McSWAIN ENGINEERING
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WILLIAM D. CARDEN, M.S., P.E.

Curriculum Vitae

EDUCATION:

1994: University of Alabama-Birmingham - Bachelor of Science in Materials Engineering

1997: The Ohio State University - Master of Science in Materials Engineering

ENGINEERING REGISTRATION:

Registered Professional Metallurgical Engineer in the State of Alabama - 2003. P.E. #26030

Registered Professional Metallurgical Engineer in the State of Georgia - 2005. P.E. #30778

Registered Professional Metallurgical Engineer in the State of Florida - 2006. P.E. #65271

EXPERIENCE:

2006 to Present	Consulting Materials Engineer/Director of Materials Engineering McSwain Engineering, Inc. Pensacola, Florida Failure analysis and engineering investigation. Evaluation of properties, processing and manufacturing of aerospace, automotive and consumer products and materials. Oversight of laboratory operations, metallurgical and materials testing, and technical staff.
2001 to 2006	Senior Engineer Vista Engineering Birmingham, Alabama Failure analysis, including metallurgical evaluations, numerical/engineering analysis, fractography. Analysis of materials and manufacturing processes. Microstructural modeling of grain refinement in the processing of super alloys. Software code development, validation and numerical analysis. Deformation modeling using finite element analysis (DEFORM).

1997 to 2001	Materials Engineer Private Contractor/Self-Employed
	Microstructure modeling using Monte Carlo Simulation Techniques to simulate solidification in nickel alloy systems. Development of solidification modeling computer code and comparison to actual microstructures. FORTRAN coding and software development.
1995 to 1997	Graduate Research Assistant The Ohio State University Columbus, Ohio
	Research and testing related to the processing and utilization of new weight saving materials in the automotive industry. Specializing in sheet metal forming and mechanical metallurgy.
1993 to 1995	Research Assistant/Laboratory Technician University of Alabama-Birmingham Birmingham, Alabama
	Conducted research on various projects. Taught undergraduate labs. Performed testing related to various engineering consulting and failure analysis projects. Performed metallography and other testing related to crystal growth and semiconductor compatibility research.

MEMBERSHIP IN PROFESSIONAL SOCIETIES:

American Society of Mechanical Engineering (ASME)

American Society for Materials (ASM International)

Society of Manufacturing Engineers (SME)

Association for Forming & Fabricating Technologies of SME (AFFT/SME)

Society of Automotive Engineers (SAE)

Alabama Society of Professional Engineers (ASPE)

National Society of Professional Engineers (NSPE)

Failure Analysis Society ASM International (FAS)

ASTM International (formerly American Society for Testing and Materials)

FUNDED RESEARCH:

DoD-AF, SBIR Phase I, Efficient Superalloy Ingot Breakdown

CTeC, Microstructure Modeling of Ingot Grain Refinement for Turbine Disks

PRESENTATIONS AND CONFERENCE PARTICIPATION:

"Microstructure Simulation and Verification of Alloy 718 Hot Compression Tests," G. Janowski, R. Thompson, M. Papo, W. Carden: Presentation at ASM 13th Advanced Aerospace Materials & Processes Conference & Exposition (AeroMat), Presented by David Lambert, Scientific Forming Technologies Corporation, Orlando, Florida, June 2002.

"Microstructure Analysis and Modeling of Ingot to Billet Conversion in Alloy 718," R. Thompson, G. Janowski, W. Carden, J. Papo, H. Ning: THERMEC 2003, Madrid, Spain, 2003.

"Spot Weld Failure in Galvanized Steel Sheets: A Case Study," R. Thompson, W. Carden, Failure Analysis and Prevention, ASM Materials Solutions Conference, Pittsburgh, 2003.

"Fatigue Failure in a Threaded Eyebolt: A Case Study," W. Carden and R. Thompson, Failure Analysis and Prevention, ASM Materials Solutions Conference, Pittsburgh, 2003.

"Modeling Microstructure Evolution in 718 Ingot to Billet Conversion," W. Carden, R. Thompson, G. Janowski, J. Papo, H. Ning, The New Face of Forging II, ASM Materials Solutions Conference, Pittsburgh, 2003.

"Modeling Microstructure Evolution in 718 Ingot to Billet Conversion," W. Carden, R. Thompson, D. Barker, R. Goetz, F. Meisenkothen, F. Scheltens, G. Janowski, 6th International Symposium on Superalloys 718, 625, 706 and Derivatives, TMS Conference, Pittsburgh, 2005.

"Causation and Consequences of Spring Failure in RCF 67 Buckles," American Academy of Forensic Sciences, Annual Meeting, San Antonio, Texas, February 2007.

"Preparation of Three-Dimensional Exhibits and Replicas for Courtroom Presentation," E. Van Iderstine, W. Carden, 41st Annual Air Law Symposium, Dallas, Texas, February 2007.

"Application of Reverse Engineering Created Models to Failure Analysis Investigations (Invited)," R. H. McSwain, M. B. Hood, E. L. Van Iderstine, W. D. Carden, C. C. Coburn, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Detroit, MI, September 2007.

"Contact and Non-Contact Dimensional Analysis in Forensic Investigations (Invited)," E. L. Van Iderstine, R. H. McSwain, W. D. Carden, C. C. Coburn, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Detroit, MI, September 2007.

"Causation and Consequences of Spring Failure in RCF 67 Buckles," R. H. McSwain, M. B. Hood, W. D. Carden, E. L. Van Iderstine, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Detroit, MI, September 2007.

"Ford Probe Seat Collapse," R. H. McSwain, M. B. Hood, W. D. Carden, E. L. Van Iderstine, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Columbus, OH, October 2011.

"Trailer Hitch Receiver Failure on a Class A Motorhome," W. D. Carden, E. L. Van Iderstine, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Columbus, OH, October 2011.

Session Chair: Failure Analysis and Prevention: Environmentally Assisted Failures, Materials Science & Technology Conference and Exhibition, Montreal, Quebec, Canada, October 2013.

Session Chair: Failure Analysis and Prevention: Consumer Products, Materials Science & Technology Conference and Exhibition, Pittsburgh, PA, October 2014.

"Failure of a Pickup Truck Track Bar," William Carden, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Pittsburgh, PA, October 2014.

"Knife Blade Delamination Failure," William Carden, Eric Van Iderstine, McSwain Engineering, Inc., Materials Science & Technology Conference and Exhibition, Pittsburgh, PA, October 2014.

"Computerized Metrology, Small and Large Scale Laser Scanning, Real Time Radiography, Computed Tomography Radiography, and 3D Printing and Rapid Prototyping in Engineering Investigation and Materials Failure Analysis," Eric Van Iderstine, Richard McSwain and William Carden, McSwain Engineering, Inc., Materials Science & Technology Conference, Columbus OH, October 2015.

"History of Aircraft Carburetors and Carburetor Failures," Richard McSwain, William Carden, and Eric Van Iderstine, McSwain Engineering, Inc., Materials Science & Technology Conference, Columbus, OH, October 2015.

"Contamination Identification of CPVC Pipes using DART Open-Beam Mass Spectrometry and Subsequent Fracture Analysis," William Carden, Amy Meyers, McSwain Engineering, Inc., Materials Science & Technology Conference, Columbus, OH, October 2015.

Session Chair: High Performance Vehicles/Corrosion, Materials Science & Technology Conference and Exhibition, Salt Lake City, UT, October 2016.

"Failure Analysis and Engineering Investigation of a Failed Tower Crane Turntable Weld That Led to a Crane Collapse," Richard McSwain, William Carden, Eric Van Iderstine, L. Scott Marshall, and Leah Godwin, McSwain Engineering, Inc., Materials Science & Technology Conference, Salt Lake City, UT, October 2016.

"DSC and TGA: Tools for Analyzing the Thermal Characteristics of Polymers," Amy Wells, William Carden, and Richard McSwain, McSwain Engineering, Inc., Materials Science & Technology Conference, Salt Lake City, UT, October 2016.

"Failure Analysis of a Main-mast Hydraulic Backstay Adjuster Piston Rod from a High Performance, Long Range Sailing Yacht," William Carden, L. Scott Marshall, and Richard McSwain, McSwain Engineering, Inc., Materials Science & Technology Conference, Salt Lake City, UT, October 2016.

"Investigation and Analysis of a High Performance Wake Boarding Boat Accident Using Instrumentation and Data Acquisition," William Carden, Eric Van Iderstine, and Richard McSwain, McSwain Engineering, Inc., Materials Science & Technology Conference, Salt Lake City, UT, October 2016.

Session Chair: Unusual and Complex Cases, Materials Science & Technology Conference and Exhibition, Pittsburgh, PA, October 2017.

"Tire Analysis Tools and Techniques," William Carden and Amy Meyers-Wells, McSwain Engineering, Inc., Materials Science & Technology Conference, Pittsburgh, PA, October 2017.

"Complex Failure of a Residential Heating and Air Conditioning System," William Carden, McSwain Engineering, Inc., Materials Science & Technology Conference, Pittsburgh, PA, October 2017.

"Commercial Truck Cab Retention Failure and Crashworthiness in a Jack-knifing Event," William Carden and Eric Van Iderstine, Materials Science & Technology Conference, Columbus, OH, October 2018.

"CT and Volume Graphics in the Failure Analysis Process," Volume Graphics UGM North America 2019, April 2019.

"Failure of Polycrystalline CT Blade Fir Trees and the Role of Carbide Morphology: Unusual Failures of FAA PMA Compressor Turbine Blades in PT6 Aircraft Engines," William Carden, McSwain Engineering, Inc., Materials Science & Technology Conference, Portland, OR, September 2019.

Session Chair: Failure Analysis: Industry Specific Failures: Aerospace, Materials Science & Technology Conference, Portland, OR, September 2019.

"Helicopter Main Rotor Servo Disconnect Failure Due to Self-locking Nut Reuse," Richard McSwain, William Carden and Leah Godwin, McSwain Engineering, Inc., Materials Science & Technology Conference, Portland, OR, September 2019.

"The Identification of Plastic Additives in a Failure Analysis Investigation," Dr. Amy M. Wells, Dr. Richard McSwain, PE, FASM, and Mr. William Carden, MS, PE, McSwain Engineering, Inc. Materials Science & Technology Conference, Portland, OR, September 2019.

Panel Session: Physical Defect or Flaw, That is the Question, Moderator: Mr. William Carden, MS, PE, ASM International Materials, Applications & Technologies Conference, St. Louis, MO, September 2021.

"Dimensional Analysis Techniques in Forensic Investigations," Mr. William Carden, MS, PE and Mr. Eric Van Iderstine, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, St. Louis, MO, September 2021.

"Getting Answers from Off-Gassing – How TGA-IR is Utilized in the Failure Analysis of Polymers," Dr. Amy M. Wells, Dr. Richard McSwain, PE, FASM, and Mr. William Carden, MS, PE, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, St. Louis, MO, September 2021.

"Dual Pipeline Explosions: Two Pipelines Meet in the Desert with Explosive Results," William Carden, Amy M. Wells, and Eric Van Iderstine, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, New Orleans, LA, September 2022.

"How to Conduct a Laboratory Inspection in a Multiparty Failure Investigation," William Carden, Amy M. Wells, and Eric Van Iderstine, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, New Orleans, LA, September 2022.

"Chain of Custody Procedures and Practices for Failure Investigations," William Carden, Amy M. Wells, and Eric Van Iderstine, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, New Orleans, LA, September 2022.

"Failure Analysis of a Reworked Aircraft Engine Cylinder," William Carden and Richard McSwain, PE, FASM, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, New Orleans, LA, September 2022.

"The Burning Question – Identifying Flame Retardants in a Failure Analysis Investigation," Dr. Amy M. Wells, Dr. Richard McSwain, PE, FASM, and Mr. William Carden, MS, PE, McSwain Engineering, Inc., ASM International Materials, Applications & Technologies Conference, New Orleans, LA, September 2022.

PUBLICATIONS:

Wang, J.F., Wagoner, R.H., Carden, W.D., Matlock, D.K., Barlat, F., "Creep and Anelasticity in the Springback of Aluminum," International Journal of Plasticity, V20, N12, December 2004, p 2209-2232.

R. Thompson, G. Janowski, W. Carden, J. Papo, H. Ning, "Microstructure Analysis and Modeling of Ingot to Billet Conversion in Alloy 718," Materials Science Forum, V426-432, N1, 2003, p 809-814.

Carden, W.D., Geng, L.M., Matlock, D.K., Wagoner, R.H., "Measurement of Springback," International Journal of Mechanical Sciences, V44, N1, January 2002, p 79-101.

R. H. Wagoner, W. D. Carden, W. P. Carden, D. K. Matlock, "Springback after Drawing and Bending of Metal Sheets," Proc. IPMM '97 - Intelligent Processing and Manufacturing of Materials, eds. T. Chandra, S.R. Leclair, J.A. Meech, B. Verma, M. Smith and B. Balachandran, University of Wollongong, 1997, V1 (Intelligent Systems Applications), p 1-10 [KEYNOTE].

SERVICE AND HONORS:

ASTM International Membership and Committee Service:
- Committee F08 – Sports Equipment, Playing Surfaces, and Facilities
  - Subcommittee F08.18 – Treestands
- Committee E58 – Forensic Engineering
  - Subcommittee E58.01 – General Practice
  - Subcommittee E58.02 – Product Defect Incidents
  - Subcommittee E58.03 – Vehicular Incidents
  - Subcommittee E58.05 – Industrial Processes
  - Subcommittee E58.06 – Incidents Involving Structures
- Committee F18 – Electrical Protective Equipment for Workers
  - Subcommittee F18.15 – Worker Personal Equipment

FAS Failure Analysis Society – Founding Member (ASM International), 2016

FAS Failure Analysis Society – Awards Committee (ASM International)

FAS Failure Analysis Society – MS&T Conference Programming Committee (ASM International)

ASM Failure Analysis Committee – Voting Member – American Society for Materials (ASM International)

ASME Birmingham, Chairman 2005-2006, Chapter Treasurer 2003-05

Society of Manufacturing Engineers Birmingham, Chairman 2005-06, Chapter Treasurer 2003-05

Birmingham Business Journal's Top 40 Under 40, 2004

Engineering Council of Birmingham's Young Engineer of the Year, 2003

The Ohio State University Alumni Association, 2002

University of Alabama - Birmingham Alumni Association, 2001

ASM/TMS Joint Student Chapter President-UAB, 1994

AFS Student Chapter Vice-President-UAB, 1994

Alpha Sigma Mu, Materials Engineering Honor Society, 1994

Tau Beta Pi, Engineering Honor Society, 1994

CONTINUING ENGINEERING EDUCATION:

Course Title	Source	Date
Motor Vehicle Accident Reconstruction	SAE International	2004
Air Brake Systems Training	Bendix	2004
Practical Fracture Analysis	ASM International	2007
The Tire as a Vehicle Component	SAE International	2007
Tire and Wheel Safety Issues	SAE International	2007
PC-DMIS Training for ROMER CimCore Portable CMM	ROMER CimCore	2007
CAMIO Basic	Metris	2008
The Basics of Internal Combustion Engines	SAE International, Course I.D.# PD130404	2008
Impulse Operators Course	Instron	2009

Course Title	Source	Date
Advanced Factory Training Course	Teledyne Continental Motors	2009
Introduction to Welded Joints	ICE Technology, Dr. Jess Comer	2010
Threaded Fasteners and the Bolted Joint	ICE Technology, Dr. Jess Comer	2010
Medical Device Design Validation and Failure Analysis	ASM International	2012
Radiation Safety and Operation of Portable XRF Analyzers	Thermo Scientific Portable Analytical Instruments Inc.	2013
NTSB Helicopter Accident Investigation	National Transportation Safety Board	2014
Tire Forensic Analysis	Society of Automotive Engineers	2016
Basic Tire Mechanics and Inspection	Society of Automotive Engineers	2016
Understanding the FAA Aircraft Certification Process	SAE International	2016
Aircraft Cabin Safety and Interior Crashworthiness	SAE International	2016
Torsional Vibration of Rotary and Reciprocating Machines	No Bull Engineering	2017
Intro to Handheld XRF – Theory and Safety	Olympus	2018
Superalloys for Heavy-Duty and Aircraft-Type Gas Turbines	University of Florida	2018
Hydrogen Sulfide Training	Helmerich & Payne IDC	2018
Fall Protection Awareness Training	Guardian Fall Protection	2018
Competent Person Training	Guardian Fall Protection	2018
Fundamentals of Power Transmission and Distribution	McKissock	2018
Forensic Engineering: • Conducting Failure Analyses of Metallic Materials • Classes of Metallurgical and Mechanical Failures • Case Histories: Metallurgical/Mechanical Failure Analyses	SunCam	2020
Nondestructive Examination	SunCam	2022

Course Title	Source	Date
Welding Technology	SunCam	2022
Corrosion Control and Tactics	SunCam	2023