Exponent®
Engineering & Scientific Consulting

Bill Davies, Ph.D., P.E., CFEI

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Professional Profile

Dr. Davies is a licensed professional mechanical engineer who specializes in failure analysis and design assessments for thermal and fluid processes and equipment. He has expertise in pipelines for liquid and gas, heat exchangers, HVAC systems, upstream oil and gas, and two-phase flow.

Dr. Davies applies this expertise to the investigation of fires, explosions, floods, and equipment failures. His project experience includes failure analysis of piping, valves, pumps, HVAC systems, consumer products, and power plants He also investigates issues with piping fabrication, and performs design reviews and analysis of heat exchangers, consumer products, and oil and gas equipment..

Dr. Davies has conducted fire origin and cause investigations involving appliances, electrical systems, consumer products, and other combustion equipment. Dr. Davies has conducted flooding and water loss investigations involving HVAC equipment and pumping stations. Dr. Davies' investigative work includes field assessments, laboratory testing, and analytical modeling. Dr. Davies has designed and built experimental systems for the analysis of HVAC components, consumer electronics, utility piping, and power-plant components. He models natural gas systems using the Synergi Gas software.

Prior to joining Exponent, Dr. Davies was a research assistant in the Air Conditioning and Refrigeration Center (ACRC) at the University of Illinois at Urbana-Champaign (UIUC). His work focused on reducing water use in power plants. He designed and built facilities to test air-cooled condensers, including measurements of heat transfer, pressure drop and two-phase void fraction. He also designed and built an anemometer calibration facility.

Prior to graduate school, Dr. Davies was a General Field Engineer for Schlumberger Wireline. In this role, he led crews in acquiring petrophysical well and geotechnical reservoir data on both land and offshore rigs. He designed and led data-acquisition operations using seismic, pressure-testing, coring, and other well-testing equipment. He was certified and led operations with radiation and explosives for international clients.

Dr. Davies' additional experience includes analysis of water hammer using the AFT Impulse software, analysis of flow-induced vibration in both single- and multi-phase flows, analysis of automotive radiators, analysis of injection wells, analysis of geothermal systems, pressure testing, analysis of plate heat exchangers, and analysis and testing of kitchen appliances.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Illinois, Urbana-Champaign, 2019

M.S., Mechanical Engineering, University of Illinois, Urbana-Champaign, 2016

B.A., Physics, Bates College, 2008

TechnipFMC Educational Fund Fellowship, 2017

David Hinde Award, 2017

IBM Thomas J. Watson Memorial Scholarship, 2004-2008

Licenses and Certifications

Professional Engineer Mechanical, California, #40299

Professional Engineer, Pennsylvania, #PE095026

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

General Field Engineer (Wireline), Schlumberger, 2009-2013

Professional Affiliations

ASTM International (Metrology subcommittee member E11.50)

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

-TC 6.2 Subcommittee on District Energy

-TC 6.8 Subcommittee on Geothermal Heat Pump and Energy Recovery Applications

-TC 6.9 Subcommittee on Thermal Storage

National Association of Fire Investigators (NAFI)

Society of Petroleum Engineers (SPE)

Languages

Spanish

Publications

Davies WA, Wolf MI, Barry M, O'Hern SC, Morse TL. The Effect of Valve Closure Time on Water Hammer. ASME 2021 International Mechanical Engineering Congress and Exposition, November, 2021. Paper No. 71153.

Davies III, William A; Hrnjak, P. Heat transfer and flow regimes during counter-flow steam condensation in flattened-tube air-cooled condensers. International Journal of Heat and Mass Transfer, 2020; 147: 118930.

Davies III, William A; Hrnjak, P. A correlation for heat transfer coefficient during stratified steam

condensation in large flattened tubes with variable inclination and wall temperature. International Journal of Heat and Mass Transfer, 2020; 146: 118666.

Davies III, William A; Hrnjak, P. Local heat transfer coefficient during stratified flow in large, flattened-tube steam condensers with non-uniform heat flux and wall temperature. International Journal of Heat and Mass Transfer, 2020; 146: 118854.

Davies III, William A; Hrnjak, P. Effects of Airflow Profile and Condensation Pressure on Performance of Air-Cooled Condensers. Heat Transfer Engineering, 2019; 1-13.

Davies III, William A; Hrnjak, P. Heat transfer in a large, inclined, flattened-tube steam condenser. Heat Transfer Engineering, 2019; 41.

Abadi, S.M.A.N.R; Davies, William A; Hrnjak, P; Meyer, J.P. Numerical study of steam condensation inside a long inclined flattened channel. Int. J. Heat Mass Transfer, 2019; 134:450-467.

Davies III, William A; Hrnjak, P. Thermo-hydraulic model for steam condensation in a large, inclined flattened-tube air-cooled condenser. Applied Thermal Engineering, 2019; 149:745-756.

Davies III, William A; Kang, Y; Hrnjak, P; Jacobi, A.M. Effect of inclination on heat transfer and flow regimes in large flattened-tube steam condensers. Applied Thermal Engineering, 2019; 148:722-733.

Davies III, William A; Kang, Y; Hrnjak, P; Jacobi, A.M. Heat transfer and flow regimes in large flattened-tube steam condensers. Applied Thermal Engineering, 2019; 148:722-733.

Davies III, W A; Kang, Y; Hrnjak, P; Jacobi, A M. Method for evaluating the effect of inclination on the performance of large flattened-tube steam condensers. Applied Thermal Engineering, 2018; 138:934-941.

Kang, Y; Davies III, W A; Hrnjak, P; Jacobi, A M. Effect of inclination on pressure drop and flow regimes in large flattened-tube steam condensers. Applied Thermal Engineering, 2017; 123:498-513.

Presentations

Davies W, Owens Z, Hur IY, Ajdari A, Nirankari Z, Datta D, Vytiniotis A, Levine M. Vibrational Assessment of Injection Well Tubing. SPE, AAPG, SEG: Carbon Capture, Utilization, and Storage. March 2024.

Davies W. Performance Comparison Between Co-current and Counter-flow ACC Tubes. Air Cooled Condenser Users Group Conference. October 12-14, 2021.

Morse TL, Wolf MI, Davies WA. Residential Fuel Gas Explosions. Oakland County Association of Arson and Fire Investigators, Inc. OCAAFII Quarterly Training. November 2020.

Davies W, E Wikramanayake, M Wolf, A Hudgins. Transient Effects of Injecting Green Hydrogen into Natural Gas Pipelines. AIChE 10th International Congress on Sustainability Science & Engineering (ICOSSE2021), September 13-15, 2021.

Davies, William A; Hrnjak, P. Pressure drop in large flattened-tube steam condensers. Paper presented at the 25th IIR International Congress of Refrigeration. Montreal, Canada, Aug 2019.

Davies, William A; Hrnjak, P. Steam condensation heat transfer coefficient in large, flattened-tube steam condensers. Paper presented at the 25th IIR International Congress of Refrigeration. Montreal, Canada, Aug 2019.

Davies, William A; Hrnjak, P. Thermo-hydraulic model for steam condensation in a large, inclined, flattened-tube air-cooled condenser. Paper presented at Refrigeration and Air Conditioning Conference. Purdue, Indiana, Jul 2018

Davies, William A; Hrnjak, P. Effects of Airflow Direction, Air Velocity Profile, and Condensation Pressure on the Performance of Air-Cooled Condensers. Paper presented at Refrigeration and Air Conditioning Conference. Purdue, Indiana, Jul 2018.

Davies, William A; Kang, Y; Hrnjak, P; Jacobi, A M. Effect of Inclination on Heat Transfer in Large Flattened-Tube Steam Condensers. Paper presented at ASME 2017 International Mechanical Engineering Congress and Exposition. Tampa, Florida, Nov 2017.

Davies, William A. Effect of California's Carbon Cap-and-Trade Policy on Home Design. Poster presented at the Institute for Sustainability, Energy, and Environment Congress. Urbana, Illinois, Sep 2017.

Davies, William A; Hrnjak, P; Jacobi, A M. Advanced Air-Cooled Condensers with Vortex-Generator Arrays Between Fins. Presented at NSF-EPRI Power Plant Dry Cooling Science and Technology Innovation Program Annual Review Meeting. Palo Alto, California, May 2017

Davies, William A; Kang, Y; Hrnjak, P; Jacobi, A M. Heat Transfer and Visualization in Large Flattened-Tube Condensers with Variable Inclination. Paper presented at Refrigeration and Air Conditioning Conference. Purdue, Indiana, Jul 2016.

Peer Reviews

Energy

Applied Thermal Engineering

International Journal of Heat and Mass Transfer

13th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics

Chemical Engineering and Processing