



**Cavote Inc. DBA
David N. French Metallurgists**

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CURRICULUM VITAE OF David French

EDUCATION:

B.S. Metallurgy, Mass. Inst. of Technology, 1958

M.S. Metallurgy, Mass. Inst. of Technology, 1959

Sc.D. Metallurgy, Mass. Inst. of Technology, 1962

BOILER RELATED EXPERIENCE:

2002-2012: Member of the Board of Directors, United Dynamics *Advanced Technologies* Corporation (UDC)

1984-2002: Founder, David N. French Metallurgists; a metallurgical consultancy providing failure analysis, material-condition studies, metallurgical consultation, and conducting seminars on metallurgical failure in boilers.

1998-Present: Member of the Board of Directors, MMR Group, Inc.

1983-1984: Douglas G. Peterson & Associates, Greenfield, MA, Metallurgist

1982-1983: Leighton Industries, Inc., Phoenixville, PA, Vice-President, Quality Assurance.

1973-1982: Riley Stoker Corporation, Worcester, MA, Director, Corporate Quality Assurance. More than 10 years as Chief Metallurgist/Quality Assurance head for a major boiler manufacturer (Riley Stoker Corp. now DB Riley) and a pressure-parts manufacturer (Leighton Industries, Inc.) responsibilities included overall management of the corporate quality-assurance function, materials selection for all alloys not governed by the ASME B&PV Code, metallurgical control of: welding fabrication, heat treatment, and the metallurgy laboratory for failure analysis of boiler components. Expert in fuel-ash corrosion, welding, high-temperature oxidation and corrosion, creep and stress-rupture failure. Knowledgeable in boiler operation, boiler design, materials selection, casting and foundry techniques. Particular expertise in failure analysis.

1972-1973: P.R. Mallory Co., Burlington, MA, Member of Technical Staff. Engaged in fundamental research on cemented carbides.

1968-1972: Abex Corporation, Mahwah, NJ, Physical Metallurgist. Research studies on friction alloys for railroad brake shoes, composite materials and castings, and foundry technology.

1963-1968: Ingersoll-Rand Co., Princeton, NJ, Member of the Technical Staff. Basic research on cemented carbides, powder-metallurgy processing, X-ray stress analysis, and heat treatment of high-strength steels.

1962-1963: Linde Division, Union Carbide Co., Indianapolis, IN, Research Metallurgist. Research on welding and heat transfer in magnetically guided arc plasmas.

LECTURER:

Boiler-Related Metallurgy: Teaches a course entitled Metallurgical Failures in Boilers, sponsored by the ASME and available through his company also; has lectured at the University of Alabama; Lehigh University; Lafayette College; Ohio Wesleyan University; M.I.T; the Florida Municipal Utilities Assoc. technical meetings; Birmingham, AL chapter of NACE Intl.; Virginia Electric & Power Co. training session; U. of Illinois, 7th Annual Electric Utility Workshop; APPA Engineering and Operations Workshop; EPRI Conference on Boiler Tube Failures in Power Plants, and training seminars upon request for utilities and manufacturers. Power Plant Symposia for Halliburton, GE, Drew Chemical Co., and Southern Co. Services among others.

PROFESSIONAL ACTIVITIES:

1980-2000: Member of Section I Sub-committee of the ASME B & PV Code Committee, its two Sub-Groups on Materials, and on Fabrication and Examination; and ASME Post-Construction Main Committee. Member of an industry-wide Task Group on dissimilar Metal Welds, sponsored by the ASME, ASTM, and MPC, and the Steam Power Panel, 1978-83.

MEMBERSHIPS:

ASME International
ASM International
American Institute of Metallurgical Engineers
NACE International

PUBLICATIONS:

The books, Metallurgical Failures in Fossil Fired Boilers, John Wiley & Sons, Inc., Publishers, NY, NY, 1983, and Metallurgical Failures in Fossil Fired Boilers, 2nd Edition, John Wiley & Sons, Inc., Publishers, NY, NY, 1993.

1. Adams, C.M., Jr., D.N. French, W.D. Kingery, "Solidification of Sea Ice", Journal of Glaciology, Vol. 3, 28, p. 745-760, 1960.
2. Kingery, W.D., and D.N. French, "Field Solidification ;and Desalination of Sea Ice", Ice and Snow, W.D. Kingery, ed., MIT Press, 1963.

3. Adams, C.M., Jr., D.N. French, W.D. Kingery, "Stress-Rupture Behavior of Sea Ice", Journal of Glaciology, 1963.
4. French, D.N. and D.A. Thomas, "Hardness Anisotropy and Slip in WC Crystals", Trans. Met. Soc. AIME, Vol. 233, p. 950-952, 1965.
5. French, D.N. and D.A. Thomas, "The Nature and Effects of Excess Carbon Defects in Tungsten Carbide-Cobalt Alloys on Mechanical Properties", International Journal of Powder Metallurgy, Vol. 3, No. 3, p. 7-14, 1967.
6. French, DN. and D.A. Thomas, "Crystallographic Polarity of WC", International Symposium on Anisotropy of Single Crystal Refractory Compounds, F.W. Vahldiek and J. Mersol, eds., Plenum Press, 1968.
7. French, D.N., "Deformation of WC and Co Alloys", International Journal of Power Metallurgy, Vol. 4, No. 3, p. 55-61, 1968.
8. Rohatqi, P.K., S.M. Jain, D.N. French, C.M. Adams, Jr., "Effect of Solute Concentration and diffusivity on Dendritic Solidification of Dilute Binary Aqueous Solutions", Trans. Met. Soc. AIME, Vol. 245, P. 267-273, 1969.
9. French, D.N. and C.M. Adams, Jr. "Heat Transfer Coefficients and Thermal Conductivity of Cold Liquids", International Journal of Heat and Mass Transfer, Vol. 12, p. 439-443, 1969.
10. French, D.N., "X-Ray Stress Analysis of Tungsten Carbide-Cobalt Cermets, Part I Procedures", Journal of American Ceramic Society, Vol. 52, No. 5, p. 267-271, 1969.
11. French, D.N., "X-Ray Stress analysis of Tungsten Carbide-Cobalt Cermets, Part II Temperature Stresses", Journal of American Ceramic Society, Vol. 52, No. 5, p. 271-275, 1969.
12. French, D.N., "The Microstructure and Microproperties of WC-Co Alloys", International Journal of Powder Metallurgy, Vol. 5, No. 3, p. 47-60, 1969.
13. French, D.N. and B.A. MacDonald, "Experimental Methods of X-Ray Stress Analysis", Experimental Mechanics, Vol. 9, No. 10, p. 456-462, 1969.
14. French, D.N., "Residual Stresses and Cracking in WC-Co Alloys, Trans. Met. Soc. AIME, Vol. 245, p. 2351-2352, 1969.

15. French, D.N., "Ash Corrosion Under Reducing Conditions", presented to National Association of Corrosion Engineers, Corrosion '80, Chicago, IL, March 3-7, 1980.
16. French, D.N., "Welding Austenitic Stainless Steel (321H) to Ferritic Steel (T22) – 15 Years of Successful Service", presented at the ASM Conference "The Solution to Material Problems in Power Plants", Philadelphia, PA, Dec. 2, 1980.
17. French, D.N., "High Nickel Joints Unite Dissimilar Steels, Welding Design & Fabrication, May, 1981.
18. French, D.N., "Corrosion of Superheaters and Reheaters in Fossil Fired Boilers", Environmental Degradation of Engineering Materials in Aggressive Environments, M.R. Loutham, Jr., R.P. McNitt, and R.C. Sisson, Jr., eds., Virginia Polytechnic Institute, 1981.
19. French, D.N., "Microstructural Degradation in Boiler Steels", Environmental Degradation of Engineering Materials in Aggressive Environments, M.R. Loutham, Jr., R.P. McNitt, and R.C. Sisson, Jr., eds., Virginia Polytechnic Institute, 1981.
20. French, D.N., "Furnace Wall Corrosion Problems in Coal-Fired Boilers", presented to National Association of Corrosion Engineers, Corrosion '82, Houston, TX, March 22-26, 1982.
21. French, D.N. and C.W. Arcari, "Thermal Considerations in Boiler Tube Failures", presented at the 1982 Joint Power Generation Conference, Denver, CO, October 17-21, 1982.
22. French, D.N., "Liquid Ash Corrosion Problems in Fossil Fired Boilers", published in Corrosion in Fossil Fuel Systems, G. Wright, ed., Electrochemical Society, Pennington, NJ, 1983.
23. Alice, J.A., J.A. Janiezewski, D.N. French, "Liquid Ash Corrosion Remaining Life Estimation and Superheater/Reheater Replacement Strategy in Coal Fired Boilers", Joint Power Generation Conference, Milwaukee, WI, Oct. 20-24, 1985.
24. French, D.N., "A View from the Penthouse: Useful Information for the World of Boilers", a quarterly newsletter, published since the spring of 1984 by David N. French, Inc., Metallurgists, Northborough, MA.
25. Revised chapter: "Failures of Boilers and Related Equipment" in ASM Metals Handbook, 9th Edition, Vol. 11, Failure Analysis and Prevention, 1986.

26. French, D.N. "Material Condition Assessment – Superheater and Reheater", EPRI Conference on Boiler Tube Failures in Fossil Plants, Atlanta, GA, Nov. 1987.
27. French, D.N., "Circumferential Cracking and Thermal Fatigue in Fossil Fired Boilers", Presented to NACE, Corrosion '88, St. Louis, MO, Mar. 21-25, 1988.
28. French, D.N., "Water Wall Corrosion in RDF Fired Boilers", Conference on Fireside Problems While Incinerating Municipal and Industrial Solid Waste, Engineering Foundation, sponsor, Palm Coast, FL, Oct. 1989.
29. French, D.N., "Waterwall Tube Blistering in Industrial Boilers", presented to NACE, Corrosion '90, Las Vegas, NV, Apr. 23-27, 1990.
30. Series of articles , "The Metallurgy of Power Boilers", in 8 parts for the Bulletin of National Board of Boiler and Pressure Vessel Inspectors, beginning in October 1990.
31. French, D.N. and S.M. French, "Improvement of Superheater Life Through Chemical Cleaning", Presented in NACE, Corrosion '91, Cincinnati, OH, Mar. 11-15, 1991.
32. French, D.N., "Creep Failures in Waterwall Tubes in Utility Boilers", presented to International Conference on Boiler Tube Failures in Fossil Plants, EPRI Conference, San Diego, CA, Nov. 5-7, 1991.
33. Abbott, R., D.N. French, and T. Sherlock, "Effects of Coal Chemistry on the Behavior of Dissimilar Metal Welds", presented at 9th annual Intl. Pittsburgh Coal Conference, Oct. 12-16, 1992.
34. French, D.N., "Carburization Corrosion in Stainless Steel Superheater Tubes", presented at ASM International Conference, Chicago, IL, Nov. 2, 1992.
35. French, D.N., and French, S.M., "Hydrogen Damage Revisited", presented to NACE, Corrosion '95, Orlando FL, March 27-31, 1995.
36. French, D.N., "Carburization Corrosion in Superheaters and Reheaters", presented to EPRI International Conference on Boiler Tube Failures in Fossil Plants, Nashville, TN, Nov. 11-13, 1997.
37. French, D.N., "Observations on the Graphitization of Carbon and Carbon-Molybdenum Steels", EPRI International Conference on Boiler Tube Failures and HRSG Tube Failures, and Inspections, Phoenix, AZ, Nov. 6-8, 2001

38. French, D.N., "Old Superheaters and Modern Metallurgy", EPRI International Conference on Boiler Tube Failures, Louisville, KY, Oct. 16-18, 2006

LECTURES

1977 "Metallurgical Failures in Boilers"

University of Alabama
Sargent & Lundy, Consulting Engineers

"Metallurgical Problems in Fossil Fired Boilers"

University of Alabama

"Corrosion Failures in Power Boilers"

Iowa Electric Co.

"Metallurgical Failures in boilers"

E.I. DuPont de Nemours & Co.
Sargent and Lundy, Consulting Engineers

1980 "Microstructural Degradation in Boiler Steels"

University of Alabama

"How to Avoid Problems in Superheaters and Reheater"

Florida Municipal Utilities Association

"Welding Austenitic Stainless Steel (321H) to Ferritic Steel (t-22) – 15 Years of Successful Service"

ASM Conference

1981 "Corrosion of Superheaters and Reheaters"

Birmingham Section of NACE
University of Alabama

"Corrosion in coal Fired Boilers"

Florida Municipal Utilities Association

1982 "Material Considerations in Boiler Design"

Association of Edison Illuminating Companies – Technical Meeting

"How to Avoid Problems in Superheaters and Reheaters"

Halliburton sponsored seminar

"High Temperature Corrosion and Metal Wastage in Coal fired Boilers"

University of Alabama

- 1983 “Microstructural Changes in Ferritic Steels Used in Boilers”
Lehigh University
- 1985 “Combustion of Coal”
Ohio Wesleyan University
- “Corrosion of Superheaters and Reheater”
Halliburton sponsored seminar
Lehigh University
- “Boiler Tube Failures”
Southeast Electric Exchange Technical Meeting
- “Materials Condition Assessment for Older Steam Generators”
Florida Municipal Utilities Association
- 1986 “Metallurgical Consulting”
Lafayette College
Lehigh University
- 1987 “Boiler Tube Failures, Past, Present and Future”
APPA, Engineering and Operations Workshop, Nashville, TN
U. of Illinois, Champaign/Urbana, Electric Utility Workshop
- 1992 “Metallurgical Problems in Refuse Fired Boilers”
ASM International, Worcester Chapter, Dec. meeting
- 1997 “High Temperature Problems in Carbon Steels”
Student Metallurgical Society at MIT, Cambridge, MA
- 2002 43rd FOMIS Conference, Orlando, FL “Boiler Tube Metallurgy and Corrosion Control”

SEMINAR: “WELDING & ASME CODE”

- 1984 GE, Schenectady, NY (twice)
- 1985 GE, Schenectady, NY (three times)
Pennsylvania Power & Light, Harrisburg, PA
- 1986 GE, Schenectady, NY
- 1987 GE, Schenectady, NY (twice)
- 1988 GE, Schenectady, NY
- 1989 Pacific Power & Light, Dave Johnston Plant, Glenrock, WY
Pacific Power & Light, Jim Bridger Plant, Point of Rocks, WY

SEMINAR: “METALLURGICAL FAILURES IN BOILERS” (2 days) is for sale, sponsored by ASME International or David N. French Metallurgists

- 1983 Atlanta, GA --- ASME
VEPCO, Richmond, VA
- 1984 Knoxville, TN --- ASME
TUGCO (TU Electric) Dallas, TX
Toronto, Ontario --- ASME
NEESA, Port Hueneme, CA
Detroit Edison (2 times) Detroit, MI
- 1985 Chicago, IL --- ASME
- 1985 PP&L, Harrisburg, PA
SC E&G Co., Columbia, SC
Houston, TX --- ASME
GSU, Beaumont, TX (2 times)
- 1986 Riley Stoker Corp, Worcester, MA
NYSEG, Binghamton, NY
Philadelphia, PA --- ASME
Commonwealth Electric, Wareham, MA
Santee Cooper, Moncks Corner, SC
Consolidated Edison of NY, NY, NY
Carolina Power & Light, Raleigh, NC
- 1987 Consolidated Edison of NY, NY, NY
New England Power co., Westborough, MA
- 1988 Pacific Power & Light, Dave Johnston Plant
PA Power & Light, Sunbury Station, PA
Berkeley, CA --- ASME
- 1989 St. Louis, MO --- ASME
Syncrude Canada, Ft. McMurray, Alberta, Canada
Pacific Power & Light, Jim Bridger Plant (twice)
New England Power, Westborough, MA
- 1990 Riley Consolidated, Worcester, MA
Boston, MA --- ASME
New England Power Co., Westborough, MA
New England Power co., Salem Harbor (3 times)
- 1991 Zurn Industries, Erie, PA
Consolidated Edison of NY, NY
Chicago, IL --- ASME
Richmond, VA --- ASME
Southern California Edison, 2 locations, --- ASME

- 1992 Phoenix, AZ --- ASME
- 1993 Southern California Edison, 2 locations, --- ASME
- 1994 PacifiCorp, Huntington, Utah
- 1997 New England Power Co., Westborough, MA
- 1999 Doswell Limited Partnership, Ashland, VA
- 2001 PP&L Montana, Colstrip, MT
Ondeo-Nalco, Naperville, IL
- 2002 UDC Training Seminar
Key West, FL (Dec.)
- 2003 Drew Chemical Company
Beulah, ND (Mar.)
Southern Company Engineers Training Seminar
Pensacola, FL (Sept.)
Wheelabrator Seminar – “Corrosion in Refuse Fired Boilers”
Baltimore, MD (Oct.)
UDC Training Seminar
Key West, FL (Dec.)
- 2004 UDC Training Seminar
Louisville, KY (Apr.)
UDC Training Seminar
Phoenix, AZ (Sept.)
- 2005 UDC Training Seminar
Louisville, KY (Jun.)
UDC Training Seminar
Phoenix, AZ (Sept)
- 2006 UDC Training Seminar
Key West, FL (Jan.)
UDC Training Seminar
Louisville, KY (May)
UDC sponsored by Kansas City Power & Light Engineers Seminar
Kansas City, MO (Aug.)
UDC Training Seminar
Scottsdale, AZ (Sept.)
- 2007 UDC Training Seminar

Alexandria, VA (Jul.)

2008 UDC Training Seminar
Key West, FL (Jan.)
UDC Training Seminar
Louisville, KY (Jun.)
UDC Training Seminar
Lena, LA. (Aug.)
UDC Training Seminar
Alexandria, VA.
UDC Training Seminar/Pennsylvania Power & Light
Danville, PA.

2009 UDC Training Seminar
Key West, FL (Jan.)
UDC Training Seminar
Snow bird, Utah (Feb.-March)

2010 UDC Training Seminar
Key West, FL (Jan.)

2011 UDC Training Seminar
Key West, FL (Jan.)

2012 UDC Training Seminar
Key West, FL (Jan.)

2019 UDC Training Seminar
Shepherdsville, KY (June 2019)

SEMINAR: "BOILER TUBE FAILURES"

1987 City Utilities of Springfield, Springfield, IL (4 separate occasions)

1988 Drew Chemical Company
Southwest Texas Public Utilities

LITIGATION SERVICES

1. Burlington (Vt) Electric and Zurn Industries. Deposition, date and docket number unknown
2. Injured party vs. a propane tank manufacturer, New Haven District Court, (plaintiff injured when a propane tank exploded as a result of a faulty safety valve.) Deposition/Testimony date and docket number unknown.
3. Hartford Steam Boiler and Inspection Co. vs. employees of Coffeyville KS, Municipal Utilities, killed as a result of a boiler explosion. Deposition, Kansas, date and docket number unknown.
4. City of Henderson, KY, vs. insurance co. Trial testimony and deposition in Federal District Court in Kentucky. Date and docket number unknown (70's while at Riley Stoker Corp.) Case was against an insurance company for damage as a result of a low-water upset.
5. New Energy Co. of Indiana vs. ? Deposition in Worcester MA. Date and docket numbers unknown.
6. Leighton Industries, Inc. vs. an insurance co., Kentucky District Federal Court, (suit by Leighton against a pipe supplier for wrong material) date and docket numbers unknown. Both deposition and trial testimony.
7. BHP Hawaii vs. Century Insurance Co., et al, Deposition/Testimony AAA Arbitration hearing, Chicago, IL, March 28, 1995 forward
8. BHP Hawaii vs. Century Insurance Co., et al, Deposition/Testimony US District Court Hawaii
Case No. 95-00497 DAE
Honolulu, HI, Sept-Oct. '97
9. Cogen Technologies vs. Ebasco, Deposition/Testimony AAA Case 13.110 00756 96
Washington DC, Oct & Dec. '98
10. Shawmut Woodworking & Supply et al vs. Maurer & Sforza, Inc., et al Middlesex Middlesex Superior Court, Cambridge MA, CA No. 96-05162J
Deposition, Jan. '98

11. General Electric Co. vs. Henry Vogt Machine Co., Deposition/Testimony
AAA Case 13 181 01035 98
Newark NJ, Sept & Nov. '99
12. Bunker Hill Insurance Co. vs. John & Maryann Dempsey
Bristol County Court, Taunton MA, Mar. '99
13. International Chamber of Commerce
Arbitration Case 10091/FMS between Aalborg Keystone Inc (AKI) & Kolon
Engineering, Inc., Singapore, July 10, 2000
14. Domtar vs. Combustion Engineering. Dec 99, May 2002, June 2002. Docket
number unknown. Montreal, Quebec. Retained by the law firm of Ogilvy
Renault.
15. Global Power Equipment Group, Inc., et al. Case No. 06-11045(BLS) US
Bankruptcy Court – District of Delaware December 2007, Deposition and
testimony.
16. ADM vs ECO et al. Case No. 3:10-cv-00052 US District Court for the Southern
District of Iowa, May 5, 2011, Deposition.
17. AESWR v. NBS: Consulting Services, litigation services, 2009- March, 2011,
Docket and date not known.
18. Trans Alta Generation Partnership v. Trans Canada Energy Ltd. & Balancing
Pool. Boiler Tube Corrosion Fatigue. Canada, July 2012. Docket and date
unknown. Litigation.
19. McCarter & English, LLP., Associated Electric Gas Insurance Services, et al vs.
Babcock & Wilcox Power Generation Group, Inc. Docket No. 3:11-CV-00715-
JCH – 2014.
20. Kvaerner North American Construction Inc. and Siemens Energy, Inc. against
Longview Power, LLC and Foster Wheeler, AAA Case #50 158 00411 11
(Arbitration) –2015.
21. Leprino Foods Company v. DCI, INC., Case no. 13-CV-02430-RM-KMT; 2014-
2015.
22. Pacific Ethanol Inc vs. Indeck Power Equipment Company, Circuit Court of Cook
County, Illinois County Department, Law Division Case #2015-L-6405, 2016-
present