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David J. Eby, Ph.D., P.E., CFEI

Professional Specialization

Dr. Eby investigates issues related to failure analysis, mechanical systems, metallurgy, accident reconstruction, fire cause/origin, and design analysis. Dr. Eby has expertise in material fatigue/fracture, machine design, welding, structural reinforcements, thermal fluids, hydraulic machines, and industrial equipment. Dr. Eby also has expertise in evaluating trade secrets, patent infringement, and patent validity. Dr. Eby is a registered professional engineer and a certified fire and explosion inspector. Dr. Eby is currently a guest lecturer at Lawrence Technological University in the areas of materials science and mechanical engineering.

Dr. Eby's areas of specialization include experimental and analytical stress analyses, experimental and analytical thermal fluids analyses, and the application of design optimization to industrial problems. He has extensive experience with the finite element method (crashworthiness, modeling of metals, modeling of rubbers, and modeling of composites), computational fluid dynamics (high- and low-speed flow, multiphase flow, sloshing/mixing of liquids, and radiant/conductive/convective heat transfer), fluid structure interaction problems, and optimization theories (machine learning, neural networks, genetic algorithms, and evolutionary strategies).

Select Experiences

Intellectual Property/Trade Secrets

Infringement/validity analyses of structural reinforcements for automotive crashworthiness.

Valve lifters in engines.

Welding wire.

Blenders.

Trampolines.

Plumbing, Water Supply, and Natural Gas Piping

Valves in recirculating hot water systems.

Residential gas valves.

Soldered joints.

Natural gas pipe lines.

Brass plumbing component dezincification.

Brass plumbing component stress corrosion cracking.

Industrial Equipment

Steelmaking.

Dewatering presses.

Scaffolding.

Industrial lifting/rigging.

Conveyor belts.



Recreational Products

Mountain bikes.
Fitness equipment.

Professional Background

Ph.D., Engineering Mechanics, Materials Science and Mechanics Department, Michigan State University (2000)
M.S., Engineering Mechanics, Materials Science and Mechanics Department, Michigan State University (1997)
B.S., Engineering Mechanics, Materials Science and Mechanics Department, Michigan State University (1996)

Honors

Best Graduate Student in Materials Science and Mechanics Department at MSU (2000)
General Motors Scholarship (1999-2000)
DeVlieg Scholarship (1996-1998)

Senior Engineering Consultant

Design Research Engineering (2012 to present)

Managing Engineer

Exponent, Failure Analysis Associates (2006-2012)

Advanced Methods Group Manager

CD-adapco (2002-2006)

Co-Founder

Red Cedar Technologies (2000-2002)

Adjunct Professor

Michigan State University, Materials Science and Mechanics Department (1999)

Engineer

General Motors (1996-1999)

Professional License

Registered Professional Mechanical Engineer, 2007, Michigan #6201054813
Certified Fire and Explosion Inspector, 2019

Technical Organization Membership

National Association of Fire Investigators
American Society of Mechanical Engineers
Engineering Society of Detroit
American Welding Society
The Minerals, Metals & Materials Society

Technical Publications

Ramirez JC, Eby DJ, Bullen DB, Carpenter AR, Ogle RA. Inerted vessels: Avoiding hazards caused by gas buoyancy. 2008 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2008.



Madakacherry JM, Eby D, Isaac MB, Bruggeman CA, Farahani A, Averill RC. A process of decoupling and developing body structure for safety performance. 5th European LS-DYNA Users' Conference, 2005.

Eby DJ, Averill RC, Goodman ED, Sidhu RS. Shape optimization of crashworthy structures. Proceedings, 7th International LS-DYNA Users Conference 2003, pp. 7-15-7-21, Livermore, CA, 2003.

Eby D. Optimization of CFD analyses with STAR-CD and modeFrontier. Proceedings, TCN CAE, pp. 1-21, 2003.

Engelstad SP, Berry OT, Averill RC, Eby. Implementation and application of zig-zag finite elements for composite bonded tee-joint modeling. 42nd Annual AIAA / ASME / ASCE / AHS / ASC Structures, Structural Dynamics, and Materials Conference and Exhibit, Seattle, WA, April 16-19, 2001.

Eby D, Averill RC. Zigzag sublaminar model for nonlinear analysis of laminated panels. Journal of Aerospace Engineering 2000; 13(3):100-109, July.

Eby DJ. Coupled multiobjective optimization of crashworthiness and modal frequencies in structures using genetic algorithms. Doctoral Thesis, Michigan State University, East Lansing, Michigan, 1999.

Eby D, Averill R, Goodman E, Punch W. The optimization of flywheels using an injection island genetic algorithm. pp. 167-190. In: Evolutionary Design by Computers. Bentley P (ed), Morgan Kaufmann, San Francisco, 1999.

Eby D, Averill RC, Punch III W, Goodman ED. Optimal design of flywheels using an injection island genetic algorithm. Artificial Intelligence in Engineering Design, Analysis and Manufacturing, Vol. 13, pp. 389-402, 1999.

Eby D, Goodman E, Averill R, Punch W. Parallel genetic algorithms in the optimization of composite structures. pp. 199-208. In: Soft Computing in Engineering Design and Manufacture. Chawdry PK, Roy R, and Pant RK, (eds), Springer Verlag, 1998.

Eby D, Averill RC, Punch III WF, Goodman ED. Evaluation of injection island GA performance on flywheel design optimization. Proceedings, 3rd Conference on Adaptive Computing in Design and Manufacturing, Plymouth, England, April 1998.

Goodman E, Eby D, Averill RC, Punch W. Genetic algorithms for design of specialized laminated composite structures. Proceedings, 2nd International Aerospace Congress, Moscow, Russia, pp. 68-73, 1997.

Eby D, Averill RC, Gelfand B, Punch WF, Mathews O, Goodman ED. An injection island GA for flywheel design optimization. Invited Paper, Proceedings, EUFIT '97, 5th European Congress on Intelligent Techniques and Soft Computing, September 1997.



Goodman ED, Averill RC, Punch WF, Eby DJ. Parallel genetic algorithms in the optimization of composite structures. 2nd World Conference on Soft Computing (WSC2), June 1997.

Presentations

Eby D. Evaluating the strength of welded T-Joints: comparing experimental and analytical approaches. FABTECH/AWS Professional Program, Session 15: Weld Joint Properties And Design, 2008.

Eby D. Failure analysis of a PWR reactor head. STAR North America User Conference, 2008.

Eby D. Optimization of CFD analyses with STAR-CD and commercial optimization tools.

STAR European User Conference, 2005; STAR North America User Conference, 2005.

Eby D. Fluid structure interaction analysis with STAR-CD. STAR North America User Conference, 2004.

Eby D. Optimization of CFD analyses with STAR-CD and commercial optimization tools. STAR North America User Conference, 2004.

Eby D. Optimization of CFD analyses with STAR-CD and commercial optimization tools. OPTECH, 2004.

Eby D. Rotating machinery and fluid structure interaction modeling. STAR North America User Conference, 2004.

Eby D. CAD based parametric optimization of STAR-CD CFD analyses using iSIGHT. Engineous User Conference, 2004.

Eby D. The effect of blade mistuning on fluid structure interaction analyses. High Cycle Fatigue Conference, 2004.

Eby D. Optimization of CFD analyses with STAR-CD and modeFrontier. TCN CAE Conference, Sardinia, Italy, 2003.

Eby D. Shape optimization of crashworthiness structures. 6th U.S. National Congress on Computational Mechanics, 2001.

