



Exponent[®]

Engineering & Scientific Consulting

Falak Shah, Ph.D., P.E., CWI

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Professional Profile

Dr. Shah advises leading industrial, litigation, and insurance clients as they face complex challenges involving the performance, mechanical integrity, and operational reliability of mechanical and structural systems. By combining his experience and expertise in solid mechanics, experimental characterization of materials, and engineering analysis and modeling, he has served clients across a wide range of industries, including construction, energy/utilities, mining, transportation, rail, consumer products, and chemicals.

Specific examples of Dr. Shah's project engagements domestically and internationally include:

- Advising a major chemical plant during a reliability-enhancement effort by developing, through investigations, an understanding of failure mechanisms (e.g., corrosion, mechanical overload, and material considerations) of metal piping systems and related components
- Assessing the impact on overall reliability of a major metropolitan transit system due to rolling stock overcrowding and insufficient maintenance of rolling stock, equipment, and tracks
- Characterizing the risk profile associated with a pressure vessel used in a novel application, as benchmarked against accepted industry practice
- Investigating, using computational structural analysis, the root cause of the failure of a welded steel truss during erection at a powerplant
- Investigating, using metallurgical and stress analyses, the failure of a welded steel hopper used for granular materials storage
- Assessing the failure of wire-rope components that supported a personnel lift (elevator)
- Determining the cause of an overturned sign in a public space, resulting in an injury
- Working with a playground equipment manufacturer to analyze the cause of unanticipated deformation of an installed piece of equipment

Throughout his work, Dr. Shah's analyses have often been in the context of various codes, standards, and specifications, including ASME, ASCE, AISC, AWS, API, ASTM, ANSI, EN, and BS.

A graduate of the Georgia Institute of Technology School of Civil and Environmental Engineering, Dr. Shah's Ph.D. work focused on structural engineering, mechanics, and materials. More specifically, his doctoral dissertation provided—through a combined experimental and analytical approach—design-oriented engineering solutions for characterizing how the mechanical behavior of a duplex stainless steel grade changes over time, through a process known as stress relaxation. During his studies at Georgia Tech, Dr. Shah also earned a Multidisciplinary Certificate in the Mechanical Properties of Materials. Dr. Shah's experience extends to experimentally characterizing the mechanical properties of metals; modeling time-dependent constitutive behavior; finite element analysis (FEA) with such codes as Abaqus,

FB-MultiPier, and LS-DYNA; structural rehabilitation; metallography; instrumentation; and data acquisition (DAQ). He also has experience modeling the response of structures subjected to impact loading by combining nonlinear, dynamic finite element analysis with probabilistic simulation techniques.

Dr. Shah's academic background includes study of advanced topics in reinforced and prestressed concrete, steel, and fiber-reinforced polymer (FRP) design; finite element analysis; design of temporary structures (e.g., shoring, scaffolding); structural reliability; structural stability; plasticity; and fatigue.

On a personal note, Dr. Shah is deeply invested in developing positive change through service. To that end, he is active within the firm, with technical organizations, and with non-profit organizations. For instance, he is the Chicago offices coordinator of Exponent's diversity and inclusion efforts and is active in efforts to increase the recruiting and retention of women and minority consultants. For service to the technical community, he is, furthermore, a member of the American Society of Civil Engineers' committee on Fatigue and Fracture and is focused on synthesizing and disseminating the state-of-the-art on fatigue and fracture mechanics to practicing engineers. Finally, he volunteers as a professional mentor for the Illinois Institute of Technology's Engineers Without Borders student chapter, a group of students working to develop hygiene solutions in communities around the world, and serves as a Young Professionals Ambassador with the Chicago Council on Global Affairs, where he is focused on increasing the engagement of Chicago's young professionals with the global community.

Academic Credentials & Professional Honors

Ph.D., Structural Engineering, Georgia Institute of Technology, 2014

M.S., Structural Engineering, Georgia Institute of Technology, 2012

B.S., Civil Engineering, University of Florida, 2009

Multidisciplinary Certificate in Mechanical Properties of Materials, Georgia Institute of Technology

Contract Plans Reading Certificate, Florida Department of Transportation

Tau Beta Pi Engineering Honor Society

Rockwell Collins Scholar

Henry Bauch Engineering Scholar

Licenses and Certifications

American Welding Society Certified Welding Inspector (CWI)

Professional Affiliations

American Society of Civil Engineers (ASCE)

- Structural Engineering Institute (SEI), Member
- Engineering Mechanics Institute (EMI), Member
- ASCE/SEI Metals Fatigue and Fracture Committee, Committee Member

American Institute of Steel Construction (AISC), Member

Structural Engineers Association of Illinois (SEAOI), Associate Member

American Society of Mechanical Engineers (ASME)

- Applied Mechanics Division (AMD), Member

Languages

Hindi

Gujarati

Publications

Articles and Reports

Horsnail J, Edwards J, Hardyniec A, Shah F. New construction trends and their impact on contracts. Law360, 2018, available at <https://www.law360.com/articles/1100615/new-construction-trends-and-their-impact-on-contracts>.

Shah FD. Time-dependent behavior of pretensioned stainless steel bars used for structural rehabilitation and retrofitting. Ph.D. Dissertation, Georgia Institute of Technology, 2014.

Zureick A, Ellingwood B, Kim S, Bechtel A, O'Malley C, Shah F. Bridge repair and strengthening study: Part I. Structural Engineering, Mechanics, and Materials Research Report to the Georgia Department of Transportation, 2014.

Davidson MT, Consolazio GR, Getter DJ, Shah FD. Probability of collapse expression for bridges subject to barge collision. ASCE Journal of Bridge Engineering 2013; 18(4):287-296.

Crowley RW, Bloomquist DB, Shah FD, Holst CM. The sediment erosion rate flume (SERF): A new testing device for measuring soil erosion rate and shear stress. ASTM Geotechnical Testing Journal 2012; 35(4):649-659.

Crowley RW, Bloomquist D, Hayne JR, Holst CM, Shah FD. Estimation and measurement of bed material shear stresses in erosion rate testing devices. ASCE Journal of Hydraulic Engineering 2012; 138(11):990-994.

Invited Presentations

Shah F. Why things fall down: Failure analysis of engineered structures. Structural engineering seminar series, University of Illinois at Urbana-Champaign, 2019.

Shah F and Mo P. Case studies to the American Society of Civil Engineers chapter, University of Michigan, 2018.

Shah F. Consulting with a technical twist. Advanced Degree Consulting Summit, Northwestern University, 2017.

Additional Education & Training

API 579-1/ASME FFS-1 Fitness-for-Service Course, American Society of Mechanical Engineers

Peer Reviews

ASME International Mechanical Engineering Congress and Exposition (IMECE)