PRESTON SCARBER, Jr., Ph.D., P.E.

PROFESSIONAL BIOGRAPHICAL OUTLINE

BACKGROUND

Dr. Preston Scarber is a forensic investigator who uses his expertise in materials engineering and mechanics to determine how and why a failure or accident occurred and if a mechanical system design is sound. Dr. Scarber is also an accident reconstructionist and analyzes how vehicle crush, road geometry, and human factors relate to an accident. Dr. Scarber investigates incidents of any scope, from minor property damage to major accidents involving loss of life. He also works as a consultant in material processing, failure analysis, and risk management, and conducts research in forensic investigation and accident prevention.

Dr. Scarber holds a Bachelor's degree, Master's degree, and Ph.D. in Materials Engineering (MtE) from the University of Alabama at Birmingham. His research and teaching background include the mechanical properties of materials, material strengthening mechanisms, failure modes of composites, and fracture mechanics. As a former industrial consultant, Dr. Scarber has experience designing production experiments to resolve anomalies, equipment failures, quality assurance, and production safety.

AREAS OF SPECIALTY

- Accident Reconstruction
- Human Factors
- EDR (Black Box) Imaging & Analysis
- Commercial vehicle HVEDR Imaging & Analysis
- Pedestrian/Bicycle Accident Analysis
- Vehicle Accident Simulation
- Failure Analysis
- Metallurgy
- Material Identification and Characterization
- Materials Science
- Fatigue and Fracture of Metals
- Forensic Analysis
  - Fracture Surface Analysis
  - Metal Corrosion
  - Weld and Fastener Failures
- Safety Engineering, Machine Design, Safeguarding, Instructions, and Warnings
- Consumer Product Failure Analysis
  - Distinguishing flaws and defects from wear, tear, and operator error or abuse
- Construction Accident Investigation
- Industrial Safety Standards and Regulations

SUMMARY OF PROFESSIONAL ACCOMPLISHMENTS

- Developed a method for accurately simulating shrinkage porosity in Al-Si casting alloys.
- Developed a thermo-physical properties database for more accurate simulation of Al Si alloys.
- Developed a method for simulating the rate and volume of gas produced when liquid metal contacts bonded sand.
- Improved the accuracy of lost foam casting simulation through collaboration with commercial code-writers.
- Co-developed basic gating rules for lost foam castings.
- Developed a method to simulate foam pattern irregularities for more accurate prediction of anomalies in lost foam castings.
- Developed a method to quantify the filling behavior of gating systems for open cavity castings.
- Worked with over 35 companies in both public and proprietary simulation studies to reduce casting anomalies and scrap with a total estimated energy savings of more than $13 million.

As a forensic investigator, Dr. Scarber applies materials engineering to understand the history of an artifact. Whether the part is made from metal, ceramic, polymer, or a composite, the material an object is made from dictates how the object interacts with its environment, so the condition of the object contains evidence of its past use. Dr. Scarber's past forensic investigations include failures of heavy construction and mining equipment, automobile assemblies, plumbing materials, consumer packaging and warnings, kitchen appliances, mechanics' tools, metalworking tools, welds, fasteners, and carbon monoxide deaths.

Dr. Scarber also specializes in the fields of accident reconstruction and human factors. Dr. Scarber investigates and reconstructs passenger vehicles, commercial vehicles, pedestrian, and bicycle collisions. He has training and experience in the field of human factors, including driver perception-response times and Interactive Driver Response Research (IDRR) software. He is trained in photogrammetry to determine vehicle crush and map scene evidence from photographs. He is also experienced in constructing scene diagrams and drawings utilizing computer aided design software, is certified as a BOSCH Crash Data Retrieval (CDR) technician and analyst, certified by the Society of Automotive Engineers (SAE) to access and interpret Heavy Vehicle Event Data Recorders (HVEDR) in commercial vehicles, and is experienced in documenting evidence utilizing three-dimensional laser scanning. Dr. Scarber is also an experienced user of crash simulation software and has used simulations in the courtroom to provide insight in convoluted multi-vehicle accidents.

As a licensed engineer in mechanics, Dr. Scarber analyzes how engineering design, technology, standards, instructions, and warnings were used, or should have been used, to manage a hazard. Dr. Scarber's engineering design analysis experience includes boiler systems, crane lift systems, hydraulic systems, lockout/tagout procedures, corrosion failures, durable medical equipment failures, and consumer products.

EDUCATION & TRAINING

- Bachelor of Science in Materials Engineering at the University of Alabama at Birmingham, 1992
- Master of Science in Materials Engineering at the University of Alabama at Birmingham, 1995
- Doctor of Philosophy in Materials Engineering at the University of Alabama at Birmingham, 1998
    - Dissertation Title: "Finite Element Modeling of Particle Cracking in Metal Matrix Composites"

PROFESSIONAL REGISTRATIONS

- Registered Professional Metallurgical Engineer in the State of Alabama (P.E.# 36351)
- Registered Professional Metallurgical Engineer in the State of Mississippi (P.E. #28301)

PROFESSIONAL EXPERIENCE

2024 – Present | ARCCA, LLC |Senior Engineer

- Investigation and analysis of failures in aviation, automotive, and mechanical systems and components.
- Reconstruction of pedestrian impacts and passenger and heavy vehicle accidents.

2023 -- 2024 |McSwain Engineering, LLC |Consulting Materials Engineer

- Duties included failure analysis and engineering investigation of failed and accident-related components; vehicular accident reconstruction and evaluation of properties and finite element analysis.

2009 -- 2023 | Vista Engineering | Professional Engineer / Accident Reconstructionist

- Duties included materials failure analysis; engineering design evaluation and development; mathematical verification of forensic evidence; presentation of analysis, testimony.

2009 – 2023 | VEAR, Inc. | Professional Engineer / Accident Reconstructionist

- Duties included computer simulation of vehicular accidents; mathematical verification of forensic evidence; failure analysis, presentation of analysis, testimony.

2001 – 2009 | University of Alabama at Birmingham (UAB) Department of Materials Science and Engineering | Research Engineer

- Duties included collaborating with industry and simulation software producers to increase accuracy and usefulness of materials process simulation for reduced energy consumption; manage graduate and undergraduate student labor; discover new research capabilities that would augment the group's casting research; publish research results in scientific journals; present research findings at conferences and meetings; maintain the group's web site.

1995 – 1997 | University of Alabama at Birmingham (UAB) Department of Materials and Mechanical Engineering | Postdoctoral Fellow

- Duties included developing ability to simulate casting processes; publish research results in scientific journals; present research findings at conferences and meetings.

PROFESSIONAL MEMERSHIPS

- National Society of Professional Engineers
- National Association of Professional Accident Reconstruction Specialists, Inc.
- ASM International – Birmingham chapter "10-14" coordinator
- National Society of Black Engineers
- American Foundry Society

PARTICIPATION IN TECHNICAL COMMITTEES

- American Foundry Society Division 1-F: Process Modeling
- American Foundry Society Division 1A/B: Engineering
- American Foundry Society Division 13: Lost Foam Casting Research
- Steel Founders' Society of America: Gating for Clean Steel Castings

RELEVANT CASEWORK

Plaintiff - Evaluation of commercial roof access door design; discovered that roof door had been modified from the original design, resulting in plaintiff injury; plaintiff judgment.

Plaintiff – Evaluation of crane ball bearing failure on service truck in coal mine; investigation revealed proper ball bearing design for expected loads, but completely improper materials selection that resulted in plaintiff injury; plaintiff judgment.

Defense – Complete evaluation of steam generation process for cardboard making factory; investigation of the entire steam generation process and design, revealing that the transient usage of the steam process caused localized accelerated corrosion and catastrophic failure of a pressure vessel that killed 4 people; defense judgment.

PUBLICATIONS

P. Scarber, Jr., "Modified Graphitic Iron – Now What?" Ductile Iron Society Keith Millis Symposium – Keynote Address, AFS 2008.

P. Scarber, Jr. and H. Littleton, "Simulating Macro-Porosity in Aluminum Lost Foam Castings", AFS 2008.

P. Scarber, Jr. and C.E. Bates, "Simulation of Core Gas Production During Mold Fill", AFS 2006.

P. Scarber, Jr., C.E. Bates, and J. Griffin, "Effects of Mold and Binder Formulations on Gas Evolution When Pouring Aluminum Castings", AFS 2006.

P. Scarber, Jr., "Gaseous Defects in Castings", Foundry Management and Technology, 2005.

P. Scarber, Jr. and W. Sun, "Watching Defects Form", Ductile Iron Society Technical and Operators Conference, 2003.

P. Scarber, Jr., "Using Gating Design to Minimize and Localize Reoxidation", SFSA Technical and Operating Conference, October 2002.

P. Scarber, Jr., "The Effect of Gating and Pouring Practice on Reoxidation in Steel Castings", SFSA Technical and Operating Conference, October 2001.

P. Scarber, Jr. and G.M. Janowski: "Finite Element Analysis of Reinforcement Particle Cracking in Al/SiCP Composites", Materials Science and Technology, October 2001.

P. Scarber, Jr., "Computer-Based Simulations of Liquid Metal Alloy Interactions with Air During Mold Fill of Castings", accepted for publication in International Journal of Cast Metals Research, 2001.

P. Scarber, Jr., "Using Liquid Free Surface Area as a Predictor of Reoxidation Tendency in Metal Alloy Castings", SFSA Technical and Operating Conference, October 2000.

P. Scarber, Jr., "Gating Design in Steel Castings", SFSA Technical and Operating Conference, November 1999.

P. Scarber, Jr. and G.M. Janowski: "The Effects of Reinforcement Shape and Volume Fraction on Residual Stress and Particle Cracking in Al/SiCp Composites", Modeling and Composites: Properties and Processing, Edited by Shao Ping Chen and Michael Paul Anderson, TMS-AIME, 1996, pp. 57-75.

P. Scarber, Jr. and G.M. Janowski: "The Effect of Reinforcement Particle Cracking on the Matrix Stress and Strain Behavior in Al/SiCP Composites", in preparation for Materials Science and Technology.

P. Scarber, Jr. and G.M. Janowski: "Finite Element Analysis of the Stress and Strain Distribution in Al/SiCP Composites", in preparation for Metallurgical Transactions B.

Robin D. Griffin, **Preston Scarber, Jr.,** Gregg M. Janowski, and Charles E. Bates: "Quantitative Characterization of Graphite in Cast Iron," A.F.S. Transactions, vol. 96-129, 1996, pp. 977-983.

AWARDS & HONORS

- American Foundry Society Outstanding Service Award – Division 11, 2008
- American Foundry Society Best Paper – Engineering, 2007
- University of Alabama at Birmingham National Alumni Society Outstanding
- Young Alumnus of the Year, 2004

CONTINUING ENGINEERING EDUCATION

Course Title	Source	Date
South Carolina Accident Reconstructionist Society Conference		2010
HVE Advanced Users' Conference		2011
HVE Advanced Users' Conference		2012
ARC-CSI Conference		2012
Faro 3D Laser Scanner Training		2013
Excel in Accident Reconstruction		2014
At-Scene Traffic Crash/Traffic Homicide Investigation, IPTM		2014
International Association of Forensic & Security Metrology Conference		2014
Advanced Crash Investigation-Institute of Police Technology & Management (IPTM)		2015
Motor Vehicle Accident Reconstruction and Cause Analysis - MARC1		2016
Faro Reality Forensics Training		2016
3D Forensics and Crash Seminar		2016
Forensic Science and Metrology International Educational Conference		2016
National Expert Witness Conference		2017
Human Factors for Traffic Reconstruction		2017
Event Data Recorder in Traffic Crash Reconstruction: Update and Advanced Analysis Techniques, Gulf Breeze, FL		2018