

JEONG K. (J.K.) HONG, PH.D.

Vice President



Summary

Jeong K. Hong (J.K.) has experience managing and investigating engineering research and development programs in the offshore, shipbuilding, oil & gas, nuclear, heavy machinery, and automotive industries for more than 25 years. His main research interest areas are advanced design methods and analysis procedure development for welded structures using computational and analytical methods. He has developed unique analysis tools for characterizing residual stresses, distortions, and fatigue (a co-inventor of equilibrium-based structural stress procedures known as Verity®) in welded structures. He also has extensive research experience in weld-related issues such as mitigation techniques, repair welds, fitness for service.

Areas of Technical Expertise

- Mechanical Engineering
- Welding Engineering
- Weld Fatigue Evaluation

Education

- PhD., Welding Engineering, 1996, Ohio State University
- M.S., Mechanical Engineering, 1989, Yonsei University
- B.S., Mechanical Engineering, 1987, Yonsei University

Professional Activities

- Member, American Welding Society (AWS)
- Member, Korean Welding and Joining Society (KWJS)
- Member, Society of Automotive Engineers (SAE)
- Member, American Council of International Institute of Welding (C-XIII)
- Member, Society of Automotive Engineers (SAE)
- Editorial Board Member, Journal of Welding and Joining, KWJS
- Session Organizer, WCX SAE World Congress Experience, SAE
- Member, AWS A9 Committee on Computerization of Welding Information

Awards

- R & D 100 Awards, R&D Magazine, 2006
- Prof. Dr. Rene Wasserman Memorial Award, AWS, 1999
- F. Davis Silver Medal Award, AWS, 1998

Select Project Experience

Emergency Response

Tower Crane Collapse, Atlanta, GA. Emergency response to tower crane counterweights collapse during construction.

Fatigue, Fracture, Failure Projects

Mission Bay Light Pole, San Francisco, CA. Investigation of weld fatigue failure of light poles.

Man Lift Boom, Milwaukee, WI. Investigation of weld failure due to fatigue.

Structural Stress Joint Industry Program, Phase I-IV,*

Multi-client, 17+ year industry consortium program to develop and apply structural stress method organized by J.K. and co-workers. Development of fatigue evaluation procedures using structural stress method for various joint types and development of master S-N curve and weld fatigue database.

Advanced Fatigue Evaluation Procedure Development for a Structure of Excavator, Incheon, Korea.*

Providing an FE-based weld modeling recommendations for improving the capability of the weld fatigue prediction for an excavator, advanced weld fatigue evaluation procedures, and comments after reviewing the current test procedures to simulate field loading conditions

Fatigue Evaluation Procedure Development of Spot Welded, Weld-bonded, Self-Piercing Rivet (SPR), Flow Drill Screw (FDS) Joints for Automotive Structures, Gyeonggi, Korea.*

Development testing (coupons and components) and modeling procedures for spot welded, weld-bonded, self-piercing rivet, and FDS joints for automotive applications and conducting fatigue tests and construction of design master S-N curve using FE-based structural stress method and fatigue test results.

Airbag Inflator Laser Welded Failure Analysis,* Investigation of root cause of failure of airbag inflators through observations and FE analysis.

*Denotes work performed with previous employer.

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Fatigue Prediction Evaluation Incorporating Weld Residual Stress, Peoria, IL.* Development of a predictive tool for evaluating the fatigue life of welds that are subjected to residual stresses due to welding and fabrication as well as to externally applied cyclic loads.

Optimization of Hydrotesting for Vintage Liquid Lines, Washington, DC.* Formulation of a new improved constant-depthaxial-surface-crack model to predict crack growth and burst pressure using FE-based fracture mechanics analysis, and validation as compared to pipe test models.

Fitness-for-Service

Jackson Generation ACC, Elwood, IL., Tube bucking analysis in cooling systems using fitness-for-service assessment.

Crack Extension Effects on Welding Residual Stress, Multi-client,* Formulation of procedures to decide changes in residual stress with crack extension and their effect on structural integrity for various welded application cases. Comparison with existing codes/standard procedures, and recommendations provided.

Fracture Toughness of High-Temperature Alloys, Literature Review, St. Louis, MO.* Proving an overview of currently available fitness-for-service (FFS) assessment and remaining-life prediction methodologies for Alloy 20Cr32Ni1Nb outlet manifold components and a summary of available material properties for the as-cast, as-welded, ex-service, and laboratory-aged materials from which they are fabricated.

Residual Stress

Thin Sheet Weld Simulation, Milwaukee, WI.* Development and validation of a computational weld process model for thin plate automotive applications.

Residual Stress Analysis of Repair Welds in Alloy 2195 Super-Lightweight Tank, Huntsville, AL.* Investigation of residual stress characteristics of subject welded plate (welded, repair welded, and then planished) and development of residual stress mitigation procedure due to repair welding.

Residual Stress Analysis of a Pump Casing Repair Weld and Spine Repair Weld, Gloucester, UK.* Investigation of residual stress characteristics using finite element analysis (FEA).

Residual Stress Analysis of a Multi-Pass Repair Weld in a Test Plate, Axisymmetric Residual Stress Analysis of a Boiler Shell Repair Weld, and Management of Residual Stresses for a Boiler Shell Repair, Scotland, UK.* Investigation of residual stress characteristics of repair welds, optimization of repair weld procedures using FEA and validation with experiments.

Select Papers, Lectures and Publications

"Forensic Analysis of High-Strength Steel Boom Failure in a Mobile Elevating Work Platform," ASCE 10th Forensic Engineering Congress, 2024 (co-author)

"Mode- $\{I, III\}$ Multiaxial Fatigue of Welded Joints in Steel Maritime Structures: Total Stress Based Resistance Incorporating Strength and Mechanism Contributions," International Journal of Fatigue, 2024 (co-author)

"An Improved Axial Surface Crack Model to Predict Crack Growth and Burst Pressures Based on FEA Analyses for Jplastic and J-R Curve Methodology," ASME IPC 2022 (co-author)

"Fitness-For-Service Assessment and Material Properties for Alloy 20Cr32Ni1Nb in Outlet Manifolds," 2022 Safety in Ammonia Plants and Related Facilities Symposium (co-author)

"Residual Stress Effects on Fatigue Strength under Torsion Dominant Loading," WCX SAE World Congress Experience, 2022 (presenter)

"The Master SN Curve Approach for Fatigue Assessment of Welded Bridge Structural Details," International Journal of Fatigue, 2021 (co-author)

"Determination of Crack-Initiation in Fracture Toughness Testing Using an Experimental Key-Curve Methodology," ASME PVP 2021 (co-author)

"Weld Root Failure Investigation Under In-plane Shear Dominant Loading," WCX SAE World Congress Experience, 2021 (presenter)

"Flaw Design for d-c EP Monitoring of Crack Initiation and Growth During Full-Size Pipe Experiments," ASME PVP 2020.

"Re-Evaluation of Fatigue Evaluation Procedures for Weld Root Failure," SAE Technical Paper, 2019 (author)

"Weld Fatigue Evaluation Procedure Incorporating Residual Stress Effect using the Battelle Structural Stress Method," International Welding/Joining Conference-Korea 2017 (keynote speaker)

"Calculation of Weld Residual Stresses and the Effects of Local Post Weld Heat Treatment," Welding Research Council Bulletin, 2016 (co-author)

"Study on Weld Fatigue Evaluation Incorporating Welding Induced Residual Stress Effect," ASME OMAE 2016 (author)

"Fatigue Evaluation of Welded Structures using Battelle Structural Stress Method," Workshop on Weld Residual Stress and Distortion Prediction Conference, 2015 (invited speaker)

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Select Papers, Lectures and Publications Continued

"Study on Multi-axial Fatigue Evaluation in Welded Structures using the Battelle Structural Stress Methodology" ICMR-2015 (invited speaker)

"Fatigue Evaluation Procedures for Bi-axial Loaded Plate Joints using the Battelle Structural Stress Method," Procedia Engineering, 2015 (author)

"Fatigue Evaluation Procedures for Multiaxial Loading in Welded Structures Using Battelle Structural Stress Approach," ASME OMAE 2014 (author)

"Development of Friction Stir Weld Fatigue Evaluation Procedure Using Battelle Structural Stress Method," International Journal of Materials and Manufacturing, 2014 (author)

"Evaluation of Weld Root Failure using Battelle Structural Stress Method," Journal of Offshore Mechanics and Arctic Engineering, 2013 (author)

"Fatigue Evaluation of Notched Plate Specimens by the Battelle Structural Stress Method," International Journal of Materials and Manufacturing, 2013 (author)

"Study on Weld Fatigue Evaluation under Sour Service Environment using Battelle Structural Stress Method," ASME OMAE, 2013 (author)

"Fatigue of Tubular Joints: Hot Spot Stress Method Revisited," Journal of Offshore Mechanics and Arctic Engineering, 2012 (co-author)

"The Development of a Simplified Spot Weld Model for Battelle Structural Stress Calculation," International Journal of Materials and Manufacturing, 2011 (author)

"A Path-Dependent Cycle Counting Method for Variable-Amplitude Multi-Axial Loading," International Journal of Fatigue, 2010 (co-author)

"The Master S-N Curve Method- An Implementation for Fatigue Evaluation of Welded Components in the ASME B&PV Code, Section VIII, Division 2 and API 579-1/ASME FFS-1," Welding Research Council Bulletin, 2010 (co-author)

"Improvement and Validation of Weld Residual Stress Modelling Procedure," Swedish Radiation Safety Authority Report, 2009 (co-author)

"Effect of Welding Residual Stresses on Crack Opening Displacement and Crack-Tip Parameters," Swedish Radiation Safety Authority Report, 2009 (co-author)

"Analysis of Solder Fatigue in Electronic Packaging Using a Mesh-Insensitive Structural Stress Method," Materials Science Forum, 2008 (author)

"Analysis of Recent Fatigue Data Using the Structural Stress Procedure in ASME Div 2 Rewrite," Journal of Pressure Vessel Technology, 2007 (co-author)

"On the Residual Stress Profiles in New API 579/ASME FFS-1 Appendix E," Welding in the World, 2007 (co-author)

"A Robust Structural Stress Parameter for Evaluation of Multiaxial Fatigue of Weldments," Journal of ASTM International, 2006 (co-author)

"Analysis of Residual Stresses at Weld Repairs," International journal of pressure vessels and piping, 2005 (co-author)

"Fracture Mechanics Treatment of Residual Stresses in Defect Assessment," Welding in the World, 2004 (co-author)

Patents

Hong, J.K. 2014, Path-dependent Cycle Counting and Multi-Axial Fatigue Evaluation of Engineering Structures, U.S. Patent 8,649,985 B2, filed October 30, 2009 and issued February 11, 2014 (co-inventor)

Hong, J.K. 2009, Structural Stress Analysis, U.S. Patent 7,516,673, filed June 15, 2006 and issued April 14, 2009 (co-inventor)

Hong, J.K. 2006, Structural Stress Analysis, U.S. Patent 7,089,124, filed November 16, 2004 and issued August 8, 2006 (co-inventor)

Hong, J.K. 2005, Structural Stress Analysis, U.S. Patent 6,901,809, filed November 16, 2001 and issued June 7, 2005 (co-inventor)

CONTACT

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