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EDUCATION

B.S., Metallurgy and Materials Science Engineering Lehigh University, Bethlehem, PA

Brad Wolf is a registered mechanical engineer (PE) with over forty years of project and construction experience as an owner, supplier, and contractor in the specifications, estimates, design, construction, and operation of complex infrastructure and heavy industrial facilities. He has developed and executed projects internationally in both the municipal and private sectors and has hands-on design and construction experience in many industries, including power generation, mining, metals, chemical/oil/gas, and water and wastewater. He is familiar with the processes, equipment, standards, contract terms, cost systems, and typical roles, responsibilities, and expectations of participants employed on industrial construction projects. At a previous firm, he was responsible for the development, design, and construction of several design/build/operate (DBO) and public-private partnership (PPP) projects.

As an expert witness, Mr. Wolf has written numerous expert reports that have helped lead to successful settlements, as well as testified in front of juries, judges, and international arbitration courts regarding construction-related issues such as engineering, procurement, and construction (EPC) and owner standard of care, estimating and engineering issues, defective design, productivity claims, hazard and operability studies (HAZOP), commissioning, quality assurance (QA) deviations, Occupational Safety and Health Administration (OSHA) issues, schedule analysis, and damages. He has also testified on commercial transactions in the iron and steel industry. In a consulting role, he has worked with owners to improve project delivery systems and manage estimating risk. He supports bankruptcy practices to review and value industrial facilities and plants under construction.

Mr. Wolf has served as an arbitrator and as a neutral to help parties reach settlements and finalize business decisions. He has taught seminars on the iron and steel industry and effective project implementation (development, management, and controls). He was the general chairman of and continues to serve on an International Water Conference focused on power generation and industrial water treatment. Earlier in his career, he was on the Construction Industry Institute (CII) Advisory Board and on multiple engineering society boards. He has authored several papers in his career.

Mr. Wolf is recognized as a construction professional by Who's Who Legal: Arbitration Expert Witnesses. WWL's independent research process selects the most highly ranked practitioners globally for their work providing written and oral testimony in contentious proceedings. The guide includes the following quotes from their research: "delivers a well-written report and gets the work done on time," is able "to communicate clearly and give convincing testimony," stands out "for his attention to detail, technical expertise and commercial acumen," and impresses with "his performance under cross-examination."

REPRESENTATIVE OIL & GAS RELATED ENGAGEMENTS

- Testifying Expert on the piping design & fabrication processes for a Canadian Bio Fuels facility.
- Retained Expert for Standard of Care, engineering defects and damages associated with gas turbine compressors in a Canadian manufacturing facility.
- Testifying Technical Expert for a Clean Fuel upgrade/expansion on a Middle Eastern refinery.
- Retained Expert to develop progress and value of an interrupted Hydrogen merchant supply facility.
- Testifying Expert on PMC & QA Standard of Care on two South American refinery projects.
- Quantum, productivity, technical and schedule expert analysis for a series of South American FPSO units where the final design significantly varied from FEED estimates.
- Quantum, productivity, and schedule analysis to support equitable change order development on a Mideast refinery expansion project with significant variations from FEED information and estimates.
- Retained Technical Expert on a South American FPSO dispute over system performance.
- Testifying expert in London arbitration on reasonable Capital Cost (CAPEX) and Operating Cost (OPEX) for a Nigerian NGL storage, separation and processing facility.
- Testifying Expert for Delay, Quantum, Productivity, Defects, Design Standard of Care, weld failures and other labor impacts for multiple mid-stream cryogenic gas storage and processing plants that included deethanizing and fractionating natural gas. (WVA, CO, TX, PA & OH)
- Testifying Expert on Project Management Standard of Care, EPC staffing requirements and allocation for change orders on an Australian LNG plant project.
- Retained Expert for analysis of the commissioning for a gulf coast USA LNG plant project.
- Testifying Expert on Standard of Care for contractors when installing Owner supplied equipment such as control valves with the incorrect materials of construction.
- Retained Schedule, Productivity and Damage expert for international EPC contractors on multiple international natural gas, fertilizer, petro & chemical process plant projects (CA, SA, MENA, India).
- Schedule analysis and support for an international EPC firm on a Nigerian Gas to Liquids facility to support subcontractor incentive awards.
- Testifying expert on Standard of care, standards, regulations and reasonable expectations of contractors and OSHA regulations after an explosion impacted US refinery turnaround project.
- Testifying expert on the Design Standard of Care concerning a refinery's OSHA citation allegations.
- Retained Expert for Standard of Care, Productivity Claims and Schedule analyses on multiple mid-stream pipelines and compressor stations for natural gas in OH, PA and WVA.
- Standard of Care analysis on a Procurement Contract concerning the Manufacture and supply of a Vertical Carousel System for the Umbilicals serving a subsea oil exploration production unit.
- Testifying Standard of Care and Quantum Expert on the reasonable owner setoffs for defective welding repairs on a large ethylene cracker project in the USA Gulf Coast.
- Retained Expert for Standard of Care for a tank cleaning subcontractor concerning a flash fire during a turnaround in a USA gulf coast chemical plant.
- Testifying Expert on the reasonableness of Expert fees on a tank car failure and chlorine spill.

REPRESENTATIVE MINING ENGAGEMENTS

- Testifying Expert (Process, Design & Capabilities) for an international arbitration concerning a new iron ore mine, railroad and port complex in Australia.
- Testifying Expert in an international arbitration dispute over the completion a new USA iron ore processing facility for an international iron mining and steel company.
- Expert Analysis on Standard of Care and technical issues on multiple arbitrations concerning coal supply contracts between mine owners and their customers.
- Technical and quantum analysis for a coal mining equipment failure in a USA project.
- Testifying expert for an international contractor in a USA arbitration concerning performance testing on a coal mining water runoff treatment facility in a North American location.
- Testifying Expert for EPC Standard of Care and design in a chromium smelting facility in Kazakhstan.
- Testifying Expert (Engineering & Construction) for a treatment facility at a molybdenum mine
- Consulting Expert on a Uranium mine expansion project in Canada and a Tungsten mine in the UK
- Project controls and governance assistance for the recovery efforts and re-base line of a multibillion troubled mine expansion project in Canada.
- Advisory assistance, schedule and cost analysis for an EPC contractor to develop opinions on validity of performance incentives for an iron ore mining expansion project in Canada.

REPRESENTATIVE METALS ENGAGEMENTS

- Standard of Care and Quantum Testifying Expert on the catastrophic failure of a Process Gas Heater for a large natural gas fired iron ore processing plant in international arbitration.
- Oversight on site services for Arbitration Support, Claim Management and Risk Management for a new 5 MTPY green field integrated steel plant in Brazil. Testified in Rio arbitration.
- Testifying expert in a commercial dispute between an international steelmaker and electrode supplier.
- Retained Expert on steel mill practices for a superfund environmental cleanup program.
- Business interruption claim analysis for an integrated steel mill in Michigan.
- Testifying expert in a commercial dispute between a Chinese steel purchaser and Turkish steel mill.
- Testifying expert in a commercial dispute between a pipeline and Canadian steel manufacturer.
- Project Risk Management and oversight for a new 5 MTPY USA Strip Rolling Mill and Multiple Process Lines. Developed internal contracts to share services. Oversight Performance tests.
- Testifying expert for Technical and Standard of Care on new USA Seamless Pipe Mill Project.
- Retained expert for Quantum and Technical on the termination of a slag / scrap processor contract.
- Testifying expert in a new USA electric furnace steel mill melt shop construction dispute.
- Project Advisory Services and Claim Preparation for the owner of a new polysilicon plant in the USA.
- Damages, Design, and Engineer Standard of Care testifying expert on a zinc electrowinning plant.
- Testifying Expert for Quantum on a USA Carbide facility following termination of EPC contractor.

- Expert analysis of a non-performing Acid Plant Preheater System at a copper smelter in Arizona.

REPRESENTATIVE EQUIPMENT & DESIGN ENGAGEMENTS

- Expert supporting acquiring company over indemnities and warranties stemming from a design dispute relative to industrial motors used in commercially sized HVAC units.
- Expert analysis of HVAC system design enhancements claims at a federal armaments plant.
- Testifying Expert for a design dispute concerning a startup system in a sulfuric acid plant.
- Investigation and failure analysis of a molten glass furnace breakout for a commercial bottler.
- Retained Expert for issues related to a salt handling conveyor installation in Iowa.
- Various design/OSHA/SOC analyses relative to injuries in cases including injection molding machines, machine tools, Digital Readout instruments, emergency stops, filters, hydraulic recycling, bakery ovens, rotating equipment, winches and furnaces.

REPRESENTATIVE CM, EPC & DESIGN BUILD ENGAGEMENTS

- Testifying expert in US Federal Court on quantum and delay concerning the construction of a federal facility to process and purify acids for munitions.
- Standard of Care & scope analysis for a federal munition facility by contract operator.
- Testifying Expert (Damage, Delay and Technical) on a USA cement plant SCR modification project.
- Testifying Expert on technical, completion and Standard of Care for a USA Grain Feed Mill project.
- Retained Expert for design issues related to livestock processing plants in FL & KY.
- Retained Expert for performance and design issues related to a USA pharmaceutical plant.
- Retained Expert for Schedule Analysis and damages for a control system and software on a major signaling upgrade on a rail system of a large urban USA Transportation Authority.
- Testifying Expert on Project Management and Design Standard of Care on a WV Airport.
- Testifying Expert on electrical productivity impact and GC Standard of Care on FL retirement homes.

REPRESENTATIVE POWER ENGAGEMENTS

- Retained Expert for Standard of Care, construction defects and damages associated with gas generators in a series of South American power plants.
- Testifying Expert for design and division of work technical issues on a Middle Eastern power plant in international arbitration.
- Retained Expert for technical analysis of issues associated with a series of South American dams and associated hydroelectric power plants.
- Testifying Expert on industry expectations, roles & responsibilities with EPC contracts in power plants.
- Testifying Expert on QA and Standard of Care on a fuel conversion for a Caribbean power plant.
- Retained Expert to review contractor claims on a 500 MW simple cycle Middle Eastern power plant.
- Productivity Analysis, damage calculations, Force Majeure Insurance Claim development and management for two earthquake-stricken coal fired Power Plants under construction in Chile.
- Schedule, Damage and Standard of Care for a power plant's zero liquid discharge (ZLD) facility.

REPRESENTATIVE WATER TREATMENT RELATED ENGAGEMENTS

- Testifying Expert on Standard of Care for Performance Testing of a design build treatment project.
- Testifying Expert for design and division of work technical issues on a Middle Eastern desalination and gas fired power plant project in international arbitration.
- Retained Standard of Care Expert for a chlorine system installation at a TX municipal water plant
- Damages, Process and Design Engineering Standard of Care analysis for a dispute on a corrosion failed Marcellus Shale Gas centralized Frac Water Treatment complex.
- Expert Testimony and analysis for technical, schedule analysis and damages on multiple separate Water & Waste Water Treatment disputes (including CA, CT, MI, NE, TX, PA & WVA).
- Consulting Expert on performance, operations and design on numerous water treatment plant projects including large municipal sanitary wastewater facilities producing Biosolids product.
- Consultant on performance, operations and design on water treatment power plant projects including multiple large municipal sanitary wastewater cogen facilities producing Biosolids product.
- Technical/Business Consultant for Korean, Japanese, Finnish, German, French & British firms.

REPRESENTATIVE NEUTRAL ENGAGEMENTS

- Project Neutral retained to analyze assets at a municipal WWT facility and develop options to improve plant operations and financial performance of a Cogeneration / Biosolids Drying Facility.
- Arbitrator mutually selected by the Parties for a dispute between the general contractor and the engineer on a PA coal fired power plant groundwater collection and treatment project.
- Neutral expert retained by Unsecured Creditors to perform project and completion due diligence to support selling a partially completed natural gas fueled plastics facility.
- Process technology and equipment neutral expert to perform technical due diligence of a closed biodiesel production refinery facility by a financial investor as part of potential acquisition.
- Due Diligence Neutral for capital plant and equipment technical support for natural gas pipeline and processing asset commercial transaction.

REPRESENTATIVE MANAGEMENT CONSULTING ENGAGEMENTS

- **Chemical Manufacturer (Calgary, Canada):** Project organization, contracting strategy and negotiation support for Ammonia & Urea production facility projects over 3 sites in North America.
- **Stainless Steel Manufacturer (Reading, Pennsylvania):** Management consulting services in relation to the development of capital project development procedures for new facilities.
- **Steel Manufacturer (Harrisburg, Pennsylvania):** Project post mortem, risk analysis and procedural recommendations for Owner financed capital projects and service contract renewals.
- **Mining Company (Cleveland, Ohio):** Management consulting services for the development, definition and risk management for an iron nugget business/project utilizing new technology.
- **Steel Manufacturer (Mobile, Alabama):** Consulting services for oversight of construction and development of an internal contract to segregate comingled utility services between operating entities in divestiture.
- **Construction Company (Indianapolis, Indiana):** Advisory Services on establishing a new business venture to supply and install equipment in the ethanol market.

RELEVANT PROFESSIONAL EXPERIENCE

Berkeley Research Group, Managing Director – Dispute Experience

Mr. Wolf has been engaged by both the Owners and Contractors for various roles on several large disputes including LNG projects in Australia, Saudi Power Plant, NGL projects in Africa, multiple international Oil Refineries and fertilizer projects; Steel plants and Iron Ore mines worldwide; Metallurgical plants in the USA and Kazakhstan and South American FPSO vessels.

Veolia Water (formerly US Filter), Vice President – Capital Program Management

Mr. Wolf was responsible for all aspects of Design/Build/Operate (DBO) Projects from inception through to steady state operations. Projects ranged from \$5 to \$50 million in capital and typically had operation durations of 10 to 20 years. The projects included several in the Metals, Process and Power industries.

Wheelabrator APC, Executive Vice President

Responsibility for all design, engineering, project management, construction and purchasing activities of a business supplying equipment for air pollution control to Utilities, Metals and Process Industries.

Primary Energy, Director of Engineering and Construction

Mr. Wolf had the oversight responsibility supervising the owner's project management teams for construction and commissioning of cogeneration power plants using gas fired combined cycle technology located at industrial facilities in the Midwest. The plants were built under lump sum EPC agreements with a large US engineer constructor. Responsibilities included progress monitoring, change order negotiations, commissioning and performance guarantee evaluation.

LTV STEEL, General Manager of Engineering

Mr. Wolf led a 100+ person Engineering Division which managed 450 active projects ranging from green field plants, process refurbishment, infrastructure, mobile equipment, and IT upgrades for a \$5 billion steel and mining business with multiple facilities. He was responsible for the company's capital spending and supervised project definition, environmental permitting, contracting and construction.

KVAERNER (formerly Davy/Dravo/John Brown), Various Positions

Mr. Wolf had increasing responsibility in projects, sales, purchasing, engineering, construction, training, startup and executive management in this international engineering & construction (EPC) firm. He led the international oven and furnace business and also oversaw all commercial activity for a billion dollars per year international engineering and construction business performing capital and maintenance work for the process, mining and metals industries. He led international contract negotiations and sales efforts for projects in Venezuela, Chile, Mexico, Saudi Arabia, Egypt, India, Indonesia and Australia.

Lukens Steel Company

As an entry level front line supervisor in the melting department, he gained manufacturing insight to union relations and steelmaking operations, including an EAF startup and DRI steel making.

PROFESSIONAL CERTIFICATIONS / AFFILIATIONS / PUBLICATIONS

- Professional Engineer: Mechanical; Pennsylvania, Wyoming
- OSHA Construction Safety & Health
- International Water Conference; General Chairman 2004-2006; Exec Committee 2002-present
- American Society of Safety Engineers; Professional Member 2016 - present
- Engineer Society of Western PA; Board of Directors 2001-2010
- Cleveland Engineers Society; Board of Directors/President Elect 1997-2000
- Construction Industry Institute; Board of Advisors, Research Committee 1998-2001
- American Iron and Steel Institute; Board of Directors, Capital Effectiveness and Supplier Committees 1991- present
- Association of Iron and Steel Technology, Foundation Trustee, Life Member 1980-present
- Industrial Heating Equipment Association; Board of Directors 1993-1996
- US Coast Guard Advisory Panel on Hazardous Cargoes 1982-1987

Mr. Wolf has published papers on projects and technologies in various industries, the most recent:

*Project Development and Strategies for Success
Presented at 2013 AACE Annual Meeting in Washington DC, USA*

TESTIMONIAL EXPERIENCE

Parties

Veolia NA Regen Serv. vs Noram E&C#
Gulf Spic vs. Hyundai, Fluor & Daewoo
ArcelorMittel vs. Graftec *
Matrix NAC vs. Pro-Tec Coating Co.#
REP Processing vs. Kahuna Ventures#
Axiall Corp. vs. Rescar Inc. *&#
Whorley Intl. vs. Ecuador *
Enerkem BioFuels vs. E.D.B. Inc.*
RE Yates Electric vs. Schmid Constr. *&#
JSC TNC Kazchrome vs. SMS Group*
Avon Park & Jones vs. Kinder Morgan et al#
Samuel Eng vs. Summit Midstream#
Evraz vs. Midship Pipeline Co. *&#
Altoukhi vs. Samsung Engineering Co.*
Dancar Energy vs. Stateline#
Performance Contractors vs. Sasol#
MarkWest vs. JF Allen (et al) *&#
MarkWest vs. SNC Lavalin#
Town of Plymouth vs. Stantec #
Samsung C&T vs. Duro Felguera *
Brahma vs. Tenaris *&#
CB&I vs. Sinclair #

Case Number

1:2-cv-00912-RGA
ICC Case #26194
ICC Case #25380
3:20-cv-00084
2020CV30323
GD 18-010944
PCA 2019-15
450-17-004996-139
01-21-0004-7296
ICC Case #23296
8:20-cv-01643
2020CV340
01-19-0002-814
DIFC-LCIA #DL18169
15-04-22382-CVR
AAA 01-19-0000-9730
16-C-82
16-10409
1683-CV-00113
ARB 065/16/JJ
AAA 01-17-0003-8875
15-cv-00091

Venue

US Federal Court
Arbitration London
Arbitration London
US Federal Court
Colorado Court
Pennsylvania Court
Arbitration Miami
Canadian Court
Arbitration USA
Arbitration Swiss
Florida Court
Colorado Court
Arbitration USA
Arbitration Dubai
Texas Court
Arbitration USA
West Virginia Court
Pennsylvania Court
Massachusetts Court
Arbitration Singapore
Arbitration USA
US Federal Court

DCK Pacific vs. Hawaii DOT #	16-1-1090-06	Hawaii Court
CWVRAA vs. Triad Engineering #	15-C-1022	West Virginia Court
JKC Australia vs. INPEX *	ICC Case #23826	Arbitration London
ArcelorMittal vs. Essar Steel *	ICC Case #22187	Arbitration USA
HYL Tech vs. Kinetic Tech *	ICC Case #21197	Arbitration Italy
Norwalk WPCA vs. Gilbane #	3:14-cv-00549	US Federal Court
Federal Carbide vs. Exeter Const.*	3:15-cv-248	US Federal Court
Calgon Carbon vs. Atlas Const.*	AAA 01-15-0003-0996	Arbitration USA
Fluor vs. TNT Crane & Rigging #	2015-23268	Texas District Court
Abengoa Bioenergy vs. Frucon #	Unknown	Arbitration USA
Process & Indust Dev. vs. Nigeria *	Claim No 28	Arbitration London
Sinopec USA vs. Habaş Sinai *	19357/EMT	Arbitration Swiss
SNC Lavalin vs. ATK *&#	7:10-cv-00540	US Federal Court
Kranick Enviro vs. HRG Eng.*	13015-2009	Pennsylvania Court
Tesar Const. vs Republic Steel *&#	14CV182694	Ohio Court
Veolia Water vs. Consol *&#	AAA 01-14-0000-3762	Arbitration USA
RG Engineers vs. Vitol *	ICC Case#: 22095	Arbitration USA
Tetra Tech vs. Skanska *&#	AAA 01-16-0004-7876	Arbitration USA
GEA Process vs. BLH I*&#	AAA 01-17-0003-3394	Arbitration USA
Agra Industries vs. Hoover #	AAA 02-17-0003-7433	Arbitration USA
AZR vs. CSD Engineers *&#	Ad Hoc	Arbitration USA
ThyssenKrupp CSA vs. MPE *	17/2009	Arbitration Brazil
British Petroleum vs. OSHA *&#	10-0637	US Federal Court
Kinder Morgan vs. ARGOS #	2009-50242	Texas District Court
Multiplex vs. Boyle & Hildreth #	11-C-53	West Virginia Court

(* - Hearing; # - Deposition; *&# - Both)