



Exponent®

Engineering & Scientific Consulting

Alex Zelhofer, Ph.D., P.E.

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## Professional Profile

Dr. Zelhofer specializes in the development, evaluation, and failure analysis of industrial equipment and consumer products. He has provided consulting services on matters of industrial problem solving, product recalls, product defect litigation, workplace safety, OSHA and Cal/OSHA requirements, intellectual property disputes, and insurance issues. In addition to his technical evaluations, he frequently assembles and directs multidisciplinary teams.

Dr. Zelhofer's experience spans industrial sector advisor, litigation consultant, and academic lecturer. Specific categorical examples of his experience include:

- Vehicles and equipment utilizing hydraulics including skid steers, line grinding vehicles, lawn mowers, forklifts, refuse hauling vehicles, tarping systems, and reach trucks.
- Products utilizing hydraulics including hydraulic actuators, motor-driven hydraulic pumps, floor jacks, bottle jacks, and hand pumps.
- Hydraulic associated components including control systems, hoses, couplings, valves, seals, and fluids.
- Industrial equipment including automated equipment, forklifts, reach trucks, light towers, mowers, air compressors, generators, and conveyors.
- Industrial equipment safety including guarding, lockout/tagout, interlocks, and risk assessment.
- Material handling associated equipment including chains, liftings straps, winches, chain hoists, and conveyors.
- Food preparation equipment including vats, food grinders, food choppers, food blenders, food warmers, and conveyors.
- Woodworking equipment including power presses, planers, jointers, table saws, miter saws, bandsaws, circular saws, jig saws, scroll saws, sanders, and drill presses.
- Metalworking equipment including mills, lathes, shears, bench grinders, angle grinders, die grinders, bandsaws, abrasive saws, arbor presses, brakes, and rivet guns.
- Offroad vehicles including three and four wheeled all-terrain vehicles (ATV).
- Vehicle associated including jack stands, tailgates, winches, loading ramps, dock levelers, and gas fuel nozzles.
- Micromobility vehicles including electric standing scooters, electric seated scooters, and electric bicycles.
- Exercise equipment including strength training equipment, selectorized equipment, treadmills, leg presses, and stationary bikes.

- Water supply and plumbing including press-fit fittings, compression fittings, push-to-connect fittings, threaded fittings, barbed fittings, toilet supply hoses, sink supply hoses, regulators, valves, float switches, filter housings, and pumps.
- Consumer products including coffee makers, blenders, clothing irons, clothing steamers, ice makers, dishwashers, blowers, trimmers, battery operated and unpowered toys.

In the course of evaluation and failure analysis Dr. Zelhofer performs both non-destructive and destructive techniques of investigation. For non-destructive evaluation he frequently uses 3D scanning via LiDAR (light detection and ranging) and CT (computerized tomography), 2D X-ray, and dimensional measurement using a coordinate measuring machine (CMM). For destructive evaluation Dr. Zelhofer frequently employs his extensive woodworking and metalworking knowledge coupled with his expertise in machine design to dissect and/or test items of focus. He is frequently called upon to conduct destructive testing in high load applications.

### Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), 2017

M.S., Mechanical Engineering, California Institute of Technology (Caltech), 2014

B.S., Mechanical Engineering, Milwaukee School of Engineering, 2008

NASA Aeronautics Fellowship, 2010

American Society of Mechanical Engineering, Foundation Gratitude Scholarship, 2009

### Licenses and Certifications

Professional Engineer Mechanical, Arizona, #80157

Professional Engineer Mechanical, California, #39478

Professional Engineer Mechanical, Missouri, #2023036909

Professional Engineer Mechanical, Nevada, #031961

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Forklift Operator (CFO)

IFPS Certified Fluid Power Electronic Controls Specialist, Certificate

IFPS Certified Fluid Power Hydraulic Specialist, Certificate

OSHA #511 Occupational Safety and Health Standards for General Industry

OSHA #7115 Lockout/Tagout

PADI Certified Open Water Scuba Diver

### Prior Experience

Lecturer – Machine Design, Loyola Marymount University, 2019

Graduate Research / Teaching Assistant, California Institute of Technology, 2012-2017

Composite Structures Intern, NASA Dryden Flight Research Center, 2011

Undergraduate Research Assistant, MSOE Rapid Prototyping Research, 2009-2011

## Professional Affiliations

American Society of Mechanical Engineers

ANSI B11 – Safety of Machinery - Standards Development Committee

Association for Advancing Automation (A3) – member

- R15.06 Committee - Industrial Robots and Robot Systems – Safety Requirements

American Society for Quality (ASQ) - member

International Fluid Power Society (IFPS) - member

National Fluid Power Association (NFPA) – member

- US. TAG to ISO/TC 131/SC 9 – Installations and systems - member

- US. TAG to ISO/TC 131/SC 9/WG 1 – Hydraulic systems - member

ASTM International

- Committee F15 - Consumer Products - member

- Committee F42 - Additive Manufacturing Technologies - member

## Publications

Desmoulins A, Zelhofer AJ, Kochmann DM. Auxeticity in truss networks and the role of bending versus stretching deformation. *Smart Materials and Structures* 2016; 25(5):054003.

Meza LR, Zelhofer AJ, Clarke N, Mateos AJ, Kochmann DM, Greer JR. Resilient 3D hierarchical architected metamaterials. *Proceedings of the National Academy of Sciences* 2015; 112(37):11502-11507.

## Presentations

Zelhofer AJ. Directional wave propagation in structural lattices. ASME IMECE, Phoenix Convention Center, Phoenix, AZ, November 15, 2017.

Zelhofer AJ. Modeling hierarchical lattice stiffness scaling and effect of beam waviness. 52nd Annual SES Technical Meeting, Texas A&M, College Station, TX, October 26, 2015.

Zelhofer AJ. Effect of unit cell topology on periodic lattice stability. ASME IMECE 2015, Houston, TX, November 12—19, 2015.