

Mr. Edwards is a polymer materials scientist with over 38 years of experience in the plastic and composites industry. He is a co-author of the book, ***Fractography in Failure Analysis of Polymers***, first published in 2015 with a second edition released in 2024.

His experience includes testing and analysis of plastic, rubber and composite materials, consulting, and laboratory management. He has special expertise in failure analysis, fractography and testing of plastics, including plastic pipe and fitting materials and stress rupture testing for design.

Additional areas of expertise include failure analysis, creep and stress rupture, fracture, mechanical testing, analytical testing, environmental effects and lifetime prediction. Mr. Edwards has managed a polymer test laboratory (Bodycote Broutman) that included hydrostatic pipe testing, as well as mechanical and analytical testing of polymers and composite materials.

Mr. Edwards has taught courses on failure analysis, fracture of plastics and testing of plastic materials. He has provided expert testimony regarding product failures in both state and federal courts.

Licenses & Certifications

- State of Arkansas License No. 18187
- State of Illinois License No. 062-041364

Positions Held

Engineering Systems, Inc., Aurora, Illinois

- Senior Managing Consultant, 2010 to Present
- Senior Consultant, 2007 to 2010

Bodycote Polymer-Broutman Laboratory, Chicago, Illinois

- Senior Consultant, Bodycote Polymer, 2004-2007
- Vice President, Technical, Bodycote Polymer, 2000-2004

Bodycote Broutman, Inc., (f.k.a. L.J. Broutman & Associates, Ltd.)

- Vice President, Plastics Technology, 1995-2000
- Manager, Piping Products Laboratory, 1990-1995
- Research Engineer, 1982-1990

International Harvester Company

- Research Associate, 1979-1982

Dale B. Edwards, PE
Senior Managing Consultant

Email: dbedwards@engsys.com
Phone: 630-851-3397

ESi Aurora
4215 Campus Dr.
Aurora, IL 60504

Education

B.S., Chemical Engineering -
University of Illinois, 1978

Graduate Courses in Materials
Engineering - IL Inst. of Technology
1981-1982

Areas of Specialization

Failure Analysis and Testing of
Plastics

Environmental effects and lifetime
prediction

Creep and stress rupture

Fracture

Mechanical Testing

Material Testing

Material Selection

Stress rupture testing for design

Book Contribution

Fractography in Failure Analysis of Polymer

M.D. Hayes, D. B. Edwards, A.R. Shah, Elsevier Inc., Oxford, UK, 2015, second edition released in 2024

Publications

Service Lifetime Assessment of Polymeric Material Products

ASM Handbook, Volume 11, ASM International, 2020, with A.R. Shah

Failure Analysis and Prevention

Fracture of Plastics, ASM Handbook, Volume 11, ASM International, 2019, edited with A.R. Shah

Assessment of Polybutylene Plumbing Installations after Long-term Service

Proceedings of the Society of Plastics Engineers Annual Technical Conference (ANTEC), Orlando, Florida, May 7, 2018, with D. E. Duvall

Identifying ESC Failures in Polymers Using Fractography

Microscopy Society of America, Columbus, Ohio, July 28, 2016

Failure Analysis of a Plastic Toy Helicopter

Proceedings of the Society of Plastics Engineers Annual Technical Conference (ANTEC), Indianapolis, Indiana, May 23, 2016, with D.B. Brickman, C.A. Fox and R.A. Brewster

Determining the Processing Quality of PVC Pipe by DSC – How Precise?

Proceedings of the 17th Plastic Pipes Conference, PPXVII, Chicago, Illinois, September 22-24, 2014, with D. E. Duvall and A. R. Shah

Assessment of Polybutylene Plumbing Installation after 18 Years of Service

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Cincinnati, Ohio, April 22-24, 2013, with D. E. Duvall

Polybutylene Water Service Pipe: The Other Side of the Story

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Orlando, Florida, April 1-4, 2012, with D. E. Duvall

Determination of Environmental Stress Cracking Failure Mode in Investigation of CPVC Fire-Suppression Sprinkler Pipe Failures

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Orlando, Florida, April 1-4, 2012, with A. R. Shah

Failure Analysis of Plastic Crimp Fitting Assemblies

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Boston, Massachusetts, May 1-5, 2011, with D. E. Duvall and A. R. Shah

Field Failure Mechanisms in HDPE Potable Water Pipe

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Boston, Massachusetts, May 1-5, 2011, with D. E. Duvall

Challenges in Investigating Chlorinated Polyvinyl Chloride Pipe Failures

Journal of ASTM International, 8(1), 2011, with M. D. Hayes, M. L. Hanks, F. E. Hagan and D. E. Duvall

Forensic Analysis of Oxidation Embrittlement in Failed HDPE Potable Water Pipes

Proceedings of the 2010 ASCE Pipeline Division Specialty Congress – Pipelines 2010, pp. 648-662, with D.E. Duvall

Evaluation of Fractures Created in Plastic Pipes by Freezing of Water Inside of the Pipes

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Orlando, Florida, May 16-19, 2010, with D. E. Duvall and J. F. Grzetic

Analysis and Testing of Freezing Phenomena in Plastic Piping Systems

Proceedings of the ASME Congress, Orlando, Florida, November 13-18, 2009, with K. M. Smith, D. E. Duvall and J. F. Grzetic

Fracture Toughness Testing (KIC) of PE 4710 Pipe Material

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Milwaukee, Wisconsin, May 4-7, 2008, with H. Svetlik and A. Shabeer

Failure Investigation of XLPE Chemical Storage Tanks

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Milwaukee, Wisconsin, May 4-7, 2008, with D. E. Duvall

Failure Analysis of a Large Diameter Heat-Fusible PVC Pipe in a Horizontal Directional Drilling Installation

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Milwaukee, Wisconsin, May 4-7, 2008, with D. E. Duvall

Lessons from Failure

Appliance Design, pp. 19-21, May 2007, with B. J. Gedeon and A. I. Kasner

Failure Analysis of Polypropylene Used in a Hot Water Environment – Effects of Different Stabilizer Systems

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Cincinnati, Ohio, May 6-10, 2007, with L. J. Broutman and A. I. Kasner

Phosphate Esters as Stress Crack Agents – Case Studies in Failure Analysis

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Cincinnati, Ohio, May 6-10, 2007, with A. I. Kasner

Failure Prevention – Lessons from the Failure Analysis Investigations of Polymer Parts in Appliances

57th Annual Conference of the International Appliance Technical Conference, Rosemont, Illinois, March 27-29, 2006, with A. I. Kasner and B. J. Gedeon

Failure Analysis of a PEX Pipe Crimping System

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Boston, Massachusetts, May 1-5, 2005, with T. P. Jeka

Steel Wire Reinforced Plastic Composite Pipe

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Chicago, Illinois, May 16-20, 2004, with B. D. Agarwal and L. J. Broutman

The Effects of High Stress and Material Constraint on the Fracture Appearance of a Polyethylene Liner Pipe

Proceedings of the Society of Plastics Engineers Annual Technical Conference, Chicago, Illinois, May 16- 20, 2004, with R. Miller); also presented at the International Plastic Pipe Symposium, PPXII, Milan, Italy, April 19-22, 2004

Complex Yield Behavior of PE100 Resin on Plane Strain Tensile Specimens

Proceedings of the International Plastic Pipe Symposium, Munich, Germany, September 3-6, 2001, with L. J. Broutman, S. W. Choi, S. Lee, G. Palermo, K. Cho, M. Choi and T. Park

An Alternative Method for Determining the Hydrostatic Design Basis for Plastic Pipe Materials

Proceedings of the International Plastic Pipe Symposium, Munich, Germany, September 3-6, 2001, with L. J. Broutman, and S. W. Choi

Failure Analysis Models for Polyacetal Molded Fittings in Plumbing Systems

Proceedings of the Society of Plastics Engineers 57th Annual Technical Conference, 1999, with L. J. Broutman and P. K. So

An Alternative Method for Determining the Hydrostatic Design Basis for Plastic Pipe Materials

Proceedings of the International Plastic Pipe Symposium, Goteburg, Sweden, September 14-17, 1998, with L. J. Broutman, E. F. Palermo and A. R. Shah

Failure Analysis of Thermoplastic Camper Tops

Proceedings of the Society of Plastics Engineers 56th Annual Technical Conference, 1998, with L. J. Broutman, L. R. Nylander and P. K. So

A Case Study of Polyethylene Pipe in a Paper Mill Application

Proceedings TAPPI Engineering Conference, 111, September 16-19, 1996, with D. E. Duvall

Creep and Stress Rupture Testing of Polyethylene Sheet under Equal Biaxial Tensile Stresses

Journal of Reinforced Plastics and Composites, 12(3), March 1993, with D. E. Duvall

Fatigue Testing of PVC Pipe Fittings

Journal of Vinyl Technology, June 1992, 14(2), with B. Lehman and R. Cohen; also presented at the Proceedings of the Society of Plastics Engineers 50th Annual Technical Conference, 38, 276-279, 1992

Aging of Plastic Pipe Used for Natural Gas Distribution

Final Report to the Gas Research Institute, GRI Report No. 88/0285, December 1988, with L. J. Broutman, L. R. Nylander, et al.

Analysis of Polyethylene Gas Pipe Field Failure at Clear Lake, Iowa

National Transportation Safety Board, NTSB Accident No. DCA-83-AP-022, July 12, 1983, with L. J. Broutman

Environmental Testing of High Strength Molding Compounds

Polymer Composites, 3(1), January 1982, with N. Sridharan; also presented at the Press Molders Committee Meeting of the Society of the Plastics Industry, Columbus, Ohio, 1981

Presentations

Quantifying Oxidative Degradation in Polyolefin Pipe by IR Spectroscopy

ANTEC Conference, Orlando, Florida Society of Plastic Engineers Annual Conference, with D. E. Duvall, 2018

Professional Instruction & Seminars

Plastic Failure Analysis Series Co-sponsored by Society of Plastics Engineers (SPE) & Bodycote Broutman, Inc.

- Plastics Failure Analysis/Prevention and Testing Seminar (1995–2001, 2007–2008, 2015, 2018)
- Plastics Fracture Analysis Workshop (2001–2008, 2015, 2018)

Mechanical Behavior of Plastics Seminar Series Co-sponsored by SPE & Bodycote Broutman, Inc.

- Mechanical Properties of Polymers and Service Life Predictions (1995–1999)

Medical Plastics Division of SPE Seminars on failure analysis for medical device materials

- Failure Analysis of Plastic Materials for Medical Devices: A Tool for Prevention
- MDM West (Anaheim, CA), Jan 2004
- MDM East (New York, NY), June 2004
- MDM Midwest (Minneapolis, MN), Oct 2004
- MEDTEC (Stuttgart, Germany), Mar 2006
- Failure Analysis of Plastic Materials A tool for Prevention
 - Design & Manufacturing Midwest (Rosemont, IL), Sept 2010

Adjunct Instruction Lewis University

- Manufacturing Processes for Composite Materials, Dec 17, 2011

Continuing Education

- Fall Protection Safety for the Competent Person - Construction Safety Council, Aurora, IL 2020
- **Infrared Microscopy Course (FTIR Spectroscopy)** – Hooke College of Applied Sciences (McCrone Group), April 20-22, 2010
- **Strategy of Experimentation** – DuPont Specialty Services Course, June 1987

Professional Affiliations/Honors

Society of Plastics Engineers (SPE) – Senior Member

- Technical Program Chair – Failure Analysis and Prevention Special Interest Group (FAPSIG), 2010-2011
- Chairman – FAPSIG, 2011, 2012
- Dr. Myer Ezrin Best Paper Award – ANTEC 2011
- Member of the Board of Directors of the Medical Plastics Division of SPE (2007 through 2010)

American Society for Testing and Materials

- Member of Committee F-17 on Plastic Piping Systems

Journal of Pipeline Systems

- Peer reviewer
- Member, International Relations Committee, 2016-present
- Co-Chair, Non-metallics Session in the Failure Analysis Symposium at MS&T 2016