

Exponent®
Engineering & Scientific Consulting

Kathryn Anderson, Ph.D., P.E.

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Professional Profile

Dr. Anderson's primary expertise is the evaluation of a mechanical asset's fitness for intended service in the context of its regulatory environment and the relevant industry standards. With her background in mechanical and materials engineering, she serves clients across a range of industries, including process, rail, mining, hazmat transportation and aerospace. Additionally, she has supported clients in analyzing machine safety investigations.

Process

Dr. Anderson supplies clients across the chemical and oil and gas sectors with the technical analysis and framework to make informed decisions regarding the integrity of their equipment and future maintenance strategies. This includes leading fitness-for-service investigations to minimize the risk of piping, pressure vessels, and related equipment failures that could result in process upsets, environmental damage, or production disruptions.

Rail

Dr. Anderson assists clients in improving aspects of the reliability and longevity of both freight and passenger transportation systems as well as providing fundamental root cause analyses. Examples of engagements include assessing the factors contributing to derailments, evaluating the mechanical integrity of railcar components, and assessing the wear and tear of railcars caused by environmental phenomena such as corrosion and erosion.

Mining

Dr. Anderson conducts mechanical integrity assessments in the mining environment to help clients mitigate risks associated with equipment failures, identify maintenance needs, and optimize equipment performance in the future. She has experience evaluating the regulatory framework set forth by the Mine Safety and Health Administration (MSHA) and is experienced in assisting clients in administrative law disputes.

HAZMAT Transportation

Dr. Anderson conducts HAZMAT transportation failure investigations, where she assists clients in understanding the causes and contributing factors leading to releases involving hazardous substances across various transportation modalities. In these investigations, she assesses compliance with relevant regulations and standards which govern HAZMAT transportation, such as those set forth by the U.S.

Department of Transportation (DOT) and the Pipeline and Hazardous Materials Safety Administration (PHMSA).

Aerospace

Dr. Anderson assists clients in understanding and navigating the regulatory framework of mechanical components of primarily transport category aircraft. She is experienced in evaluating an aircraft's ability to withstand fatigue-related damage or cracks throughout its intended service life. Examples of engagements include investigations of the durability and damage tolerance of various components such as wings, fuselages and window frames of transport category aircraft, whether constructed from composite or metallic materials.

Machine Safety

Dr. Anderson is experienced in investigating specific aspects of machine safeguarding, lock-out/tag-out procedures, and specialized evaluations of machine safety. Some of the machines and devices that she has performed failure investigations on include overhead cranes, wire ropes, forklifts, hydraulic equipment, industrial valves and hoses, and pile driving equipment. Her experience includes evaluating the regulatory framework set forth by the Occupational Safety and Health Administration (OSHA) and the industrial context provided by various consensus codes and standards, including ANSI and ASME.

Prior to joining Exponent, Dr. Anderson's doctoral research focused on predicting the fatigue response of both additively manufactured and friction stir welded metals to increase the safety and reliability of the cryogenic fuel tanks on NASA's current generation launch vehicle. More specifically, her doctoral work developed a microstructure-sensitive fatigue model to enable the certification of a novel additive manufacturing technology at NASA. Additionally, during her studies she helped increase the efficiency and operational lifetime of several coal-fired power plants through material and component characterization, modeling, and simulation of land-based turbines.

Dr. Anderson has extensive experience in advanced manufacturing techniques; mechanical testing via servohydraulic load frames including cryogenic and thermomechanical fatigue; finite element modeling (FEA) with Abaqus; metallography; data acquisition; and the use of various regulations, codes, and standards including ASTM, ANSI, and ASME.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Alabama, 2021

M.S.E., Mechanical Engineering, University of Alabama, 2019

B.S., Mechanical Engineering, University of Alabama, 2017

Alabama Space Grant Consortium Graduate Fellowship, 2020, 2019, 2018

American Society for Testing and Materials (ASTM) International Graduate Scholarship Award, 2018

American Society for Testing and Materials (ASTM) Committee E08 Student Presentation Award, 2018

Pi Tau Sigma Engineering Honor Society, 2016

Licenses and Certifications

Professional Engineer, Illinois, #062075665

Prior Experience

Advanced Manufacturing Research Associate, Southern Research Institute, 2020-2021.

Mechanical Testing Intern, Jacobs under the direction of NASA Marshall, 2018.

Professional Affiliations

American Society for Testing and Materials (ASTM)

American Society of Mechanical Engineers (ASME)

Society of Woman Engineers (SWE)

Publications

Anderson-Wedge K, Barlow JZ, Daniewicz SR. Fatigue crack growth resistance of additive friction stir deposited AA6061. International Journal of Fatigue, under review.

Anderson K. SLS Production Friction Stir Plugs by Additive Friction Stir Deposition AA2219. Ph.D. Dissertation, University of Alabama, 2021.

Anderson-Wedge K, Avery D, Daniewicz SR, Allison P, Sowards J, Jordon B, Amaro R. Characterization of the fatigue behavior of additive friction stir deposition AA2219. International Journal of Fatigue, 2021 January; 142.

Anderson-Wedge K, Stubblefield G, Zhu N, Burford E, Long B, Daniewicz SR, Allison P, Sowards J, Rodriguez O, Amaro RL. Characterization of the Evolution of 2219-T87 Aluminum as a Function of the Friction Stir Welding Process. International Journal of Fatigue, 2021 January; 142.

Anderson K. Characterization of the Evolution of 2219-T87 Aluminum as a Function of the Friction Stir Welding Process. Master's Thesis, University of Alabama, 2019.

Anderson K and Daniewicz SR. Statistical Analysis of the Influence of Inclusion Levels on Fatigue Life Using a Gumbel Distribution. International Journal of Fatigue, 2018 July; 112:78-83.

Cauthen C, Anderson K, Avery D, Baker A, Daniewicz SR, Jordon J. Fatigue crack nucleation and microstructurally small crack growth mechanisms in high strength aluminum alloys. International Journal of Fatigue, 2020 November, 140

Nezhadfar P, Anderson-Wedge K, Daniewicz SR, Phan N, Shao S, Shamsaei N. Improved high cycle fatigue performance of additively manufactured 17-4 PH stainless steel via in-process refining micro-/defect-structure. Additive Manufacturing, 2020. 36.

Nezhadfar P, Burford E, Anderson-Wedge K, Zhang B, Shao S, Daniewicz SR, Shamsaei N. Fatigue crack growth behavior of additively manufactured 17-4 PH stainless steel: Effects of build orientation and microstructure. International Journal of Fatigue, 2019. 123:168-179.

Presentations

Anderson-Wedge K, Daniewicz SR, Amaro R. SLS Production Friction Stir Plugs by Additive Friction Stir Deposition. Materials Science and Technology (MS&T), Portland, OR, 2019.

Anderson-Wedge K, Daniewicz SR, Sowards J, Rodriguez O, Amaro RL. Characterizing the Evolution of 2219-T87 Aluminum as a Function of the Friction Stir Welding Process. International Conference on

Fatigue Damage of Structural Materials, Hyannis, MA, 2018.

Anderson-Wedge K, Daniewicz SR, Sowards J, Rodriguez O, Amaro RL. Characterizing the Evolution of 2219-T87 Aluminum as a Function of the Friction Stir Welding Process. American Society for Testing Materials (ASTM), Washington D.C., 2018.

Anderson K, Nezhadfar P, Burford E, Daniewicz SR, Shamsaei N. Fatigue Behavior of Additively Manufactured 17-4 PH Stainless Steel. American Society for Testing Materials (ASTM), Atlanta, GA, 2017.

Anderson K and Daniewicz SR. Statistical Analysis of the Influence of Inclusion Levels on Fatigue Life Using a Gumbel Distribution. American Society for Testing Materials (ASTM), Atlanta, GA, 2017.