



**JEFFREY L. MCDOUGALL, P.E.**  
**SENIOR CONSULTANT**

[jlmcdougall@engsys.com](mailto:jlmcdougall@engsys.com)

Jeffrey L. McDougall is a Senior Consultant with Engineering Systems Inc. (ESi), with over 25 years of experience in failure analysis, metallurgy, and fractography. His expertise in metallurgical evaluation and the analysis of metallurgical failures has been applied to a number of industries including aerospace, automotive, boat/marine, rail, power generation, medical, mining, and firearms.

Prior to joining ESi, Mr. McDougall conducted failure analysis at Metals & Materials Engineers in Suwanee, GA, Applied Technical Services in Marietta, GA, and General Motors North America Materials Laboratory in Pontiac, Michigan. Mr. McDougall also conducted research at Michigan State University during graduate school.

**Areas of Specialization**

Failure Analysis

Ferrous/Non-Ferrous Metallurgy Performance of Automotive Components

Materials Analysis (Metallography, Fractography, SEM/EDXA) Materials at Elevated Temperatures

**Education**

M.S., Materials Science, Michigan State University, 1998

B.S., Materials Science & Engineering, Michigan State University, 1995

**Licensed Professional Engineer (P.E.)**

State of Alabama: License No. PE25473

State of Georgia: License No. PE29926

State of Mississippi: License No. PE19901

**Classroom Teaching Experience**

Introduction to Materials Science Laboratory

*March 2024*



## **Continued Technical Education**

Propeller Accident Reconstruction Class, Hartzell Propeller Inc., 2024  
Dimensioning and Tolerancing Overview, ASME, 2023  
GD&T Fundamentals (On Demand), ASME, 2023  
Drawing Interpretation (GD&T), ASME, 2023  
Welding Fundamentals I, American Welding Society, 2021  
PumpTec-2008 "Centrifugal and Positive Displacement pumps," 2008  
Aluminum & Its Alloys, ASM International, 2002  
Fundamentals & Applications of Powder Metallurgy, ASM International, 2002  
Principles of Failure Analysis, ASM International, 2000

## **Professional Affiliations**

ASM International - Member, since 1994  
ASM - Atlanta Executive Committee, 2007 - Present  
    Chairman, 2010 - 2011  
    Vice Chair, 2009 - 2010  
    Secretary, 2008 - 2009

## **Positions Held**

### **Engineering Systems Inc., Atlanta, Georgia**

Senior Consultant, 2007 - Present  
Manager of Georgia Operations, 2013 - 2017

### **Metals and Materials Engineers, Suwanee, Georgia**

Senior Metallurgist, 2002 - 2007

### **Applied Technical Services, Marietta, Georgia**

Metallurgist, 2001 - 2002

### **General Motors (Contract)**

Failure Analyst, 1999 - 2001

## **Technical Reports**

Metallurgical Failure Analysis

Failure Analysis of Automotive Components Component Failures  
Relating to Fires and Explosions Corrosion Failure Analysis

Environmentally Assisted Cracking of Materials Fatigue

Failure of Aircraft and Marine Components Mechanical Integrity of Pressure Components  
Performance of Bolts and Bolted Connections

## Publications

"Corrosion of Sulfur Removal Tanks Used in the Processing of Landfill Gas," E.L.S. Solomon, A.M. Pettinger, J.R. Babcock, S.A. Sanders, **J.L. McDougall**, *Journal of Failure Analysis and Prevention*, Vol. 21, Issue 1, February 2021

"Investigation of a Bridge Crane Derailment with Limited Subject Parts," **J. L. McDougall**, Lance Rewerts, Hans Iwand, Michael Stevenson, Foster Peterson, Tracy Bell, James Stage, Scot Karlins, *Journal of Failure Analysis and Prevention*, December 15, 2019

"Failure Analysis of a Circular Saw Blade with a Fractured Carbide Tip," M.E. Stevenson, S.F. Uchneat, P.D. Umberger, **J.L. McDougall**, *Journal of Failure Analysis and Prevention*, Manuscript ID JFAP-19-06-2230.R1, Accepted October 2019

"Failure Analysis of an Aluminum Chiller Pipe by Experimental Simulation and Stress Analysis," M.E. Stevenson, H.C Iwand., **J.L. McDougall**, P.D. Umberger, J.A. Wilkinson, M.T. Kenner, D.H. Stone, *Journal of Failure Analysis and Prevention*, Vol. 17, Issue 5, October 2017

"Case Study: Analysis of Corrosion Patterns to Evaluate the Preaccident Configuration of an ATV Tie Rod End Connection," S.F. Uchneat, M. E. Stevenson, **J.L. McDougall**, *ASM Journal of Failure Analysis and Prevention*, Vol. 16, Issue 4, August 2016.

"Post-Fire Structural Integrity Evaluation of an Aircraft Utilizing ASTM E 004-02," **J.L. McDougall**, D.G. Klepacki, M.E. Stevenson, M.T. Kenner, *ASM Journal of Failure Analysis and Prevention*, Vol. 15, Issue 1, February 2015.

"Failure Investigation of an Aircraft Crankshaft Gear Connection," M.E. Stevenson, D.G. Klepacki, **J.L. McDougall**, and D.E. Alexander, *ASM Journal of Failure Analysis and Prevention*, Vol. 12, Issue 6, December 2012.

"Failure Analysis of Hydraulic Fitting Brazed Connections," M.E. Stevenson, M.D. Hayes, **J.L. McDougall**, S.A. Sanders, *ASM Journal of Failure Analysis and Prevention*, Vol. 12, Issue 2, April 2012.

"Evaluation of a Turbocharger Turbine Wheel," **J.L. McDougall**, R.R. Knuteson, M.E. Stevenson, F.E. Schmidt, *Microscopy and Microanalysis*, Vol.17, Supplement S2, July 2011.

"Analysis of a Spiral/Spliced Pipe Weld Hydrostatic Test Rupture," **J.L. McDougall**, F.E. Schmidt, and M.E. Stevenson, *Microscopy and Microanalysis*, Vol.16, Supplement S2, July 2010.

## Publications (continued)

"Metallurgical and Metallographic Aspects of Engineering Failure Analysis," M.E. Stevenson, **J.L. McDougall**, and M.D. Hayes, *Microscopy and Microanalysis*, Vol. 14, Supplement S2, August 2008.

"Failure Analysis of a Tree Pruner Saw Blade Anchor Screw," M.E. Stevenson, M.D. Hayes, **J.L. McDougall**, E.R. Weishaupt, and D.A. Turnquist, *Microscopy and Microanalysis*, Vol. 14, Supplement S2, August 2008.

"Failure Analysis of a Temporary Power Line Anchor," M.E. Stevenson, M.E. Barkey, **J.L. McDougall**, and E.R. Weishaupt, *Journal of Failure Analysis and Prevention*, Vol. 8, Issue 3, April 2008.

"Stresses in Bent Copper Tubing: Applications to Fatigue and Stress Corrosion Cracking Failure Mechanisms," M.E. Stevenson, M.E. Barkey, and **J.L. McDougall**, *Journal of Failure Analysis and Prevention*, Vol. 5, Issue 6, December 2005

"Analysis of Sheet Steel Fracture During Deep Drawing," **J.L. McDougall**, M.E. Stevenson and K. McKeever, *Journal of Failure Analysis and Prevention*, Vol. 5, Issue 5, October 2005.

"Applied Fracture Mechanics in Metallurgical Failure Investigations," M.E. Stevenson and **J.L. McDougall**, *Microscopy and Microanalysis*, Vol. 11, Supplement S02, August 2005.

"Failure Analysis of a High-Speed Pinion Shaft," M.E. Stevenson, **J.L. McDougall**, R.D. Bowman, and R.L. Herman, *Journal of Failure Analysis and Prevention*, Vol. 5, Issue 2, April 2005.

"Stress-Corrosion Cracking in Copper Refrigerant Tubing," **J.L. McDougall** and M.E. Stevenson, *Journal of Failure Analysis and Prevention*, Vol. 5, Issue 1, February 2005.

"Failure Analysis of Gray Iron Pump Housings," E.E. Vernon, M.E. Stevenson, **J.L. McDougall**, L. McCall, *Journal of Failure Analysis and Prevention*, Vol. 4, Issue 6, December 2004.

"Failure of a Vehicle Braking System Air Reservoir," **J.L. McDougall** and M.E. Stevenson, *Microscopy and Microanalysis*, Vol. 10, Supplement S02, August 2004.

"Effects of Improper Heat Treatment on Steel Crane Wheels," E.E. Vernon, M.E. Stevenson, **J.L. McDougall**, *Microscopy and Microanalysis*, Vol. 10, Supplement S02, August 2004.

## Publications (continued)

"Failure Analysis in a Vehicle Accident Reconstruction," M.E. Stevenson, **J.L. McDougall**, E.E. Vernon, L. McCall, R.D. Bowman, *Journal of Failure Analysis and Prevention*, Vol. 4, Issue 2, April 2004.

"Water Chemistry and Processing Effects on the Corrosion Degradation of Copper Tubing in Cooling Water Systems," **J.L. McDougall**, L. McCall, M.E. Stevenson, *Practical Failure Analysis*, Vol. 3, Issue 5, October 2003.

"Metallurgical Failure Analysis of Titanium Wing Attachment Bolts," M.E. Stevenson, **J.L. McDougall**, K. Cline, *Practical Failure Analysis*, Vol. 3, Issue 4, August 2003.

"Quantification of Creep Strain Distribution in Small Crept Lead-Free In-situ Composite and Non-Composite Solder Joints," **J.L. McDougall**, S. Choi, T.R. Bieler, K.N. Subramanian, J.P. Lucas, *Materials Science and Engineering*, Vol. 285, Issues 1-2, June 2000.

"Mechanical Properties of Sn-Ag Composite Solder Joints Containing Copper-Based Intermetallics," S.L. Choi, A.W. Gibson, **J.L. McDougall**, T.R. Bieler, K.N. Subramanian, Design and Reliability of Solders and Solder Interconnections, R.K. Mahidhara, D.R. Frear, S.M.L. Sastry, K.L. Murty, P.K. Liaw, W.L. Winterbottom, eds. TMS, Warrendale, PA 1997, p.241.

## Presentations, Seminars, and Invited Lectures

"Post-Fire Structural Integrity Evaluation of an Aircraft Utilizing ASTM E 004-02," presented at Materials Science & Technology Conference & Exhibition (MS&T 2015), Columbus, OH, October 8, 2015.

"Applications of Failure Analysis Techniques in ATV Accident Investigation," presented at Materials Science & Technology Conference & Exhibition (MS&T 2015), Columbus, OH, October 5, 2015.

"Unusual Failure of a Rim Fire Cartridge Brass Casing," presented at Microscopy and Microanalysis 2011, Nashville, TN, August 7-11, 2011.

"Introduction to Metallurgy" presented to North American Bus Industries, Anniston, AL, June 15, 2011.

"Adjusting Property Losses: Failure Analysis" presented to CEU Institute for Hartford/AOL, Tampa, FL, February 14, 2008.

## Presentations, Seminars, and Invited Lectures (continued)

"Corrosion of Copper Tubing in Heat Exchangers," **J.L. McDougall** and M.E. Stevenson, presented at Failure Analysis Symposium, 2004 ASM Materials Solutions Conference, Columbus, OH, October 18-20, 2004.

"Failure Analysis of a Braking System Air Reservoir," **J.L. McDougall** and M.E. Stevenson, presented at 2004 IMS Annual Meeting, Savannah, GA, August 5, 2004.

"Fracture Mechanics Applications in Aircraft Structural Failure Analysis," **J.L. McDougall**, M.E. Stevenson, presented at Failure of Structural Materials-Fundamentals, 133 Annual Meeting & Exhibit, TMS 2004, Charlotte, NC, March 17, 2004.

"Failure Analysis at Work, Home, & Play," **J.L. McDougall**, P.J. Pfiefer, D.A. Moore, R.J. Shipley, M.E. Stevenson, L. McCall, presented at Failure Analysis Symposium, 2003 ASM Materials Solutions Conference, Pittsburgh, PA, October 13-15, 2003.

"Quantification of Creep Strain Distribution in Small Crept Lead-Free In-situ Composite and Non-Composite Solder Joints," **McDougall, J.L.**, S. Choi, T.R. Bieler, K.N. Subramanian, J.P. Lucas, presented at NSF-IMM Symposium on Micromechanic Modeling of Industrial Materials, Seattle, WA, July 20, 1998.

"The Development of a Lead Free, In-Situ Composite Solder Alloy Containing Ni or Fe Based Composite Phases," Choi, S., A.W. Gibson, **J.L. McDougall**, T.R. Bieler, K.N. Subramanian, Alloy Design and Soldering Technologies for Lead-Free and Lead-Bearing Solders, presented at Materials Week 1997, Indianapolis, IN, September 16, 1997

"Creep Deformation of Non-Composite and Composite Sn-Ag Eutectic Solders Under Isothermal and Thermal Cycling Conditions," K.N. Subramanian, **J.L. McDougall**, A.W. Gibson, S.L. Choi, T.R. Bieler, Alloy Design and Soldering Technologies for Lead-Free and Lead-Bearing Solders, presented at Materials Week 1997, Indianapolis, IN, September 15, 1997.

"Effect of Composite Strengthening Strategies on the Microstructural Evolution of a Tin-Silver Solder," A.W. Gibson, S.L. Choi, **J.L. McDougall**, T.R. Bieler, K.N. Subramanian, presented at TMS Spring Meeting, Orlando, FL, February 10-13, 1997.

"Microstructural Evolution in Pb-Sn and Sn-Ag Composite Solder Joints Containing Copper," Choi, S.L., J.L. McDougall, T.R. Bieler, **K.N.** Subramanian, Alloy Design and Soldering Technologies for Lead-Free and Lead Bearing Solders, presented at Materials Week 1996, Cincinnati, OH, October 9, 1996.

## **Presentations, Seminars, and Invited Lectures (continued)**

"Comparison of Modes of Deformation of a Pb-Free Solder with and Without Intermetallic Reinforcements," **McDougall, J.L.**, A.W. Gibson, S.L. Choi, T.R. Bieler, K.N. Subramanian, Alloy Design and Soldering Technologies for Lead-Free and Lead Bearing Solders, Materials Week 1996, Cincinnati, OH, 9 Oct. 1996.

"Microstructural Evolution During Aging and Bending Fatigue of a Sn-Ag Solder," A.W. Gibson, **J.L. McDougall**, T.R. Bieler, K.N. Subramanian, presented at TMS Fall Meeting, Cincinnati, OH, October 7-10, 1996.