

Robson Forensic

Engineers, Architects, Scientists & Fire Investigators

JOSEPH A. DICK Aerospace and Automotive Expert

Provide technical investigations, analysis, reports, and testimony toward the resolution of commercial and personal injury litigation involving vehicle collisions, vehicle design issues, mechanical defects and malfunctions, and vehicle repair issues for passenger cars, light trucks, SUVs, medium and heavy trucks; aircraft design, structural, and systems defects and malfunctions in fixed wing and lighter-than-air craft; vehicular crash reconstruction, field and laboratory test, and failure analysis.

Professional Skills – Comprehensive knowledge of aircraft structural design, flight loads, flight testing, and interaction between structural components, propulsion units, control and maneuver loads. Extensive knowledge of propeller design and propulsion analysis. Comprehensive knowledge of automotive driveline, suspension, and braking systems, vehicle dynamics, traction and stability, and component and systems failure analysis. Experienced in wind tunnel testing and data reduction, flight testing, and regulatory certification of complete vehicle systems. Subject matter authority in unsteady aerodynamics, inertial loads, and aeroelasticity.

Products Developed – Aircraft Structures, Aircraft Systems, Inflatable Structures, Automotive Driveline Systems and Components, Electronic Control Systems, & Telecommunications Equipment.

Design & Analysis Expertise – 25 years Solid Modeling (SolidWorks, Pro/Engineer, and CATIA), Finite Element Analysis, Computational Fluid Dynamics, Structures, Aerodynamics, Propulsion, Fluids, Hydraulics, Flight Dynamics and Loads, Systems Engineering, Heat Transfer, Parametric Modeling.

Test & Laboratory Experience – Wind Tunnel, Dynamometer, Fatigue, Tensile and Torsion, Metallurgy, Proving Grounds, Field Test, Flight Test, and Aircraft Certification.

Manufacturing Practices – Rapid Prototyping, New Product Introduction, Assembly Line Layout, Workflow Optimization, Theory of Constraints, Design for Manufacturing, Time and Motion, Statistical Process Control, Casting (sand, permanent mold, die, lost foam, investment in iron, aluminum, & magnesium), Forging, Metal Forming, Machining, Injection Molding, Stamping (die, progressive die, CNC), Hydro-forming, Roll-forming, Fastening (riveting, threaded, weld, adhesives), Composites (carbon fiber, Kevlar, glass fiber), & Fabrics (heat sealing, sewing, cementing, coating and laminating).

PROFESSIONAL EXPERIENCE

2010 to present **Robson Forensic, Inc.**
Associate

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1997 to present **Aeronautiq, Inc.**, Washington, DC
Senior Partner

Provide management and engineering solutions for aircraft structures, aerodynamics, propulsion, flight dynamics, flight loads, systems integration, and mechanical systems. Clients include the Missile Defense Agency, Lockheed-Martin, CargoLifter AG, Luftschiffbau-Zeppelin GmbH, Triton Network Systems Inc, Lucas-Varity, Rigid Airship Design BV, Virgin Lightship, American Blimp, Foster-Miller, and Nippon Zeppelin.

1990 to 1997 **Dana Corporation**, Fort Wayne, IN
Senior Product Development Engineer

Developed advanced technology automotive drivetrain components, including electronic all-wheel-drive control systems, all-wheel-drive transfer cases, limited slip differentials, electromagnetic clutch actuators, and multi-plate clutch packs. Optimized the weight, cost, and life of driveline structural components using solid modeling and finite element analysis. Developed parametric axle design and optimization methods, engineering computational methods, and related software. Performed gear fatigue and bearing life analysis and tests. Developed the VariLok™ hydro-mechanical limited slip differential currently in production in the Jeep Grand Cherokee.

1988 to 1990 **AeroLift, Inc.**, Tillamook, OR
Program Manager

Directed X.2 CycloCrane structural refurbishment and retrofit, scale model flight tests for aerodynamic and tether stability, helium management and purification, and flight tests. Performed aerodynamic, flight dynamics, and structural analysis to support airframe redesign and retrofit activities. Trained and certified as Airship Rigger.

1987 to 1998 **ILC Dover, Inc.**, Frederica, DE
Airship/Aerostat Design Engineer

Designed and analyzed airship envelopes and tethered aerostats, including structural loads arising from flight dynamics and gusts, and implemented CAD for design and patterning. Optimized manufacturing performance. Directed repair and retrofit of production aerostats. Performed scale model and component testing. Acted as field engineer for installation of aerostat systems. Assisted in the design and development of Space Shuttle space suit gloves.

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1986 to 1987 **Goodyear Aerospace Corporation, Akron, OH**
Airship Development Engineer
Designed and analyzed structural, propulsion, propeller drivetrain, vectored thrust, and bow thruster systems. Performed operations and flight envelope analysis, including aerodynamics, flight dynamics and structural loads. Researched the Daniel Guggenheim Airship Institute gust studies.

1986 **Boeing Military Airplane Company, Wichita, KS**
Preliminary Design Engineer
Designed and analyzed advanced composite airship structures. Performed nonlinear finite element analysis. Developed a non-linear six-degree of freedom potential flow code for analysis of airship loads and trajectories in atmospheric turbulence.

CONSULTING PROJECTS

2007 to present **Aegis Group, Inc., Seattle, WA**
Consulting Engineer
Provide design and analysis, rapid prototyping, and manufacturing sourcing for Aegis Group's mechanical engineering needs in support of its clients, including design of complete robotic systems for T-Mobile, Intel, and Boeing, X-Box test stands for Microsoft, rapidly deployable camera systems for Law Enforcement Services Agency, automotive suspension analysis, portable MRI fire investigation for the Veterans Administration, AWACS system monitoring units, V-22 antenna leading edge antenna systems, nitrogen recovery, purification, and generation system for aerospace autoclaves, electronics test equipment for the U.S. Navy Keyport facility.

2005 to 2007 **The Boeing Company**
787 Hydraulic and Fuel Systems Consultant
Developed technical solutions and standards for the 787 composite air transport, including dielectric insulation and isolation of electrostatic discharge, lightning, and general electromagnetic sources to prevent fuel tank ignition in compliance with the new FAA fuel tank flammability requirements of FAR 25.981(a)(3).

2004 to 2005 **Defense Advanced Research Projects Agency, Washington DC**
"Walrus" Transport Airship Consultant
Developed plans and proposals to assist DARPA in its effort to study the development of airship technology for global fort-to-fight troop and equipment transport capability. Performed critical evaluation of DARPA proposed enabling technologies, and performed preliminary optimization the most promising approaches for final down-select of the most viable approach. Provided preliminary phase proposal to develop selected candidate airship system.

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- 2004 to 2005 **Missile Defense Agency**, Washington DC
High Altitude Surveillance Airship Consultant
Developed plans and proposals to assist the Missile Defense Agency in its continuing effort to create an autonomous long endurance stratospheric surveillance platform. Demonstrated technical superiority of off-shelf photovoltaic propulsion system technologies in combination with technological evolution of existing airship platform designs to achieve mission requirements, including significant schedule and risk reduction and order of magnitude program and platform cost reductions.
- 2003 to 2004 **Missile Defense Agency**, Washington DC
Airship Systems Engineering Consultant
Provided technical expertise, engineering support and program support to the Missile Defense Agency's High Altitude Airship program. Acted as the lead member of key Integrated Product Teams formed to implement development of the Airship, including structures, aerodynamics, photo-voltaic propulsion system, wind tunnel tests, flight dynamics and gust load analysis of the aircraft. Oversaw and reviewed all aspects of Lockheed Martin's engineering work on a \$40 million contract to provide a long endurance multi-payload advanced technology stratospheric airship platform.
- 2001 **CargoLifter GmbH**, Berlin, Germany
Aerospace Systems Engineering Consultant
Reviewed and critiqued design concepts, identified technical and schedule risks and shortfalls, and developed solutions for improvement and risk reduction. Reviewed certification criteria, and developed systems, flight dynamics, and maneuvering and gust-related structural loads analysis and input for the FAA and LBA. Reviewed and developed operations procedures for cargo hauling airships. Developed accommodations for long endurance missions and performed human factors analysis. Re-designed vectoring propeller propulsion installation, envelope, gas management, empennage, and payload exchange systems. Provided flight dynamics and gust loading expertise and analysis.
- 1999 to 2000 **Lockheed Martin Global Telecommunications**, Philadelphia, PA
Project Consultant, Stratospheric Telecommunications Airship Project
Reviewed and critiqued design concepts proposed by Airship Technologies Group (formerly Airship Industries, Ltd.) for Lockheed project management team. Responsibilities included identification of technical and schedule risks and shortfalls, and identification for opportunities for improvement and risk reduction. Provided complete vehicle dynamics and structural loads evaluation of the aircraft.
- 1988 to 2001 **Triton Network Systems, Inc.**, Orlando, FL
Director of Advanced Engineering Research
Created a new department to develop advanced revolutionary mechanical solutions for the deployment and mounting millimeter wave telecommunications transceivers.

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- Invented and designed dual polarization millimeter wave flat panel array antenna. Lead mechanical engineering department that grew to 15 personnel. Developed revolutionary engineering solutions for the enclosure, thermal management, deployment and mounting of OC-3 and OC-12 based millimeter wave telecommunications transceivers.
- 1997 to 1998 **Lucas-Varity**, Livonia, MI
Chief Engineer
Lead department of ten engineers and draftsmen responsible for all Chrysler caliper brakes (4+ million units per annum, \$100+ million in annual sales encompassing 14 platforms. Developed product and manufacturing improvements. Promoted and implemented SolidWorks solid modeling and CosmosWorks finite element analysis as engineering desktop tools, shortening the design and analysis cycle by 40%.
- 1996 to 1997 **Rigid Airship Design, BV**, Franse Kampweg, Graveland, The Netherlands
Project Consultant, Millennium Navigator Project
Developed rigid airship design, including complete airframe structural loads and flight dynamics definition, and developed manufacturing facility plans for commercial airship project pursuant to the formation of an interdisciplinary consortium of Fokker Aviation, Nevesbu Design Bureau, and RDM Aerospace.
- 1989 to 1990 **Luftschiffbau Zeppelin GmbH**, Friedrichshafen, Germany
Chief Design Engineer, LZ-133 Project
Directed the conceptual and preliminary design of a 25,000 cubic meter rigid airship, including manufacturing and certification costs, prospectus for sightseeing passenger service, and all aspects of propulsion, flight controls, flight dynamics and loads of the aircraft.
- 1990 **Virgin Lightships, Ltd.**, London, UK
Field Engineer
Oversaw the technical aspects for first commercial application of the A-60 "Lightship."
- 1990 **American Blimp Corporation**, Seattle, WA
Flight Test Engineer
Directed flight tests. Performed test data reduction and flight dynamics and structural loads evaluation for certification. Co-authored flight test report and the Pilot's Manual submitted to the FAA for type certification of the A-60 "Lightship."
- 1989 to 1990 **Foster-Miller, Inc.**, Waltham, MA
Materials Application Consultant
Advised on the application of ordered polymer gas barrier films to airship and balloon envelopes.

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1988 to **Nippon Zeppelin**, Tokyo, Japan
1989 *Airship Design Engineering Consultant*
Advised Japanese research group on the design, construction, and manufacture, and certification of non-rigid airships, providing complete airship design methods and practices including structural design, flight dynamics, gust and maneuvering loads, propulsion and propeller analysis and design, and operations pro-forma analysis.

INTERNSHIPS

1984 to **Purdue University Engineering Computer Network**, West Lafayette, IN
1985 *Engineering Technician*
Developed and implemented board level modifications for Dual Vax 11780 parallel processing computers. Wrote software upgrades (C programming language) for School of Electrical Engineering's proprietary computer aided board design program.

1982 to **Wren Skyships Ltd.**, Ramsey, Isle of Man
1984 *Intern Engineer*
Researched metal-clad airship history and technology. Performed airship transport market analyses. Developed new metal-clad airship production methods.

1981 **Dana Corp. Center of Technology**, Ottawa Lake, MI
1982 *Intern Engineer*
Performed detail design drafting and materials lab analyses. Operated dynamometers and test cells. Performed vehicle tests and data acquisition on semi tractor-trailer and heavy off road equipment.

EDUCATION

Bachelor of Science, Aeronautical and Astronautical Engineering, Purdue University
School of Aeronautics and Astronautics, West Lafayette, Indiana, 1985.

PROFESSIONAL AFFILIATIONS

American Institute of Aeronautics and Astronautics (AIAA)

Society of Automotive Engineers (SAE)

Keynote Speaker, History and Theory of Airship Gust Load Analysis and Experimentation, US Navy Special Conference on Airship Gust Loads, Washington, DC, December 1987

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Chairman, Flight Dynamics Session, AIAA Lighter Than Air Systems Conference, Monterey, CA, August 1987

Presenter, Aerodynamics Session, Unsteady Aerodynamic Loads on an Airship Passing Through Discrete Turbulence: Numerical Methods vs. Experiment and Experience, AIAA Lighter Than Air Systems Conference, Monterey, CA, August 1987

PATENTS

<u>Technology</u>	<u>U.S. Patent No.</u>	<u>Date Granted</u>
Self-Balancing Mounting Bracket with Precision Azimuth and Elevation Adjustment	Pending	—
Environmentally Protected Ribbonized Fiber Optic Cable Connector	Pending	—
Cassigrain Millimeter Microwave Antenna and Radome	Pending	—
Dual Polarized Horn Matrix Flat Panel Antenna with Labyrinth Feeds	Pending	—
Digital Comparator Logic Controller for Differential Speed Control	6,449,549	September 10, 2002
Microwave Radio Transceiver Housing and Antenna	D 427,182	June 27, 2000
Hydro-mechanical System For Limiting Differential Speed Between Differentially Rotating Members	5,916,052	June 29, 1999
Reversible Gerotor Pump	5,711,408	January 28, 1998
Adjustable Rotating Mechanism	5,562,192	October 8, 1996
Electronic Clutch Control Mechanism for Vehicle Transmission	5,462,496	October 31, 1995
Hydro-mechanical System For Limiting Differential Speed Between Differentially Rotating Members	5,655,983	April 28, 1995
Electronic Lock Up/Limited Slip Differential	5,217,416	April 17, 1992