January 2026

Karen A. Thole
Robert J. Vlasic Dean of Engineering

University of Michigan
College of Engineering
2265 Lurie Engineering Center
1221 Beal Avenue
Ann Arbor, MI 48109

Phone: 734-647-7008
Cell: 814-321-3167
kthole@umich.edu

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ACADEMIC PREPARATION

B. S.	1982	Mechanical Engineering, University of Illinois, Urbana-Champaign
M. S.	1984	Mechanical Engineering, University of Illinois, Urbana-Champaign
Ph.D.	1992	Mechanical Engineering, University of Texas, Austin

CONTINUING EDUCATION

Harvard Graduate School of Education
Institute for Management and Leadership in Education, 2025

SECURITY CLEARANCE

Top Secret / Sensitive Compartmented Information (TS/SCI), Department of Air Force

PROFESSIONAL EXPERIENCE

University of Michigan
College of Engineering
August 2024 – present, Robert J. Vlasic Dean of Engineering

The Pennsylvania State University (Penn State)
Department of Mechanical Engineering
August 2024 – present, Affiliate Professor
August 2021 – July 2024, University Distinguished Professor
Director, Engineering Ambassador Network
January 2006 – August 2021, University Distinguished Professor and Department Head

Virginia Polytechnic Institute and State University (Virginia Tech)
Mechanical Engineering Department
January 1999 – June 2006, Assistant Department Head for Research; VT ADVANCE Professor
William S. Cross Professor of Mechanical Engineering

University of Wisconsin-Madison
Mechanical Engineering Department
November 1994 – December 1998, Assistant Professor

Karlsruhe Institute of Technology, Karlsruhe Germany
Institute for Thermal Turbomachinery
January 1993 – November 1994, Post-Doctoral Research Associate

University of Texas
Mechanical Engineering Department
January 1988 – December 1992, Research Assistant
June 1989 – August 1989 Teaching (Assistant Instructor): Fluid Mechanics (ME 330)

Lawrence Livermore National Laboratory
Nuclear Test and Engineering Division
September 1984 – December 1988, Research Engineer

HONORS AND AWARDS

ASME IGTI Scholar Lecture, 2027
ASME Kate Gleason Award, 2025
U-M Department of Mechanical Engineering E & M Ulsoy Citation Leader Award, 2025
AIAA Mary W. Jackson Award, 2025
Earl Exum Community Impact Award given by RTX, 2024
University of Texas Distinguished Engineering Graduate, 2024
Royal Aeronautical Society Fellow, 2023
ASME R. Tom Sawyer Award, 2023
The Engineers' Council Outstanding Engineering Educator Award, 2023
ASME Heat Transfer Memorial Award, 2022
AIAA Thermophysics Award, 2022
AIAA Fellow, 2021
AIAA Air Breathing Propulsion Award, 2019
ABET Claire L. Felbinger Award, 2017
53rd AIAA/SAE/ASME Joint Propulsion Conference Best Paper Award, 2017
University Distinguished Professor, Penn State, 2017
ASME Edwin F. Church Medal for Engineering Education, 2016
College of Engineering's Distinguished Service Alumni Award, University of Illinois, 2016
ASME George Westinghouse Gold Medal, 2015
ASME Distinguished Service Award, 2015
Howard B. Palmer Faculty Mentoring Award, Penn State, 2015
Society of Women Engineers Distinguished Engineering Educator Award, 2014
Distinguished Alumnae in Mechanical Science and Engineering, University of Illinois, 2013
Rosemary Schraer Mentoring Award, Penn State, 2012
U. S. White House *Champion of Change* in Science, Technology, Engineering, and Math, 2011
Best TurboExpo Paper (K-14), ASME's IGTI, 2005, 2009, 2013, 2016, 2021, 2023, 2024, 2025
Top 10 cited papers from 2005-2010 in the *International Journal of Heat and Fluid Flow*
ASME Distinguished Service Award, 2008
William S. Cross Professorship, Virginia Tech, 2005-06
ASME Fellow, 2004
Distinguished Alumnae in Mechanical Engineering, University of Texas, 2004
College of Engineering Faculty Fellow, Virginia Tech, 2003-2006
AdvanceVT Professorship, Virginia Tech, 2003-2006
Power Generation Distinguished Lecturer, Siemens, 2002 and 2004
Ingersoll-Rand Faculty Award, Virginia Tech, 2001
W. M. Rohsenow Best Presentation for Gas Turbine Heat Transfer, ASME, 1997, 2005, 2009
CAREER Award, National Science Foundation, 1996
Non-tenured Faculty Grant, 3M, 1996, 1997, 1998

RESEARCH EXPERTISE

Convective heat transfer taking theory to application in developing new cooling designs for harsh, high temperature environments that lead to increases in energy efficiency in power producing energy systems. Setting up unique experimental facilities that address needed predictive methods for convective heat transfer and pressure loss in various cooling methods.

Using additive manufacturing and computational optimization methods to develop new, complex cooling strategies that are not possible with traditional manufacturing.

RESEARCH LEADERSHIP

Director and Founder of the Steady Thermal Aero Research Turbine (START) Lab, Mechanical Engineering Department, Penn State, 2011-2024

The START Lab includes a one stage turbine operating at engine-representative conditions. The research focus includes developing novel cooling methods for turbine airfoils; developing improved sealing mechanisms for inter-stage gaps; validating sensors in rotating environments; and advancing additive manufacturing for turbine airfoil cooling. As Director, I led the Pratt & Whitney and Solar Turbines Centers of Excellence, each involving between five and ten faculty.

Director and Founder of the Experimental and Computational Convection Lab (ExCCL), Mechanical Engineering Department, Penn State, 1994-2011

ExCCL focuses on experimental and computational studies of fundamental turbulence and applied convective heat transfer. Subjects include freestream turbulence effects on gas turbine blade boundary layers, endwall secondary flow effects, turbine blade cooling techniques, and electronic cooling.

EDUCATIONAL LEADERSHIP

Robert J. Vlasic Dean, College of Engineering, 2024-present

Academic and executive officer of Michigan Engineering, one of the nation's largest and highest ranked engineering colleges with over 12,000 students and postdocs, 1400 faculty and staff and over 90,000 living alums. The College has an annual budget of $700M and an annual research expenditure of $390M. Provides leadership and is responsible for all matters relating to the administration of the College, including academic programs, personnel, resources, alumni engagement, government and industry relations, and fundraising.

University Distinguished Professor, Mechanical Engineering Department, 2021-2024*

- Director of the Engineering Ambassador Network composed of 40^{+} institutions who educate undergraduate engineering students on effective STEM messages for exciting k-12 students.
- Co-PI / PI on research experience for undergraduates in sustainable aviation sponsored by the National Science Foundation and NASA.

Department Head, Mechanical Engineering Department, 2006-2021*

- Led a major curriculum change to modernize the Bachelors of Science in Mechanical Engineering degree at Penn State. Features of the new curriculum included: i) an emphasis on computations and mechatronics; ii) a new laboratory course emphasizing systems with modern topics such as big data, renewable energy, autonomous systems, and other such topics; and iii) a two-part course for one credit that includes career planning, business principles for engineers, ethics and several other topics of importance for skill development.
- Developed and offered the first micro-credentialing workshops in the College of Engineering to enhance students' skills identified by companies to include topics such as technical communications, geometric tolerancing, project management, value engineering, introduction to machine learning, and others. These workshops, taught by instructors from industry, are between four and eight hours. Students' proficiency is assessed at the end of the workshop and a badge is presented if assessment is positive.

- Led and instituted global team projects for the mechanical engineering capstone course. Developed numerous global partnerships to carry out these projects involving students from Penn State and another international university partner to address an industry-proposed problem.
- Led the development and offering of an on-line Master of Science in Mechanical Engineering. Program approved by the Graduate School
- Led the development and offering of an on-line and resident Master of Engineering in Additive Manufacturing and Design
- Co-founder of the Engineering Ambassador Program at Penn State and the Engineering Ambassador Network involving over 40 institutions reaching 40,000 K-12 students each year. This program is a professional development program teaching communication and leadership to our college students with an outreach mission to local high schools. Using the National Academy of Engineering's *Changing the Conversation*, Engineering Ambassadors communicate the excitement of engineering to high school students. Effort funded through the National Science Foundation and Raytheon Technologies.

** prior to July 2019, Department Head of Mechanical and Nuclear Engineering*

SIGNIFICANT SERVICE TO THE PROFESSION

- National Academies of Sciences, Engineering, Medicine / Defense Materials, Manufacturing and its Infrastructure (DMMI) Standing Committee, 2025-present
- Department of the Air Force Scientific Advisory Board, 2023- 2025 (SAB dissolved by Defense Secretary Hegseth)
- National Academies of Sciences, Engineering, Medicine / NASA Aeronautics Research and Technology Roundtable, 2022-present
- National Science Foundation, Engineering Directorate Advisory Board, 2024-2025 (Advisory Board dissolved by federal government)
- Penn State's Applied Research Laboratory Advisory Board, 2007-2024
- National Academies of Sciences, Engineering, Medicine's Smart Manufacturing Study Committee, 2022-2023
- ASME Technical Committee on Publications & Communications, January 2022-2024
- ASME TurboExpo Executive Committee, June 2021-2024
- Gas Turbine Association, member, 2021-present; Chair of Government Relations
- ASME TurboExpo Conference Chair, June 2021
- Zero Carbon Flight on the Horizon Panel Organizer and Moderator, ARPA-E, May 2021
- AIAA Gas Turbine Engine Technical Committee, 2021-present
- National Academies of Sciences, Engineering, Medicine's Gas Turbine Development Study Committee, Member, 2018-2019
- ASME Board of Governor Member, 2018-2020
- NASA Advisory Council, Aeronautics Committee, 2013-2020
- National Science Foundation's Committee of Visitors for Engineering Education Division, 2016
- National Academies of Sciences, Engineering, Medicine's Low Carbon Aviation Study Committee, Co-Chair, 2015-2016
- ASME Energy Conversion and Storage Segment, Leader and Member, 2014-2016
- Advisory board membership for engineering at Georgia Tech, University of Illinois-Urbana-Champaign, University of Texas, Lehigh University, Brigham Young University

- Program reviewer for Mechanical Engineering Departments at University of Delaware (2022), Texas A&M University (2020), University of Texas-Dallas (2019), Carnegie-Mellon (2019), University of Colorado (2018), University of Florida (2017), Iowa State University (2016), Purdue University (2015), and University of Minnesota (2014)
- ASME Committee on Honors, Member from 2009-10; Chair from 2010-14
- Board of Directors for the International Gas Turbine Institute, Member, 2009-12; Vice Chair, 2012-13; Chair 2013-14; and Special Advisor to the Chair, 2016-17
- ASME Mechanical Engineering Department Head Executive Council, Member for 2006, Secretary from 2007-2009, Vice Chair from 2010-2012; Chair from 2012-13
- ASME Vision 2030 Committee (ME curriculum reform), Member, 2008-2011
- ASME Knowledge and Communities Re-organization Task Force, 2013-14
- ASME Center for Education Board of Directors, 2010-2014

INVITED GOVERNMENTAL TECHNICAL BRIEFINGS/TESTIMONIES

- Invited keynote on The National Experimental Turbine: Progress and Results, DOE University Turbine Systems Research Program, November, 2023
- Invited panelist on the NASA/ARMD University Leadership Initiative, National Academy of Engineering's Aeronautics and Space Engineering Board, October 2023.
- Invited presenter for the Aviation Climate Impacts Meeting of Experts, National Academies of Sciences, Engineering, and Medicine, February 2023
- Organizer and presenter for a US Congressional Briefing on Gas Turbines, ASME Sponsored, March 2022
- Invited Testimonial to the Space and Aeronautics Subcommittee of the U.S. House of Representatives' Science, Space, and Technology Committee, March, 2021
- Invited presenter for Congressional Briefing on the NASA University Leadership Initiative Program, NASA hosted, July 2021
- Invited presenter for Gas Turbine Association to American Ceramics, May 2021
- Invited presenter in a US Congressional Briefing on Gas Turbines, April 2019
- Invited presenter in a US Congressional Briefing on Gas Turbines, September 2017
- Invited presenter in a US Congressional Briefing on Gas Turbines, September 2016 (https://www.asme.org/about-asme/advocacy-government-relations/policy-publications/capitol-update/october-7-2016-capitol-update#1)
- Invited presenter for the Low Carbon Aviation Report by the National Academies of Sciences, Engineering, and Medicine to the FAA, DOE, USDA, USAF, AIAA, House Subcommittee, Office of Science and Technology, and EPA, Summer 2016
- Invited presenter in a US Congressional Briefing on Digital Manufacturing, May 2016 (http://housemanufacturingcaucus-reed.house.gov/sites/housemanufacturingcaucus.house.gov/files/wysiwyg_uploaded/Briefing%20on%20Digital%20and%20Cyber%20Manufacturing_Final.pdf)
- Invited presenter in a US Congressional Briefing on Gas Turbines, March 2016 (http://gasturbine.org/docs/newdocs/GTA-AGA_Capitol_Hill_Briefing_Flyer_Feb_2016.pdf)

- Invited presenter for ASME to the *Education and Skills for Manufacturing-US Teaching Methods and Course Structures,* Institution of Mechanical Engineers, London England, February 2013

INVITED LECTURES AND KEYNOTE PRESENTATIONS (Last eight years)

Keynote Presenter, 26th Conference of the International Society for Air Breathing Engines, Toulouse France, September 2024

Exploring Additive Manufacturing for Advancing Cooling, Pratt & Whitney, Tech Talk, June 2024

Exploring Additive Manufacturing for Advancing Cooling, American Carbon Society Thermal Management Conference, March 2024

Exploring Additive Manufacturing for Advancing Turbine Cooling, ASME IGTI Student Advisory Committee and Gas Turbine Technology Group's Technical Webinar Series, February 2024

Zero Emission Aviation – A Status Report on Global Efforts, AIAA SciTech, January 2024

Advances in Additive Manufacturing Leading to Applications in Convective Heat Transfer, Thermophysics Award Lecture, AIAA SciTech, January 2024

Career Pathways in the Turbomachinery Field, ETN Global Young Engineers, December 2023

Using Additive Manufacturing to Advance Turbine Technologies, Turbine Forum, October 2023

Advances in Additive Manufacturing Leading to Applications in Convective Heat Transfer, invited speaker, ASME Summer Heat Transfer Conference, July 2023.

Exploring Additive Manufacturing for Cooling Channel Designs, invited keynote, 26th National and 4th International Indian Society for Heat and Mass Transfer-American Society of Thermal and Fluids Engineers 2021 Conference, December 2021

The Economist – Sustainability Week: Countdown to COP26, The Economist, Panel Moderator, September 2021 https://events.economist.com/sustainability-week-countdown-to-cop/

R&D: Paving the Way to a More Sustainable, Resilient NAS, Air Traffic Controllers Tech Symposium: May 2021, panelist, https://www.atca.org/agenda-symp

Sustainable Aviation, Public Broadcast System (PBS), May 2021

Examining R&D Pathways to Sustainable Aviation, March 2021, U.S. House of Representatives Committee on Science, Space & Technology: Subcommittee on Space and Aeronautics, invited presentation: https://www.youtube.com/watch?v=1b0gouZ2rd0

Meeting the Demands of Developing Programs, invited panelist, ASME International Mechanical Engineering Education Leadership Summit, March 2021

New *Frontiers of Thermal Transport,* invited speaker, National Science Foundation Workshop, January, 2021

Improving Diversity and Inclusion in your Department, invited panelist, ASME Engineering Education, November 2020

What's the next breakthrough: Technology or Integration, AIAA Propulsion and Energy Forum 360 Panelist, August 2020

Development of a National Experimental Turbine (NExT), invited speaker, 13th Operational Energy Summit, Washington DC, January 2020

Advanced Technologies for Gas Turbines, AIAA SciTech Panel, January 2020

Using Additive Manufacturing to Advance Convective Cooling Designs, invited keynote seminar for the ASME International Mechanical Engineering Conference, November 2019

University-Industry-Academia Collaboration to Develop the National Experimental Turbine (NExT), invited keynote at DOE's University Turbine Systems Research Program Workshop, November 2019

Advanced Technologies for Gas Turbines, National Academies of Sciences, Engineering, and Medicine' Aeronautics Science and Engineering Board, September, 2019

Effects of Additive Manufacturing on Convective Heat Transfer, invited keynote seminar for the American Society of Thermal and Fluids Engineers Conference, March 2018

Aligning Engineering Education: Opportunities for Collaboration between Universities, Industry, and Professional Societies, National Academies of Sciences, Engineering, and Medicine, December 2018

Invited University Lectures (last 5 years): University of California-Irvine, University of Houston, Clemson University, Case Western Reserve, University of Delaware, University of Texas at Dallas, University of Colorado, University of Michigan, Oxford University, University of Tennessee-Deans Distinguished Seminar*,* University of Illinois at Urbana-Champaign, University of Alabama-Huntsville, University of Washington, Washington University

RESEARCH SUPERVISION

Doctoral Student Advisees

Radomsky, Roger, 2000, *High Freestream Turbulence Studies on a Scaled-Up Stator Vane*, Mechanical Engineering, University of Wisconsin-Madison. (Raytheon)

Lethander, Andrew, 2003, *Evaluation of a Fillet Design for a First Vane*, Mechanical Engineering, Virginia Tech. (Air Force Research Lab)

Colban, Will, 2005, *Performance of Shaped Film-Cooling Holes on a Turbine Vane*," (Recipient of NSF Honorable Mention, Recipient of 2nd Place for the the Paul E. Torgersen Graduate Student PhD Poster for Research Excellence Award) Mechanical Engineering, Virginia Tech. (Amber Kinetics, Director)

Sewall, Evan, 2005, *Heat Transfer Predictions for Ribbed Surfaces*, co-advised with D. Tafti, Mechanical Engineering, Virginia Tech. (GE Power)

Barringer, Mike, 2006, *Developing and Testing a Combustor Simulator for Investigating High Pressure Turbine Aerodynamics and Heat Transfer* (recipient of Best Technical Presentation, AIAA 28th Dayton-Cincinnati Aerospace Science Symposium; Recipient of Incentive Award at the Propulsion Directorate, AFRL), Mechanical Engineering, Virginia Tech. (Penn State, Associate Res Prof)

Sundaram, Narayan, 2007, *Effects of Surface Conditions on Endwall Film-Cooling* (recipient of 2nd Place for the the Paul E. Torgersen Graduate Student PhD Poster for Research Excellence Award; recipient of 2005 Best Heat Transfer Paper at the International Gas Turbine and Aeroengine Congress and Exposition) Mechanical Engineering, Virginia Tech. (Amazon)

Scrittore, Joe, 2008, *Experimental Study of the Effect of Dilution Jets on Film Cooling Flow in a Gas Turbine Combustor,* Mechanical Engineering, Virginia Tech. (NAVAIR)

Knost, Daniel, 2008, *Parametric Investigation of the Combustor-Turbine Interface Leakage Geometry*, Mechanical Engineering, Virginia Tech. (Stewart-Haas Racing Crew Chief)

Cardwell, Nick, 2010, *Investigation of Particle Trajectories for Wall Bounded Turbulent Two-Phase Flows*, co-advised with P. Vlachos (recipient of 2005 Best Heat Transfer Paper at the International Gas Turbine and Aeroengine Congress and Exposition), Mechanical Engineering, Virginia Tech. (Bractlet, Vice Pres of Operations)

Lawson, Seth, 2011, *Simulating Particle Deposition from Coal-Derived Fuels*, (recipient of IGTI Travel Award, 2009 Best Heat Transfer Paper at the International Gas Turbine and Aeroengine Congress and Exposition) Mechanical Engineering, Penn State. (Department of Energy-NETL, Program Manager)

Lynch, Steve, 2011, *The Effect of Endwall Contouring on Boundary Layer Development in a Turbine Blade Passage,* (recipient 2005, 2006, 2007 Virginia Space Grant Fellowship, Wilbur Wright Fellowship, 2006 Gordan C. Oates Graduate Award, and 2009 Warren M. Rosenhow Best IMECE Heat Transfer Presentation), Mechanical Engineering, Virginia Tech. (Penn State, Associate Professor)

Thrift, Alan, 2011, *Contour Effects on Secondary Flows*, Mechanical Engineering, Penn State. (Siemens Energy)

Ostanek, Jason, 2012, *Flowfield Interactions in Low Aspect Pin Fin Arrays* (recipient of a fellowship from the Science, Mathematics and Research for Transformation-SMART Program) Mechanical Engineering, Penn State. (Purdue Polytechnic, Associate Professor)

Mensch, Amy, 2015, *Using Conjugate Heat Transfer Analyses to Assess the Cooling Performance on a Turbine Endwall* (recipient of the Alan Brockett Penn State-Pratt & Whitney Graduate Award, College of Engineering Distinguished Teaching Fellow) Mechanical Engineering, Penn State. (National Institute of Standards and Technology)

Schroeder, Robert, 2015, *High Density Ratio Film-Cooling Studies*, Mechanical Engineering, Penn State (recipient of a three year fellowship from the NASA Aeronautics Scholarship Program). (Sargent-Lundy)

Gibson, Jeffrey, 2015, *Deposition Effects on Turbine Endwalls* (recipient of a one year University Graduate Fellowship and Graduate Teaching Fellowship) Mechanical Engineering, Penn State. (Honeywell)

Clark, Ken, 2016, *Sealing Effectiveness of a Turbine Rim Seal at Engine-Relevant Conditions*, 2016 (recipient of a three year National Defense Science and Engineering Graduate Fellowship) Mechanical Engineering, Penn State. (Pratt & Whitney)

Stimpson, Curtis, *MicroChannel Cooling through the Uses of Additive Manufacturing*, (recipient of a one year University Graduate Fellowship; 2017 PSU Alumni Dissertation Award—only two given in the College of Engineering) Mechanical Engineering, Penn State. (Solar Turbines)

Kirsch, Katie, 2017, *Optimized Microchannel Cooling Made Possible through Additive Manufacturing* (recipient of a National Science Foundation Graduate Fellowship; Alan Brockett Award; and AIAA/SAE/ASME Joint Propulsion Conference Best Paper Award, ASME Heat Transfer Best Paper Award) Mechanical Engineering, Penn State. (Raytheon Technologies Research Center)

Snyder, Jacob, 2019, *Improving Turbine Cooling through Control of Surface Roughness in the Additive Manufacturing Process*, (AIAA/SAE/ASME Joint Propulsion Conference Best Paper Award, recipient of the 2019 PSU Alumni Dissertation Award) Mechanical Engineering, Penn State. (Pratt & Whitney)

Knisely, Brian, 2021, *Integration of Infrared Thermography to Measure Part-to-Part Cooling Variations on Turbine Blades,* Mechanical Engineering, Penn State. (Carrier)

Monge-Concepcion, Ivan, 2021, *The Effect of Vane Trailing Edge Flow on Inter-Stage Turbine Sealing,* Mechanical Engineering, Penn State, recipient of Sloan Fellowship (Honeywell)

Siroka, Shawn, 2021, *Advanced Heat Flux Gauges Applied to Test Turbines Operating in Steady Facilities,* (recipient of ASME best paper award), Mechanical Engineering, Penn State. (Industrial Research Technology)

Deshong, Eric, 2022, *Fault Characterization and Diagnostics Supporting Condition-Based Operation and Maintenance of Gas Turbine Engines,* (recipient of AT&T Fellowship), Mechanical Engineering, Penn State. (Applied Research Lab)

Wilkins, Peter, 2023, *Mechanical Engineering, Influence of Ceramic Matrix Composite Weave Patterns on Heat Transfer, Film Cooling, and Aerodynamic Performance*, Penn State (Pratt and Whitney)

Wildgoose, Alexander, 2023, *Exploring Additive Manufacturing for Cooling Designs*, Mechanical Engineering, Penn State (GE Aircraft)

Veley, Emma, 2023, *Evaluation of Additively Manufactured Internal Cooling Channels and Film Cooling Holes for Cooling Effectiveness,* Mechanical Engineering, Penn State (NIST)

Corbett, Thomas, Mechanical Engineering, 2024, *Exploration of Internal Cooling Schemes Enabled through Additive Manufacturing,* Mechanical Engineering, Penn State (Pratt & Whitney)

Rozman, Maria, 2025, *Characterizing the Impact of Cooling Flows on Single State Turbine Performance,* Mechanical Engineering, Penn State (GE Aviation)

Chad Schaeffer, 2025, *Dilution and Effusion Flow Interactions and the Design of a Turbine Inlet Profile Simulator,* Mechanical Engineering, Penn State

Wiese, Major Connor, 2025, *Casing Treatments and Tip Cooling Strategies for High Pressure Turbines,* Mechanical Engineering, Penn State (Assistant Professor, Air Force Institute of Technology)

Gailey, Nicholas, 2025, *Verifying the Use of Additively Manufactured Turbine Components in Research Facilities*, Mechanical Engineering, Penn State (Pratt & Whitney)

Current Doctoral Advisees

Bonn, Ethan, Mechanical Engineering, Penn State (passed Comprehensive Exam) - member

Altland, Abigail, Mechanical Engineering, Penn State (passed Qualifying Exam)–co-advisor

Masters of Science Advisees

Bangert, Boris, 1996, *Development and Testing of a Scaled-up Turbine Vane Cascade*, Mechanical Engineering, University of Wisconsin.

Martin, Cheryl, K. A., 1997, *Leading Edge Film Cooling Conceptual Design Through CFD*, Mechanical Engineering, University of Wisconsin.

Springer, Marlow, 1998, *Flowfield Studies in Louvered Fins Relevant to Compact Heat Exchangers*, Mechanical Engineering, University of Wisconsin. (Nominated by the Mechanical Engineering Department as the best thesis in 1998).

Kang, Brian, 1998, *Detailed Measurements in the Endwall Region of a Gas Turbine Stator Vane*, Mechanical Engineering, University of Wisconsin.

Hermanson, Kristina, 1999, *Effect of Inlet Conditions on Endwall Secondary Flows*, Mechanical Engineering, University of Wisconsin.

Zess, Gary, 1999, *Methods to Reduce the Leading Edge Horseshoe Vortex in a Gas Turbine Stator Vane*, Mechanical Engineering, University of Wisconsin.

Lemmon, Chris, 2000, *Internal Geometry Effects on Film Cooling*, Mechanical Engineering, University of Wisconsin.

Lyman, Andrew, 2000, *Heat Transfer Measurements in Louvered Fin Arrays*, Mechanical Engineering, Virginia Tech.

Barringer, Michael, 2001, *Heat Transfer and Flowfield Measurements Downstream of a Scaled-Up Combustor*, Mechanical Engineering, Virginia Tech.

Weinberger, Sarah, 2001, *Predictions of the Flowfield and Heat Transfer in a Turbine Vane Test Section Downstream of a Combustor Liner*, Mechanical Engineering, Virginia Tech.

Colban, Will, 2002, *Effects of Realistic Combustor Exit Profiles on Vane Endwall Heat Transfer*, Mechanical Engineering, Virginia Tech (Outstanding Scholar in Mechanical Engineering at Virginia Tech; Honorable Mention for the NSF Graduate Fellowship).

Stephan, Ryan, 2002, *Heat Transfer Measurements Along Louvered Fins*, Mechanical Engineering, Virginia Tech.

Pang, Yingfeng, 2002, *Thermal Analyses of IPEMs*, co-advised with Dr. Elaine Scott, Mechanical Engineering, Virginia Tech.

Sewall, Evan, 2002, *Thermal Analyses of Electronic Components*, Mechanical Engineering Department, Virginia Tech, continued on for a PhD co-advised with Dr. Danesh Tafti.

Vakil, Sachin, 2002, *Flow and Thermal Field Measurements in a Combustor Simulator Relevant to a Gas Turbine Aero-Engine,* Mechanical Engineering, Virginia Tech.

Hohlfeld, Erik, 2003, *Simulations of Blowing for Blade Tip and Hub Cooling*, Mechanical Engineering, Virginia Tech (recipient of FLUENT Best Student Paper, 2003).

Couch, Eric, 2003, *Adiabatic Effectiveness Measurements for Blade Tip Cooling*, Mechanical Engineering, Virginia Tech.

Christophel, Jesse, 2003, *Adiabatic Effectiveness Measurements for Blade Hub Cooling*, Mechanical Engineering, Virginia Tech.

Knost, Daniel, 2003, *Endwall Film-Cooling for a First Vane*, Mechanical Engineering, Virginia Tech.

Ebeling, Chris, 2003, *Tube Wall Heat Transfer Coefficients for Compact Heat Exchangers*, Mechanical Engineering Department, Virginia Tech.

Gratton, Andrew, 2003, *Heat Transfer Coefficients on a Contoured Vane*, Mechanical Engineering, Virginia Tech.

Ranson, William, 2004, *Adiabatic Effectiveness Measurements of Leakage Flows Near the Hub Region of Gas Turbine Engines,* Mechanical Engineering, Virgina Tech.

Prausa, Jeffrey, 2004, *Heat Transfer Coefficient and Adiabatic Effectiveness Measurements for an Internal Turbine Vane Cooling Feature*, Mechanical Engineering, Virginia Tech.

Morris, Angela, 2005, *Experimental and Computational Study of a Turbine Blade Tip with a Shelf*, Mechanical Engineering, Virginia Tech (University Turbine Systems Fellowship Recipient).

Elder, Erin, 2005, *Advance Cooling Concepts*, Mechanical Engineering, Virginia Tech (recipient of a Virginia Space Grant Fellowship).

Walsh, Scott, 2005, *Effects of Sand Ingestion on the Film-Cooling of Turbine Blades*, Mechanical Engineering, Virginia Tech (University Turbine Systems Fellowship Recipient).

Sanders, Paul, 2005, *Effects of Louver Length and Vortex Generators to Augment Tube Wall Heat Transfer in Louvered Fin Heat Exchangers*, Mechanical Engineering, Virginia Tech.

Cardwell, Nick, 2005, *Effects of Gap Leakages on Endwall Film-Cooling*, Mechanical Engineering, Virginia Tech (1st Place Presentation for the Paul E. Torgersen Graduate Student MS Research Excellence Award; University Turbine Systems Fellowship Recipient).

Brumbaugh, Scott, 2006, *Development of a Methodology to Measure Aerodynamic Forces on Pin Fins in Channel Flow,* Mechanical Engineering, Virginia Tech.

Lyall, Evan, 2006, *Heat Transfer for Low Aspect Ratio Pin Fins*, Mechanical Engineering, Virginia Tech.

Lawson, Michael, 2006, *Practical Applications of Delta Winglets in Compact Heat Exchangers with Louvered Fins*, Mechanical Engineering, Virginia Tech.

Land, Cam, 2006, *Effects of Sand Ingestion on the Cooling of Turbine Blade Outer Air Seals*, Mechanical Engineering, Virginia Tech.

Carullo, Jeff, 2006, *Effects of Freestream Turbulence, Turbulence Length Scale, and Reynolds Number on Turbine Blade Heat Transfer in a Transonic Cascade*, Mechanical Engineering, Virginia Tech.

Lawson, Seth, 2007, *Heat Transfer from Multiple Row Arrays of Low Aspect Ratio Pin Fins*, Mechanical Engineering, Virginia Tech.

Thrift, Alan, 2007, *Aerodynamic Force and Pressure Loss Measurements on Low Aspect Ratio Pin Fin Arrays*, Mechanical Engineering Department, Virginia Tech.

Lynch, Steve, 2007, *Endwall Heat Transfer and Shear Stress for a Nozzle Guide Vane with Fillets and a Leakage Interface*, Mechanical Engineering, Virginia Tech (1st Place Poster for the Paul E. Torgersen Graduate Student Research Excellence Award).

Ostanek, Jason, 2008, *Establishing a Methodology for Resolving Convective Heat Transfer from Complex Geometries*, Mechanical Engineering, Penn State.

Musgrove, Grant, 2009, *Computational Predictions and Experimental Measurements of the Performance of a Louver Particle Separator for Use in Gas Turbine Engines*, Mechanical Engineering, Penn State.

Neely, Gaelyn, 2009, *Heat Transfer and Friction Factor Augmentation in Rib Turbulated Flow*, Mechanical Engineering, Penn State.

Weaver, Steve, 2010, *Heat Transfer and Pressure Drop Augmentation in Micro Channels with Pin Fins,* Mechanical Engineering, Penn State.

Breneman, Duane, 2011, *Dirt Plugging in a Seal Pin Geometry*, Mechanical Engineering, Penn State.

Eberly, Molly, 2012, *Shaped Film Cooling Studies at High Density Ratios*, Mechanical Engineering, Penn State.

Kirsch, Katie, 2013, *Pin Fin Surface Heat Transfer in Arrays of Oblong-Shaped Pin Fins,* Mechanical Engineering, Penn State.

Whitfield, Chris, 2013, *High Density Ratio Film Cooling,* Mechanical Engineering, Penn State.

Shrager, Adam, 2017, *Flowfield Measurements Relative to Dilution Jets in a Combustor,* Mechanical Engineering, Penn State.

Huelsmann, Nathan, 2020, *Effects of Jet Impingement on Convective Heat Transfer and Discharge Coefficients in Effusion Holes,* Mechanical Engineering, Penn State.

Cory, Trevor, 2020, *Dust Feed and Weave Topology Effects in Gas Turbine Cooling*, Mechanical Engineering, Penn State.

Creer, Riley, 2020, *Impact of Dilution Jets on Combustor Liner Static Pressure and Effusion Cooling*, Mechanical Engineering, Penn State.

Edelson, Ryan, 2021, *Wave Topology Effects on Gas Turbine Cooling Technology,* Mechanical Engineering, Penn State.

Bollapragada, Sudhakar, 2022, *Additively Manufactured Tip Shoes for an Industrial Gas Turbine Engine: Manufacturing and Structural Integrity Assessment*, Additive Manufacturing and Design, Penn State

Fallon, Brandon, 2022, *Dirt Mitigation Techniques in Double-Walled Combustor Liners*, Mechanical Engineering, Penn State

Wolff, Justin, 2022, Masters of Engineering in Additive Manufacturing and Design, Penn State

Do, Christopher, 2023, Masters of Engineering in Additive Manufacturing and Design, Penn State

McCormack, Kelsey, 2023, Geometric and Flow Characterization of Additively Manufactured Turbine Blades with Drilled Film Cooling Holes, Penn State

McFerran, Kyle, 2024, Novel Designs to Mitigate the Negative Impacts of Dirt Deposition in Combustor Walls, Mechanical Engineering, Penn State

Laureano, Pedro, 2025, Analytical Evaluation of Frictional Heating as a Result of Variations in Rotor-Stator Geometry, World Campus Mechanical Engineering, Penn State

<u>Current Masters of Science Advisees</u>

Boudinot, Peyton, University of Michigan

<u>Diplom Advisees</u>

J. Sauer, *Development of a High Freestream Turbulence Generator*, Diplom Arbeit, 1996.

M. Schwaenen, *Simulations of Pin Fin Arrays,* Diplom Arbeit, 2005.

<u>Undergraduate Senior Honor Theses and Research Supervised</u>

Nikki Matson, 1996, University of Wisconsin
Brian Kang, 1997, University of Wisconsin
Will Colban 2001, Virginia Tech (NSF Graduate Fellowship Honorable Mention)
Jesse Christophel, 2002, Virginia Tech
William Ranson, 2003, Virginia Tech
Andrew Graham, 2003, Virginia Tech (NSF Graduate Fellowship Recipient)
Scott Walsh, 2003, Virginia Tech (University Turbine Systems Fellowship Recipient)
Joe Scrittore 2003, Virginia Tech (University Turbine Systems Fellowship Recipient)
Kaitlin Keim, 2004, 2004-05, Virginia Tech
Elizabeth Hoppe, 2005, Virginia Tech
Betsy Thompson, 2005, Virginia Tech
Jason Ostanek, 2005, Virginia Tech (SMART Fellowship Recipient)
Benjamin Cruz-Perez (Univ of Puerto Rico-Mayaguez), 2007, Penn State
Josuan Hilerio-Sánchez (Univ of Puerto Rico-Mayaguez), 2007, Penn State
John Lucena Jimenez (Univ of Puerto Rico-Mayaguez), 2008, Penn State
Scott Fishbone, 2010, BS Honors, Penn State, *Measurements of Thermal Conductivity*
Elizabeth Donofrio, 2010, Penn State, *Measurements of Pin Fin Heat Transfer*
Jacob Snyder, 2013, Penn State, *Development of a CO2 Sensing Device*
Shane Haydt, 2013, Penn State, *Pin Fin Spacing Visualization*
Carly Seneca, 2013, Penn State, *Pin Fin Shape Effects*
Mimi Overbaugh, 2013, Penn State, *Attachment Methods for Thermocouples*
Jeffrey Glusman, 2013, Penn State, *Simulating Roughness Effects for Film Cooling*
Kate Fersten, 2016-17, Penn State, *Additive Manufactured Pin Fin Studies*
Jackie Trautman, 2017, Penn State, *Additive Manufactured Component Testing*
Carolyn Orth, 2017, BS Honors, Penn State, *Comparison of Various Additive Manufacturing Processes*
Sara Fox, 2022, BS Honors, Penn State, *Dirt Deposition on AM Parts*
Haylee Wormer, 2020-2023, Penn State, *Pressure Drop Characteristics in START*
Esha Sharma, BS Honors, Penn State
Emily Hart, 2023, Penn State

<u>Non-Tenure Faculty, Staff, and Post Doctorate Supervision</u>

Justin Brumberg, Research Engineer, Steady Thermal Aero Research (START) Lab, May 2023-24

Leland Tien, Research Engineer, Steady Thermal Aero Research Turbine (START) Lab, June 2022-24

Scott Fishbone, Research Engineer, Steady Thermal Aero Research Turbine (START) Lab, July 2018-24

Mike Barringer, Research Associate Professor, Steady Thermal Aero Research Turbine (START) Lab, January 2007-24

Reid Berdanier, Research Associate Professor, Steady Thermal Aero Research Turbine (START) Lab, July 2016-24 (now tenured Associate Professor)

Jeremiah Bunch, Research Engineering Technician, Steady Thermal Aero Research Turbine (START) Lab, July 2016 - 24

Jay Neal, Project Manager, Steady Thermal Aero Research Turbine (START) Lab, July 2016-2018

David Johnson, Research Associate, Steady Thermal Aero Research Turbine (START) Lab, October 2012-Dec 2017

Andrew Coward, Research Associate, Steady Thermal Aero Research Turbine (START) Lab, October 2012-2015

Ting Wang, Visiting Professor from Shanghai Jiao Tong University, *Studies in Particle-Gas Flows*, August 2010-May 2011

Nick Cardwell, Post-Doctorate from Virginia Tech, *Time-Resolved Digital Particle Image Velocimetry Studies in Ribbed Channels*, January 2010-May 2010

Narayan Sundaram, Post-Doctorate from Virginia Tech, *Investigation of Gaps on Turbine Endwall Flows*, July 2008-April 2009

Mike Barringer, Post Doctorate from Virginia Tech, *Studies in Three-Dimensional Boundary Layers*, September 2005 – December 2006

Satoshi Hada, Visiting Scholar from Mitsubishi Heavy Industries, *Simulations of Vane Gaps and Slots,* January 2004 – December 2004

PATENTS

1. Gas Turbine Engine Combustor Wall Dirt Mitigation, S. Kramer, R. Lundgren, D. Joshi, G. Boardman, K. McFerran, K. Thole, Application Number: U373-P15722US2
2. Internally Cooled Turbine Tip Shroud Component, Bollapragada, S., Zeng, X, Fox, M., Elam, B., Ryan, D. Thole, K. A., and Corbett, T. M., US Patent 11,814,974 B2
3. Apparatus and Method for Inhibiting Radial Transfer of Core Gas Flow within a Core Gas Flow Path of a Gas Turbine Engine, Kvasnak, W., Soechting, F., Thole, K., Zess, G, US Patent 6,419,446
4. Apparatus and Method for Inhibiting Radial Transfer of Core Gas Flow within a Core Gas Flow Path of a Gas Turbine Engine, European Patent 00306649.5-231
5. Systems and Methods for Determining Heat Transfer Characteristics, Van Suetendael, A., Prausa, J., Ostanek, J., and Thole, K., US Patent 20100128752-A1
6. Cooling arrangement for a turbine engine component, Joe, C. and Thole, K. A., US Patent 0232929 A1
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8. Cooling Holes of Turbines, Lewis, S., Thole, K. A., Schroeder, R., 0101870 A1
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TECHNICAL CONTRIBUTIONS

Peer Reviewed Study Reports and Congressional Testimonies

Options for a National Plan for Smart Manufacturing, National Academies of Sciences, Engineering, Medicine, https://nap.nationalacademies.org/resource/27260/RH-smart-manufacturing.pdf

Advanced Technologies for Gas Turbines, National Academies of Sciences, Engineering, Medicine, committee co-chair, https://sites.nationalacademies.org/DEPS/ASEB/DEPS_190328

Commercial Aircraft Propulsion and Energy Systems Research: Reducing the Global Carbon Emissions, National Academies of Sciences, Engineering, Medicine, committee member, https://sites.nationalacademies.org/DEPS/ASEB/DEPS_161178

Examining R&D Pathways to Sustainable Aviation, March 2021, U.S. House of Representatives Committee on Science, Space & Technology: Subcommittee on Space and Aeronautics, invited presentation: https://www.youtube.com/watch?v=1b0gouZ2rd0

Book Chapters

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Peer Reviewed Journal Publications

(Thole ranks first for publishing the most papers in the *Journal of Turbomachinery* since 1999, which has a 20-30% acceptance rate. Note many of the journal papers listed are also presented as conference papers at TurboExpo. Google Citations > 16,000; H-Index = 72)

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Publications Accepted/Under Review

McFerran, Thole, K. A., Lynch, S., Lundgreen, R., Kramer, S., Joshi, D., Lynch, S., Boardman, G., and Thole, K. A., "A Novel Approach to Dirt Mitigation for Combustor Walls," *J of Turbomachinery.* Best K-14 Paper for 2025

Schaeffer, C.B., Barringer, M.D., Lynch, S.P., Thole, K.A., (2026), "Comparison of Predicted and Measured Combustor-Relevant Flow Fields," *Journal of Turbomachinery*.

Peer Reviewed Conference Publications

(* Indicates also published in the Journal with a 20-30% acceptance rate to the Journal)

203 Wiese, C., Berdanier, R., and Thole, K. A., *Sensitivity of Tip Seal Groove Performance to Manufacturing and Operational Deviations From an Optimized Design*, GT2025-151563.

202 Gailey, N., Hartman, E., Barringer, M., R. Berdanier, A., Thole, K., Arisi, A., and Kohli, A., *Thermal Performance Comparisons of Advanced Cooling Designs Under Engine Representative Conditions,* GT2025-154164.

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190 Schaeffer, C., Barringer, M., Lynch, S. P., and Thole, K. A., *Influence of Dilution and Effusion Flows in Generating Variable Inlet Profiles for a High-Pressure Turbine*, GT2024-123899*.

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51 Cardwell, N., Narayan, S., and Thole, K. A. "The Effects of Varying the Combustor-Turbine Gap," International Gas Turbine and Aeroengine Congress and Exposition, Barcelona, GT2006-90089.*

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35 Vakil, S. and Thole, K. A., 2003, "Flow and Thermal Field Measurements in a Combustor Simulator Relevant to a Gas Turbine Aero-Engine," International Gas Turbine and Aeroengine Congress and Exposition, Atlanta, GT-2003-38254.*

34 Lethander, A., Thole, K. A., Zess, G., and Wagner, J., "Optimizing the Vane-Endwall Junction to Reduce Adiabatic Wall Temperatures in a Turbine Vane Passage," International Gas Turbine and Aeroengine Congress and Exposition, Atlanta, GT-2003-38940.*

33 Stitzel, S. and Thole, K. A., 2003, "Flow Field Computations of Combustor-Turbine Interactions Relevant to a Gas Turbine Engine," International Gas Turbine and Aeroengine Congress and Exposition, Atlanta, GT-2003-38253.*

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30 Pang, Y. F., Chen, J. Z., Scott, E. P., and Thole, K. A., 2002, "Electrical and Thermal Layout Design and Optimization Considerations for DPS Active IPEM," New Orleans, IMECE2002-33778.

29 Nix, A., Smith, A. C., Diller, T. E., Ng, W. F., and Thole, K. A., 2002, "High Intensity, Large Length Scale, Freestream Turbulence Generation in a Transonic Turbine Cascade," International Gas Turbine and Aeroengine Congress and Exposition, Amsterdam, ASME Paper GT-2002-30523.

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24 Radomsky, R. and Thole, K. A., 2001, "Detailed Boundary Layer Measurements on a Turbine Stator Vane at Elevated Freestream Turbulence Levels," International Gas Turbine and Aeroengine Congress and Exposition, New Orleans, 2001-GT-0169.*

23 Barringer, M. D., Richard, O. T., Walter, J. P., Stitzel, S. M., and Thole, K. A., 2001, "Flow Field Simulations of a Gas Turbine Combustor," International Gas Turbine and Aeroengine Congress and Exposition, New Orleans, 2001-GT-0170.

22 Zess, G. A. and Thole, K. A., 2001, "Computational Design and Experimental Evaluation of Using a Leading Edge Fillet on a Gas Turbine Vane," International Gas Turbine and Aeroengine Congress and Exposition, New Orleans, 2001-GT-0404.*

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20 Radomsky, R., and Thole, K. A., 2000, "High Freestream Turbulence Effects in the Endwall Leading Edge Region," International Gas Turbine and Aeroengine Congress and Exposition, Munich Germany, 2000-GT-201.*

19 Lemmon, C., Kohli, A., and Thole, K. A., 1999, "Formation of Counter-Rotating Vortices in Film-Cooling Flows," International Gas Turbine and Aeroengine Congress and Exposition, Indianapolis Indiana, 99-GT-161.

18 Radomsky, R. and Thole, K. A., 1999, "Highly Turbulent Flowfield Measurements Around a Stator Vane," International Gas Turbine and Aeroengine Congress and Exposition, Indianapolis Indiana, 99-GT-253.*

17 Kang, M., and Thole, K. A., 1999, "Flowfield Measurements in the Endwall Region of a Stator Vane," International Gas Turbine and Aeroengine Congress and Exposition, Indianapolis Indiana, 99-GT-188.*

16 Zhang, L. W., Memory, S. B., Wattelet, J. P., Springer, M.E., and Thole, K. A., 1999, "A Combined Experimental and Computational Study of Flowfields in a Louvered Fin Heat Exchanger," VTMS 4, ICE, London United Kingdom.

15 Hermanson, K. and Thole, K.A., 1999, "Effect of Inlet Conditions on Endwall Secondary Flows," AIAA Aerospace Meeting, Reno Nevada, AIAA Paper 99-0241.

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13 Kohli, A., and Thole, K. A., 1998, "Entrance Effects on a Diffused Film-Cooling Hole," International Gas Turbine and Aeroengine Congress and Exposition, Stockholm Sweden, 98-GT-402.

12 Kang, M., Kohli, A., and Thole, K. A., 1998, "Heat Transfer and Flowfield Measurements in the Leading Edge Region of a Stator Vane Endwall," International Gas Turbine and Aeroengine Congress and Exposition, Stockholm Sweden, 98-GT-173.*

11 Radomsky, R., and Thole, K. A., 1998, "Effects of High Freestream Turbulence Levels and Length Scales on Stator Vane Heat Transfer," International Gas Turbine and Aeroengine Congress and Exposition, Stockholm Sweden, 98-GT-236.

10 Kohli, A., and Thole, K. A., 1997, "A CFD Investigation on the Effect of Entrance Flow Conditions in Discrete Film Cooling Holes," 32nd National Heat Transfer Conference, vol. 12, pp. 223-232, W. M. Rohsenow Prize for Best Presentation for the Gas Turbine Heat Transfer Committee.

9 Martin, C., and Thole, K. A., 1997, "A CFD Benchmark Study: Leading Edge Film Cooling with Compound Angle Injection," presented to The International Gas Turbine and Aeroengine Congress and Exposition, Orlando, Florida, 97-GT-297.

8 Bangert, B., Kohli, A., Sauer, J., and Thole, K. A., 1997, "High Freestream Turbulence Simulation in a Scaled-Up Turbine Vane Passage," International Gas Turbine and Aeroengine Congress and Exposition, Orlando, Florida, 97-GT-51.

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6 Wittig, S., Schulz, A., Gritsch, M., and Thole, K. A., 1996, "Transonic Film Cooling Investigations: Effects of Hole Shapes and Orientations," International Gas Turbine and Aeroengine Congress and Exposition, Birmingham England, 96-GT-222.*

5 Laudon, M. F., Engelstad, R. L., Thole, K. A., Dauksher, W. J., Resnick, D. J., Cummings, K. D., and Seese, P. and Johnson, W., 1995, "Modeling of In-Plane Distortions due to Variations in Absorber Stress," International Micro- and Nano- Engineering, Aix-en-Provence France.

4 Laudon, M. F., Thole, K. A., Engelstad, R. L., Resnick, D. J., Cummings, K. D., and Dauksher, W. J., 1995, "Thermal Analysis of X-ray Membrane in a Plasma Environment," 39th International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication, Phoenix Arizona.

3 Thole, K. A., and Bogard, D. G., 1994, "Enhanced Heat Transfer and Skin Friction due to High Freestream Turbulence," International Gas Turbine and Aeroengine Congress and Exposition, The Hague Netherlands 94-GT-296.*

2 Thole, K. A., Whan-Tong, J., and Bogard, D. G., 1991, "Generation of Very High Freestream Turbulence Levels and the Effects on Heat Transfer," 27.5.1-27.5.7, Turbulent Shear Flow Conference, Munich, Germany.

1 Thole, K. A., Sinha, A., Bogard, D. G., and Crawford, M. E., 1990, "Mean Temperature Measurements of Jets with a Crossflow for Gas Turbine Film Cooling Application," Rotating Machinery Transport Phenomena, J. H. Kim and W. J. Yang, ed. Hemisphere Publishing Corporation, New York, New York.

<u>Proceedings Accepted/Under Review</u>

Altland, A., Lynch, S., Thole, K. A., “Influence of Entrance Effects and Relative Roughness on the Cooling Performance in Additively Manufactured Channels,” GT2026-177117.

Horning, W., Lynch, S., Thole, K. A., Streeter, J., “Experimental and Computational Investigation of Rib Turbulator Designs Adapted for Additive Manufacturing,” GT2026-174171.

Barringer, M., Gailey, N., Berdanier, R., and Thole, K. A., “Bridging Research and Application: Transitioning Turbine Cooling Innovations from Lab to Industry,” GT2026-179320.

Schroeder, C., Barringer, M., Thole, K. A., “Large Eddy Simulation of a Non-Reacting Profile Simulator for the First-Stage Vane,” GT2026-179299.

Vega, F., Stokes, J., Boudinot, P. and Thole, K. A., “Evaluating a Triple Wall Combustor Liner to Mitigate Dirt Deposition Under High Temperature Conditions,” GT2026-174894.

Non-peer Reviewed Publications

Thole, K. A. and Fishbone, S., 2023 "Additive Manufacturing Benefits and Challenges in Developing Turbine Technologies," vol. 145 (3), ASME ME Magazine.

Lieuwen, T. C. and Thole, K. A., "As industry makes large investments in gas turbine technology, advanced manufacturing will play an important role in improving performance and reducing costs" *At the Intersection,* ME Magazine, ASME, June 2016.

PROFESSIONAL SOCIETY MEMBERSHIPS

- Royal Aeronautical Society, Fellow
- American Society of Mechanical Engineers (ASME), Fellow
- American Institute of Aeronautics and Astronautics (AIAA), Fellow
- American Institute of Aeronautics and Astronautics (AIAA), Gas Turbine Engine Committee
- ASME Student Section, Penn State Faculty Advisor (2007-2012)
- ASME Gas Turbine Heat Transfer Committee (K-14), Member
- American Society of Engineering Education (ASEE), Member
- Society of Women Engineers, Member
- Pi Tau Sigma, Member and Virginia Tech Student Section Advisor (2000-2003)

EDITORIAL AND REVIEW ACTIVITIES

- Editorial Advisory Board, *Physics of Fluids* 2018-2022
- Associate Editor, *AIAA Journal of Thermophysics*, January 2017-2022
- Associate Editor, *ASME Journal of Turbomachinery*, July 2006-2013
- Associate Editor, *International Journal of Heat and Fluid Flow*, July 2006-09
- Associate Editor, *ASME Journal of Heat Transfer*, January 2003-July 2006
- Reviewer for the *Journal of Fluid Mechanics*, *Journal of Turbomachinery*, *Journal of Heat Transfer*, *International Journal of Heat and Mass Transfer, Journal of Fluids Engineering*, *Experiments in Fluids, Experimental Thermal Fluid Science*
- Panel reviewer for the National Science Foundation's Chemical and Thermal Transport Division including several CAREER and unsolicited proposal panels
- Panel reviewer for the National Science Foundation Graduate Fellowship Program
- Reviewer for the National Science Foundation's ADVANCE Program
- Reviewer for the National Science Foundation's Graduate Research Fellowship Program

EDUCATIONAL AND INSTITUTIONAL CHANGE GRANTS

The Pennsylvania State University

REU Site: Lowering the Carbon Footprint through Research in Propulsion and Power Generation
National Science Foundation
Total amount $419,487
PI: O'Connor; Co-PIs: K. Thole, C. Berdanier, and M. Alley
2022-2024

EAGER: Identifying and Disseminating Transformative Professional Development of STEM Undergraduates Who Perform Outreach
National Science Foundation

Total amount: $299,999
PI: Thole; Co-PIs: M. Alley, and J. Garner (Old Dominion University)
2017-2020 (3 years)

Improvements to ME 340, Junior Level Design
Leonhard Center for Engineering Education
Total amount: $50,000
PI: T. Simpson; Co-PI: K. Thole
2016-2017 (Two years)

Creating a National Network of Engineering Ambassadors: A Professional Development Program with an Outreach Mission
National Science Foundation
Total amount: $600,000 with $500,000 to Penn State
PI: Thole; Co-PIs: M. Alley, and J. Garner (Old Dominion University)
2013-2017 (4 years)

Forming a Successful Engineering Ambassador Program Workshop
National Science Foundation and Penn State's Electro Optics Center
Total amount: $75,000
PI: Thole; Co-PI: R. Engel, Associate Dean, College of Engineering
2012-13 (1.5 years)

Communicating What Mechanical Engineers Do: A Strategy for Recruiting Women
National Science Foundation
Total amount: $100,000
PI: Thole; Co-PI: Frecker, Alley, Zappe
2009-2011 (One year)

Mechanical and Nuclear Engineering Global, Non-Travel Based Capstone Design Projects
Leonhard Center for Engineering Education
Total amount: $68,500
PI: M. Trethewey; Co-PI: Thole
2010-2011 (Two years)

Virginia Polytechnic Institute and State University

NSF Advance Institutional Transformation Award
National Science Foundation
Total amount: $3.5M
PI: McNamee; Co-PIs: Hyer, Love, Thole
2003-2008 (Five years)

RESEARCH GRANTS – FEDERAL EXTERNAL (LAST FIVE YEARS AT Penn State) (Between 2016-2024 the cumulative external research expenditures was $45M of which $10M has been from industry)

Advancing Turbine Technologies for Relevant Inlet Temperature Profiles in the Steady Thermal Aero Research Turbine (START) Lab
Sponsor: DOE – NETL Fossil Energy and Carbon Management Program

Total amount: $4,500,000 (plus $4,500,000 cost match from PSU/Pratt & Whitney)
2023-26 (Five Years)

Advanced Two-Stage Turbine Rig Development
Sponsor: FAA ASCENT Program
Total amount: $7,400,000 (plus $7,400,000 cost match from PSU/Pratt & Whitney)
2023-26 (Five Years)

REU Site: Lowering the Carbon Footprint through Research in Propulsion and Power Generation
PI: J. O'Connor / Co-PI K. Thole
Sponsor: National Science Foundation $419,107
2022-25 (Three Years)

Optical Heat Flux Measurements for Engine and Turbine Rigs to Accelerate Turbine Development
Sponsor: DURIP-Office of Naval Research/Air Force Office of Scientific Research
Award Amount: $410,000
2022 (One Year)

Leading Advanced Turbine Research for Hybrid Electric Propulsion Systems
Sponsor: NASA-University Leadership Initiative
Award Amount: $8,000,000
2021-25 (Four Years)

Hybrid Thermally Efficiency Core High Pressure Turbine Technologies
Sponsor*:* NASA
Award Amount: $1,553,064
2022-2024 (Three Years)

Novel Hot Gas Path Components for Gas Turbine Engines Enabled by Materials Development
Sponsor: Department of Energy-Oak Ridge National Lab
Total amount: $333,034
2020 (Three Years)

Combustor Wall Cooling with Dirt Mitigation
Sponsor: FAA ASCENT Program
Total amount: $1,500,000 (plus $450,000 cost match from Pratt & Whitney)
2020-22 (Three Years)

Turbine Cooling through Additive Manufacturing
Sponsor: FAA ASCENT Program
Total amount: $1,200,000 (plus $1,200,000 cost match from Pratt & Whitney)
2020-22 (Three Years)

Improving Turbine Efficiencies through Heat Transfer and Aerodynamic

Research in the Steady Thermal Aero Research Turbine (START) – National Experimental Turbine (NExT)
Sponsor: Department of Energy-National Energy Technology Lab
Total amount: $11,067,120
2015-23 (Eight Years)

Integration of Sensors through Additive Manufacturing Leading to Increased Efficiencies of Gas turbines for Power Generation and Propulsion
Sponsor: Advanced Research Projects Agency-Energy-Open Solicitation
Total amount: $5,879,897
2019-22 (Three Years)

Integrated turbine component cooling designs facilitated by additive manufacturing and optimization
Sponsor: Department of Energy-National Energy Technology Lab: University Turbine Research Program
Total amount: $400,000
2019-22 (Three Years)

Gas Turbine Fuel Reduction through Minimally Cooled Vanes and Blades
Sponsor: FAA CLEEN 2 Program / United Technologies Corporation-Pratt & Whitney
Total amount: $2,631,460
2015-19 (Four Years)

Characterizing Coke Deposition in Additively Manufactured Parts
Sponsor: Air Force Research Laboratory (with Reaction Systems)
Total Amount: $56,000
2019-20 (one year)

Conjugate Heat Transfer for LES of Gas Turbine Engines
Sponsor: U.S. Navy STTR Program (with Cascade Technologies)
Total Amount: $330,000
2019-21 (three years)

Scalable Predictive Analytics for Real-Time Life Predictions of Critical Gas Turbine Components
Sponsor: Department of Energy – University Turbine Systems Research Program
Total Amount: $700,000
2018 (three years)

LABORATORY DEVELOPMENT

DESCRIPTION OF EXPERIMENTAL AND COMPUTATIONAL CONVECTION LAB

The Experimental and Computational Convection Laboratory (ExCCL) conducts studies of fundamental turbulence and applied convective heat transfer. Subjects being researched include freestream turbulence effects on gas turbine blade boundary layers, endwall secondary flow effects, turbine blade cooling techniques, and electronic cooling. These problems are approached both experimentally as well as computationally. Within the laboratory, experimental facilities include two wind tunnels and internal flow channels. Instrumentation includes time-resolved digital particle image velocimeter, laser Doppler velocimeter, hot-wire anemometer, and infrared thermography. Computational facilities include a cluster and many desktop computers. The research conducted within the laboratory is supported through federal agencies as well as industry. In 2007, the laboratory was given the distinction of being a Pratt & Whitney Center of Excellence for gas turbine heat transfer. In 2015, Dr. Thole stepped down as the Director to develop the START Lab whereby the new Director was changed to Professor Stephen Lynch.

DESCRIPTION OF STEADY THERMAL AERO RESEARCH TURBINE (START) LAB

The Steady Thermal Aero Research Turbine Lab houses a unique, state-of-the-art one stage turbine in which blade Reynolds numbers and rotational Reynolds numbers are matched to that of an engine. The primary goals for this turbine facility include: developing novel cooling methods for turbine airfoils; developing improved sealing mechanisms for inter-stage gaps; validating sensors in rotating environments; and advancing additive manufacturing for turbine airfoil cooling. The START lab houses a facilities that evaluate the heat transfer and pressure loss in true-scale models. The development of Penn State's START Lab occurred through an initial and continuing partnership between Penn State, the Department of Energy-National Energy Technology Lab, and Pratt & Whitney. The START Lab leads the Pratt & Whitney Center of Excellence and the Solar Turbines Center of Excellence. In 2024, Associate Professor Reid Berdanier became the Director as Dr. Thole changed roles to become the Dean of Engineering at the University of Michigan.