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TECHNICAL EXPERIENCE

More than 49 years experience in the power engineering industry, with extensive experience with both an electric utility and a major transformer manufacturer:

- 24 years with American Electric Power (AEP)
- 17 years with Westinghouse Electric Corp. (WEC)
- Started WagenTrans Consulting upon retirement from AEP in August, 2006.

August, 2006 thru present (WagenTrans Consulting)

Consulting projects include:

- Design reviews on a 138 kV mobile transformer, and 480, 672 and 800 MVA, 345/138 kV autotransformers
- Provided recommendations to enhance a utility client's transformer specifications
- Test witnessing of a HVDC converter transformer and three 138/13.8 kV auxiliary transformers
- Failure analysis of two 672 MVA and one 480 MVA, 345/138/13.2 kV autotransformers and a 441 MVA, 345/16/13.8 kV generator step-up transformer
- Provided recommendations to a utility client regarding vendors that could restore 30-year old generator step-up transformers to original condition
- Participant in a group that investigated failures of several similar 230 kV bushings, leading to a panel session paper at the 2010 IEEE PES General Meeting in Minneapolis, MN
- Provided recommendations to enhance a transformer manufacturer's test facility for higher voltages
- Legal affidavit concerning bushing maintenance practices.

May, 1982 thru June, 2006 (AEP)

Senior/Principal/Staff engineer at the Columbus, OH headquarters, responsible for power and instrument transformers, and shunt reactors rated through 765 kV. Experience includes:

- Wrote and updated technical and commercial specifications.
- Contract negotiation, including writing request-for-bid letters, performing technical and commercial evaluation of bids, making plant inspections, and establishing final recommendation for purchase.
- Comprehensive design reviews at several different manufacturers, drawing review and approval, test witnessing, and factory failure reviews.
- Reviewed and coordinated implemented vendors' recommendations for repair of failed transformers.
- Evaluation of several vendors' advanced warning systems for incipient failure of transformers, bushings and current transformers.
- Performance evaluation with respect to losses, over-excitation limits, loading above nameplate rating and loss of cooling.
- Field failure analysis through examination of physical evidence and use of diagnostic techniques such as electrical field plotting, transient analysis and dissolved gases-in-oil.
- Coordination of EPRI/AEP projects, including one to determine best indicator of incipient failure of current transformers, and another to assess the integrity of operating transformers.
- Member of IEEE Transformers Committee since 1982 with continuing input to standards and guides for power transformers, shunt reactors, bushings and instrument transformers. Past Chair of Bushing Subcommittee (12 years) and past Chair of Dielectric Test Subcommittee (18 years).
- Consultant for AEP Resources, including analysis of specifications for 500 kV transformers and shunt reactors, and determining failure cause of 138 kV voltage transformers.

August 1968 through April 1982 (WEC)

Design/Senior development engineer at the Large Power Transformer Division at Muncie, IN.

Responsibilities included:

- Principal investigator on DOE contracts to investigate feasibility, dielectric and magnetic aspects of 1200 kV SF₆ shunt reactor.
- Project engineer for several development projects involving transformer insulation.
- Transfer of electrical bushings rated 115 through 1100 kV to Muncie plant from Sharon, PA plant. This involved writing the original specifications and updating procedures for manufacturing, testing and shipping such bushings.
- Design, development, application and value analysis on bushings. Specific projects included new lines of bushings to interface between transformers and compressed SF₆ gas-insulated systems, and bushings using aluminum parts.
- Procurement, testing and evaluation of several materials, resulting in a working knowledge of dielectric, thermal and mechanical properties of transformer oil, oil-impregnated paper, porcelain, epoxy, air, compressed gasses, copper, aluminum and sealing materials.

June 1965 through July 1968 (WEC)

Design/development engineer at the Medium Power Transformer Division at Sharon, PA. Experience included:

- Development of various aspects of power transformers, including optimizing of core steel thickness, temperature controls, windings for different applications and through-fault strength of windings.
- Design of core-form regulation autotransformers.

PROFESSIONAL ACTIVITIES AND OTHER ACHIEVEMENTS

- Fellow Member, IEEE PES, DEIS and IAS.
- Member, IEEE Transformers Committee and several subcommittees, working groups and task forces, including past chair of the Dielectric Test Subcommittee (1995 thru 2012) and past chair of Bushing Subcommittee (1983 thru 1994).
- Past member of High Voltage Test Techniques Subcommittee and Standards Coordinating Committee 4, dealing with thermal capabilities and testing methods of electrical insulation
- Eight U.S. Patents and 15 technical publications, including chapters on electrical bushings in two industry books.
- IEEE PES Transformers Committee Prize Paper Award, 1996 and 2000.
- IEEE PES Prize Paper Award, 2000.
- South Dakota State University Distinguished Engineer, 2006
- IEEE PES/Transformers Committee Distinguished Service Award, 2013

EDUCATION

BSEE, South Dakota State University, 1965.

MSEE, Akron State University, 1968.

MS Math, Ball State University, 1973.

Various AEP and Westinghouse courses, including several on the use of the computer, national safety code, station safety, and the Westinghouse Design and Project Management Schools.