

Pettibone Engineering and Consulting

Glen J. Pettibone, P.E., ACTAR

Founder

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Background

Mr. Pettibone has a B.S. degree in Mechanical Engineering and an A.S. degree in Vacuum Technology. He is a certified Traffic Accident Reconstructionist and a registered professional engineer with more than 30 years of diversified experience in the aluminum, automotive, refractories, semiconductor, agriculture, marine, food processing, and forensic consulting industries.

Mr. Pettibone specializes in reconstructing accidents involving industrial equipment, consumer products, motor vehicles (commercial, passenger, industrial, transit, leisure, and marine), agricultural and food processing equipment, and damages to property arising from mechanical, plumbing, and electrical failures. He has evaluated losses involving heating, ventilation, air conditioning, fire sprinkler and suppression systems, elevators, food service equipment, and medical equipment. He has examined failures of natural gas - fired, biomass, solar photovoltaic, solar thermal, and geothermal grid-scale power generation systems. He is practiced at evaluating materials, manufacturing, and design failures. He has completed projects to evaluate the need for and cost of repair, replacement, or reconstruction of equipment.

Mr. Pettibone is adept at breaking down the newest of situations and most esoteric of industrial and mechanical applications into straightforward concepts that can be analyzed to determine the cause and origin of an accident, injury, fire, etc. He is practiced at organizing multi-disciplinary teams, and using the latest technologies to reconstruct the facts. He has provided expert witness testimony in trial and deposition 27 times. He is experienced at designing repairs and/or estimating the costs of repair or replacement.

Prior to consulting, he gained experience in multiple industries: in the aluminum industry with aluminum can production; in the automotive industry, with the automated mass production of cars and trucks; In the refractories industry, with refractory materials, furnaces, and data acquisition; in the semiconductor industry with facilities and cleanrooms wafer fabrication and related safety programs.

Professional Engagements

- Design/Construction - Semiconductor Industry
 - Wafer Fabrication R&D - Livermore, CA (2003), Coordinated design and installation of high-purity gas and toxic/reactive gas delivery, storage, abatement, and detection systems; cryogenic liquid nitrogen bulk storage/delivery system; and ozone generator.
 - Wastewater Facility - Livermore, CA (2003), Designed flocculant system for arsenic-laden wastewater treatment facility.
 - Microchemistry Lab - Livermore, CA (2003), Established dry inert microchemistry lab for physical properties.
 - Atomic Layer Deposition Machine - Livermore, CA (2002), Wrote a comprehensive risk analysis using a NASA/AIAA method for the use of 100% hydrazine in an Atomic Layer Deposition machine for silicon nitride, detailing safety features of an Atomic Layer Deposition machine.
 - Arsenic Abatement Method - Livermore, CA (2002), Invented and patented a method for arsenic gas abatement.
 - Semi-Conductor Facilities - Livermore, CA (2002), Oversaw the design and construction 100,000+ square feet of semi-conductor cleanroom and research and development facilities.
 - Chemical Vapor Abatement Tool - Livermore, CA (2001), Coordinated the specification, design, construction, and commissioning of an abatement tool to treat the exhaust of highly toxic chemical vapor deposition (CVD) processes.
- Process Development/Training
 - Safety and Wellness Program - Livermore, CA (2001), Established comprehensive Injury and Illness Prevention Program for semi-conductor capital equipment manufacturer. Trained all company employees and HAZWOPER responders.
- Design/Construction - Aluminum & Refractories Industries
 - National Refractories and Minerals Corporation - Livermore, CA (1999), Programmed LabView 5.0 applications to calculate heat flow from furnace walls and to acquire data from thermocouples employed in observation of refractory cement exothermic reactions.
 - National Refractories and Minerals Corporation - Livermore, CA (1999), Coordinated facilities design, preparation, installation, and reliability testing of a 3.0 kW wavelength dispersive x-ray spectrometer, sample fusion machine, pelletizing press, chiller, and vacuum equipment.
 - National Refractories and Minerals Corporation - Livermore, CA (1999), Coordinated rebuilding of large gas-fired furnaces, including shaping of refractory brick, batching, and casting of refractory castables/mortars, and overhaul of electromechanical controls.
- Design/Construction - Automotive Industry
 - New United Motor Manufacturing, Inc. - Fremont, CA (1997), Directed maintenance of factory machinery, reduced operating costs, increased factory uptime, and installed new equipment and technologies. Implemented \$140,000 in annual cost savings suggestions.
 - New United Motor Manufacturing, Inc. - Fremont, CA (1997), Designed,

integrated, and/or directed maintenance of a diverse range of machinery, including material handling, palletizing, conveyance, robotics, stamping equipment, sheet metal blanking and leveling, scrap metal baling, and stamping oil filtration. Oversaw maintenance, production, tool and die, new model launch, and equipment encompassing process engineering for 30 major metal stampings.

- New United Motor Manufacturing, Inc. - Fremont, CA (1997), Coordinated with multiple internal and external resources to improve plant efficiency, vehicle quality, and safety as well as successfully developed spare parts database.
- New United Motor Manufacturing, Inc. - Fremont, CA (1997), Directed 14 major equipment installations totaling more than \$3 million, completing projects within specified budget and timeframe restrictions. Also participated in the production of more than 2 million passenger cars and trucks.

Selected Forensic Engagements*

- Cause and Origin Investigations - Fire/Explosion/Mechanical Failure
 - (2016), Determined the cause and origin of the failure of two 8MW gas turbines within a cogen plant at a major hospital.
 - (2010), Determined the cause and origin of an explosion and related damage at a 20MW biomass power plant.
 - (2007), Determined the cause and origin of an explosion and related damage at a 18MW biomass power plant.
- Construction Accident Investigations
 - (2015), Provided causation reconstruction and analysis to a de-gloving accident on an industrial gap-shear press. Testified at deposition.
 - (2014), Provided causation reconstruction and analysis to a dismemberment accident on an industrial paper press. Testified at deposition.
 - (2014), Provided accident reconstruction and analysis followed by litigation support and testimony in a case involving a forklift accident at a loading dock.
- Marine Accident Investigations
 - (2006-2010), Managed a major project to assess damage to 5,000 automobiles on a 700-foot roll-on/roll-off cargo vessel that nearly capsized, and then was listing and disabled at sea for weeks. Conducted vehicle inspections, examinations, and testing both onboard and at port.
- Product Failure Analysis and Liability Investigations
 - (2011), Provided reconstruction and analysis followed by litigation support and testimony in a case involving an automated wine bottling machine that allegedly damaged 900 cases of expensive wine.
- Technical/Litigation Support
 - (2017), Provided claims and litigation support including electro-mechanical ignition causation reconstruction to a related group of cases involving improperly designed refrigeration systems that were catching fire on refrigerated commercial trucks.
 - (2015), Provided litigation support including site inspections, incident

reconstruction, and construction evaluation to defendants in a fire which occurred at a 300,000-square-foot hops processing facility. Testified at deposition.

- (2015), Provided claims and litigation support including site investigation, event reconstruction, and deposition testimony regarding a fire in the commercial kitchen of a Chinese restaurant.

*The above-mentioned examples represent only a handful of over 1,600 projects spanning nearly 17 years with Rimkus, including 23 deposition testimonies and four trial testimonies.

Professional Experience

- Pettibone Engineering and Consulting April 2020 - Present
 - Founder
 - Proprietor, providing engineering and consulting services capitalizing on over 30 years' experience.

- Rimkus Consulting Group, Inc. 2003 - April 2020
 - Principal Consultant - Industrial Division/San Francisco District (2017-Present)
 - Western Region Industrial Division Manager (2012-2017)
 - District Manager/Mechanical Engineer (2003-2012)

Responsible for motor vehicle accident reconstruction, and industrial, commercial, and consumer product failure analysis. Acted as clerk of the works and project manager for reconstruction of large process equipment, hospitals, and power plants. Executed major marine cargo loss and damage evaluations. Accomplished investigations, testing, and analyses of motor vehicle accidents and motor vehicle component and systems failures including tires, power steering, and brakes. Accomplished investigations, testing, and analyses of industrial and commercial failures such as gas dryers, walk-in freezers, large agriculture roasting ovens and conveyors, large commercial refrigeration systems, sprinkler systems, Neon signs, light towers, piping, fire suppression systems, large vacuum pumps, and rotary equipment. Accomplished investigations, testing, and analyses of consumer products such as septic systems, swimming pools, washing machines, clothing dryers, water heaters, wells, pumping systems, and sprinklers. Accomplished designs of commercial restaurant and dry-cleaning establishments. Accomplished infrared thermographic analysis of industrial rotary equipment and thermographic analysis of residential construction. Performed post-fire cause engineering analyses on fires involving motor homes, mobile homes, single family detached homes, passenger vehicle, commercial trucks, industrial and agricultural machinery, and appliances. Analyzed fire sprinkler failure cases. Testified on cases involving industrial accidents, vehicle accidents, and construction defects.

- Torrex Equipment Corporation 1999 - 2003
 - Facilities Manager/Environmental Health & Safety Coordinator
Responsible for all aspects of design, coordination, construction, and implementation of facilities, health and safety, and security functions for a semiconductor CVD/ALD manufacturer. Handled contract and permit negotiations with vendors, contractors, and local authorities, resulting in timely and under-budget completion of assigned tasks and projects. Directed quarterly safety meetings, IIPP requirements, forklift, and respiratory protection programs; established safe operating practices, facilitated new chemical introductions. Established facilities work order system; managed technicians to provide safety, reliability, new resources, and comfort. Coordinated janitorial, landscaping, security, other building maintenance contractors to assure systems.

Coordinated design and construction of cleanrooms as low as Class 1. Coordinated design and installation of high-purity gas and toxic/reactive gas delivery, storage, abatement, and detection systems; cryogenic liquid nitrogen bulk storage/delivery system; and ozone generator. Established dry inert microchemistry lab for physical properties. Coordinated the specification, design, construction, and commissioning of an abatement tool to treat the exhaust of highly toxic CVD processes. Designed flocculant system for arsenic laden wastewater treatment. Invented and patented a method for arsenic gas abatement. Wrote a comprehensive risk analysis using a NASA/AIAA method for the use of 100% Hydrazine in an Atomic Layer Deposition machine for silicon nitride, detailing safety features of an Atomic Layer Deposition machine.

Key chemical experience with silane, arsine, phosphine, germane, ammonia, dichlorosilane, nitrogen trifluoride, hydrogen, oxygen, acetylene, hexchlorodisilane, diiodosilane, silicon tetraiodide, silicon tetrabromide, silicon tetrachloride, trimethyl aluminum, hydrazine, BTBAS, HEADS, chlorine, amine compounds, and others. Coordinated chemical analysis using FTIR, QMS, ICP/MS, calorimetry, and other techniques.

- National Refractories and Minerals 1998 - 1999
 - Facilities Engineer
Managed facilities, refractories pilot plant, thermal and mechanical testing projects, maintenance, improvements, and development of company facility. Coordinated facilities design, preparation, installation, and reliability testing of a 3.0 kW wavelength dispersive x-ray spectrometer, sample fusion machine, pelletizing press, chiller, and vacuum equipment. Programmed LabView 5.0 applications to calculate heat flow from furnace walls and to acquire data from thermocouples employed in observation of refractory cement exothermic reactions. Coordinated rebuilding of large gas-fired furnaces, including shaping of refractory brick, batching, and casting of refractory castables/mortars, and overhaul of electromechanical controls.
- New United Motor Manufacturing, Inc. 1991 - 1998
 - Manufacturing Engineer
Oversaw maintenance, production, tool and die, new model launch, and equipment encompassing process engineering for 30 major metal stampings

to facilitate quality assurance, design, and process improvement. Directed maintenance of factory machinery, reduced operating costs, increased factory uptime, and installed new equipment and new technologies. Handled diverse range of machinery, including material handling, palletizing, conveyance, robotics, stamping equipment, sheet metal blanking and leveling, scrap metal baling, stamping oil filtration. Wrote technical specifications, standards, ANSI/RIA risk analysis. Coordinated with multiple sources to improve plant efficiency, vehicle quality, and safety as well as successfully developed spare parts database. Directed 14 major equipment installations totaling more than \$3 million, completing projects within specified budget and timeframe restrictions; implemented \$140,000 annual cost savings suggestions. Designed ancillary metal stamping equipment and dies. Participated in the production of more than 2 million passenger cars and trucks.

- Kaiser Aluminum & Chemical Corporation 1989 – 1990
 - Summer Intern, Research and Development Division
 - Assisted research scientists to improve aluminum can stock forming and coating methods.

Education, Certifications, and Professional Organizations

- Mechanical Engineering, B.S.: University of California at Santa Barbara (1991)
- Vacuum Technology, A.S.: Las Positas College (1999)
- Professional Mechanical Engineer: Alaska, California, Hawaii, Oregon, Washington
- Traffic Accident Reconstructionist: ACTAR Accreditation #1823
- Crash Data Retrieval (CDR) System Operator: Collision Safety Institute
- Level 1 Thermographer: Infrared Training Center (FLIR Systems)
- Certified Forklift and Aerial Lift Operator: Rimkus Consulting Group, Inc.
- Certified Installer, Clear CPVC and Clear CPVC Double Containment: Ryan Herco
- California Conference of Accident Reconstruction Specialists (CCARS): Member

Continuing Education

- OSHA Training: 40-Hour HAZWOPER, New Environment, Inc. (June 2018); Hazard Communication (2018); HM126F (2003)
- Traffic Accident Reconstruction: Crash Reconstruction at Traffic Signal Intersections, Forensic Traffic Specialist (2010); Traffic Accident Reconstruction, Northwestern University (2006); Traffic Accident Investigation, Northwestern University (2004)
- Other: Fundamentals of Arctic Engineering, University of Alaska at Anchorage (2012)