

Peyton C. Richmond

Associate Professor

Dan F. Smith Departments of Chemical Engineering, Lamar University

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Academic Positions

- 2016 - Academic Director of Undergraduate Education, College of Engineering, Lamar University
- 2006 - Associate Professor, Dan F. Smith Department of Chemical Engineering
- 2001 - 2005 Adjunct Instructor, Dan F. Smith Department of Chemical Engineering

Industrial Positions

- 2000 - 2006 Senior Process Control Engineer, Chevron Phillips Chemical Company LLC, Port Arthur, Texas
- 1999 - 2000 Process Improvement Engineer, Chevron Corporation, Kingwood, Texas
- 1995 - 1999 Refinery Positions (various), Phillips Petroleum Company, Borger, Texas
- 1990 - 1995 Associate Computing Engineer, Phillips Petroleum Company, Bartlesville, Oklahoma
- 1989 - 1990 Program Development Engineer, Bryan Research & Development, Bryan, Texas

Education

- 1988 Ph.D. Chemical Engineering, Texas A&M University, College Station, Texas, Title: Estimating Multiphase Flow Functions in Porous Media from Dynamic Displacement Experiments, Advisor: A. Ted Watson
- 1983 B.S. Chemical Engineering, Lamar University, Beaumont, Texas

Peer Reviewed Publications

1. Fang, Y., Rasel, M.A.K. and **P.C. Richmond (Corresponding Author)**, "Consequence Risk Analysis using Operating Procedure Event Trees and Dynamic Simulation," Journal of Loss Prevention in the Process Industries, Vol 67, 2020, 104235, ISSN 0950-4230, <https://doi.org/10.1016/j.jlp.2020.104235>.
2. Fang, Y., Rasel, M.A.K. and **P.C. Richmond (Corresponding Author)**, "A Stylized Trend Analysis Approach for Process Monitoring and Fault Diagnosis," Process Safety Progress, Vol. 37, No. 3, 2018, pp. 411-418.
3. Rasel, M.A.K., Fang, Y., Benson, T.J. and **P.C. Richmond (Corresponding Author)**, "Fundamental Level Measurement and Control Concepts Demonstrated Using Microprocessor Activities," Computers in Education Journal, Vol. 8, No. 2, 2017.
4. Fang, Y., Rasel, M.A.K., Benson, T.J. and **P.C. Richmond (Corresponding Author)**, "Novel Hands-on Water Overflow SIS Experiment in Undergraduate Process Control Laboratory," Chemical Engineering Education, Vol. 40, No. 1, 2015.
5. Rasel, M.A.K. and **Richmond, P.C. (Corresponding Author)**, "Improve Safety and Reliability with Dynamic Simulation," Process Safety Progress, Vol. 33, No. 4, 2014, pp. 333-338.
6. Ajit Patki, Xianchang Li, Daniel Chen, Helen Lou, **Peyton Richmond**, Vijaya Damodara, Lan Liu, Kader Rasel, Arokiaraj Alphones, Jenny Zhou, "On Numerical Simulation of Black

- Carbon (Soot) Emissions from Non-Premixed Flames," *Journal of Geoscience and Environment Protection*, v. 2, pp. 15-24, 2014
7. Kanwar Devesh Singh, Preeti Gangadharan, Daniel Chen, Helen H. Lou, Xianchang Li, **P. Richmond**, "Computational Fluid Dynamics Modeling of Laboratory Flames and an Industrial Flare," *Journal of the Air & Waste Management Association*, Vol. 64, Issue 11, p1328-1340 (2014).
 8. Kanwar Devesh Singh, Preeti Gangadharan, Tanaji Dabade, Varun Shinde, Daniel Chen, Helen H. Lou, **Peyton C. Richmond** and Xianchang Li, "Parametric Study of Ethylene Flare Operations Using Numerical Simulation," *Engineering Applications of Computational Fluid Mechanics*, Vol 8, No. 2, 2014.
 9. Hitesh S. Vaid, Kanwar Devesh Singh, Helen H. Lou, Daniel Chen, **Peyton Richmond**, "A Run Time Combustion Zoning Technique towards the EDC Approach in Large-Scale CFD Simulations," *International Journal of Numerical Methods for Heat and Fluid Flow*, Vol. 24 No. 1, 2014, pp. 21-35.
 10. Benson, T., **Richmond, P.**, Leblanc, W., "Unit Operation Experiment Linking Classroom with Industrial Processing," *Chemical Engineering Education*, Vol. 47, No. 2, Spring 2013
 11. **Richmond, P. (Corresponding Author)**, Chen, D., "A model predictive control package for undergraduate education." *Education for Chemical Engineers* 7 (2012) e43-e50.
 12. **Richmond, P.C. (PhD Research)**, and Watson, A.T., "Comparison of Implicit and Explicit Methods for Interpreting Displacement Data," *SPE Reservoir Engineering* (May 1990) 389-92.
 13. **Richmond, P.C. (PhD Research)**, and Watson, A.T., "Estimation of Multiphase Flow Functions From Displacement Experiments," *SPE Reservoir Engineering* (February 1990) 121-27.
 14. Watson, A.T., **Richmond, P.C. (PhD Research)**, Kerig, P.D., and Tao, T.M., "A Regression-Based Method for Estimating Relative Permeabilities From Displacement Experiments," *SPE Reservoir Engineering* (August 1988) 953-58.

Book Chapters

1. Ross Tomson, Liwen Chen, & **Peyton C. Richmond**, *CRC Sustainable Water Management*, Volume I, Chapter 7, "Water Management for Shale Oil and Gas Development," Editor, Daniel H. Chen, Taylor & Francis/CRC Press, Boca Raton, FL, 2016.
2. Liwen Chen, **Peyton C. Richmond**, & Ross Tomson, *CRC Sustainable Water Technologies*, Volume II, Chapter 8, "Wastewater Treatment and Disposal for Unconventional Oil and Gas Development," Editor, Daniel H. Chen, Taylor & Francis/CRC Press, Boca Raton, FL, 2016.

Peer Reviewed Conference Proceedings

1. **Richmond, P.C. (Corresponding Author and Speaker)**, Gossage, J.L., and Q. Xu, "An Alarming Experience: Results of an Undergraduate Chemical Process Alarm Lab Module," 2010 ASEE Proceedings, Louisville, KY, June 2010.
2. **Richmond, P.C. (Corresponding Author and Speaker)**, Chen, D.H., Gossage, J.L., Xu, Q. and Kuyen Li, "A Modern Manufacturing Environment for Chemical Engineering PBL Problems," 2009 ASEE Proceedings, Austin, TX, May 2009.

3. **Richmond, P.C. (Corresponding Author and Speaker)**, (Reviewed by EPC Process Control Subcommittee), “Support Practices for Advanced Process Control”, 2010 AIChE Spring Meeting, Ethylene Conference Proceedings, San Antonio, TX, March 2010, Paper No. 50e.

Invited Presentations

1. **Richmond, P.C. (Speaker)**, Fang, Yan and Rasel, M.A.K., “Towards DCS Data Mining for Near Miss/At-Risk Process Events,” Golden Triangle Business RoundTable PSM Forum, ISTC Conference Room 125, 15 May 2018.
2. **Richmond, P.C. (Speaker)**, “Supporting Modern Chemical Plant Operations,” South Texas Section AIChE Computing & Systems Technology Workshop, Brady’s Landing, Houston, Texas, January 13, 2011.

Teaching and Mentoring

PhD thesis supervision

1. PhD Thesis, “Process Safety Applications of Plant DCS Data and Operating Procedure Analysis with Risk Assessment,” Yan Fang, Lamar University, Beaumont, TX, August 2018.
2. PhD Thesis, “Reducing Process Hazards by Transition Analysis in Continuous Process Operation Using Data Analytic Methods,” Md. Abdul Kader Rasel, Lamar University, Beaumont, TX, May 2017.

MS thesis supervision

1. MS Thesis, “Visualizing Industrial Multivariable Control Constraints in Operations and Chemical Process Flowsheeting in MATLAB,” Md. Rashedul Islam, Lamar University, Beaumont, TX, August 2011.
2. MS Thesis, “Optimization of Dynamic Delayed Coker Unit Including Yield Model Under Disturbance,” Chandra Kumar Soni, Lamar University, Beaumont, TX, December 2011.
3. MS Thesis, “Performance Investigation due to Model Mismatch for Constrained Model Predictive Controller Formulation in State-Space,” Md. Abdul Kader Rasel, Lamar University, Beaumont, TX, December 2010.

Project Funding

1. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil Corporation, **Peyton C. Richmond (Principle Investigator)**. Funded \$25,000. (09/01/18-08/31/19)

2. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil Corporation, **Peyton C. Richmond (Principle Investigator)**. Funded \$25,000. (09/01/17-08/31/18)
3. Lee College Engineering Articulation Partnership, Department of Education, **Peyton C. Richmond (Principal Investigator)**, \$849,100. (10/01/2016-09/30/21)
4. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil Corporation, **Peyton C. Richmond (Principle Investigator)**. Funded \$25,000. (09/01/15-08/31/16)
5. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil Corporation, **Peyton C. Richmond (Principle Investigator)**. Funded \$25,000. (09/01/14-08/31/15)
6. Flare Performance Optimization: DRE/CE vs. Soot, Daniel H. Chen, Helen Lou, Xiangchang Li, **Peyton Richmond**, Matthew Johnson (Carleton University, Canada), TCEQ, \$100,000. (01/01/14-8/31/2014)
7. Flare Speciation Study Using Advanced Computational Methods, Helen Lou (PI), Daniel Chen, Xianchang Li, **Peyton Richmond**, TCEQ, SEP Agreement No. 2009-009, Task 2-A, Phase III, \$44,000, (02/01/14-01/31/15)
8. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil Corporation, **Peyton C. Richmond (Principle Investigator)**. Funded \$25,000. (09/01/13-08/31/14)
9. CFD Study of Important Flare Operating Parameters, Daniel H. Chen, Helen Lou, Xiangchang Li, and **Peyton Richmond**, TARC, \$96,000. (09/01/13-07/15/2015)
10. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil Corporation, **Peyton C. Richmond (Principle Investigator)**. Funded \$25,000. (09/01/12-08/31/13)
11. CFD Modeling of Industrial Flares under Various Operating and Meteorological Conditions,” Daniel H. Chen, Helen Lou, Xiangchang Li, Christopher Martin, and **Peyton Richmond**, TARC, \$40,000. (07/01/12-7/15/2013)
12. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil, Christopher E. Meredith (ExxonMobil), Dennis J. Greenbank (ExxonMobil), **Peyton C. Richmond (Principle Investigator)**, with two Co-PIs (Xu and Li). Funded \$25,000. (09/01/11-08/31/12)
13. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil, Christopher E. Meredith (ExxonMobil), Dennis J. Greenbank

(ExxonMobil), **Peyton C. Richmond (Principle Investigator)**, with two Co-PIs (Xu and Li). Funded \$25,000. (09/01/10-08/31/11)

14. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil, Christopher E. Meredith (ExxonMobil), Dennis J. Greenbank (ExxonMobil), **Peyton C. Richmond (Principle Investigator)**, with two Co-PIs (Xu and Li). Funded \$25,000. (09/01/09-08/31/10)
15. Bridging the Process Control, Troubleshooting and Optimization Gaps Between Academia and Industry, ExxonMobil, Christopher E. Meredith (ExxonMobil), Dennis J. Greenbank (ExxonMobil), **Peyton C. Richmond (Principle Investigator)**, with two Co-PIs (Xu and Li). Funded \$25,000. (09/01/08-8/31/09)
16. CCLI: Improving Engineering Curricula by Integrating PBL Pedagogy with Modern Manufacturing Case Studies, National Science Foundation, **Peyton C. Richmond (Principle Investigator)**, with 4 Co-PIs (Li, Chen, Gossage, and Xu). Funded \$149,897. (03/15/2008-02/28/2011)
17. Chemical Engineering Control Lab Initiative, Lyondell Chemical Company, **Peyton C. Richmond (Principle Investigator)**. Funded \$65,000. (10/11/2007-10/10/2008)

Non-Refereed Conference Presentations and Posters

1. Fang, Y. (Speaker) and **P.C. Richmond**, "Operating Procedure Analysis with Consequence Prediction by Dynamic Simulation," AIChE 2017 Southwest Process Technology Conference, Galveston, Texas, October 13, 2017, Poster No. 507279.
2. Yan, F. (Speaker), Rasel, M.A.K. and **P.C. Richmond**, "Mitigating Ethylene Plant Flaring Risk During Equipment Switching Transitions by Dynamic Simulation, 2015 AIChE Spring Meeting, Austin, Texas, April 2015, Paper No. 138c.
3. Rasel, M.A.K. (Speaker), Fang, Y. and **P.C. Richmond**, "LTI Model Transition Monitoring Applied to Ethylene Plant Dryer Switching," 2015 AIChE Spring Meeting, Austin, Texas, April 2015, Paper No. 200a.
4. **Richmond, P.C. (Speaker)**, Benson, T.J. and Rasel, M.A.K., "Experience Using Inexpensive Water Overflow Experiment to Demonstrate SIS Concepts," 2013 AIChE Annual Meeting, San Francisco, CA, November 2013, Paper No. 209e.
5. Daniel H. Chen, Kanwar Devesh Singh, Preeti Gangadharan, Xianchang Li, Helen H. Lou, **Peyton Richmond**, "CFD Study of Flare Operating Parameters," AIChE Annual Meeting, November 3-8, 2013, San Francisco, CA.
6. **Richmond, P.**, Zhang, Q., "Using a "Level Control" Experiment to Demonstrate Operational Safety Concepts," 2012 AIChE Annual Meeting, Pittsburgh, PA, October 2012, Paper No. 58e.
7. Benson, T., **Richmond, P.**, Leblanc, W., "A Distillation Experiment Linking Classroom with Industrial Processing," 2012 AIChE Annual Meeting, Pittsburgh, PA, October 2012, Paper No. 382d.
8. **Richmond, P.C. (Speaker)**, "Distributed Control System Implementation for Undergraduate Labs," 2011 AIChE Annual Meeting, Minneapolis, MN, October 2011, Paper No. 21f.

9. **Richmond, P.C.** and Rasel, M.A.K., "Performance Investigation for Constrained Model Predictive Control of the Shell Fractionator Problem," 2011 AIChE Spring Meeting, Chicago, IL, March 2011, Paper No. 61a.
10. **Richmond, P.C.** and Soni, C.K., "Real-Time Optimization Strategies for the Delayed Coking Unit," 2011 AIChE Spring Meeting, Chicago, IL, March 2011, Paper No. 64d.
11. **Richmond, P.C.**, Rasel, M.A.K., and D.H. Chen, "Dynamic Simulation Troubleshooting and Control Exercises on the DCS," 2010 AIChE Annual Meeting, Salt Lake City, UT, November 2010, Paper No. 534f.
12. Islam, M. R. (Speaker), and **P.C. Richmond**, "Visualizing Industrial Multivariable Control Constraints in Operations," 2010 AIChE Annual Meeting, Salt Lake City, UT, November 2010, Paper No. 371j.
13. Chen, D. (Speaker), **Richmond, P.**, Xu, Q. and J. Gossage, "Incorporating Distributed Control System-Based Manufacturing into Undergraduate Chemical Engineering Education," Paper 788, INTED 2010, Valencia, Spain, March 8-10, 2010.
14. **Richmond, P.C. (Speaker)**, "An Undergraduate Process Control Lab Alarm Rationalization Module," 2009 AIChE Annual Meeting, Nashville, TN, November 2009, Paper No. 145h.
15. **Richmond, P.C. (Speaker)**, Li, K. and D.H. Chen, "Integrating DCS and MPC into Problem-based Undergraduate Chemical Engineering Education," 2009 AIChE Annual Meeting, Nashville, TN, November 2009, Paper No. 397e.
16. **Richmond, P.C. (Speaker)**, "Using .NET Cape-Open Unit Operations in an Applied Process Simulation Course," 2008 AIChE Annual Meeting Conference Proceedings, Philadelphia, PA, November 2008, Paper No. 397e.
17. **Richmond, P.C. (Speaker)** and Sidney Lin, "Preliminary Testing of a .NET Based Educational Heat Transfer Simulator," 2008 AIChE Annual Meeting Conference Proceedings, Philadelphia, PA, November 2008, Paper No. 84c.
18. **Richmond, P.C. (Speaker)**, "Investigation of Economic Penalty Due to Measurement Bias Error in Real Time Optimization," 2007 AIChE Spring Meetings Conference Proceedings, Houston, TX, April 2007, Paper No. 27b.
19. **Richmond, P.C. (Speaker)**, "A Procedure to Identify and Quantify Profitability Improvements Using Modeling and Multivariable Process Control," Presented at the AIChE Spring National Meeting, New Orleans, LA, March 1998, Paper No. 62g.
20. **Richmond, P.C. (Speaker, PhD Research)** and Watson, A.T., "Estimating Multiphase Flow Functions From Displacement Experiments," Presented at the AIChE Spring National Meeting, New Orleans, LA, March 1988, Paper No. 43b.
21. Watson, A.T., Kerig, P.D., **Richmond, P.C (PhD Research)**., and Tao, T.M., "An Improved Method for Estimating Relative Permeabilities From Displacement Experiments," Proceedings SPE 56th Annual California Regional Meeting, 1986, p. 165-174.

Courses Taught

1. Plant Design I, Lamar University CHEN 4360 (F 2019, F 2018, F 2017, F 2016, F 2015, F 2014, F 2013, F 2012)
2. Plant Design II, Lamar University CHEN 4340 (Sp 2019, Sp 2018, Sp 2017, Sp 2016, Sp 2015, Sp 2014, Sp 2013)

3. Process Control Laboratory, Lamar University CHEN 4150 (F 2019, F 2018, F 2017, F 2016, F 2015, F 2014, F 2013, F 2012, F 2011, F 1010, F 2009)
4. Global Issues in Engineering Management, Lamar University Study Abroad Course (Su 2018, Su 2017)
5. Introduction to Chemical Engineering, Lamar University ENGR 4101 (F 2016)
6. Professional Seminar, Lamar University CHEN 2140 (F 2015, F 2014, F 2012, F 2011)
7. Industrial Process Control, Lamar University ENGR 6301 (F 2015, F 2014, F 2013, F 2012, F 2011, F 2010, F 2009, F 2008, F 2007, F 2006, F 2005, F 2004, F 2003, F 2002, Sp 2001)
8. Real Time Optimization, Lamar University ENGR 6301 (Sp 2011, Su 2010, Sp 2009, Sp 2008, Su 2007)
9. Introduction to Computers and Programming, Lamar University ELEN 1301 (Sp 2011, F 2010, Sp 2010, F 2009, Sp 2009, F 2008, Sp 2008, F 2007, Sp 2007, F 2006)
10. Applied Process Simulation, Lamar University ENGR 6301 (Su 2011, Su 2009, Su 2008)
11. Advanced Analysis, Lamar University CHEN 4350 (Sp 2010)
12. Thermodynamics I, Lamar University CHEN 2374 (F 2007)

Awards

1. 2013 Unisim Design Competition Award, Honeywell Americas, Faculty Advisor
2. 2006 Research Enhancement Grant Recipient, Lamar University
3. 1985 Phillips Designated Fellowship, Texas A&M University
4. 1984 Phillips Designated Fellowship, Texas A&M University
5. 1983 Mobil Oil Scholarship Award, Lamar University
6. 1983 Omega Chi Epsilon Award, Lamar University

Professional Service

College-wide ABET Coordinator

2017-18 ABET review cycle expected to result in **accreditation renewal for all programs** (three programs completely clean, and two programs cited for weakness)

Developed and maintained program self-study submissions writing engineering college sections, soliciting supporting information and incorporating program coordinator sections (2017-18 cycle)

Chaired weekly self-study review meetings with Chemical, Civil, Electrical, Industrial, and Mechanical Engineering Program's ABET coordinators (09/15/2017-03/09/2018)

Engineering College ABET evaluation team point of contact. Supported ABET team leading up to and during their Lamar University site visit. Provided continuity after LU Engineering Dean was transferred (2017-18 cycle)

Other Service

ABET EAC Commissioner, American Institute of Chemical Engineers (2020-2021 Cycle)

ABET Program Evaluator, Chemical Engineering, **University of California San Diego** (2019)

ABET Program Evaluator, Chemical Engineering, **University of Florida** (2018)

ABET Program Evaluator, Chemical Engineering, **University of Maryland** (2017)

ABET Program Evaluator, Chemical Engineering, **Michigan State University** (2016)

ABET Program Evaluator, Chemical Engineering, **University of Southern California** (2015)

ABET Program Evaluator, Chemical Engineering, **Tennessee Tech University** (2014)

ABET Program Evaluator, Chemical Engineering, **University of Louisiana Lafayette** (2013)

Chemical Engineering Committee, Tuning Oversight Council for Engineering and Science, Texas Higher Education Coordinating Board, Austin, Texas (2012)

ABET Program Evaluator, Chemical Engineering, **University of South Alabama** (2011)

National Science Foundation TUES proposal panel reviewer, Baltimore, MD (2011)

American Institute of Chemical Engineers (AIChE) Fuels & Petrochemicals Division Director (2011-2014)

Omega Chi Epsilon (Chemical Engineering Honor Society) Student Chapter Advisor (2008-2015)

National Science Foundation CCLI proposal panel reviewer, Baltimore, MD (2008)

Committee Chair, Chemical Engineering Lab Technician Search (2008)

SACS Coordinator B.S. Chemical Engineering (2007-2012)

ABET Coordinator Chemical Engineering Department (2007-2014)

Technical Session Chair and Co-Chairpersonships, 2007 AIChE Spring National Meeting, 2009 AIChE Annual Meeting, 2011 AIChE Annual Meeting, 2012 AIChE Spring National Meeting

Advisory Board Member, Lamar University Chemical Engineering Department, Chevron Phillips (2001-2006)

AIChE Local Section President, Bartlesville, OK, 1994-1995