model. This work was supported by the United States Army Fort Belvoir Research, Development and Engineering Center.

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1996-1996, Research Consultant

* Continued research on a simulation model for an air conditioning system. Enhancements included a new compressor model based upon manufacturers performance data. This work was supported by the United States Army Fort Belvoir Research, Development and Engineering Center.

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1995-1995, Research Consultant

* Developed and enhanced a simulation model for a nominal 3 ton air conditioning system. Work included adding the capability to simulate system performance when using refrigerant blends. Refrigerant properties were obtained from NIST. This work was supported by the United States Army Fort Belvoir Research, Development and Engineering Center.

ASSOCIATED ENVIRONMENTAL CONSULTANTS, Charlottesville, VA, 1995-1995, Research (Energy) Consultant

* Modified the UVA air conditioning simulation model to incorporate manufacturers performance data for the compressor (compressor maps). This work was supported by the United States Army Fort Belvoir Research, Development and Engineering Center.

2rw CONSULTING ENGINEERS, PC, Charolttesville, VA, 1995-1995, Consultant

* Performed review of Technical Assistance Reports for Cycle XVII of the Virginia Institutional Conservation Program (ICP). This ICP is administered by the Division of Energy, Virginia Department of Mines, Minerals, and Energy.

VIRGINIA POWER, Charlottesville, VA, 1995-1995, Energy Consultant

* Performed A Feasibility Study: Application of Thermal Energy Storage Technology at Maury River Middle School. Funding for this work was provided by Virginia Power.

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1994-1994, Research Consultant

* Developed a semi-theoretical model for a positive displacement compressor. This model has been incorporated in a simulation of a nominal 36000 BTUH air conditioning unit. Funding for this work was provided by the United States Army Fort Belvoir Research, Development and Engineering Center.

2rw CONSULTING ENGINEERS, PC, Charolttesville, VA, 1994-1994, Consultant

* Performed review of Technical Assistance Reports for Cycle XVI of the Virginia Institutional Conservation Program (ICP). This ICP is administered by the Division of Energy, Virginia Department of Mines, Minerals, and Energy.

VIRGINIA POWER, Charlottesville, VA, 1994-1994, Energy Consultant

* Performed A Feasibility Study: Application of Thermal Energy Storage Technology at Alleghany High School. Funding for this work was provided by Virginia Power.

U. S. ARMY BELVOIR RESEARCH, DEVELOPMENT AND ENGINEERING CENTER, Fort Belvoir, VA, 05/93-08/93, The United States Army Summer Faculty Research and Engineering Program, Visiting Professor

* Developed and tested queuing system simulation model for Logistics Over-the-Shore Operations. Used FORTRAN 77 to produce a user friendly, interactive computer model to evaluate watercraft productivity. This work was supported by the Belvoir Research, Development and Engineering Center (Mr. John Walter) under the auspices of the U.S. Army Research Office Scientific Services Program administered by Battelle (Delivery Order 0686, Contract No. DAAL03-91-C-0034).

VIRGINIA POWER, Charlottesville, VA, 1991-1991, Energy Consultant

* Performed A Feasibility Study: Application of Thermal Energy Storage Technology at the Greif Companies Facility. Funding for this work was provided by Virginia Power, the Grief Companies, and Virginia's Center for Innovative Technology.

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1990-1990, Research Consultant

* Energy consultant: Analyzed heat pump system; evaluated the methodology and implementation of heating and cooling load assessment models for the US Army Fort Belvoir Research and Development Division

ASSOCIATED ENVIRONMENTAL CONSULTANTS, Charlottesville, VA, 1990-1990, Research (Energy) Consultant

* Performed analysis of a heat pump systems for the U. S. Army Fort Belvoir Research and Development Division.
* Evaluated the methodology and implementation of heating and cooling load assessment models for the U. S. Army Fort Belvoir Research and Development Division.

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1988-1989, Associate Research Engineer

* Conducted heat transfer research involving environmental control units (air conditioners) for the US Army Fort Belvoir Research and Development Division
* Conducted heat transfer research involving cooling of electronic components
* Continued investigation of infrared radiation shielding techniques

UNIVERSITY OF VIRGINIA, Charlottesville, VA, 1981-1982; 1984-1988, Graduate Research Assistant/Graduate Teaching Assistant

* Duties as a teaching assistant included preparing and delivering lectures during the absence of the professor, preparing solutions to assigned problems, grading homework, and helping students who were having trouble in the course.
* Duties as a research assistant included formulation and execution of a research program to investigate the heat and mass transfer characteristics of selected radiation shielding (camouflage) techniques. Research funding was provided by the U. S. Army Fort Belvoir Research and Development Division.

BABCOCK & WILCOX COMPANY, Nuclear Power Division, Lynchburg, VA, 1979-1979; 1980-1981; 1982-1984

* Thermal hydraulic safety analysis, mechanical design, hands on field experience at operating plants, Assembled and reduced experimental data associated with the recovery of the Three Mile Island nuclear power station

Professional Societies and Activities

Professional Engineer, 1991, Virginia registration number 022343.
EPA Green Lights Surveyor Ally, August 1995.
American Society of Mechanical Engineers, **Shenandoah Section Treasurer**, 1991-1992, 1992-1993; **Chairman**, 1993-1994, 1994-95
American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., **Shenandoah Section Chairman**, 1997-98, 1998-1999, 1999-2000, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05, 2005-06.
American Society for Engineering Education
Sigma Xi, the Scientific Research Society
Tau Beta Pi, Member and **Chief Faculty Advisor** (1992-present) for Virginia Delta Chapter
Selected for inclusion in the second edition of Marquis WHO'S WHO IN SCIENCE AND ENGINEERING.
Selected for inclusion in the 2002 edition of WHO'S WHO IN ENGINEERING EDUCATION.
Selected for inclusion in the seventh edition of WHO'S WHO AMONG AMERICA'S TEACHERS.

PUBLICATIONS and REPORTS

Beard, Taylor and Howard ARTHUR, and Robert Ribando, "New Shelter System Environmental Assessment Model (SAM), Phase V, Model Enhancements for Tent Applications", Final Report Submitted to Mr. Nicholas P. Johnston, US Army CECOM RD&E Center, C2 Directorate - Environmental Sys Br, Fort Belvoir, Contract No. W909MY-04-P-0066, February 2005.

ARTHUR, J. Howard, and Robert J. Ribando, "Use of Insulated Concrete Form (ICF) Construction for Energy Conservation in Residential Construction", Paper Number ISEC2004-65022, Proceeding of the 33rd American Solar Energy Society Annual Conference, Proceedings of the 29th National Passive Solar Conference, Portland, Oregon, July11-14, 2004.

ARTHUR, J. Howard, Charles D. Morgan, Cory D. Engelhard, and Berton Austin, Jr., "Investigation of A Two-Phase Siphon - Pressure Drop Characteristics, Flow Prediction, and Flow Regime Change Prediction", Paper Number HT-FED04-56186, Proceedings of the 2004 ASME Heat Transfer/Fluids Engineering Summer Conference, Charlotte, NC, July 11-15, 2004.

Beard, Taylor and Howard ARTHUR, and Robert Ribando, "New Shelter System Environmental Assessment Model (SAM), Phase IV, Model Enhancements for Latent Heat and Tent Applications", Final Report Submitted to Mr. Nicholas P. Johnston, US Army CECOM RD&E Center, C2 Directorate - Environmental Sys Br, Fort Belvoir, Contract No. DAAB15-05-P-0076, June 2004.

ARTHUR, J. Howard, J. Taylor Beard, Robert J. Ribando, Ashok Patil, Nicholas P. Johnston, "An Environmental Control System Assessment Model for Camouflaged Shelters", Strojnkski Vestnik: Journal of Mechanical Engineering, vol.49, no. 11, 2003, pp 549-557.

Beard, Taylor and Howard ARTHUR, and Robert Ribando, "Characteristics of a New Shelter System Environmental Assessment Model (SAM), Phase III, Tent Model Development and Verification", Final Report Submitted to Mr. Nicholas P. Johnston, US Army CECOM RD&E Center, C2 Directorate - Environmental Sys Br, Fort Belvoir, Contract No. DAAB15-02-P-0067, June 2003.

ARTHUR, J. Howard, J. Taylor Beard, Robert J. Ribando, Ashok Patil, Nicholas P. Johnston, "A New Environmental Control System Assessment Model for Shelters", Paper Number TED-AJ03-326, Proceedings of the 6th ASME-JSME Thermal Engineering Joint Conference, March 16-20, 2003.

ARTHUR, J. Howard, and Michael R. Sexton, "Labview Application: Energy Laboratory Upgrade", 2002 ASEE Annual Conference and Exposition Proceedings, Session 3233, Montreal, Quebec, June 16-19, 2002.

Beard, Taylor and Howard ARTHUR, and Bob Ribando, "New Shelter System Environmental Assessment Model (new SAM), Phase II, Algorithm Development", Final Report Submitted to Mr. Nicholas P. Johnston, US Army CECOM RD&E Center, C2 Directorate - Environmental Sys Br, Fort Belvoir, Contract No. DAAB15-02-V-0014, July 2002.

Beard, Taylor and Howard ARTHUR, "New Shelter System Environmental Assessment Model (SAM), Phase 1 Characteristics", Final Report Submitted to Mr. Nicholas P. Johnston, US Army CECOM RD&E Center, C2 Directorate - Environmental Sys Br, Fort Belvoir, Contract No. DAAB15-02-V-0002, March 2002.

ARTHUR, J. Howard, J. T. Beard, and C. Bolton, "Integration of Compressor Performance Maps and NIST Refrigerant Database in an Air Conditioner Thermal Performance Simulation Model", Proceedings of the 32st Intersociety Energy Conversion Engineering Conference, Vol 2, pp 1265-1270, 1997.

ARTHUR, J. Howard, J. T. Beard, and C. Bolton, "Air Conditioner Thermal Performance Simulation Model Using NIST Refrigerant Database", Proceedings of the 31st Intersociety Energy Conversion Engineering Conference, Vol 3, pp 2015-2020, 1996.

ARTHUR, J. Howard, J. T. Beard, and C. Bolton, "Simplified Analytical Modeling of an Air Conditioner with a Positive Displacement Compressor", Proceedings of the 31st Intersociety Energy Conversion Engineering Conference, Vol 3, pp 2009-2014, 1996.

Beard, J. Taylor, and James H. ARTHUR, "Application of Commercial Compressor Performance Maps in the UVA Air Conditioner Simulation Model", Final Report Submitted to Mr. Chris Bolton, Environmental Control Division, AMSEL-RD-C2-PP-E, U.S. Army Belvoir Research, Development and Engineering Center, Contract No. DAAB12-95-V-0176, November, 1995.

Beard, J. Taylor, and James H. ARTHUR, "Enhancement of the Simplified UVA Air Conditioner Simulation Model", Final Report Submitted to Mr. Chris Bolton, Environmental Control Division, AMSEL-RD-C2-PP-E, U.S. Army Belvoir Research, Development and Engineering Center, Contract No. DAAB12-95-V-0057, October, 1995.

ARTHUR, J. Howard, and Michael R. Sexton, "A Feasibility Study: Application of Thermal Energy Storage Technology at Maury River Middle School", Final Report, Submitted to the Rockbridge County School Board and Virginia Power, February, 1995.

Beard, J. Taylor, and James H. ARTHUR, "Analytical Modelling of an Environmental Control Unit with a Positive Displacement Compressor", Final Report Submitted to Mr. Chris Bolton, Environmental Control Division, AMSEL-RD-C2-PP-E, U.S. Army Belvoir Research, Development and Engineering Center, Contract No. DAAK70-94-V-0184, October, 1994.

ARTHUR, J. Howard, Michael R. Sexton, and Brian Tash, "A Feasibility Study: Application of Thermal Energy Storage Technology at Alleghany High School", Final Report, Submitted to the Alleghany County School Board and Virginia Power, September, 1994.

ARTHUR, James H., "Analytical Modelling of Army Watercraft Productivity in Logistics-Over-the-Shore (LOTS) Operations", Final Report Submitted to Marine and Mechanical Equipment Division, Logistics Equipment Directorate, U.S. Army Belvoir Research, Development and Engineering Center, Contract No. DAAL03-91-C-0034, TCN Number:93-138, 08/93.

ARTHUR, J. Howard, Michael R. Sexton, Brain S. Canaday, and Brain W. Kelly. "A Feasibility Study: Application of Thermal Energy Storage Technology at the Greif Companies Facility", Final Report, Submitted to Virginia's Center for Innovative Technology, November, 1992.

ARTHUR, J. Howard, Y. C. Huang. "Thermodynamic Properties of Freon Refrigerants", Final Report, Submitted to Life Members Club, ASHRAE, September, 1992.

Beard, J. Taylor, and J. Howard ARTHUR. "Evaluation of the Methodology and Implementing Computer Code in the Ft. Belvoir DEPMEDS Heating and Cooling Assessment Model, A Final Report." Associated Environmental Consultants, 412 Westmoreland Court, Charlottesville, VA 22901. AEnC Report Number: RAD/TR--55--1990--1, August 17, 1990.

Beard, J. Taylor, J. Howard ARTHUR, and Brian Kelley. "A Preliminary Investigation of Thermal Performance Modelling of Environmental Control Units, A Final Report." SEAS Report No. UVA/525253/MAE91/101, Submitted to the Environmental Control Division, US Army Belvoir Research and Development Center, July, 1990.

ARTHUR, J. H., J. T. Beard, and R. J. Ribando. "Natural Convection in a Vertical, Asymmetrically Heated, Permeable Walled Channel." Numerical Heat Transfer, Part A, Vol. 16, 1989.

Beard, J. Taylor, J. H ARTHUR, and Scott W. Tumperi. "A Preliminary Investigation of Enhanced Heat Transfer Applications to Power Conditioning Equipment, A Final Report." SEAS Report No. UVA/525229/MAE89/103, Submitted to the Power Generation Division, US Army Belvoir Research and Development Center, December, 1989.

Beard, J. T., R. J. Ribando, R. R. Adams, and J. H. ARTHUR. "Thermal Performance of a Heated Plate with Open-Channel Infrared Radiation Shields." Journal of Solar Energy Engineering, 1989.

Beard, J. T., K. P. Dharmasena, J. H. ARTHUR, and R. J. Ribando. "The Thermal Behavior of a Vertical Channel Formed by a Heated Plate and a Radiation Shield in a Laboratory Environment." Proceeding of the 23rd IECEC, Vol. 4, pp. 257-265, August, 1988.

ARTHUR, J. H., J. T. Beard, and R. J. Ribando. "An Analysis of Natural Convection in a Vertical, Asymmetrically Heated, Permeable Walled Channel Including Radiative Exchange at the Boundaries." Submitted for presentation at the ASME Winter Annual Meeting (Solar Energy Division), Chicago, Illinois, Nov. 27 -- Dec. 2, 1988.

ARTHUR, J. H., "An Analysis of Natural Convection in a Vertical, Asymmetrically Heated, Perforated Walled Channel Including Radiative Exchange at the Boundaries," Ph. D. Dissertation, School of Engineering and Applied Science, University of Virginia, 1988.

Beard, J. T., R. R. Adams, J. H. ARTHUR, and R. J. Ribando. "Characterization of the Thermal Performance of a Heated Plate with Open Channel Infrared Radiation Shields." Presented at the ASME Winter Annual Meeting, Boston 1987.

Beard, J. T., R. R. Adams, J. H. ARTHUR, and R. J. Ribando. "Characterization of the Thermal Performance of a Heated Plate with Open Channel Infrared Radiation Shields." Solar Energy Technology, SED-Vol. 4, ASME Publication Number G00407, 1987.

Beard, J. T., D. P. Childs, L. W. Fletcher, T. E. Joost, J. H. ARTHUR, and D. G. Fletcher. "Cooling Tobacco in Warehouses to Kill Cigarette Beetles, Part III: Passive Solar and Ventilation Cooling System Development." Tobacco Science, 1986, 30:1-10.

Beard, J. T., and J. H. ARTHUR. "Ventilation Concepts for Insect Control in Agricultural Warehousing." Paper No. 85-3517, Presented at the ASAE Winter Meeting, Chicago, Illinois, December 17-20, 1985.

Beard, J. T., and J. H. ARTHUR. *Controlled Ventilation for Destruction of Insect Life in Agricultural Warehouses, a Final Report*. No. UVA/529311/MAE86/101, submitted to the U. S. Department of Agriculture, South Atlantic Area Tobacco Research Laboratory, Oxford, North Carolina, September, 1985.

Beard, J. T., D. G. Fletcher, J. H. ARTHUR, and D. P. Childs. "Passive Solar Cooling of an Agricultural Warehouse." Paper No. 83-WA/Sol-8, presented at the ASME Winter Annual Meeting, Boston, Massachusetts. November 17, 1984.

Beard, J. T., L. W. Fletcher, D. P. Childs, T. E. Joost, J. H. ARTHUR, and D. G. Fletcher. "Cooling Tobacco in Warehouses During the Winter to Kill Cigarette Beetles: Solar and Ventilation Cooling System Development." Paper presented to Tobacco Associates in the United States, Insect Control Committee, Danville, Virginia. October 17, 1984.

Beard, J. T., D. G. Fletcher, J. H. ARTHUR, T. E. Joost, and D. P. Childs. "Passive Solar Cooling Concepts for Killing Insects in Stored Agricultural Products." Proceedings of Solar in the Southeast, Technical Conference of the North Carolina Solar Energy Association, Wrightsville Beach, North Carolina. April 27-29, 1984, pp.135-157.

Beard, J. T., F. A. Iachetta, and J. H. ARTHUR. "Controlled Ventilation for Destruction of Insects in Agricultural WareHouses." Paper presented to Virginia Academy of Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. April 22, 1982.

ARTHUR, J. H., "Ambient Ventilation Concepts for the Control of Insects in Storage Facilities", Master of Science Thesis, School of Engineering and Applied Science, University of Virginia, 1982.