Exponent®
Engineering & Scientific Consulting

Kate Cheng, Ph.D., P.E.

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Professional Profile

Dr. Cheng has extensive experience in mechanical failure analysis and software review of complex electromechanical devices in consumer products and industrial equipment. Dr. Cheng has expertise in analyzing a wide range of electromechanical equipment and routinely applies this expertise in assisting clients with the review and synthesis of technical documentation, safety standards, and regulatory statutes. Example systems that Dr. Cheng has analyzed include engine control software, railcar component monitoring sensors, power generation machinery, oil and gas equipment, and electrical switching equipment. She has also investigated derailments, railcar corrosion and component failure, and aircraft component manufacturing defects and damage.

Dr. Cheng has substantial experience in assisting clients with technical analysis (for example through mechanical inspection and source code review) relating to intellectual property disputes. She has assisted clients in performing technical analyses related to patent and trade secret litigation for a range of consumer products and industrial equipment.

Prior to joining Exponent, Dr. Cheng completed her Ph.D. at Northwestern University in computational mechanics and analytical modeling of metal deformation and manufacturing processes. She has experience in thermal and mechanical finite element analysis (FEA) for modeling plasticity, damage, and microstructure evolution. She also researched toolpath design and optimization for metal 3D printing and incremental sheet metal forming. During her studies, she also performed research in collaboration with Ford Motor Company to develop software for modeling the deformation and failure of carbon fiber composites. She has experience in data analysis, parallel and high-performance computing, image processing, data visualization, data acquisition, and experiment design.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Northwestern University, 2020

M.S., Mechanical Engineering, Northwestern University, 2017

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

Licenses and Certifications

Professional Engineer, Illinois, #062074128

Prior Experience

Guest Researcher, National Institute for Standards and Technology, 2020

Professional Affiliations

American Society for Testing and Materials (ASTM)

American Society of Mechanical Engineers (ASME)

Society of Woman Engineers (SWE)

Languages

Cantonese Chinese

Publications

Cheng P, Liu WK, Ehmann K, Cao J. Enumeration of additive manufacturing toolpaths using Hamiltonian paths. Manufacturing Letters. 2020; 26:29-32.

Cheng P. Toolpath Design for Additive Manufacturing Using Graph Theory. Ph. D. Dissertation, Northwestern University, 2020.

Ndip-Agbor E, Cheng P, Moser N, Ehmann K, Cao J. Prediction of rigid body motion in multi-pass single point incremental forming. Journal of Materials processing Technology. 2019 Jul 1;269:117-27.

Smith J, Xiong W, Yan W, Lin S, Cheng P, Kafka OL, Wagner GJ, Cao J, Liu WK. Linking process, structure, property, and performance for metal-based additive manufacturing: computational approaches with experimental support. Computational Mechanics. 2016 Apr 1;57(4):583-610.

Additional Education & Training

Certificate in Research Communication, Northwestern University

Management for Scientists and Engineers Certificate, Northwestern University

Predictive Science & Engineering Design Certificate, Northwestern University

SWE/Chevron Scholar