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IMPROVED AVAILABILITY AND RELIABILITY IN TEXTILE PROCESSING

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Abstract

The domestic textile industry is experiencing increased competition from foreign industry due to labor and production costs. While some costs are fixed, greater efficiency can lower production costs, thereby increasing asset utilization and resulting in higher shareholder value and increased profits. The cotton processing industry has the ability to collect and analyze real-time production data (from field to fabric) that are seldom fully exploited for the industry's benefit. By following the lead of other industries, a database would be created to benchmark participating facilities and mined for ways to increase availability, reliability, and quality. The database would also serve as a significant resource for future textile research. The end result of this project is the capacity to consult and assist industry, yielding significant and immediate improvements to the financial situation of the textile industry by increasing productivity.

Introduction

A crisis is occurring in the domestic textile industry. Over 234 textile plants have closed with a loss of 177,000 jobs since 1997[1]. While the devaluation of Asian currencies has played a significant role in this crisis, protectionism is not the only option that should be discussed. With the end of the Multi-Fiber Agreement (MFA) in 2005 and an economy that is depending more and more on globalization[2], it is time to look for solutions that can be enacted and controlled locally.

Industry in the United States has a technological edge over most of the countries with which it competes. It is time for the textile sector to take advantage of this edge. Technology can be implemented to optimize the production and operation of a textile mill, thereby increasing efficiency. If a mill is run more efficiently, then there is less waste, which in turn results in higher profits and a healthy industry.

Reliability Management

Reliability Engineering is optimization of a process with a focus on the reliability of said process. In order for a process to be considered reliable, it must be doing what is expected when it is expected. In the textile industry, this means that the entire production process is under control and constantly monitored because every element has an impact on the cost and quality of the final product.

Almost all textile machinery currently is capable of being outfitted with on-line monitoring equipment, allowing for the current state of the machine to be known at any time. On-line monitoring of equipment not only allows for its current state to be known, but the collected data enable accurate future performance forecasting. Forecasting when failures are likely to occur allows a mill to plan maintenance to prevent unplanned downtime, resulting in efficient use of resources.

The raw material used in textile processing is subjected to multiple tests before it is introduced to the manufacturing process. These data can be used to fine tune machinery to produce a superior product.

Environmental factors such as temperature and humidity play an important role in material properties and machinery performance, especially when working with hygroscopic fiber such as cotton. Keeping track of these factors during production may aid in process and quality control. Monitoring and optimizing these factors will allow a textile mill to produce a superior product in a more cost-effective manner.

The textile industry is not alone in facing loss of market share to lower cost foreign competition. Domestic shipyards and ship operators face higher costs than their competitors overseas; however, the maritime industry has managed to compete by instituting reliability engineering.

University of New Orleans faculty in conjunction with maritime organizations around the world have undertaken a venture called RAM/SHIPNET, a network of Reliability, Availability and Maintainability (RAM) databases which have been developed through a cooperative effort of owner/operators, government organizations, and regulatory agencies[3]. RAM/SHIPNET is a working tool for vessel operators, management, and other industry participants to collect and share anonymous performance information. For the program to work, information must be gathered regularly regarding maintenance and failure of systems for entire fleets of ships. Once it is sanitized and made available to participants, this information can be used to

benchmark the performance of one company against like companies in the industry. Additionally, failure data can be used to plan maintenance schedules and make decisions about future capital expenditures. This project has been commercialized successfully[4].

Implementation

A myriad of tools have arisen to assist industry management in the decision-making process. Programs such as ISO 9000 and Six Sigma have provided clear guidelines for increasing productivity and profitability through certification. However, implementation of real *working* tools requires not only participation and documentation through all levels of production, but the use of these collected data to make decisions. Technologies are available to allow the monitoring of product quality in all stages of textile production and testing. Several textile companies have begun to incorporate some of the available technologies[5]. In order to reap the maximum benefit from these technologies, they must be implemented in a planned, consistent manner and integrated into management decision-making. Process improvement will be the next major innovation to be embraced by the domestic textile industry[6].

A partnership between government, textile mills, and industry organizations will allow for a secure and efficient means of sharing information. Mills will collect data from each of the individual manufacturing processes and collect these data into Local Information Systems (LIS) that can be accessed directly by managers. Periodically, the data from each mill's LIS will be sent to SRRC where it will be combined with the data from other participants to form a RAM Database. SRRC will provide access and analysis to the sanitized (anonymous) data. This database will be an invaluable research tool, allowing SRRC to focus its textile research on the immediate needs of the domestic cotton industry using current, 'real world' data. Textile mills will be able to access and review the data and SRRC-provided analysis in order to identify problem areas and opportunities for improvement. Textile mills also will know exactly where they stand in relation to the state of the industry (benchmark). The authors believe that this concept can provide nearly immediate relief to the domestic textile industry with benefits that will increase as time passes.

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