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**SHIREEN AFSHAN, Ph.D., P.E.**  
**SENIOR STAFF CONSULTANT**

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Dr. Afshan is a Senior Staff Consultant with ESi in the Mechanics group in Houston, Texas. Dr. Afshan holds an Aerospace Engineering degree and a Ph.D. in Mechanical Engineering. She specializes in mechanics of materials, stress analysis, experimental testing, failure analysis, finite element analysis (FEA), damage evaluation, micromechanical modeling, scanning electron microscopy (SEM), metal forming, and damage and cost estimation. Her research and investigative work involves fatigue, fracture, environmental effects, finite element analysis, design, and maintenance and operation practices.

She has performed damage evaluations on pipelines; failure analysis for industrial machinery such as compressors and turbines; stress and thermal analysis on furnaces; finite element analysis on pressure vessels and structural components. She has extensive experience in damage assessments and cost estimates for small industrial losses to big losses such as fire or natural disaster affected chemical plants and oil and gas refineries. Her expertise has been applied in various interactions within international and multinational corporations such as Tata Steel and Airbus. Dr. Afshan has published various scientific articles and has presented her work at different industrial and international conferences. She is also an active member of ASME.

**Areas of Specialization**

Mechanical engineering  
Failure analysis  
Finite element analysis  
Heat transfer analysis  
Mechanics of materials  
Stress analysis  
Computational fluid dynamics  
Metal forming  
Pressure vessels  
Damage evaluation  
Capital cost estimating

**Education**

Ph.D., Mechanical Engineering, Imperial College London, 2013  
B.Eng., Aerospace Engineering, University of Sheffield, 2009

*January 2019*

## Licensed Professional Engineer (P.E.)

State of Texas .....License No. 127761  
NCEES Record .....ID No. 15-844-07

## Professional Affiliations

American Society of Mechanical Engineers (ASME) International

## Positions Held

### Engineering Systems Inc., Houston, Texas

Senior Staff Consultant, 2018 – present  
Staff Consultant, 2014 – 2018

### Imperial College London, United Kingdom

Research Assistant, 2009 – 2013

### Airbus, Filton, United Kingdom

Intern, 2008 – 2009

### University of Sheffield, United Kingdom

Research Assistant, summer 2008

## Certificates

BPV Code, Section VIII, Division 2, Pressure Vessels (ASME)

Fracture Mechanics & Fatigue: Theory & Modeling for Mechanical Engineers (ASME)

Modeling Fracture & Failure (Simulia)

Abaqus for Offshore Analysis (Simulia Course through VIAS)

Conceptual Development and Capital Cost Estimating, (AIChE)

## Publications and Presentations

**S. Afshan**, A. Pettinger, Thermal Analysis of Buried Insulated Pipes, [Journal of Failure Analysis and Prevention](#), Volume 19, 2013, pp 1-8.

**S. Afshan**, D. Balint, J. Lin, D. Farrugia, Automated calibration of a void closure model for high-temperature deformation, [J. Multiscale Modeling](#), Volume 03, 2011, pp 79-90. DOI: 10.1142/S1756973711000364

**S. Afshan**, D. Balint, J. Lin, D. Farrugia, Micromechanical modeling of void healing, [Advanced Structured Materials](#), Volume 19, 2013, pp 1-8.

**S. Afshan.**, D. Balint, D. Farrugia,, J. Lin., New experimental method for identifying the conditions necessary for diffusion bonding in free cutting steels, [Materials Science & Engineering A](#), volume 586, 2013, 25-30

- S. Afshan**, Application of new engineering technologies in the court of law, CLE Presentation to Woodlands Bar Association, Houston, TX, January 2018
- S. Afshan**, D. Balint, D. Farrugia, J. Lin, Micromechanical modeling of void healing, IUTAM 2012, Paris, France, April 2012 (invited lecturer)
- S. Afshan**, D. Balint, J. Lin, D. Farrugia, Micromechanical modeling of porosity elimination process, TATA Steel Symposium, Warwick University, Coventry, UK, July 2012
- S. Afshan**, D. Balint, J. Lin, D. Farrugia, Poster presentation, TATA Steel Symposium, Cardiff University, Cardiff, UK, July 2011
- S. Afshan**, D. Balint, J. Lin, D. Farrugia, Poster presentation, Automated calibration of a void closure model for high-temperature deformation, TYC London, September 2010
- S. Afshan**, D. Balint, J. Lin, D. Farrugia, Automated calibration of a void closure model for high-temperature, International Conference on Multiscale Modeling: incorporating a special symposium on Geomechanics, Ecole Nationale des Ponts et Chaussees, Paris, France, September 2010

## **Selected Project Experience**

Assisted with failure analysis of a C-300 Compressor where finite element analysis proved a loose bolt attaching the main journal bearing flange to the gearbox casing was the cause of failure.

Performed failure analysis/stress analysis of a glass fiber furnace, identifying the design problems associated with the furnace structure. The lack of expansion gaps caused the fracture of the refractory bricks at the furnace throat.

Assisted with root cause failure analysis of a crane which collapsed due to a mechanical failure of one of the securing turnbuckles of its mid-section boom pendant.

Performed damage analysis and cost assessments for hurricane damaged structures.

Assisted with failure analysis of a fired chemical plant located in Fujian province in China. Fire resulted from a Hydrocarbon leak from a ruptured weld in the pipeline. Defective and poorly manufactured weld with only 30% penetration (instead of 100%) was the cause of incident.

Performed root cause failure analysis of several natural gas compressors, where failure of mechanical parts caused fire.

Performed stress analysis and finite element analysis of several fire protection systems sections (pipes, valves, connections, etc.). In a few cases the lack of sufficient support for the system weight caused stress concentration in thin connections leading into fracture and leaking of the fire suppression liquid.

Performed structural evaluation of a scaffolding set up. Experimental and finite element modeling of the scaffolding set up revealed that insufficient number of supports in the set up resulted in instability and therefore the break-down of the scaffolding.

Performed failure analysis due to corrosion in casings, flushometer valves, pipes, HVAC systems, etc. Assisted with testing of two portable generators to investigate the likelihood of internal pressure development and fuel expulsion during fuel tank fill cap removal. The testing was performed to evaluate the pressure behavior inside the fuel tank as temperature increased.

Performed finite element analysis on a buried corroded pipe to investigate the effect of corrosion and stress concentration on the fracture of the pipe.

Performed thermal and stress analysis using finite element method to investigate the failure of an insulated Emulsion pipeline.

Performed engineering analysis to investigate the cause of damage to some exponents in an exploratory offshore well.

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Performed damage analysis and cost assessments of a Vinyl Chloride Monomer (VCM) Plant in Mexico.