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Total Productive Maintenance

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17.1 Introduction to TPM

Manufacturing organizations worldwide are facing many challenges to achieve successful operation in today’s competitive environment. Modern manufacturing requires that, to be successful, organizations must be supported by both effective and efficient maintenance practices and procedures. The global marketplace has necessitated many organizations to implement proactive lean manufacturing programs and organizational structures to enhance their competitiveness (Bonavia and Marin, 2006). Over the past two decades, manufacturing organizations have used different approaches to improve maintenance effectiveness. One approach to improving the performance of maintenance activities is to develop and implement strategic TPM programs (Ahuja and Khamba, 2007). Among various manufacturing programs, Total Quality Management (TQM), Just-in-Time (JIT), Total Productive Maintenance (TPM) and Total Employee Involvement (TEI) programs have often been referred to as components of “World Class Manufacturing” (Cua et al. 2001).

According to Nakajima (1988), vice-chairman of Japan Institute of Plant Maintenance, TPM is a combination of American preventive maintenance and Japanese concepts of total quality management and total employee involvement. TPM is a methodology originated by Japan to support its lean manufacturing system. TPM is a proven manufacturing strategy that has been successfully employed globally for achieving the organizational objectives of core competence in the competitive environment. TPM implementation methodology provides organizations with guidelines to transform fundamentally their shop-floor by integrating culture, process and technology.

Total Productive Maintenance (TPM) as the name suggests consists of three words:

*Total:* signifies to consider every aspect and involving everybody from top to bottom;
**Productive:** emphasis on trying to do it while production goes on and minimize troubles for production; and

**Maintenance:** means equipment upkeep autonomously by production operators in good condition – repair, clean, grease, and accept to spend necessary time on it.

TPM is considered to be Japan’s answer to U.S. style productive maintenance. TPM is a Japanese concept developed in the 1970s by extending preventive maintenance to become more like productive maintenance. TPM is an innovative approach to plant maintenance that is complementary with TQM, JIT, TEI, Continuous Performance Improvement (CPI), and other world-class strategies (Cua et al. 2006). TPM has been widely recognized as a strategic weapon for improving manufacturing performance by enhancing the effectiveness of production facilities. Originally introduced as a set of practices and methodologies focused on manufacturing equipment performance improvement, TPM has matured into a comprehensive equipment-centric effort to optimize manufacturing productivity. TPM brings maintenance into focus as a necessary and vitally important part of the business. It is no longer regarded as a non-profit activity. TPM describes a synergistic relationship among all organizational functions, but particularly between production and maintenance, for continuous improvement of product quality, operational efficiency, productivity, and safety. TPM is an indispensable strategic initiative to meet customer’s demands on price, quality, and lead-times. Willmott (1994) portrays TPM as a relatively new and practical application of TQM and suggests that TPM aims to promote a culture in which operators develop ‘ownership’ of their machines, learn much more about them, and in the process realize skilled trades to concentrate on problem diagnostic and equipment improvement projects.

From a lean manufacturing perspective, improved efficiency and profitability can be sought by increasing value within an organization through the elimination of waste. TPM focuses on systematic identification and elimination of waste, inefficient operation cycle time, and quality defects in manufacturing and processes (McCarthy, 2004). TPM is based on teamwork and provides a method for the achievement of world class levels of overall equipment effectiveness (OEE) through people and not through technology or systems alone. TPM is an approach to equipment management that involves employees from both production and maintenance departments through cross-functional teams. TPM is not a maintenance specific policy; it is a culture, a philosophy, and a new attitude towards maintenance. An effective TPM program can facilitate enhanced organizational capabilities across a variety of dimensions (Wang, 2006). Strategic TPM implementation success factors like top management leadership and involvement, traditional maintenance practices, and holistic TPM implementation initiatives can contribute towards effecting significant improvements in manufacturing performance (Ahuja and Khamba, 2008c).

The TPM literature offers a number of definitions for Total Productive Maintenance: