



ROBERT J. BUTLER, Ph.D., P.E.

PRINCIPAL

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Dr. Butler is a Mechanical/Aeronautical Engineer and a Principal of Engineering Systems Inc. (ESi). Dr. Butler earned his Ph.D. in Mechanical Engineering researching jet engine turbine blade heat transfer. He joined ESi after serving more than 20 years as an officer in the U.S. Air Force. During his Air Force career, he was the lead Air Force Engineer for the Joint Strike Fighter F120 Jet Engine Program. He led and worked on numerous wind tunnel and ballistic range test projects ranging from subsonic to hypersonic conditions with speeds greater than Mach 20.

Dr. Butler spent over six years teaching aeronautical and Mechanical Engineering courses at the USAF Academy and the USAF Test Pilot School in fluid dynamics, aeronautics, heat transfer, thermodynamics, engineering design, subsonic, supersonic, and hypersonic aerodynamics. He also served as Professor of Aerospace Studies and Commander at the University of South Florida in Tampa. He has been doing research in motor vehicle performance since 1998. In addition to his background in vehicle performance, he has trained in accident reconstruction at Northwestern University, University of North Florida, and the Society of Automotive Engineers (SAE). He is also a certified brake inspector (49 CFR-396.25). Dr. Butler is co-inventor of a laser liquid-crystal measuring method that earned a U.S. Patent. During his career he has authored more than 20 technical papers, reports, and articles, and has given presentations on a wide variety of technical, leadership, and educational topics. Dr. Butler is an accomplished amateur racecar driver, mechanic, high performance driving instructor, and private pilot.

Areas of Specialization

Motor vehicle and aircraft accident investigation and reconstruction

Commercial vehicles, human factors, visibility, motorcycles, bicycles, pedestrians, and racecar performance

Mechanical design, heat transfer, aerodynamics, fluid dynamics, and experimental testing

Education

Ph.D., Mechanical Engineering, University of California, Davis, 1995

M.S., Aerospace Engineering, University of Tennessee, 1989

B.S., Aeronautical Engineering, Embry-Riddle Aeronautical University, 1985



Licensed Professional Engineer (P.E.)

State of Colorado License No. 40194

Professional Affiliations/Honors

Society of Automotive Engineers (SAE) – Member

Member of the CDCA Data Collection and Archiving Standard Committee
Leads SAE J2969, Use of Critical Speed Formula, Task Force

American Institute of Aeronautics and Astronautics (AIAA) - Member since 1990

Associate Fellow
Thermophysics Technical Committee 1995-1998

National Association of Professional Accident Reconstruction Specialists – Member

Senior Professional of the Quarter, USAF Propulsion Directorate, Wright-Patterson AFB, OH, 2001

Nominee for the Frank J. Seiler Award for Research Excellence, 1996

American Institute of Aeronautics and Astronautics Young Engineer of the Year (seven-state Rocky Mountain Section), 1996

Company Grade Officer of the Quarter, USAF Academy, Department of Aeronautics, 1991

New Instructor of the Year, USAF Academy, Aeronautics Department, 1991

Company Grade Officer of the Year, Arnold AFB, TN, 1987

Pratt and Whitney Engineering Award, 1985

American Military Engineers Award, 1984

Positions Held

Engineering Systems Inc., Colorado Springs, Colorado

Principal, January 2024-Present
Principal and Senior Director, January 2021- January 2024
Principal and Director of the Automotive Practice Group, June 2017 – January 2021
Principal and Director of Commercial Vehicles, 2015 – 2017
Senior Managing Consultant, Director of Commercial Vehicles, 2013 – 2015



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January 2024

Senior Managing Consultant, 2012 – 2013
Senior Consultant, 2005 - 2012

USAF Professor of Aerospace Studies and Commander, University of South Florida
2002 - 2005

USAF C-17 Jet Engine Program Manager, WPAFB, Ohio
1999 – 2002

USAF Lead Engineer, Joint Strike Fighter F120 Jet Engine, WPAFB, Ohio
1998 - 1999

Associate Professor of Aeronautics, USAF Academy, Colorado
1995 - 1998

Instructor of Aeronautics, USAF Academy, Colorado
1989 - 1992

USAF Reentry Systems Test Manager, Arnold AFB, Tennessee
1987 - 1989

USAF Aerospace Test Facility Manager, Arnold AFB, Tennessee
1985 - 1987

Continued Education

Event Data Recorder Update and Analysis, Ruth Consulting, 2023

Traffic Signal Timing Records Interpretation and Analysis, Traffic Signal Academy, University of Tennessee

Applied Vehicle Dynamics Course, Precision Auto Research & PowerTrain Technology at Autobahn Country Club, Joliet, IL

Crash Data Retrieval (CDR) Technician Course, Collision Safety Institute

Human Factors in Traffic Crash Reconstruction, Institute of Police Technology and Management, University of North Florida

Bendix Air Brake Systems Training Program

Occupant and Vehicle Kinematics in Rollovers, Society of Automotive Engineers (SAE)



Pedestrian/Bicycle Crash Investigation, Institute of Police Technology and Management,
University of North Florida

Electronic Stability Control Systems Compliance Test Program, NHTSA Technical Workshop
and Demonstration, Transportation Research Center, Ohio

Investigation of Motorcycle Crashes, Institute of Police Technology and Management, University
of North Florida

Vehicle Accident Reconstruction Methods, Society of Automotive Engineers (SAE)

Inspection and Investigation of Commercial Vehicle Crashes, Institute of Police Technology and
Management, University of North Florida

Human, Vehicle, Environment (HVE) simulation software training, Engineering Dynamics Corp

Traffic Accident Reconstruction, Northwestern University

Defense Systems Management College, Defense Acquisition Workforce Improvement Act
(DAWIA) certified in Systems, Planning Research, Development, and Engineering, Test
and Evaluation, and Program Management

Systems Safety Management, University of Washington

Unsteady Aerodynamics, University of Tennessee

Hypersonic Aerodynamics, University of Tennessee

Aircraft Stability and Control Flight Testing, University of Tennessee

United States Patent

US Patent #5,963,292, 1999, (Co-inventor): Laser Thermal Tuft. Method and device for
measuring surface flow and boundary layer separation. This method uses a laser to heat a
small spot on a liquid crystal coated surface. The flow direction is determined by measuring at
the color pattern given off by the liquid crystal surface which produces asymmetric advection
from the surface.

Publications

Chinni, J., **Butler, R.**, Yang, S., "Simulations of Heavy Truck Rollovers and Sleeper Restraint
System Effectiveness," SAE International 2014-01-2420, September, 2014

- Bedsworth, K., **Butler, R.**, Rogers, G., Breen, K., and Fischer, W., "Commercial Vehicle Skid Distance Testing and Analysis," SAE International 2013-01-0771, April, 2013
- Slane, J., **Butler, R.**, Morris, S., "Using GPS and Accelerometer Data to Reconstruct Aircraft Flight Parameters," AIAA-2008-7032, Honolulu, Hawaii, August, 2008
- Butler, R.**, Winn, R., Morris, S., Slane, J., Turnquist D., and Wooddell, M., "Using GPS-based Data Acquisition to Evaluate Vehicle and Driver Performance," AIAA-2008-1146, Reno, Nevada, January, 2008
- Morris, S., **Butler, R.**, Slane, J., McLaughlin, T., Gamble, C., and Martin, J., "Analysis of a Hoverwing in Ground Effect," AIAA-2008-0431, Reno Nevada, January, 2008
- Butler, R.J.**, Breen, K.C., Fischer, W.J., Bedsworth, K.D., and Haupt, N.R., "Using GPS-based Data Acquisition in Forensic Accident Reconstruction," Collision - International Compendium of Crash Research, Volume 2, Issue 2, Fall 2007
- Slane, J.H., **Butler, R.J.**, Emmerling, J.J., Morris, S.L., Winn, R.C., and Kumley, K.B. "Evaluation of a General Aviation Flight Data Recorder," AIAA 2007-6365, Hilton Head South Carolina, August 2007
- Bedsworth, K.D., **Butler, R. J.**, Miller, J., and Breen, K.C., "Analysis of Occupant Kinematics During a Commercial Vehicle/Passenger Vehicle Crash Test," Classroom material and presentation at the Institute of Police Technology and Management, University of North Florida, April, 2007
- Butler, R. J.**, Byerley, A. A., VanTreuren, K., and Baughn, J. W., "The Effect of Turbulence Intensity and Length Scale on Low-Pressure Turbine Blade Aerodynamics," International Journal of Heat and Fluid Flow, Volume 22, 2001
- Butler, R. J.**, The Effect of Gearing on Racetrack Vehicle Acceleration - "Track Gearing", NSX Driver (publication of the NSX Club of America), Q1, 2001
- Butler, R. J.**, Power, Torque and Acceleration - "Vehicle Acceleration", NSX Driver (publication of the NSX Club of America), Q3, 2000
- Zuber, M. E., Towne, M. C., Chen, A. J., Bertin, J. J., and **Butler, R. J.**, "Aerothermodynamic Environment for a Generic Missile," Journal of Spacecraft and Rockets, Volume 36, Number 1, 1999
- Baughn, J. W., Mayhew, J. E., **Butler, R. J.**, Byerley, A. A., and Rivir, R. B., "Turbine Blade Flow Separation and Reattachment at Low Reynolds Number," Journal of Heat Transfer, Volume 121, 1999
- Butler, R. J.**, The Physics of an Internal Combustion Engine - "Engine Basics", NSX Driver (publication of the NSX Club of America), Volume 3, No. 13, 1999
- Baughn, J. W., Mayhew, J. E., Anderson, M. R., and **Butler, R. J.**, "A Periodic Transient Method using Liquid Crystals for the Measurement of Local Heat Transfer Coefficients," Journal of Heat Transfer, Volume 120, 1998

- Butler, R. J.**, Ketsdever A., Leland, J., Roveda, R., Tsuyuki, G., and Wood, B., "Thermophysics," Year-In-Review Article, Aerospace America, December, 1998
- Welsh, S. T., Barlow, D. N., **Butler, R. J.**, and VanTreuren, K. W. "Effect of Passive and Active Air-Jet Turbulence on Turbine Blade Heat Transfer," International Gas Turbine Conference, Orlando, FL, 1997
- Zuber, M. E., Towne, M. C., Chen, A. J., Bertin, J. J., and **Butler, R. J.**, "Determining the Aerothermodynamic Environment of a Generic Missile", AIAA 97-12-09a, 6th AIAA/BMDO Technology Readiness Conference, San Diego, California, 1997
- Baughn, J. W., Mayhew, J. E., Anderson, M. R., and **Butler, R. J.**, "A Periodic Transient Method using Liquid Crystals for the Measurement of Local Heat Transfer Coefficients," ASME National Heat Transfer Conference, Dallas, Texas, 1997
- Butler, R. J.** and Baughn, J. W., "The Effect of the Thermal Boundary Condition on Transient Method Heat Transfer Measurements on a Flat Plate with a Laminar Boundary Layer," Journal of Heat Transfer, Volume 118, No. 4, 1996
- Hassan, B., Blanchard, D., **Butler, R. J.**, Hennessey, Meyer, M., Taylor, J., Tsuyuki, G., and Wiese, J., "Thermophysics," Year-In-Review Article, Aerospace America, December, 1996
- Baughn, J. W., **Butler, R. J.**, Byerley, A. R., and Rivir, R. B., "An Experimental Investigation of Heat Transfer, Transition and Separation on Turbine Blades at Low Reynolds Number and High Turbulence Intensity," ASME 95-WA/HT-25, 1995
- Butler, R. J.**, and Baughn, J. W., "Shroud Technique using the Transient Method for Local Heat Transfer Measurements," The Journal of Experimental Heat Transfer, Volume 8, 1995
- Butler, R. J.**, and Baughn, J. W., "Validation of an In-Situ Heated Transient Technique with Local Heat Transfer Measurements on a Cylinder in Cross-Flow," AIAA 94-2009, 6th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, Colorado Springs, Colorado, 1994
- Butler, R. J.**, "Trisonic Wind Tunnel Envelope Expansion," Department of Aeronautics Report, United States Air Force Academy, Colorado, 1992
- Butler, R. J.**, "Boundary Layer Transition on Reentry Vehicle Nosetips," Arnold Engineering Development Center, AEDC-TMR-91-P5, August, 1991

Presentations

- Butler, R.**, "Accident Reconstruction – Interesting Cases," L&C 4th Annual CLE Seminar, Denver, CO, June 14, 2019
- Chinni, J., **Butler, R.**, Yang, S., "Simulations of Heavy Truck Rollovers and Sleeper Restraint System Effectiveness," SAE 2014 Commercial Vehicle Engineering Congress, Rosemont, IL, October 7, 2014

- Bedsworth, K.D., **Butler, R.J.**, "Commercial Vehicle Skid Distance Testing and Analysis," SAE World Congress, Detroit, MI, April 17, 2013
- Butler, R.J.**, "Interesting Cases in Mechanical Engineering Forensics," Rocky Mountain Association of Special Investigation Units (RMASIU), monthly training, February 7, 2011
- Butler, R.J.**, "The Latest Methods in Motor Vehicle Accident Reconstruction," Colorado Defense Lawyers Association Continuing Legal Education Seminar, Denver, Colorado, April 7, 2010
- Butler, R.J.**, "Vehicle Dynamics," Colorado Continuing Legal Education Approved, The Track at Centennial, Englewood, Colorado, May 08, 2009
- Winn, R.C. and **Butler, R.J.**, "The State of the Art in Accident Reconstruction," Association of Defense Trial Attorneys Annual Meeting, Scottsdale, Arizona, April 17, 2009
- The Annual Aerospace Sciences Meeting, **Butler, R.J.**, "Using GPS-based Data Acquisition to Evaluate Vehicle and Driver Performance," Reno NV, January, 2008
- Butler, R.J.**, Vehicle Dynamics and Racecar Setup, SAE design competition students, United States Air Force Academy, Colorado, October, 2007
- Butler, R.J.**, Motor Vehicle Accident Reconstruction, Colorado Continuing Legal Education Approved, Colorado Defense Lawyers Association, March, 2006
- Butler, R.J.**, The use of Simulation Software in Accident Reconstruction, National ESi Accident Reconstruction Training, Florida, January, 2006
- Daughters of the American Revolution annual meeting (Tampa), **Butler, R.J.**, "The Constitution," 2004, (Invited speaker)
- Golden Key International Honors Society annual induction ceremony, **Butler, R.J.**, "Leadership," 2003, (Invited speaker)
- Putnam Racetrack Classroom Instructor (IN), **Butler, R.J.**, "Vehicle Dynamics", BMW Club of America, May, 2001
- Mid-Ohio Sports Car Course Classroom Instructor (OH), **Butler, R.J.**, "Racecar Setup and Handling", BMW Club of America, September, 2001
- Road America Racetrack Classroom Instructor (WI), **Butler, R.J.**, "Vehicle Dynamics", NSX Club of America, October, 2001
- University of Kentucky, **Butler, R.J.**, "Turbulence and Turbine Blade Heat Transfer," November, 2000 (Invited speaker)
- ASME International Mechanical Engineering Congress, **Butler, R.J.**, "An Experimental Investigation of Heat Transfer, Transition and Separation on Turbine Blades at Low Reynolds Number and High Turbulence Intensity," San Francisco, California, 1995



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6th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, **Butler, R.J.**, "Validation of an In-Situ Heated Transient Technique with Local Heat Transfer Measurements on a Cylinder in Cross-Flow," Colorado Springs, Colorado, 1994