

Curriculum Vita
of
Richard E. Smith, Ph.D.

7/10/2006

Education

Virginia Polytechnic Institute - PhD Materials Engineering Science
Virginia Polytechnic Institute - MS Metallurgical Engineering
Virginia Polytechnic Institute - BS Metallurgical Engineering

Professional Associations

ASME
American Society of Metals
EEI Metallurgy and Piping Task Force
National Association of Corrosion Engineers
Technical Transfer Society
American Welding Society
Order of the Engineer
Materials Engineering Advisory Committee, N.C. State University
Advisory Board to Mechanical Engineering Department, UNC Charlotte
University of Chicago Review Committee for the Energy Technology Division at ANL
Board of Directors of Welding Research Council

Professional Experience

1998 to Present	Structural Integrity Associates, Charlotte, NC Associate
1995 to 1998	Altran, Charlotte, NC Vice President
1993 to 1995	Private Consultant, Mooresville, NC
1992 to 1993	EASI, Murrysville, PA Executive Vice President
1980 to 1992	JA Jones Applied Research, Charlotte, NC Vice President
1974 to 1980	EPRI, Palo Alto, CA Coordinator of BWR IGSCC Research Program
1969 to 1974	Combustion Engineering, Chattanooga, TN

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Supervisor of Metals Property Technology

1967 to 1969 US Army Ordinance Corps
 Captain

Summary:

Dr. Smith's 38-year career has focused primarily on electric power industry issues involving materials, corrosion, and welding issues. During his tenure at Structural Integrity he has worked primarily with utility and industrial clients on issues involving materials selection and design, welding, corrosion, and program planning, root cause assessments, licensing support, oversight, and training. He regularly supports clients on-site to help them work through complex component degradation and regulatory issues. In this capacity he provides technical support in addition to a knowledgeable interface through which Structural Integrity's broad base of technical expertise can be brought to bear on specific issues. These assignments typically require an integration of diverse technologies to evaluate, develop and implement solutions. The technologies include materials and corrosion, inspection, welding, stress analysis, applied fracture mechanics, design analysis, and risk based methodologies. Recent on-site assignments have provided extensive involvement in the major BWR and PWR industry issues including IGSCC of BWR piping and reactor pressure vessel internals, and PWSCC of primary piping and nozzles, CRDM nozzle penetrations for both BWR and PWR vessels, welding of dry fuel storage casks, RCP safety injection nozzles, and CRD upper housing and canopy seal repairs. He has provided technical liaison to the EPRI MRP Alloy 600 Subcommittee on Repair & Mitigation and regularly supports EPRI managers through the preparation of technical basis documents used to define and justify utility positions on ASME B&PV issues.

Dr. Smith has supported litigation requirements serving as expert witness on materials and welding issues regarding component failures used in the nuclear power industry. His support included root cause testing and evaluation, written responses to interrogatories, technical deposition support to the attorneys, and testimony.

Prior to joining SIA, Dr. Smith was associated with Altran Corporation as Vice President in charge of establishing and operating a consulting engineering office in Huntersville, North Carolina. He was responsible for marketing, organizing, and conducting technical projects for utility and industrial clients.

Prior to his tenure at Altran Corporation, Dr. Smith was Director and Vice President of the Repair Application Division at EPRI NDE Center in Charlotte, North Carolina. In that capacity he was responsible for the transfer of technology developed by EPRI and others to maintain and repair utility power plant equipment. These activities involved equipment used in nuclear, fossil, and combustion turbine facilities. Techniques and methods were evaluated, adapted to field usage, reduced to practical procedures and specifications, demonstrated, documented and incorporated into utility training programs. In addition, state-of-the-art equipment needed to

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implement the technology was evaluated, adapted and refined as necessary. A major accomplishment was the understanding and control of residual stresses associated with austenitic pipe welding.

Dr. Smith was associated with the Systems and Materials Department in the Nuclear Division of the Electric Power Research Institute, Palo Alto, California. He served in various capacities of project and program management related to materials technology in nuclear power plant components. Specific technical areas included the development of plastic fracture methodology, investigations on causes of and remedies to intergranular stress corrosion cracking in stainless steel piping, life prediction schemes for steam turbine rotors, embrittlement of steels (temper embrittlement, reheat cracking, and irradiation effects), thermal fatigue of feedwater nozzles, steam generator heat exchanger tubing corrosion, and the development of various processing and repair technologies. As Coordinator of BWR IGSCC Research, he was responsible for establishing, funding and coordinating a comprehensive multidisciplinary program to provide utilities with the technological bases with which to understand and implement appropriate mitigation. Extensive networks of communication channels were put in place to provide technical liaison.

Dr. Smith was employed by Combustion Engineering prior to joining EPRI. He served in the capacities of both Senior and Principal Engineer and as Supervisor of Metal Properties Technology at their metallurgical laboratory in Chattanooga, Tennessee. Technical responsibilities involved the evaluation of materials and weldments used in the manufacture of components for nuclear steam supply systems, fossil-fueled boilers, and gas scrubber systems. He was responsible for qualification of materials used in production, and was involved in the qualification of several metals working processes used to manufacture power plant equipment.

Dr. Smith has published more than 40 technical papers in his field and has organized and chaired numerous domestic and international forums. He has participated as guest lecturer in Japan, Taiwan, Denmark, England and Germany, and has supported ASM, AWS, ASME and industrial forums in this country.

PUBLICATIONS

- 1."Dilatometer to Measure Length Changes in Stressed Specimens", J. F. Eckel Co-Author, Materials Research and STDS, Vol. 7, No. 6, June 1967, p. 251-254.
- 2."On the Effect of Nitrogen Content in a Special 20% Cr-20% Ni Austenitic Stainless Steel Alloy With Respect to Dislocation Substructure as Related to Stress Corrosion", PhD Dissertation, Virginia Polytechnic Institute and State University at Blacksburg, 1968.
- 3."Statistical Analysis of Charpy-V Impact Properties SA533 Grade B Class 1 and SA516 Grade 70 Plate Material", D. J. Ayres Co-Author, Trans, ASME Journal of Engineering for Industry, Vol. 95, Series, B, No. 1, 1973 p. 158-152.
- 4."Working Group Report of Dynamic Fracture Toughness Testing", Chairman and Co-Author, PVRC/MPC Joint Task Group on Fracture Toughness of Materials in the Nuclear Pressure Boundary.
- 5."Preliminary Results of a Program for Developing Fracture Toughness Data on Ferritic Nuclear Pressure Vessel Steels", K. E. Stahlkopf, W. L. Server, R. A. Wullaert, Co-Authors, Cracks & Fracture STP 601, ASTM, 1976 pp. 291-311.
- 6."A Program to Study Methods for Plastic Fracture" J. P. D. Wikinson and G. T. Hahn Co-Authors, ASM Material Design Forum, June 1976.
- 7."Materials Problems in Light Water Reactors" K. E. Stahlkopf, H. Ocken, & T. Marston Co-Authors, ASM Materials Application Conference, Cleveland, Ohio, Oct. 26-28, 1976.
- 8."A Methodology for Evaluation the Variability in Fracture Properties of Nuclear Pressure Vessel Steel", Co-Author with K. E. Stahlkopf, W. L. Server, & R. A. Wullaert, ASME Winter Annual Meeting, December, 1976, 76/WA/PVP-9 Journal of Pressure Vessel Technology, August 1977, pp 470.
- 9."Methodology for Plastic Fracture...A Progress Report", J. P. D. Wilkinson & G. T. Hahn Co-Authors, 4th International Conference on Structural Mechanics In Reactor Technology, San Francisco 15-19 August 1977.
- 10."Progress in Reducing Stress Corrosion Cracking In BWR Piping", American Power Conference, April 1977.
- 11."Nuclear Pressure Boundary Materials Research, Problems and Proposed Solutions" 4th International Conference on Structural Mechanics in Reactor Technology with K. E. Stahlkopf, T. U. Marston, & H. Ocken, San Francisco, 15-19 August 1977.

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12. "Present Problem: Boiling Water Reactor Piping Problems Analyzed", 1977 ASME Winter Annual Meeting Symposium on Value of Effective Communication between Materials and Design Engineers, December 1, 1977.
13. "Nuclear Pressure Boundary Material Problems and Proposed Solutions", Nuclear Engineering and Design North Holland Publishing Company with K. E. Stahlkopf & T. U. Marston.
14. "Controlling Sources of Variability in Stainless Steel Piping", Metals Progress, July 1977.
15. "Engineering Circumstances Surrounding BWR Pipe Cracking Presented at EPRI-Japan Joint Symposium on Predictive Corrosion Testing" - Mt. Fuji Institute, Japan, June 1978. Published in Symposium Proceedings by NACE.
16. Written Discussion of "Reporting Failure Data for Piping System", ASME Inservice Data Reporting and Analysis Symposium, San Francisco, California, December 1978.
17. "BWR IGSCC Research Program Plan", Nuclear Systems and Materials Department, Electric Power Research Institute, November 30, 1978.
18. "An Overview of Intergranular Stress Corrosion Cracking in Light Water Reactors", Co-Authors with M. J. Povich, NACE, Atlanta, Georgia, March 1979.
19. "EPRI Programs in Nuclear Systems and Materials Which Bear on Component Design and Operation", Co-Authored with E. L. Zebroski, K. E. Stahlkopf and G. Dau. Session 13, American Power Conference, Chicago, Illinois, April 23-24, 1979.
20. "Proceedings of EPRI BWR Countermeasures Seminar" Co-edited with J. C. Danko, January 22-24, 1980, Palo Alto, California EPRI WS-79-174 Vol. 1-4.
21. "BWR IGSCC Research Program Plan", Nuclear Systems and Materials Department, Electric Power Research Institute, March 10, 1980.
22. "BWR IGSCC Program Overview", Co-Authored with A. D. Rossin, American Power Conference, Chicago, Illinois, April, 1980.
23. "Progress in Technology Transfer" EPRI/BWROG International Technical Advisory Meeting Workshop", July 1982.
24. "BWR Pipe Remedy and Repair Technology", SMIRT Post Conference No.6, Assuring Structural Integrity of Steel Reactor Pressure Boundary Components, August 29-30, 1983.

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25. "Pressure Vessel Nozzle Repair", Co-Authors Ray Hanford and S. C. Cheng, SMIRT-10 Post Conference Seminar No. 2 Assuring Structural Integrity of Steel Reactor Pressure Boundary Components, Aug. 21-22, 1989 Monterey, California Nuclear Engineering and Design, 1990.
26. "Development Program for In-Vessel Reactor Repair of Stress Corrosion Cracked Components", Co-Author Wylie J. Childs, SMIRT II PC2, Taipei, Taiwan ROC, August 26-28, 1991.
27. "Effect of Surface Preparation on Crack Initiation in Welded Austenitic Stainless Steel", Co-Authors J. C. Danko and D. W. Gandy, NACE, Monterey Conference, August 1991.
28. "Controlling Weld Dilution Using the Gas Tungsten Arc Welding Process", Co-Authors D. W. Gandy and S. J. Findlan, Welding Design and Fabrication, July, 1992.
29. "Repair Welding of Reactor Pressure Vessel Steels Utilizing the Consistent Layer Temperbead Technique", Co-Authors D. W. Gandy and S. J. Findlan, Welding Design and Fabrication, August, 1992.
30. "Guidelines for the Repair/Replacement Welding of Nuclear Service Water Systems", Co-Author S. J. Findlan and D. M. Vandergriff, EPRI TR-100386, July 1992.
31. "Reactor Core Inspections at Brunswick Unit 1", Co-authors S. Bertz, J. Langdon, and E. Black, Proceedings of EPRI Vessel and Internals Inspection Conference, San Antonio, TX, July 1994.
32. "Core Shroud Cracking Repairs at Brunswick Unit 1 and Unit 2", Co-authors S. Bertz, B. Wilton, and A. Giannuzzi, AWS Conference on Repairs in Power Plants, Orlando, FL, November 1994.
33. "SMAW Temperbead Weld Repair without Grinding", Co-author D. Gandy, EPRI 4th International Conference on Welding and Repair Technology for Power Plants, Marco Island, FL, June 2000.
34. "Analytical Evaluation of Weld Overlay for Flawed Ferritic Piping", Co-authors A. Peterson, S. Findlan, M. Herrera, and S. Tang, EPRI 4th International Conference on Welding and Repair Technology for Power Plants, Marco Island, FL, June 2000.
35. "Review of GTAW Temperbead Weld Overlay Repair Applications using Alloy 52 Filler Material, Co-author B. Newton, EPRI 4th International Conference on Welding and Repair Technology for Power Plants, Marco Island, FL, June 2000.
36. "TGSCC in Type 347 SS CRDM Upper Housings at Palisades Nuclear Station", Co-author B. VanWagner, EPRI 5th International Conference on Welding and Repair Technology for Power Plants, Point Clear, AL, June 2002.

- 37."Weld Repair of Alloy 600 Hot Leg Nozzle Cracking at V.C. Summer Nuclear Station", Co-author G. Moffatt, EPRI 5th International Conference on Welding and Repair Technology for Power Plants, Point Clear, AL, June 2002.
- 38."Review of Mechanical Mitigation Methods for PWSCC", Co-authors R. Hermann, B. Gordon, M. Badlani, A. Giannuzzi, and S. Findlan, EPRI 6th International Conference on Welding and Repair Technology for Power Plants, SanDestin, FL, June 2004.
- 39."Evaluation of Pressurizer Surge Nozzle Safe-end PT Indications of Robert E. Ginna Nuclear Station, Co-authors J. Hyres, A. Rochino, and T. Marlow, EPRI 6th International Conference on Welding and Repair Technology for Power Plants, SanDestin, FL, June 2004.
- 40."RRAC Weld Dilution Testing of Alloy 52 Machine GTAW Temperbead Overlays", Co-author A. McGehee, EPRI, Palo Alto, CA, Technical Update 1011866, 2005.
- 41."Use of Alloy 52M Filler Materials for Temperbead Welding of Dissimilar Metals", Co-authors R. Smith, L. Yopez, and S. Kiser, EPRI 7th International Conference on Welding and Repair Technology for Power Plants, Marriott Sawgrass Conference Center, Jacksonville, FL, June 2006.
- 42."Assessment of ASME Code Temperbead Weld Procedure Qualification", Co-authors R. Smith and A. McGehee, EPRI 7th International Conference on Welding and Repair Technology for Power Plants, Marriott Sawgrass Conference Center, Jacksonville, FL., June 2006.
- 43."Acceptable CVN Results for Temperbead Weld Procedure Qualification", Co-author is A. McGehee, EPRI, Palo Alto, CA, Technical Update 1013553, 2006.

FORMAL PRESENTATIONS

- 1."Design of a Dilatometer for the Investigation of Volume Changes Caused by Stress Induced Solid State Transformations", 43rd Annual Virginia Academy of Science, Richmond, Virginia, May 5-8, 1965.
- 2."Inservice Inspection Seminar-Fracture Mechanics, Company Sponsored Seminar in San Francisco and Los Angeles, October, 1973.
- 3."The Effect of Post Weld Heat Treatment on the Fracture Toughness of Weld Heat Affected Zones in SA533 Grade B Class I Materials", T. U. Marston Co-Author, Presented at ASM Southern Metals Conference, April 1973.

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4. "Materials Used in the Nuclear Primary Pressure Boundary" Houston Chapter ASM, April 1974.
5. "Materials for the Nuclear Industry" Santa Clara Chapter AWS, April 1975.
6. "Materials Problems in Lightwater Reactors" Golden Gate Materials Conference, San Francisco, January 27, 1977.
7. "BWR Pipe Cracking - Lessons Learned", Pacific Northwest Metals and Materials Conference, May 1977.
8. "BWR Pipe Cracking" Symposium on Nuclear Materials Problems, ASME, Atlanta, Georgia, December 1977.
9. Panelist and Discussion on Inservice Data & Reporting Symposium - ASME, San Francisco, California, December 1978.
10. International Materials Congress Workshop No. 9 Materials Science and Technology for New Energy Sources and More Efficient Energy Conversion, Nuclear, March 26-29, 1978, Reston, Virginia.
11. "Influence of Residual Stress on Stress Corrosion Cracking of Stainless Steel Piping", AIME Symposium on Influence of Residual Stresses, Session 3, February 26, 1980, Las Vegas, Nevada.
12. "Intergranular on Stress Corrosion o Recirculation Piping in Boiling Water Reactors", Materials Engineering Conference, Virginia Polytechnic Institute, October 17, 1980, Blacksburg, Virginia.
13. "Remedies for IGSCC in Stainless Steel Piping of Boiling Water Reactors", Central Carolina Chapter ASM, November 13, 1980, Raleigh, North Carolina.
14. "Integrated Approach to Piping Repair and Replacement" 1987 WATEC Conference October 20, 1987, Knoxville, Tennessee.
15. "IGSCC of BWR Piping", Oak Ridge Chapter ASM/AWS, May 1980, Oak Ridge, Tennessee.
16. "Repair of BWR Piping Systems", IAEA Working Group on Repair Aspects and Procedures, RISO, Denmark, August 1982.
17. "Solutions to IGSCC in Boiling Water Reactor Systems" Delaware Valley Section of American Nuclear Society, February 13, 1986, Philadelphia, Pa.

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18. Invited Lectures on Solutions to BWR Pipe Cracking Problems, December 1988, Taiwan Power Company, Taipei, Taiwan, Republic of China.

19. Invited Seminar Lecture on "Materials Challenges in the Nuclear Power Industry for the 1990's", March 1991, VPI & SU, Blackburg, Virginia.

20. 2nd Annual Euroweld Welding Seminar, "Hardness vs Toughness", Charlotte, NC, June 2004.

21. 3rd Annual Euroweld Welding Seminar, "Engineered Repair to a Non-Code Pressure Vessel", Columbus, Ohio, June 2005.

22. 3rd Annual Euroweld Welding Seminar, "Controlling Dilution of Alloy 52 Weld Deposits", Columbus, Ohio, June 2005.