



PHILIP J. DAUM, P.E.
PRINCIPAL

pjdaum@engsys.com

Mr. Daum is a Principal at Engineering Systems Inc. (ESI) who specializes in mechanical engineering, research, development, and experimental testing. He has conducted complex, multidisciplinary research and accident investigations pertaining to freight and transit railroads, cargo and portable tanks, transportation equipment systems and components, and hazardous materials. His evaluations include the areas of reliability, durability, crashworthiness, security performance and regulatory compliance. His 39 years of industrial experience includes design of railroad rolling stock, truck/bogies, brakes, draft systems, valves, pressure relief devices, safety equipment, and operating components/systems. He is also experienced in technology evaluations, intellectual property analysis, equipment qualification, health monitoring, and maintenance.

Areas of Specialization

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|--|-------------------------------------|
| Freight and transit cars | Pressure relief devices |
| Hazardous materials transportation | Valves and fittings |
| Transportation security | Railroad wheels, axles and bearings |
| Transportation accident investigations | Castings and machined components |
| Railroad safety appliances | Railroad draft systems |
| Braking systems | Railroad rolling stock |
| FELA | Cargo and portable tanks |
| Accident reconstruction | Failure Analysis |

Education

- B.S., Mechanical Engineering, University of Illinois at Urbana-Champaign, 1981
- A.S., Engineering, Moraine Valley Community College, Palos Hills, IL, 1978
- Cooperative Work-Education Program
- David W. Taylor Naval Ship R. & D. Center, Bethesda, MD, 1979–1980
- Continental Can Corporation, Chicago, IL, 1978

Licensed Professional Engineer

- State of Illinois..... License No. 062-045260
- State of California..... License No. M-37660

April 2022

Professional Affiliations

Transportation Research Board (TRB)

- Committee for Review of the Federal Railroad Administration's (FRA's) Research and Development (R&D) Program, 2019 – 2020
- Committee on the Review of Department of Transportation Testing of Electronically Controlled Pneumatic (ECP) Brakes, Transportation Research Board, National Academies of Sciences, Engineering, and Medicine, 2016 – 2017
- Contributed at briefings for Department of Transportation and U.S. Congressional Staff, February and October 2017
- Member, Committee on Transportation of Hazardous Materials (AT040), 2006 – 2015
- Associate Member, Railroad Operational Safety Committee, 2007 – 2020
- TRB Human Factors Conference: Safety Culture Measurement, January 2016
- Peer Reviewer, U.S. Department of Transportation, Federal Railroad Administration (DOT-FRA) Research Review, Hosted by TRB, 2009, 2011, & 2012
- Peer Reviewer, TRB Technical Papers, 2009 & 2010
- Human Factors Implementation – Workshop, January 2009
- Transportation of Renewable Fuels: Risk and Preparedness in a Changing World, Co-organizer, January 2009
- Rail Hazmat Safety and Security: Research, Modeling, and Testing, Co-chairman, January 2008
- Proactive Risk Management Safety Approaches for Managing Human Factors Caused Accidents in the Railroad Industry – Workshop, January 2007
- Workshop for the U.S. Government Accounting Office (GAO) evaluation of security measures for hazmat transportation by rail, Invited tank car subject matter expert, June 2002

National Transportation Safety Board (NTSB)

- Invited member of various ad hoc investigative teams, including crude-by-rail derailment investigations
- Coordinated a meeting between the National Transportation Safety Board (NTSB) and the RSI-AAR Tank Car Safety Project (Safety Project) oversight committee that led to a Memorandum of Understanding whereby NTSB invited the Safety Project to become a Party to certain future NTSB rail accident investigations, with ESI participating on behalf of the Safety Project, January 2014

Transportation Safety Board of Canada (TSB)

- Invited subject matter expert for crude-by-rail derailment investigations, including Lac-Mégantic

Advanced Tank Car Collaborative Research Program (ATCCRP)

- Coordinated the development and implementation of the initial 5-year research and development plan
- Technical Advisor, 2010 – 2012

Program Director, 2009 – 2010

Next Generation Railroad Tank Car Project (NGRTC)

Lead Contractor – Design & Construction, 2007 – 2008

Member, External Advisory Panel, 2006 – 2007

Society of Automotive Engineers (SAE International)

Member, 2014 – Present

American Society of Mechanical Engineers (ASME)

Rail Transportation Division (RTD) Assistant Technical Program Chair, 2010

Member of Rail Transportation Division (RTD), 2006 – Present

Peer Reviewer, ASME-RTD Technical papers, 2008 – 2010

Member of the Section XII Committee on Continuing Qualification Requirements for
Transportation Containers, 1999 – 2001

Chicago Railroad Superintendents Association (CRSA)

Member, 2007 – 2019

American Short Line & Regional Railroad Association (ASLRRA)

Member, 2007 – Present

American Railway Engineering and Maintenance-of-Way Association (AREMA)

Member, 2006 – Present

Association of American Railroads (AAR) Tank Car Committee (TCC)

Member of Executive Committee, 1998 – 2006

Chairman of the Material & Design (M/GD&E) Working Group, 1999 – 2001

Chairman of the Tank Car Qualification Guidelines Task Force, December 2000. Coordinated
an industry-wide workshop which resolved significant issues with new federal
maintenance planning rules

Liaison to the AAR Hazardous Material Working Group, 1999

AAR's Hazardous Material Critical Action Team

Contributed to the development of the hazmat portion of the AAR's National Security
Management Plan

Charter member – tank car design subject matter expert, October 2001 – 2004

Railway Supply Institute (RSI) Engineering & Technical Subcommittee

Member, 1995 – 2006

Chairman, 2001 – 2002

Chlorine Institute (CI)

Hydrochloric Acid Rubber Lining Condition Monitoring Task Group,

Ex-officio member, 2008 – 2014

Chairman, 2006 – 2008

Chairman, Tank Car Subcommittee, 2004 – 2006; Vice-Chairman, 2000 – 2004

Member, 1998 – 2008

Invited speaker at special session on future chlorine tank car specifications, Atlanta, GA, 2005

Side Bearing Testing Consortium

Chairman, 2003 – 2005

American Association of Railroad Superintendents (AARS)

Member, 2006 – 2008

American Petroleum Institute (API) Railroad Transportation Committee

Member, 2001 – 2006

Positions Held

Engineering Systems Inc., Aurora, IL

Principal, August 2014 – Present

Director of Rail 2018 – 2022

Senior Managing Consultant, 2010 – July 2014

Senior Consultant, 2006 – 2010

Union Tank Car Company, East Chicago, Indiana

Director of Engineering, 1998 – 2006

Chief Product Engineer, 1991 – 1998

Product Engineer, 1987 – 1991

Project Engineer, 1984 – 1987

General Electric Railcar Services Corporation, Chicago, Illinois (Originally North American Car Corporation)

Mechanical Engineer, 1981 – 1984

Continued Education

University of Illinois RailTEC William Hay Railroad Engineering Seminars, 2006 – Present

Metra Mental Health Awareness Symposium, Suicide Prevention and Railroad Safety, October 2019

FARO Focus 3D Scanner, Certified Technician

FARO Technologies, June 2015

Traffic Crash Reconstruction

Northwestern University Center for Public Safety, Ann Arbor, MI, January 2015

Vehicle Crash Reconstruction Methods

Society of Automotive Engineers, Troy, MI, December 2014

U.S. Department of Homeland Security

Transportation Security Administration (DHS-TSA) SECRET Clearance, 2012 – 2020

Union Pacific Derailment Investigation Course, October 2011

NTSB Accident Investigation Orientation for Rail Professionals, July 2011

Department of Homeland Security (DHS) Toxic Inhalation Hazard (TIH) release and dispersion tests;
Dugway, UT, Invited Guest 2010

ASME Joint Rail Conferences, Annual Technical Conferences, 2006 – 2010

ASME Rail Transportation Division (RTD) Fall Technical Conferences, 2006 – 2010

ASSE Hazard Recognition for the Field Employee, February 2010

FMCSA National Truck and Bus Crash Picture Webinar, February 2011

University of Illinois Railroad Environmental Conference, 2006, 2007, 2008, 2009

BNSF Derailment Analysis and Prevention Workshop, May 2007

40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) Training for Initial
Site Workers (29CFR 1910.120), 2006

Derailment Investigation and Prevention Seminar

Sponsored by the American Association of Railroad Superintendents, November 2006

Powered Industrial Truck Operator Safety Training

Certified 2012 - Present

Patents

Combination Bottom Outlet Saddle and Sump, U.S. Patent No. 4,892,042, issued 1990, Canadian
Registration No. 1,310,542, issued 1992

Technical Presentations

Tank Car Damage Assessment Guidelines, Security and Emergency Response Training Center
(SERTC) Teach-Back Session, January 2022

Tank Car Damage Assessment Guidelines, Union Pacific Railroad Hazardous Materials Department,
October 2021

Toxic Tort Litigation Issues, Benjamin R. Slater III, Esq., Robert A. Wells, and Philip J. Daum, NARTC, La Jolla, CA, 2017

Lessons from the Field — Risk Assessment, RSA Rail Forum, RSA Rotterdam and London Offices, September 2015

Crude by Rail Safety, Chicago Railroad Superintendent Association, October 2014

Visual Data: 3-Dimensional Laser Scanning, Global Level Crossing Symposium, Champaign, IL August 2014

Scene Preservation for Future Safety, American Short Line and Regional Railroad Association, Annual Meeting, Mechanical breakout Session, San Diego, CA, April 2014

Scene Freeze-Frame in 3-D, AREMA Student Chapter, University of Illinois, Champaign, IL, January 2014

RSI-AAR Tank Car Safety Project, Lac-Mégantic, Quebec, Investigation, Factual Information Meeting at Transportation Safety Board of Canada's Engineering Laboratory, Ottawa, Ontario, December 2013

Damage Assessment Task Force, Norfolk Southern Damage Assessment Class, Charlotte, NC, November 2013

Scene Freeze-Frame in 3-D, Association of American Railroads General Claims Conference, Palm Beach, FL, October 2013

"Advanced Tank Car Collaborative Research Program," Chlorine Institute meetings, Charlotte, NC, October 2009 and New Orleans, LA, March 2010

"Rubber Lining Condition Monitoring Test Results," Chlorine Institute Hydrochloric Acid Forum, New Orleans, LA, March 2010 and Nashville, TN, September 2010

"The Initial Forensic Investigation," American Short Line and Regional Railroad Association (ASLRRRA) Liability Seminar, Boston, MA, July 2009

"Preventing Release – Improved Puncture Resistance of Hazardous Materials Tank Cars," University of Illinois Railroad Environmental Conference, November 2008

"Hydrochloric Acid Rubber Failure Analysis," Chlorine Institute Fall Meeting, Broomfield, CO, September 2008

"Hydrochloric Acid Rubber Lining Condition Monitoring," Presentation at the Chlorine Institute Hydrochloric Acid Forum, Houston, TX, March 2007

"Tank Car Journal Bearing Investigation," Presentation at the Chlorine Institute Tank Car Forum, Houston, TX, March 2007

"Chlorine Tank Car," Chlorine Institute's Fall Meeting, Atlanta, GA, September 2005

“Tank Car and Fittings Design,” Training course and tour of production facilities for Class 1 Railroad
Emergency Response Teams

Union Pacific Railroad Company, 2005 (two sessions)

BNSF, 2003

CSX Transportation, 2000, 2001

Norfolk Southern Corporation, 2004

AAR Transportation Technology Center Inc. (TTCI) Hazmat Instructors, 1999

Technical Publications

“Assessment Best Practices - Tank Car Damage,” Contributors: Hazardous Materials Committee of the
Association of American Railroads (HMC-AAR), May 2021

TRANSCAER 2020 “Seconds Count” Video Series, “Rapid Scene Size-Up (Tank Cars),” Invited
subject-matter-expert co-author, CHEMTREC®, TRANSCAER®, American Chemistry Council,
January – December 2020

“Review of the Federal Railroad Administration’s Research and Development Program, Transportation
Research Board Special Report 334,” a Consensus Study Report of the National Academies of
Sciences, Engineering, and Medicine, December 2020

“A Review of the Department of Transportation’s Testing and Analysis Results for Electronically
Controlled Pneumatic Brakes: Letter Report (Phase 2),” Contributors: Committee on the Review
of the Department of Transportation Testing of Electronically Controlled Pneumatic (ECP)
Brakes; Policy Studies; Studies and Special Programs Division; Transportation Research Board;
National Academies of Sciences, Engineering, and Medicine, October 5, 2017,
<http://www.trb.org/main/blurbs/176644.aspx>

“A Review of the Department of Transportation Plan for Analyzing and Testing Electronically Controlled
Pneumatic Brakes,” Contributors: Committee on the Review of Department of Transportation
Testing of Electronically Controlled Pneumatic (ECP) Brakes; Policy Studies; Transportation
Research Board; National Academies of Sciences, Engineering, and Medicine, February 17,
2017, <http://www.trb.org/Main/Blurbs/175476.aspx>

“Energy Transportation Safety on the Rails: Historical Perspectives on Applied and Cooperative
Research,” article in TR News 298, June-July-August 2015,
<http://www.trb.org/Main/Blurbs/173066.aspx>

“Feasibility Study for Highway Hazardous Materials Bulk Package Accident Performance Data Collection,” HMCRP Report 10: Transportation Research Board of the National Academies, Washington, D.C., 2013, www.trb.org/HMCRP/Blurbs/168492.aspx