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Dr. Gery Wilkowski, P.E.
President

Education

B.S., Mechanical Engineering, University of Michigan (1973)
M.S., Mechanical Engineering, University of Michigan (1974)
Ph.D., Nuclear Engineering, University of Tokyo, Japan (1988)
(First U.S. citizen to obtain Ph.D. from the University of Tokyo
Engineering College through their Visiting Scholar program.)

Areas of Expertise

Full-Scale Pipe and Pressure Vessel Fracture Testing, Nondestructive Examination, J_R-Curve Testing, High-Rate Toughness Testing, Experimental Design and Instrumentation, Elastic-Plastic Estimation Scheme Analysis, Impact Testing, ASME Section XI Flaw Analyses, Leak-Before-Break Analyses, Crack Arrest, and Pipe System Fracture Under Seismic Loading.

Technical Qualifications

Dr. Wilkowski has been responsible for managing, conducting experimental research, and analyzing the fracture behavior of piping and pressure vessels. He is an internationally recognized expert on fracture of piping in the nuclear as well as oil and gas industries. Some of his technical developments are:

- (1) Development and verification of fracture mechanics and Net-Section-Collapse analyses of circumferential cracks in stainless steel pipe. This work is a major contribution to the ASME Boiler and Pressure Vessel Code - Section XI criteria for evaluation of cracks in austenitic and ferritic steel piping.
- (2) Developing experimental techniques for conducting laboratory specimen and pipe fracture experiments. This has involved significant development using the d-c electric potential technique for in-situ crack monitoring during fatigue or elastic-plastic fracture. Another extension of the d-c electric potential method involved mapping the profile of surface cracks. This has been done for stress-corrosion cracks, and circumferential surface cracks during elastic-plastic crack growth as well as fatigue crack growth.
- (3) Fracture mechanics analyses of cracked pipe. Analysis and experimental verification for fracture instability of axial, circumferential and helical cracks in pipes for nuclear, oil and gas transmission lines, down-hole tubular products and offshore platforms has been performed in numerous programs.
- (4) Pressure Vessel Nozzle cracking. Dr. Wilkowski is the principle investigator for a long term program on stress-corrosion cracking of reactor pressure vessel nozzles for the US Nuclear Regulatory Commission (2000-present). This work involved coordinating multiple disciplinary analyses to determine residual stresses and their effects on the occurrence and

potential failure of failure of cracked nozzles. The work involved analyses of the Davis-Besse nuclear plant incident, as well as assisting in the development of regulatory positions and development/enhancements to the ASME code for nuclear power plant inspections and evaluation procedures.

- (5) Other Studies. Dr. Wilkowski has also been involved in numerous other projects, some of which are: crack initiation and arrest in liquid natural gas storage tanks, material design of low temperature explosive blast containers, optimization between wear and fracture of snow plow blades, design of large arctic pressure vessels, developing hydrostatic retest criteria for oil and gas pipelines, fracture behavior of pipelines buried in frozen soil, fracture analysis of railroad tank cars, fracture of arctic grade valves, flanges, and fittings, steam generator tubing rupture analyses, fracture toughness requirements for nuclear shipping casks, experimental evaluations of explosive girth welds in large diameter pipe, crack arrest considerations for liquid CO₂ pipelines, design and optimization of mechanical crack arrestors for pipelines, fracture behavior of valves and elbow, developing failure criteria for helical flaws in spiral weld pipe under combined pressure and bending loads, developed the precracked drop weight tear test used for measuring dynamic ductile fracture toughness of natural gas transmission piping, elastic-plastic low-cycle fatigue crack growth analyses of pipe girth welds, transition of unstable axial cracks to circumferential crack in CANDU reactor pressure tubes, numerous field failure investigations for oil and gas companies, failure analysis/expert witness testifying for Netherlands Police Department investigation of benzene line failure, failure investigation on the PEPCO diesel fuel line that failed and caused significant environmental damage, litigation case on need for girth weld repairs in gas pipelines, development of the initial concept of interactive FE mesh generator with ABAQUS FE solver for determining natural shape of SCC cracks, development of a master curve for fracture transition temperatures, etc.

Member of Major Review Committees

- (1) Consultant to the NRC Pipe Crack Task Group that developed the NRC LBB analysis procedure, which evolved into the draft Standard Review Plan 3.6.3 "Leak-Before-Break Evaluation Procedures".
- (2) Member of DOE's Structural Integrity Peer Review Groups for:
 - Savannah River plant,
 - New Production Reactor plant,
 - Advanced Neutron Reactor plant, and
 - Uranium hexafluoride storage cylinders.
- (3) Consultants to AECB on CANDU pressure tube guillotine break phenomena.
- (4) Member of NRC's Peer Review Committee on new seismic design rules for nuclear power plant piping.
- (5) Expert witness on ductile fracture control on a proposed natural gas pipeline at Canadian National Energy Board hearings.
- (6) NRC reactor pressure vessel nozzle cracking review team

(7) NRC Elicitation panel for loss-of-coolant-accident (LOCA) redefinition efforts (also on seismic LOCA analysis team).

(8) Expert reviewer of CANDU fitness-for-purpose guidelines for feeder line flaws.

Professional Recognition and Affiliations

Fellow of ASME – since 1997.

Past member of the ASTM E-24 Fracture Committee, American Welding Society, and Canadian Institute of Mining and Metallurgy

A registered professional engineer in the State of Ohio since 1979

Current member of the following American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI groups:

- Flaw Evaluation Working Group,
- Plant Operating Criteria Special Working Group,
- Erosion-Corrosion Flaw Acceptance Task Group,
- Stress-Corrosion Cracking Task Group,
- Evaluation of Beyond Design Basis Events Working Group, and
- Secretary of the Pipe Flaw Evaluation Working Group.

Past chairman of the ASME Materials Fabrication Committee, and past chairman of the Pipe and Support Subcommittee of the ASME Operations, Applications, and Components Committee, all of which are part of the ASME Pressure Vessel and Piping Division.

Coordinator of the 14th, 16th, and 17th Structural Mechanics in Reactor Technology (SMiRT) Conference Divisions G and F sessions on “Fracture Mechanics and Non-Destructive Testing” and “Metallic Material Behavior and Damage, and Design Methods and Rules for Components”.

Prior Professional Experience

Founder and president of Engineering Mechanics Corporation started in January 1998.

He worked from 1974 to 1998 at Battelle Columbus where he was a Research Leader for Pressure Boundary Integrity.

During the spring and summer of 1973, he worked at Westinghouse Electric Company conducting finite element analyses of fatigue and vibration failures.

Other Experience

Dr. Wilkowski gave short courses on “Elastic-Plastic Fracture Mechanics Applications to Nuclear Piping” to the Argentina Comision Nacional De Energia Atomica, and similar courses on LBB and piping fracture mechanics in Switzerland, Korea, and Brazil.

Major Publications

Dr. Wilkowski has published more than 300 technical papers and referable reports involving fracture initiation, propagation, and crack arrest in pipes or pressure vessels, as well as toughness

testing and experimental crack monitoring techniques.

He is a past Associate Technical Editor of the ASME *Journal of Pressure Vessel Technology*, and guest editor of the *Nuclear Engineering and Design* journal. He is currently on the Editorial Board of the *International Journal of Pressure Vessels and Piping*.

He was editor or co-editor of eleven ASME special technical publications. He was co-editor of four NRC Conference Proceeding Reports on leak-before-break.