International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 05 | May-2016 www.irjet.net p-ISSN: 2395-0072

World Class Manufacturing (WCM) Practices: An Introspection

Sandeep[1], Rajesh Kumar Attri[2], Nitin Panwar[3]

[1]M.tech Student, Department of Mechanical Engineering, YMCA University of Science & Technology, Faridabad, Haryana
[2]Assistant Professor, Department of Mechanical Engineering, YMCA University of Science & Technology, Faridabad, Haryana

---

Abstract - *The implementation of world class manufacturing (WCM) practices have emerged as an effective tool for the manufacturing organizations in order to survive in the present cut-throat competitive scenario. Application of these practices have resulted in the process improvement, productivity improvement, quality and cost reduction. In view of this, the main objective of the paper is to enumerate the basic concepts of WCM practices along with the brief description of various WCM practices.*

Key Words: WCM, tools, techniques, manufacturing, implementation, barriers

1. INTRODUCTION

The presence of cut-throat competition among the manufacturing organizations has forced them to implement the world class manufacturing (WCM) practices in order to remain competitive in the global market. WCM is a collection of concepts, techniques and philosophies, which set standards for production and manufacturing for another organization to follow (Nazir, 2012). The term world class manufacturing was first used by Hayes and Wheelwright in 1984. The aim of world class manufacturing is to achieve global competitiveness by adopting the various principles such as "no waste", "no stock", "no failure", "no defect" (Pałucha, 2012).

The implementation of world class manufacturing practices lead to the improvement of applied processes, increased productivity, improved security, cost reduction, etc. (Pałucha, 2012). According to Montgomery et al., (1996), the goals of world-class manufacturing efforts embrace upholding market share, cultivating profitability and refining the firm's capability to compete in a global market place while Schonberger (1986) stressed that the goal of world-class manufacturing is continual and rapid improvement.

World class manufacturing practices basically includes total quality management, total productive maintenance, 5S, supply chain management, lean manufacturing, just in time manufacturing. According to Gunn (1987), World-Class manufacturing rests on three pillars namely Computer integrated manufacturing (CIM), total quality control (TQC) and just-in-time (JIT) production methods.

The main objective of this paper is to enumerate the basic concepts, principles, benefits and barriers of world class manufacturing practices.

2. WORLD CLASS MANUFACTURING PRACTICES

There are many world class manufacturing practices that help the organizations to achieve their goals more effectively. The adoption of these concepts and practices will help the organizations to improve their efficiency and effectiveness. The most commonly used WCM practices are as follows:

- **Kaizen:** Kaizen is a Japanese term made up of two words namely Kai and Zen. Here, Kai represents the 'do' and Zen represents the 'well'. Kaizen means 'continuous improvement'. It means gradual and continuous progress, increase of value, intensification, and improvement (Karkoszka and Szewieczet, 2007; Singh and Singh, 2015).
- **Lean Manufacturing:** Lean Manufacturing approach is meant to transform non-value added activity into value added activity (Mehta et al., 2012).The main purpose of implementing the lean manufacturing is to condense the waste so as to become more approachable to the customer demand. Moreover, it targets at the production of product for the customer in the lowest cost as well as in less time (Bhamu and Sangwan, 2014).
- **Total Quality Management (TQM):** TQM is a quality improvement approach which is increasingly implemented by manufacturing and service organizations in order to improve the performance

in terms of quality, productivity, customer satisfaction, and profitability (Sadikoglu and Zehir, 2010; Singh and Ahuja, 2013). The main elements of TQM are 'Total', 'Quality' and 'Management'. Here, Total refers to the involvement of all the employees working in the organization. Quality refers to the 'fitness for the purpose' and Management refers to the managing the system.

- **Just in Time (JIT):** JIT concept was developed by Taiichi Ohno (1982). JIT is a method of continuous manufacturing improvement which is based on eliminating all the waste in manufacturing process so as to achieve the competitive advantage over the other organizations (Singh and Ahuja, 2012). It is considered as a production method to evolve a defect free process (Chenand Podolsky, 1996; Singh and Ahuja, 2013).
- **5S:** 5S is a systematic philosophy for ensuring optimum workplace productivity, quality, output and safety (Voelkel and Chapman, 2003; Kumar and Kumar, 2012; Singh and Ahuja, 2014). 5S refers to the five Japanese words namely Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. The acronym of these words in English language is Sort, Set, Shine, Standardize, and Sustain.
- **Total Productive Maintenance:** Total Productive Maintenance (TPM) is an important world class manufacturing program introduced during the quality revolution (Ahuja and Khamba, 2008). TPM help in streamlining the manufacturing and other business functions, and gathering continuous profits (Ahuja and Khamba, 2007). Moreover, TPM is considered as a beneficial tool for improving the manufacturing performance by augmenting the effectiveness of production facilities (Dwyer, 1999; Dossenbach, 2006).
- **Supply Chain Management (SCM):** SCM practices basically aims in the management of integration and coordination of supply, demand and relationships for the fulfillment of customer requirements in effective and profitable manners (Wong et al., 2005; Singh et al., 2010). Chopra et al., (2006) have stated that the SCM consists of various methodologies which integrate the suppliers, manufacturers, distributors and customers more effectively in order to refine the long term performance of the organizations.
- **Six-Sigma:** Six-Sigma has been considered as a more beneficial approach for improving the organizational productivity (Kumar et al., 2008; Dubey et al., 2015). Brun (2011) has illustrated six-sigma as an approach to improve manufacturing processes. Moreover, It is also considered as a formal and disciplined approach for defining, measuring, analyzing, improving and controlling the processes (Antony and Banuelas, 2002). Six-sigma basically drives out the variability and reduce waste in processes with the help of statistical tools and techniques (Coronando, and Antony, 2002).

3. BENEFITS OF WCM PRACTICES

The benefits achieved through the implementation of WCM practices are as follows:

- Improvement in quality
- Improvement in productivity
- Better communication
- Reduced cost
- Reduced paper work
- Increased employee participation
- Better innovations
- Reduced waste

4. FACTORS RESPONSIBLE FOR WCM PRACTICES

There are a number of factors which are responsible for effective implementation of world class manufacturing practices. These factors are very important as they make the implementation easier. Some of these factors are listed below:

- **Top management commitment:** Top management is very necessary for the implementation of any new program. Top management of the organization should lay down the rules and regulations for the effective implementation of a program.
- **Education and Training:** Education and training is also an important aspect in the implementation of a new management program. With the help of education and training, the employees get the knowledge of basic concepts, implementation procedure of the program to be implemented.
- **Motivation and empowerment:** Top management of the organization should motivate its employees to effectively participate in the implementation of

new quality program. Motivation can be in any form like money, empowerment.

- **Proper leadership:** Top management of the organization should give proper guidance for the effective implementation of the new program.
- **Proper planning:** The implementation of any management program depends upon the proper planning.

5. BARRIERS IN IMPLEMENTATION OF WCM PRACTICES

The barriers which inhibit the successful implementation of WCM practices are as follows:

- Lack of top management support
- Poor planning
- Cultural Resistance
- Lack of knowledge
- Lack of communication
- Lack of motivation
- Lack of education and training

6. CONCLUSION

The implementation of world-class manufacturing (WCM) practices in an organization leads to the better competitive advantage over the other organizations. It basically includes the various tool, techniques and methodologies such as total quality management, total productive maintenance, just-in-time manufacturing, supply chain management and six-sigma etc. The implementation of these WCM practices is not an easy task due to presence of some hurdles. These hurdles need to be handled carefully in order to make the implementation process easier.

REFERENCES

[1] Ahuja, I.P.S. and Khamba, J.S. (2007) An Evaluation of TPM Implementation Initiatives in an Indian Manufacturing Enterprise, Journal of Quality in Maintenance Engineering, Vol. 13, No. 4, pp. 338-352.

[2] Ahuja, I.P.S. and Khamba, J.S. (2008) Total productive maintenance implementation in a manufacturing organisation, International Journal of Productivity and Quality Management, Vol. 3, No. 3, pp. 360-381.

[3] Antony, J. and Banuelas, R. (2002) Key ingredients for the effective implementation of six sigma program, Measuring business excellence, Vol. 6, No. 4, pp. 20-27.

[4] Bhamu, J. and Sangwan, K.S. (2014) Lean manufacturing: literature review and research issues, International Journal of Operations & Production Management, Vol. 34, No. 7, pp. 876-940.

[5] Brun, A. (2011) Critical success factors of Six Sigma implementations in Italian companies, International Journal of Production Economics, Vol. 131, pp. 158-164.

[6] Chen and Podolsky (1996) Just-in-Time Manufacturing: An Introduction, 2nd edition, Chapman & Hall, London.

[7] Chopra, S., Meindl, P. and Kalra, D.V. (2006) Supply chain management: strategy, Planning and Operation, Pearson Education, Inc.

[8] Coronando, R.B. and Antony, J. (2002) Critical success factors for the successful implementation of six-sigma projects in organisations, The TQM Magazine, Vol. 14, No. 2, pp. 92-99.

[9] Dossenbach, T. (2006) Implementing total productive maintenance: a successful TPM program will help you eliminate defects, machine breakdowns and accidents, Wood and Wood Products, Vol. 111, No. 2, pp. 29-32.

[10] Dubey, R., Gunasekaran, A., Childe, S.J., Wamba, S.F. and Papadopoulos, T. (2015) Enablers of Six Sigma: contextual framework and its empirical validation, Total Quality Management, Available online at http://dx.doi.org/10.1080/14783363.2015.1075877.

[11] Dwyer, J. (1999) More than a maintenance technique, Works Management, Vol. 52, No. 9, pp. 15- 26.

[12] Gunn, T.G. (198) Manufacturing for Competitive Advantage, Ballinger Publishing Co., Cambridge, Massachusetts.

[13] Karkoszka, T. and Szewieczet, D. (2007) Risk of the processes in the aspect of quality, natural environment and occupational safety, Journal of Achievements in material and manufacturing Engineering, Vol. 20, No. 1, pp. 539-542.

[14] Kumar, K. and Kumar, S. (2012) Steps for implementation of 5S, International Journal of Management, IT and Engineering, Vol. 2, No. 6, pp. 402-416.

[15] Kumar, U.D., Nowicki, D., Ramirez-Marquez, J.E. and Verma, D. (2008) On the optimal selection of process alternatives in a Six Sigma implementation, International Journal of Production Economics, Vol. 111, No. 2, pp. 456-467.

[16] Mehta, R.K., Mehta, D. and Mehta, N.K. (2012) An Exploratory Study on Implementation of Lean Manufacturing Practices (With Special Reference to Automobile Sector Industry), Journal of Management and Economics, Vol. 19, No. 2, pp. 289-299.

[17] Montgomery, J.C. and Levine, L.O. (1996)The Transition to Agile Manufacturing, ASQC Quality Press, Wisconsin.

[18] Nazir, S.M. (2012) world-class manufacturing practices - The best strategy for Indian manufacturing organisations to endure in new millennium, Abhinav National Monthly Refereed Journal of Research in Commerce & Management, Vol. 1, No. 6, pp. 144-160.

[19] Ohno, T. (1982) How the Toyota production system was created, Japanese Economic Study, Vol. 10, No. 4, pp. 83-101.

[20] Pałucha, K. (2012) World Class Manufacturing model in production management, Archives of Materials Science and Engineering, Vol. 58, no. 2, pp. 227-234.

[21] Sadikoglu, E. and Zehir, C. (2010) Investigating the effects of innovation and employee performance on the relationship between total quality management practices and firm performance: an empirical study of Turkish firms, International Journal of Production Economics, Vol. 127, No. 1, pp. 13-26.

[22] Schonberger, R.J. (1986) World Class Manufacturing: The Lessons of Simplicity Appied, The Free Press, New York, NY.

[23] Singh, A. and Ahuja, I.S. (2014) Evaluating the impact of 5S methodology on manufacturing performance, Int. J. Business Continuity and Risk Management, Vol. 5, No. 4, pp. 272-305.

[24] Singh, G. and Ahuja, I.S. (2012) Just-in-time manufacturing: literature review and directions, International Journal of Business Continuity and Risk Management, Vol. 3, No. 1, pp. 57-98.

[25] Singh, G. and Ahuja, I.S. (2013) Strategies and success factors for overcoming challenges in JIT implementation in Indian manufacturing industry, International Journal of Technology, Policy and Management, Vol. 13, No. 1, pp. 15-33.

[26] Singh, J. and Singh, H. (2015) Continuous improvement philosophy – literature review and directions, Benchmarking: An International Journal, Vol. 22, No. 1, pp. 75-119.

[27] Singh, K. and Ahuja, I.S. (2013) Synergistic suitability of transfusion of TQM-TPM for Indian manufacturing industries using fuzzy-based model simulation, International Journal of Business Continuity and Risk Management, Vol. 4, No. 1, pp. 36-53.

[28] Singh, R.K., Sharma, H.O. and Garg, S.K. (2010) Interpretive structural modelling for selection of best supply chain practices, International Journal of Business Performance and Supply Chain Modelling, Vol. 2, Nos. 3/4, pp. 237-257.

[29] Voelkel, G.J. and Chapman, C.D. (2003) Frontiers of quality: value stream mapping, Quality Progress, May, Vol. 36, No. 5, pp. 65-69.

[30] Wong, Y.C., Arlbjqrn, S.J. and Johansen, J. (2005) Supply chain management practices in toy supply, Supply Chain Management: An International Journal, pp. 367-378.