



Optimizing Gas Pipeline Safety and Compliance Using a Lean Workflow



A team from the Tauber Institute of Global Operations at the University of Michigan spent the summer of 2015 helping Pacific Gas & Electric (PG&E) designing and piloting a Lean initiative to optimize the company's corrosion workflow. They used centralized work plans, tiered huddles and metrics, and clarified roles and responsibilities to increase visibility into critical compliance work and allow supervisors to focus on essential field operations work.

Pacific Gas & Electric (PG&E) is a \$21 billion investor owned utility which provides electricity and natural gas to 15 million Californians. PG&E Gas Operations owns and operates approximately 42,000 miles of distribution pipelines and 6,000 miles of backbone and local transmission pipes serving 4.3 million gas customers.

As part of its commitment to safety and reliability, particularly following the San Bruno, California gas pipeline explosion, PG&E made major advancements in revamping its pipeline maintenance and operations. As part of this initiative, the company was developing an advanced process management framework to deploy across multiple work streams in PG&E Gas Operations.

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The Tauber team consisted of Luyi Chen, a Master of Science in Industrial and Operations Engineering student, and Zachary Duncan and Sneha Venkatachalam, both MBA students. The team was advised by faculty members Len Middleton, adjunct professor of corporate strategy, international business, and entrepreneurship at the U-M Ross School of Business and Siqian Shen, assistant professor of industrial and operations engineering, U-M College of Engineering.

The Tauber team evaluated the corrosion workflow through a series of site visits, interviews, and financial and operational metrics evaluations to identify three areas of focus.

Centralized Work Plan

The team reviewed the visibility of work in corrosion operations in order to help balance work priorities with available resources. They evaluated the work that needed to be completed over a 90-day period and developed a work plan tool which provided visibility into both work and resources. The tool increased visibility into corrosion work from just 25 percent to over 90 percent.

Tiered Huddles and Metrics

Four tiered huddles and a metrics structure were developed by the team to ensure key metrics associated with the workflow, execution, and compliance were being communicated among PG&E personnel. The improved flow of communication between work planning and execution in the Stockton, California pilot location helped corrosion operations personnel attend to critical work and reduced the number of potential non-compliance situations to zero over a six-week period.



Left to Right: Luyi Chen (MSE—Industrial and Operation Engineering '15), Sneha Venkatachalam MBA '16, and Zachary Duncan, MBA '16)



Left to Right: Bikram Chatterjee, senior operations analyst, Process & Quality Excellence, PG&E; Sneha Venkatachalam (MBA '16); Michael Ritter, director, Project and Program Services, PG&E, Luyi Chen (MSE-IOE '15), and Zach Duncan (MBA '16)

Clarified Roles and Responsibilities

As part of its process design efforts, the team identified clear roles and responsibilities for planning, scheduling, and running process management meetings and workshops. The realignment helped to free approximately 1,200 hours per supervisor annually. This time could now be better spent on more critical field crew management.

In August 2015, based on the team's recommendations, PG&E Gas Operations took the important step of identifying a rollout strategy for the new workflow across its different divisions after the Stockton pilot had stabilized.

The impact of the Tauber team's time and cost-saving recommendations was significant. Nearly \$2.7 million or 0.05 percent of PG&E's operating costs could be saved through better planning and non-compliance avoidance costs as the pilot is incorporated across the company's work streams.

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Tracking project metrics

PG&E Project Team

Student Team

- Luyi Chen—EGP (MSE Industrial and Operation Engineering)
- Zach Duncan—Master of Business Administration
- Sneha Venkatachalam—Master of Business Administration

Project Champions

- Mallik Angalakudati—Vice President, Financial & Resource Management
- Bikram Chatterjee—Senior Operations Analyst, Process & Quality Excellence
- Daniel Jarmel—Director, Process & Quality Excellence
- Nick Raad—Senior Manager, Gas CI & Analytics

Faculty Advisors

- Len Middleton—Ross School of Business
- Siqian Shen—College of Engineering

About Tauber Team Projects

Each two to three person Tauber Team consists of graduate Engineering, MBA, and/or MSCM students. Along with receiving high-level corporate support from the sponsoring company, each team is advised by a College of Engineering and a Ross School of Business faculty member and overseen by a Tauber Institute Co-Director. The projects begin on-site in May and continue for 14 weeks. Students present the results of their projects and compete for over \$40,000 in scholarships at the U-M Tauber Institute's annual *Spotlight!* event, held each September in Ann Arbor, Michigan. *Spotlight!* provides outstanding opportunities for students and corporate partners to establish relationships while exploring innovations in operations and manufacturing.

The 2015 Tauber Team Projects resulted in \$500 million in savings according to sponsoring company calculations, an average of \$14.3 million per project over three years.

To learn more about the Tauber Institute for Global Operations, visit tauber.umich.edu or contact us at (734) 647-1333.