



ERIC J. KLEIN, PH.D., P.E., PMP



Dr. Klein is a Vice President of Long International. He has over 20 years of industrial experience as a Technical Leader, Project Manager, and Consultant in engineering, procurement, and construction (EPC), manufacturing, and research and development (R&D) environments. Dr. Klein is skilled in corporate leadership and has significant experience leading cross-functional teams to design, build, commission, start up, and test chemical processing systems in the power generation and semiconductor manufacturing industries. He possesses project management experience for multimillion-dollar capital projects including earned value management, risk management, contract and scope of work negotiation, technical project proposals, cost estimating, change control, requests for information (RFI), change order management, design management, and equipment procurement oversight. He has experience reviewing drawing packages and performing quantum cost analysis for LNG projects. Prior to joining Long International, Dr. Klein held the positions of Chief Technology Officer, Vice President of Chemical Systems, Director of Chemical and Process Engineering, Staff Technologist, and Senior Process Engineer.

EDUCATION

Ph.D., Chemical Engineering, University of Colorado, 2000

M.E., Chemical Engineering, Stevens Institute of Technology, 1997

B.E., Chemical Engineering, Stevens Institute of Technology, 1995

PROFESSIONAL REGISTRATIONS

Registered Professional Engineer, Colorado (No. 52404)

Project Management Professional (No. 2164131)

PROFESSIONAL AFFILIATIONS

American Institute of Chemical Engineers

International Society of Automation

Association for the Advancement of Cost Engineering International

TEACHING AND SEMINARS

Teaching Assistant, University of Colorado, Department of Chemical Engineering, "Senior Laboratory," Fall 1999.

Teaching Assistant, University of Colorado, Department of Chemical Engineering, "Numerical Methods for Process Modeling," Fall 1997.

Teaching Assistant, Stevens Institute of Technology, Department of Chemical Engineering, "Chemical Engineering Design II," Spring 1996.

Teaching Assistant, Stevens Institute of Technology, Department of Chemical Engineering, "Chemical Engineering Design I," Fall 1995.



TECHNICAL EXPERIENCE

Representative U.S. and international technical experience includes:

- Construction claims cost analysis
- Management of air quality control projects for the power generation industry including program and project management and the management of design teams, engineering subcontractors, and construction contractors as the lead contractor
- Management of a government-funded co-development project including cost-share management
- Project cost and schedule controls (earned value management)
- Development of project management plans and procedures including work breakdown structures, and resource-loaded schedules for large projects
- Creation of risk management plans and procedures including failure modes and effects analysis and equipment redundancy studies
- Contract negotiation including scope of work development, design requirements, performance testing criteria, and process guarantees
- RFI and change order management
- Change order (CO) pricing and negotiations with clients, subcontractors, and equipment vendors
- Equipment and materials procurement and request for quote management
- Hands-on equipment and process commissioning, start up and troubleshooting in the field, performance testing, ownership transfer, and project closeout
- Technical reporting and project status reporting, including management of teams producing reports and presentations and peer review of same
- Development of project proposals containing scope of work, schedule, and cost estimations for federal, municipal, and private clients
- Formulation and implementation of quality management systems in manufacturing and design environments including change control management and design review management
- Techno-economic analyses of new process technologies including process modeling and cost optimization
- Development of standard operating procedures, operations and maintenance (O&M) manuals, and operations training material for new processing technologies and systems
- Process and equipment characterization, documentation, and process transfer to new production facilities
- Oversight and management of field O&M including field laboratories
- Corporate leadership, business development, and marketing
- Technical, hands-on leadership of cross-functional teams
- Research, development, design, and scale-up of new process technologies
- Management of technical staff including performance assessments
- Process specialties: dual-alkali flue gas desulfurization (FGD), carbon dioxide (CO₂) capture (absorption) and stripping using advanced amine solvents (piperazine), multi-phase fluid flow, solids handling and filtration (sludge handling including pumps, piping, vacuum belt filters and filter presses), and semiconductor manufacturing



- Process design: process hazards analysis, process scale-up, mass and energy balances, process flow diagram (PFD) development, piping & instrumentation diagram (P&ID) development, process control system development, equipment sizing, equipment and instrument specifications development, equipment procurement, equipment installation, and commissioning
- Manufacturing: sustaining of high-volume production lines, continuous quality improvement, Six Sigma, design of experiments, statistical process control, model-based problem solving, root cause analysis (RCA), lean manufacturing, preventive maintenance scheduling optimization, preventive maintenance procedures and checklists development, and discrepant material quarantine and disposition
- Speaker and author of peer-reviewed articles on the subjects of advanced FGD and carbon capture processes and systems, development of robust processes for next generation semiconductor manufacturing, online control of ion milling processes, and optimization of chromatography processes

PROJECT EXPERIENCE

Dr. Klein has over 20 years of experience as a Technical Leader and Project Manager. He has led multiple projects in the air quality control sector and the semiconductor manufacturing industry. Representative projects include the following:

Gas Production Facility

- On behalf of the owner, performed an assessment of the EPC contractor's cost performance on an LNG project in Australia. Reviewed and analyzed actual and budgeted cost information, performed quantum cost analysis, and prepared an expert report.
- On behalf of the owner, performed an assessment of the EPCM contractor's schedule performance with respect to engineering deliverables on an LNG project in Australia. Reviewed and analyzed construction drawings, specifications, and project schedules and assisted in the preparation of an expert report, reply reports, and a joint expert report.

Air Quality Control Systems for the Power Generation Industry

- On behalf of an equipment provider, reviewed and analyzed contract and design documentation as well as performance test data and reports. Prepared an expert report and a rebuttal report, and testified in deposition regarding the reagent requirements and process capability with respect to process performance guarantees for a Dry Sorbent Injection (DSI) system installed at a coal-fired power plant.
- Investigated the possible relocation and reuse of a decommissioned FGD system for a coal-fired power plant. Reviewed and analyzed design documents and operational data for the system, as well as system requirements and specifications for the potential new application. Performed mass balances and equipment sizing calculations to determine the suitability of the existing equipment with respect to the performance requirements of the new application. Prepared and presented a report summarizing findings and recommendations.
- Technical Expert and Co-Project Manager for the first-of-a-kind deployment of an advanced, dual-alkali, FGD technology, a \$180 million project at a 227 MW municipally-owned coal-fired power plant. Co-authored a design study and project proposal for design, procurement, construction oversight, commissioning, process start up, and performance testing of the system. Presented design study to client and won contract. Worked with client to develop system requirements and negotiate contract including scope of work. Developed work breakdown structure and budget and managed project using earned value management methodology. Served as Technical Expert and final reviewer during design, procurement and value engineering phases, including development of PFDs, stream tables, P&IDs,



equipment layout, equipment specifications, and requests for quotes. Technical Reviewer/Approver of all procurement decisions. Drove risk management efforts including failure mode and effects analysis, and reliability/redundancy studies. Managed engineering subcontractors and equipment vendors. Reviewed and approved RFIs and COs for the main contract, subcontracts, and purchase orders. Reviewed and approved commissioning test plans. Technical Leader for successful process start up. Co-authored start-up procedures, test plans and O&M manual, partnered with the owner's engineer to oversee start-up activities in the field, and trained client's staff on system safety, operation, and maintenance. Co-led successful performance testing (> 98% SO₂ removal v. 92% contract requirement) and co-authored the final technical report. Successfully transferred ownership of the system to the client and closed out project.

- Technical Expert and Co-Project Manager for the \$27 million 20 MW slipstream pilot scale demonstration of an advanced, dual-alkali FGD technology at a municipally-owned coal-fired power plant. Co-led project during design, construction, start-up, and demonstration phases of project. Led a cross-functional team to resolve a critical technical issue and significantly improve reliability performance of the system, which resulted in a successful pilot demonstration. Oversaw 24 x 7 field operation of the pilot system and worked closely with the Electric Power Research Institute to facilitate a successful third-party evaluation of the new technology. Fully characterized and analyzed system performance to support design of a full-scale commercial system.
- Technical Expert and Co-Project Manager for the 0.5 MW slipstream pilot scale demonstration of an advanced CO₂ capture and stripping technology using an advanced amine solvent (piperazine) for the Department of Energy's National Energy Technology Laboratory (DOE NETL) at a municipally-owned coal-fired power plant and at a secondary natural gas-fired boiler site (\$9 million project cost). Co-led project R&D to improve absorber energy efficiency by a factor of ten. Co-led team during the design, testing, and process characterization at the natural gas-fired boiler site. System demonstrated > 90% CO₂ capture and > 95% purity of regenerated CO₂, meeting and/or exceeding project requirements. Responsible for final technical report, cost-share negotiations with DOE, and project closeout.

Semiconductor Manufacturing

- Led cross-functional teams of process, yield and integration engineers, and technicians to reduce defects and increase yield for a 130 nanometer (nm) Wi-Fi chipset production line. Championed statistical process control and model-based problem solving. Mentored engineers in aggressive identification, RCA, and resolution of yield-limiting defect modes as well as in rapid excursion detection, containment, and elimination. Decreased key defect modes by ~50% to meet aggressive factory yield goals.
- Directed cross-functional teams to implement lean methodologies including waste reduction and total production maintenance programs to increase availability of key toolset by 50%, significantly contributing to the 130 nm Wi-Fi chipset factory achieving best-in-world cycle times.
- Led cross-functional teams of engineers and technicians to install and start up plasma etch production tools. Performed safety qualifications, equipment and process qualifications, and new product and technology introductions in support of a 130 nm flash memory production ramp at worldwide manufacturing facilities, and in support of a 180 nm flash memory production ramp at a new fabrication plant.

Research and Development

- Technical Expert and Program Manager for the investigation of the extraction of various metals from ore and fly ash sources, including the development and characterization of milling processes. Authored a project proposal for DOE NETL.



- Technical Expert and Program Manager for the development of a new technology to recycle sorbent for DSI FGD systems resulting in significantly decreased operating expenses and a potential best-in-class FGD technology. Led team to develop new process, scale-up from the lab to pilot scale, perform successful pilot demonstration, perform preliminary design, and develop a process and cost model to generate marketing information. Presented technical information and project proposals to potential technology partners and clients in the U.S. and China.
- Technical Expert and Co-Program Manager for the development of a field-deployable CO₂ capture/regeneration (stripping) system designed to provide super-critical CO₂ for enhanced oil recovery operations at the well site. Co-led team to perform a successful pilot scale demonstration of the new technology. Co-authored and presented project proposals including preliminary design, cost, and schedule to U.S. oil and gas companies.
- Led cross-functional teams of engineers and technicians to qualify new plasma etch production tools and equipment upgrades, and to develop robust etching processes and station monitors for 130 nm, 90 nm, and 65 nm flash memory production lines.
- Ph.D. Thesis: Partnered with the Joint Institute for Laboratory Astrophysics (JILA), the National Institute of Standards and Technology (NIST), and local industry to develop a model-based system for the online etch depth control of an ion milling process. Developed, built, and tested an online, laser-based measurement system to profile wafer surfaces in real time.
- Master's Thesis: Partnered with local industry to develop an optimization methodology for protein separations using liquid chromatography. Optimization system included a neural network trained to automatically recognize and classify varying degrees of peak separation.

PROFESSIONAL EXPERIENCE

Long International, Inc.

Denver, Colorado Area (November 2017 to Present)

As Vice President of Long International, Dr. Klein provides project management and project development advisory services as well as expert services in all facets of engineering and construction contract dispute analysis and resolution, litigation/arbitration/mediation support, and expert testimony.

Klein Engineering and Consulting, LLC

Castle Rock, Colorado (November 2017 to December 2021)

As the Owner and Principal, Dr. Klein provides engineering consulting with expertise in process engineering, project management, and manufacturing efficiency improvements. Process specialties include emissions control systems, aqueous chemistry systems, multi-phase flow systems, and semiconductor manufacturing.

Neumann Systems Group (NSG), Inc.

Colorado Springs, Colorado (March 2009 to June 2017)

During his employment at NSG, Dr. Klein occupied several high-level managerial positions. As Chief Technology Officer (CTO), Dr. Klein served as the Technical Leader for an organization of more than 40 engineers and technicians who were responsible for developing, designing, building, and testing the first-of-a-kind, revolutionary NeuStream[®] absorber technology for FGD and carbon capture. More specifically, Dr. Klein co-led the successful commercial deployment of the NeuStream[®] FGD process that involved a 227 MW installation at Colorado Springs Utilities' (CSU) Martin Drake Coal-Fired Power



Generation Station. He also directed the R&D team to make significant improvements to the NeuStream[®] absorber technology that led to the development of a new product line for the oil and gas industry (NeuStream[®]-EOR), a technology that generates CO₂ at the well site, which can be used for enhanced oil recovery operations, and to develop and test processes for extracting metals from fly ash. Dr. Klein also served as Co-Project Manager for a multimillion-dollar 0.5 MW CO₂ capture slipstream demonstration project for the DOE NETL. Furthermore, as CTO, Dr. Klein was responsible for managing the R&D team and the company patent portfolio, and was the technical expert for business development efforts. He evaluated various chemical processes, including ammonia and urea production processes, for the potential application of NSG's NeuStream[®] amine-based carbon capture technology. Additionally, he led a team of engineers and scientists to investigate the extraction of various metals from ore and fly ash sources. Dr. Klein co-authored all project proposals and presented technical project proposals to potential utility clients and technology partners across the U.S. and China.

As Vice President of Chemical Systems, Dr. Klein managed and led the R&D team to develop a recycling process for DSI FGD technology, resulting in a new, potential best-in-class FGD process. Moreover, Dr. Klein was responsible for instituting key quality control programs, including a change control board of which he was a principal member, to facilitate the growth of the company from R&D to the commercial stage. As Director of Chemical and Process Engineering, Dr. Klein co-managed and directed a team of more than 25 engineers and technicians to perform a 20 MW pilot demonstration of NSG's NeuStream[®] FGD system at CSU's Martin Drake Station. In addition, Dr. Klein oversaw a team of engineers to perform a technical design study and author a project proposal for the full-scale deployment of the NSG NeuStream[®] FGD technology. Dr. Klein was responsible for presenting the design study report and project proposal to the client resulting in a \$75 million contract award.

Intel Corporation

Colorado Springs, Colorado and Santa Clara, California (October 2000 to March 2009)

As Staff Technologist, Dr. Klein led cross-functional continuous improvement teams comprised of process, yield and integration engineers and technicians at a 130 nm fabrication site. In addition, he directed task force teams to solve critical, factory-limiting issues, and served as the go-to person in the process engineering organization. Dr. Klein also led continuous improvement teams to resolve critical yield issues and implemented lean manufacturing techniques to improve equipment availability that contributed to Intel's Fab23 achievement of best-in-world cycle time performance at the Colorado Springs location. Dr. Klein was awarded a divisional recognition award for key improvements made to the production line.

As Senior Process Engineer, Dr. Klein was responsible for the development of plasma etch processes for 130 nm, 90 nm and 65 nm flash memory production lines. In this role, Dr. Klein worked closely with an equipment vendor to install and qualify a new advanced plasma etching toolset to enable the new technologies and oversaw a cross-functional team to qualify equipment upgrades and develop new station-level monitors to improve tool capability and process stability for the next generation processes. He became the virtual factory expert for the new toolset and traveled to worldwide fabrication sites to lead the installation and qualification of the new toolset to ensure successful production ramps of the new technologies. Dr. Klein was awarded three divisional recognition awards for the development of key process improvements. Moreover, Dr. Klein directed teams of engineers and technicians to install and qualify plasma etch processing tools in support of the startup of a 180 nm flash memory production line at a new fabrication facility. He was responsible for the documentation and transfer of equipment and process knowledge from existing sites and performed process qualifications to ensure a successful factory start up.



He also oversaw a cross-functional team whose tasks were to sustain the process and complete continuous improvement projects to decrease manufacturing costs.

StorageTek

Louisville, Colorado (June 1998 to September 2000)

As an Engineering Intern, Dr. Klein was tasked with investigating the causes of fencing formation due to re-deposition during an ion milling process. Additionally, Dr. Klein oversaw the characterization of UV hardening of various photo-resists. Dr. Klein performed experiments for both projects, analyzed and summarized all data, and presented results.

University of Colorado

Boulder, Colorado (July 1997 to September 2000)

During his employment with the University of Colorado, Dr. Klein served as a Teaching Assistant. He aided with the instruction of Numerical Methods for Process Modeling, a senior-level Chemical Engineering course, during the fall semester of 1997. Dr. Klein led weekly problem solving sessions, assisted students with the MATLAB computing environment, prepared homework solutions, and supervised an undergraduate homework grader. During the fall semester of 1999, he assisted with the instruction of the Chemical Engineering Senior Lab. Dr. Klein lectured on the theory of multiple effect evaporators, supervised students operating a triple-effect evaporator, and aided students with data acquisition and analysis using National Instruments' LabView computing environment. As a Research Assistant, Dr. Klein researched the modeling and control of an ion milling process, a project that was funded by local industry (StorageTek) and had practical, real-world implications. Dr. Klein developed a surface evolution model to predict wafer surface profiles during ion milling. In addition, he partnered with JILA and NIST to design a heterodyne laser interferometer measurement system to monitor surface profile evolution in-situ and designed a model-based control system for the online control of ion milling etch depth, a system that was built and fully tested at StorageTek's facility. Additionally, Dr. Klein researched and developed an advanced control theory for the optimal control of multivariate time-delayed systems. He was responsible for presenting the results of both research projects at nationally recognized technical conferences, and was the lead author of several peer-reviewed journal articles that detailed the work.

Stevens Institute of Technology

Hoboken, New Jersey (August 1995 to June 1997)

As a Teaching Assistant, Dr. Klein assisted with the instruction of the Chemical Engineering Senior Design I&II courses. Dr. Klein aided 13 teams of students with all aspects of their senior design projects from design to implementation and testing. Moreover, he provided computer control and data acquisition expertise in the laboratory.

As a Research Assistant, Dr. Klein led a small team of engineers to research the optimization of high-performance liquid chromatography (HPLC) protein separations, a research project sponsored by local industry (Hoffman-LaRoche) that had practical, real-world implications. Dr. Klein applied statistical design of experiments and response surface methodology to optimize the separation process and developed a pattern recognition neural network to perform online peak tracking and peak classification. Dr. Klein presented the results of the research at nationally recognized technical conferences, and was the lead author of several peer-reviewed journal articles that detailed the work.



U.S. Army Corps of Engineers

Picatinny Arsenal, New Jersey (May 1994 to August 1994)

During his time as an Engineering Intern, Dr. Klein served as Assistant Project Manager on several new construction, renovation, and demolition projects, including projects specified for high explosive environments. He performed quality control tasks and compiled punch lists for the various projects. Additionally, Dr. Klein worked with the general contractor to ensure timely completion of punch list items.

Foster Wheeler Development Corporation

Livingston, New Jersey (May 1992 to August 1992, January 1993 to August 1993)

As an Engineering Intern, Dr. Klein designed an economizer test stand, including in-situ NO_x and SO₂ removal processes, for an in-house pilot plant. He was responsible for researching low temperature NO_x and SO₂ removal processes, and prepared PFDs and cost analyses of all viable processes to facilitate the selection of the most economic and efficient process. Dr. Klein also performed experiments to characterize the heat transfer efficiency of finned tube designs, analyzed data, and subsequently presented results.

Polymer Processing Institute

Hoboken, New Jersey (May 1991 to December 1991)

During his time as an Engineering Intern, Dr. Klein characterized the tensile strength, compressive strength, flexural strength, and intrinsic viscosity of various polymer blends. Moreover, he performed characterization experiments, analyzed experimental data, and summarized and presented experimental results.

PUBLICATIONS AND SPEAKING ENGAGEMENTS

“Carbon Capture – A Capital-Intensive Technology with Large Growth Potential,” *Long International, Inc.*, October 3, 2022.

“Design Phase Risk Mitigation Tools and Methods,” *Long International, Inc.*, September 2022.

“Best Practices for Mitigating COVID-19 Impacts on Construction Projects,” *Long International, Inc.*, September 16, 2022.

“Suggestions for Considering COVID-19 in Negotiation Strategies for Construction Contracts,” *Long International, Inc.*, September 12, 2022.

“Applicability of Suspension and Termination Contract Clauses for COVID-19 Impacts in the Construction Industry,” *Long International, Inc.*, September 2, 2022.

“Applicability of Force Majeure and Delay Contract Clauses for COVID-19 Impacts in the Construction Industry,” *Long International, Inc.*, August 29, 2022.

“Applicability of Change in Law and Cardinal Change Contract Clauses for COVID-19 Impacts in the Construction Industry,” *Long International, Inc.*, August 19, 2022.

“Applicability of the Frustration of Purpose Defense for COVID-19 Impacts in the Construction Industry,” *Long International, Inc.*, August 15, 2022.

“Applicability of the Impossibility of Performance Defense for COVID-19 Impacts in the Construction Industry,” *Long International, Inc.*, August 8, 2022.

“Review of American Bar Association Articles Regarding COVID-19 Impact on the Construction Industry,” *Long International, Inc.*, August 1, 2022.



- “Apportionment of Indirect Costs to Significant Change Events,” *Long International, Inc.*, June 2022.
- “Considerations for Successful Project Commissioning and Start-Up Planning and Execution,” *Long International, Inc.*, February 2022.
- “Carbon Absorber Retrofit Equipment (CARE) Final Scientific/Technical Report,” DOE Contract No. FE0007528, December 2015.
- “System and Method for Selectively Removing Metals from Industrial Waste,” with D. K. Neumann, C. M. Ohman and J. K. Brasseur, *U.S. Patent Application No. 14/402,097, Publication No. U.S. 2015/0143954 A1*, May 2015.
- “Dry Sorbent Injection (DSI) Recovery System and Method Thereof,” with D. K. Neumann, C. M. Ohman and J. P. Feve, *PCT Patent Application No. PCT/US2013/053503, Publication No. WO 2014/113069 A1*, July 2014.
- “Dry Sorbent Injection (DSI) Recovery System and Method Thereof,” with D. K. Neumann, C. M. Ohman and J. P. Feve, *U.S. Patent Application No. 13/958,412, Publication No. U.S. 2014/0205521 A1*, July 2014.
- “NeuStream[®]-C: Carbon Capture Progress Update, Carbon Dioxide Absorber Retrofit Equipment (CARE Program),” with A. Awtry and J. Brasseur, *Power-Gen XXV*, Orlando, FL, November 2013.
- “System and Method for Selectively Removing Metals from Industrial Waste,” with D. K. Neumann, C. M. Ohman and J. K. Brasseur, *PCT Patent Application No. PCT/US2013/042819, Publication No. WO 2013/177583 A2*, November 2013.
- “NeuStream[®]-C: Carbon Capture Progress Update, Carbon Dioxide Absorber Retrofit Equipment (CARE Program),” with A. Awtry and J. Brasseur, *Air Quality IX*, Arlington, VA, October 2013.
- “NeuStream[™] Emissions Control Technology,” with J. Brasseur and S. Kladder, *Carbon Capture Workshop*, Boulder, CO, October 2011.
- “NeuStream[™] Ultra-Compact, Advanced Gas-Liquid Contactors for Multi-Pollutant Systems,” with J. Brasseur, B. Nizamov, A. Awtry and R. Sears, *Power2011*, Denver, CO, July 2011.
- “NeuStream[™] Ultra-Compact Advanced Gas-Liquid Contactors for Multi-Pollutant Systems,” *Energy, Utility & Environment Conference*, Phoenix, AZ, January 2011.
- “Development of 65 nm Dry Etch Process,” *Intel Corporation PATCON*, May 2005.
- “Increased Sensitivity Station Monitor for Plasma Etch Toolset,” *Intel Corporation NMTEC*, October 2004.
- “Optimal Parameter Estimation for the Online Control of Ion Milling Etch Depth,” with W. F. Ramirez, *AIChE Journal*, February 2002.
- “A Common-Path Heterodyne Interferometer for Surface Profiling in Microelectronic Fabrication,” with W. F. Ramirez and J. L. Hall, *Review of Scientific Instruments*, May 2001.
- “State Controllability and Optimal Regulator Control of Time-Delayed Systems,” with W. F. Ramirez, *The International Journal of Control*, March 2001.
- “Model-Based Control of an Ion Milling System,” with W. F. Ramirez and J. L. Hall, *AIChE Annual Meeting*, Los Angeles, CA, November 2000.
- “Optimal Control and State Controllability of Time-Delayed Systems,” with W. F. Ramirez, *AIChE Annual Meeting*, Los Angeles, CA, November 2000.



- “Identification and Etch Depth Control of an Ion Milling Process,” *Ph.D. Thesis, University of Colorado*, October 2000.
- “A Review of Criteria Functions and Response Surface Methodology for the Optimization of Analytical Scale HPLC Separations,” with S. L. Rivera, *Journal of Liquid Chromatography*, August 2000.
- “Model-Based Control of an Ion Milling System,” *Massachusetts Institute of Technology*, Cambridge, MA, June 2000.
- “Optimal Control and State Controllability of Time-Delayed Systems,” *Massachusetts Institute of Technology*, Cambridge, MA, June 2000.
- “Optimization of Ion-Exchange Protein Separations using a Vector Quantizing Neural Network,” with S. L. Rivera and J. E. Porter, *Biotechnology Progress*, June 2000.
- “Consideration of Local Shadowing and Ion Beam Voltage Effects in the Prediction of a Surface Evolving Under Ion Milling,” with W. F. Ramirez, *Journal of Vacuum Science and Technology A*, February 2000.
- “Model-Based Control of an Ion Milling Process,” with W. F. Ramirez, *AIChE Annual Meeting*, Dallas, TX, November 1999.
- “Optimal Control of Time-Delayed Systems and Time-Series Models using a Partitioned Riccati Equation,” with W. F. Ramirez, *AIChE Annual Meeting*, Dallas, TX, November 1999.
- “Neural Network Signal Interpretation for Optimization of Chromatographic Protein Purifications,” with S. L. Rivera, *International Journal of Applied Mathematics and Computer Science*, December 1998.
- “Ion Milling Modeling and Control,” with W. F. Ramirez, *Computer Modeling and Simulations at UC Boulder Workshop*, Boulder, CO, October 1998.
- “Automatic Classification of Chromatographic Peaks,” with S. L. Rivera, *Automatic Control Conference*, Albuquerque, NM, June 1997.
- “Optimization of Ion-Exchange Chromatographic Protein Separations,” with C. M. Rudakewycz, M. Pottman (speaker) and S. L. Rivera, *1997 International Federation of Automatic Control ADCHEM*, Banff, AB, Canada, June, 1997.
- “Optimization of Protein Separations using Ion-Exchange Liquid Chromatography,” *Master’s Thesis, Stevens Institute of Technology*, May 1997.
- “Optimization of Protein Separations using Ion-Exchange Chromatography,” with S. L. Rivera and J. E. Porter, *AIChE Annual Meeting*, Chicago, IL, November 1996.
- “Optimization of Chromatographic Protein Separations,” with N. A. Albanese and S. L. Rivera, *Sixth Annual Mini-Tech Conference (Best Paper Award)*, Hoboken, NJ, April 1996.

EXPERT REPORT PREPARATION

- 2020–2021 On behalf of the owner, performed an assessment of the EPC contractor’s cost performance on an LNG project in Australia. Reviewed and analyzed actual and budgeted cost information, performed quantum cost analysis, and prepared an expert report.
- 2019–2020 On behalf of an equipment provider, reviewed and analyzed contract and design documentation as well as performance test data and reports. Prepared an expert report and a rebuttal report, and testified in deposition regarding the reagent requirements, and process



capability with respect to process performance guarantees for a DSI system installed at a coal-fired power plant.

2018–2021 On behalf of the owner, performed an assessment of the EPCM contractor’s schedule performance with respect to engineering deliverables on an LNG project in Australia. Reviewed and analyzed construction drawings, specifications, and project schedules and assisted in the preparation of an expert report, reply reports, and a joint expert report.