

EDITORIAL

“Six Sigma - Its Application, Practice, and Utility”

Since its inception, the International Journal of Industrial Engineering Theory, Application, and Practice has provided a venue for articles of interest to researchers, practitioners, and consultants from the international community. Until Drs. Anil Mital and Jeffery Fernandez envisioned a new journal that focused on theory, application, and practice, much of what was being published was either in theoretical operations research or ergonomics related topics. This new journal publishes application and practice articles that may be of greater interest to practicing industrial engineers, manufacturing engineers, or production managers in the performance of their duties. Although the emphasis on traditional industrial engineering still remains the primary focus, the venue is now open to case studies and other articles that present emerging ideas that would not be considered by classical or traditional research. The eight articles in this issue address the application, practice, and value of Six Sigma in meeting the challenges of today's quality environment. While assembling this document, the special edition editors were impressed by both the diversity of application and thought.

The first article, *“The Impact of a Material's Inherent and Process Stress on Meeting Specification and Tolerances: A Six Sigma Case Study”*, Jimerson, Fahmy, Fender, Nelms, Powell, and Yearout based attempted to determine if it would be possible to eliminate the final manual lathing process on a 16” (diameter) rear cooling plate whose production required 18 machining processes. Manual lathing was used as the last step because the material characteristics of the plate and the stress induced by the previous processes caused the final product to expand. By using the Six Sigma methodology it was discovered that relaxing the first process tolerances would allow later processes to be numerically machine controlled to more closely conform to the prescribed tolerance of the final product. After the plate was shot peened, measurements confirmed that non-conformance had been eliminated and the final machining process could be discontinued. Cost savings from eliminating the last machining and inspection process were approximately 11% of total cost for the item studied.

The next two articles outline Six Sigma methodology steps to obtain significant improvement in the examined processes. Valles, Sanchez, Noriega, and Nunez's article, *“Implementation of Six Sigma in a Manufacturing Process: A Case Study”*, documented the key factors, identified optimum levels or tolerances, and identified improvement opportunities in the manufacture of inkjet printer cartridges. The case study, *“Six Sigma Improvement Project for Automotive Speakers in an Assembly Process”*, by Valles, Noriega, Sanchez, Martínez, and Salinas, examined an automotive speaker production process in a multinational corporation twin plant. Operations were malfunctioning. High scrap and rework rates, high levels of in-process inventory, and inspection station backlogs all contributed to the problem. The authors found that the large product variation could be attributed to operator procedure, unsuitable fixtures and inappropriate tool use. As a result of this study, the fixtures and tools were re-dimensioned and re-designed.

The fourth article, *“Cycle Time Improvement by a Six Sigma Project for the Increase of New Business Accounts”* by White, Garcia, Hernandez, and Meza, addresses quality issues in acquiring new credit accounts in a financial institution. The article documents an analysis of tasks performed by the management team. Identified changes reduced cycle time from 49 days to 30 days and resulted in an expected annual savings of \$300,000.

The fifth article, *“Troubleshooting Analyses of Production Data”*, by Steffey, Ostarello, Clevenger, and Villarraga, addresses the substantial challenges for statistical analysis that production data may present. Because these data are not generated in controlled experiments, key factors are frequently confounded or nested, observations are unbalanced across factor levels, and a substantial number of values may be missing. The authors aimed to describe and illustrate how production data can be analyzed to provide clues to the sources of quality problems. These investigations were a part of the analysis step in a Six Sigma DMAIC (Design – Measure – Analyze – Improve – Control) methodology and are undertaken to improve the process mean with respect to specification limits and to control process variation. Effectiveness can be measured in subsequent capability studies.

The sixth and seventh articles propose alternatives to the established Six Sigma methodology. In their article, *“DEAPS- An Alternative to DMAIC? A Case Study”*, Bishu, Jones, and Thummalapalli propose an alternative to DMAIC as it applies to health care. DEAPS (Define – Evaluate – Analyze – Prioritize – Sustain) is a strategy based on Lean tools and a revised Six Sigma approach. This new Six Sigma based roadmap was formulated to accommodate and implement an Integrated Health Care System (IHCS). This new methodology provided the project with the adequate flexibility to implement IHCS and demonstrate the results in a public health and human services department. The DEAPS application resulted in a feasible IHCS strategic plan to address the large scale challenges presented by information technology (IT) centralization. In *“Beyond Six Sigma – A Control Chart for Tracking Defects Per Billion Opportunities (dpbo)”*, [add author(s) names] presents an alternative to the classical attributes-based statistical process control (SPC) charts where defects are measured in counts and are cumbersome when coping with such large scale defect possibilities. With this in mind, Santos uses a new control chart for attributes data measured in counts where the plot point per period is represented by defects per billion opportunities (dpbo). In addition to showing the plot point and control chart calculations, an example is provided and analyzed.

In the final article, “*Professional Perceptions of Six Sigma’s Value*”, Myrick and her editors address the evolution of quality control, its application and promises. Quality methodology and tools have not changed much over the years. However, these practices and techniques have been renamed and sold to upper management as the latest and greatest cure for what ails the company. Lean Six Sigma and Six Sigma are the current corporate management repackaged principles that have been extensively marketed to companies. With this initiative has come the promise to top executives that a large return on investment (ROI) can be realized. Are these expectations appropriate for every organization, and do they always hold true?

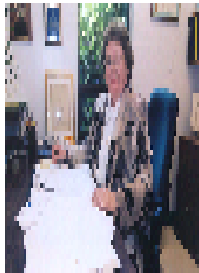
Causal observations by industrial engineers and practitioners in the very broad field of industrial engineering indicate that there are many more non-traditional areas that, when explored, may be of interest to engineering and practitioners in their respective fields. One such topic might be the application of Taguchi Methods in product design that meets Six Sigma methodology and criteria. The editors of this special issue hope that this collection of articles will inspire readers to consider conducting research in more non-traditional areas of their discipline.

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Caudel B. McKenzie Department Chair and Professor of Accounting, B.S. Accounting, Mars Hill College; M.B.A., Western Carolina University. CPA and CMA. Distinguished Teaching Award Recipient 1991 and Board of Governors Award for Excellence in Teaching 1998. In addition to publishing in many accountancy journals, she has published several professional papers and case studies that reflect course objectives. In recent years she has become more interested in researching industrial and manufacturing issues and has published in the International Journal of Industrial Ergonomics and in the Proceedings for the International Conference on Industrial Engineering Theory, Applications and Practice. Mrs. McKenzie also won the Ruth and Leon Feldman Professorship Distinction for Outstanding Scholarship and Service for the 2005-2006 year.



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