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## QUALITY AND WORLD CLASS MANUFACTURING

**Abstract:** *The World Class Manufacturing (WCM) is a contemporary concept that is applied by the world leaders in the business. In this concept, one of the nine pillars is directly related to the quality and the other eight are related to it indirectly. That is why is very important to investigate relations between this concept and concept of model of quality. In the end of this paper are appointed the examples of best practice.*

**Keywords:** *Implementation, PDCA, 7 steps*

### 1. INTRODUCTION

Although we have witnessed the changes of economic structure from manufacturing to services, there remains a significant influence of production in creating new value and competitiveness, the level of organization, region or state. Therefore, it is still very contemporary concept of world class manufacturing (WCM - World Class Manufacturing), which was developed in nineties of the twentieth century, Hausan, Schönberger and many others. They found that existing methods of measuring the excellence of manufacturing organizations, especially those that make the products according to work orders (MTO - Make To Order) no longer meeting requests, and it was necessary to develop a new concept that, in addition to a more realistic description of the processes, allows benchmarking on the global level.

In Serbia, this concept is used mostly by foreign-owned companies, with international or combined management, where they monitor changes in the competitiveness of any organization on a monthly basis. If they are a part of international company, they conduct regular internal benchmarking with other companies.

### 2. WCM BASICS

World Class Manufacturing represents a synthesis of various concepts, principles, policies and techniques for the management and operation of companies engaged in production. It's guided by the results of which enabled the revival of Japanese manufacturing after World War II and adapted the ideas that were used in the Japanese automotive, electronic and black industry, in order to achieve competitive advantage. The primary goals are to continually improve the quality, cost, production time, flexibility and customer service.

World Class Manufacturing is not a cure and should not be accepted as a religion. This is an operating strategy that if it is properly applied, gives a new dimension of production which correspond to rapid inclusion of new high quality products, faster decisions and increased productivity products.

WCM system is based on systematic reduction of all types of costs and losses from the contribution of all employees and the precise use of methods, standards and tools required by world class production. The picture below shows the functioning of WCM methodology, where it is clear

that the main goal of this system will reach zero in the waste, defects, faults and stocks, and values of this system are greater involvement of people, creating better values and more satisfied customers.

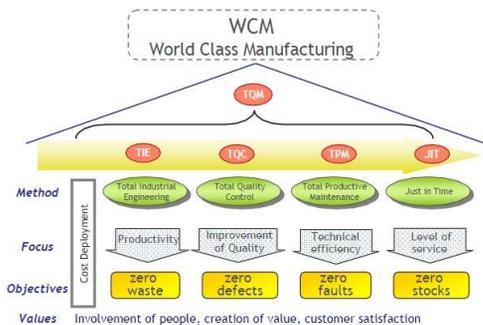


Figure 1. WCM Concept

### 3. WCM ORGANIZATION

World class manufacturing is based on twenty pillars. On the figure 2 WCM pillars are listed, which are divided into two groups. There are ten technical and ten managerial pillars of production.

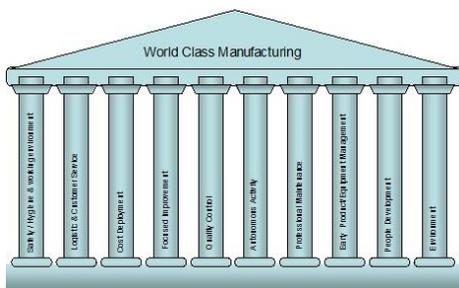


Figure 2. WCM Pillars

Each technical pillar must achieve a certain goal and they have full support from managerial pillars. With managerial pillars are requirements have been prescribed that needs to be met in order to gain better working conditions and progress of technical pillars. Each technical pillar, following

prescribed standards, must go through seven steps, where each needs to fulfill certain tasks in order to go to the next step. Although we have a variety of pillars with different objectives and targets, they are closely affiliated with each other and one without the other can not work. For example, the pillar of Safety has the target to eliminate accidents, Cost Deployment aims to identify the problems from the standpoint of cost and to show to others where the same are at maximum in order to focus on their elimination. The pillar for Focused Improvement develop new knowledge and reduce costs by using appropriate methods, the pillar of Workplace Organization and Autonomous Maintenance aims to raise the competence of people on the shopfloor with right organization of the workplace where the costs are highest and where intensive work is needed. Thus, the pillars are like a linked chain, build upon each other and their cooperation, providing support for company WCM temple.

Ten managerial pillars in short are foundation of WCM:

- 1) Commitment – If the board members are not aware of or do not support the management in their objective of achieving world class levels of performance, the company is doomed to fail.
- 2) Involvement – All the people are not only aware of the goals and objectives of the business but they are a part of achieving them.
- 3) Communication – Before people can commit to a concept or an ideal they need to be told about it. They need to understand the how's and the why's of a decision and an objective. It is important for people to know how well they are performing against their objectives and also how the overall business is progressing towards its goals.
- 4) Understanding – Understanding what and where problems are is the starting point for making improvements.
- 5) Measurement – Measurement is key to

- quantify problems and prioritize them and to determine the effectiveness of improvement activities. It is necessary to measure performance before and after implementation to determine if and to what extent the changes have improved performance.
- 6) Deployment – Deployment relates to how objectives are translated into action.
  - 7) Implementation – Implementation of right solutions with rigor by right people to identified problems is central to success. People can also learn things better by doing them and grow.
  - 8) Evaluation – Evaluation needs to be an integral part of the improving process to see whether the identified problems have been solved.
  - 9) Standardization – Once the evaluation cycle is completed, it is time to standardize the method to manage the process to sustain the obtained result after solving the problem and not to have the same problem again.
  - 10) Documentation – Documentation is to accumulate created knowhow to prevail and use it in other area and in the future.

#### 4. PROBLEM SOLVING TECHNIQUES

The WCM system must first identify the issues to be discussed, then determine where they are and prioritize them according to cost analysis. After that, it is necessary to determine the right methods to estimate how much it cost solution to the problem with these methods. It is necessary to implement a solution with rigor and evaluate the results obtained from the original objective. The 7 steps of WCM way:

- 1) Identify What problems need to be addressed
- 2) Detect Where are the problems
- 3) Prioritize them based on cost deployment
- 4) Analyze them and choose Right

- 5) Estimate How much they cost to be solved
- 6) Implement solutions with rigor
- 7) Evaluate the achieved results against the original objective

To solve problems we can use WCM tools which can be split into three groups: tools for the description of the problem (eg 5W +1 H, 5G), to find the root cause (4M, 5Why's) and to standardize the results (eg, OPL, GAV ). When problem arise it needs to be described with the use of appropriate tools. Tools 5W +1H we can describe deeply the problem by completing a standardized form with questions. After detailed problem description we can start to search for the root cause of the problem with the tools 4M (Men, Machine, Material, Method), which uses a fish bone diagram for describing all possible root causes of the problem, which can be caused by man, machines, methods or materials. After generating all possible root causes they needs to be analyzed one by one in order to eliminate ones that are not really root cause. In the end, the remaining possible root causes are analyzed into the depth of the problem using the tool 5Why's. Ask ourselves Why, at least five times, we can determine the actual root cause of the problem. The above tools are tested and they can help in faster and easier problem elimination with removing possibility of arising again. At the end of a successful problem elimination, solution of the problem is accepted as a standard and helps to eliminate future same or similar problems.

As all the WCM pillars, and implementation of WCM approach has 7 steps. Those steps are presented on Figure 3, with all the major activities that are necessary to be completed in order to finish full implementation.

Step 1 deals with safety and environment - These are fundamental issues for a manufacturing company to be responsible for the safety of the people who work there and for being a respectable existence for the community surrounding it.

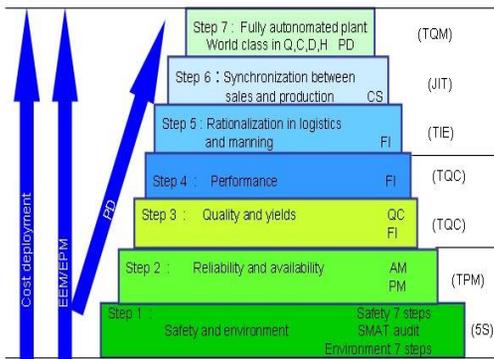


Figure 3. Seven Steps of WCM approach

Step 2 relates to reliability and availability – These require to develop the skills, capabilities and experience of operators under the heading of “Autonomous Maintenance” and to involve the maintenance crew in doing work to ensure that plant and equipment do not break down during required production periods. The maintenance crew need to develop a deep understanding of the plant and equipment under their care. This process needs to be carefully managed to balance the cost-benefit relationship between maintenance costs and delivered performance improvements.

Step 3 seeks to build on the quality and the yields being achieved from processes – The focus is on building-in quality at the process, and maximizing yields, looking for ways to minimize waste and losses by the use of the tools of quality and especially Total Quality Control.

Step 4 brings the full focus on to performance - By this time the company and its people understand their operations and processes in a very deep way. Planned daily production output must be achieved and plant performance is at its highest level. Achievements being made at steps 1, 2 and 3 enable the improvements at Step 4.

Step 5 moves towards the use of the tools and techniques of Total Industrial Engineering – The focus is on rationalization in both the areas of logistics (production and service delivery). Efforts must be made to reduce the logistics burden both internally

and externally. Step 5 is also meant to introduce LCA and labour saving devices.

Step 6 looks at completing synchronization between the sales and manufacturing areas. Efforts must be used in order to look at the full supply chain and to identify and remove waste and losses throughout the system. Companies focus their attention on the advanced use of Just in Time techniques, using their responsiveness to meet market needs rather than relying on large inventories of either finished goods or raw materials. It is important to realize that Step 6 looks at waste along the full supply chain. This chain stretches from the raw material suppliers right through to the consumer.

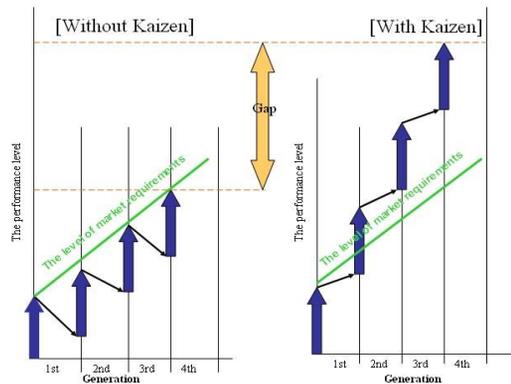


Figure 4. Increasing the performance level with and without Kaizen approach

Step 7 is the point where businesses are fully aligned with market requirements. Automated and automated plants and machines are producing at world class levels in terms of both internal and delivered Quality, where product, warranty and full life Costs are at the highest levels, where Deliveries are made as and when the customers require, each and every time and where the workforce can operate in a safe and healthy environment. The best way to achieve good results in WCM implementation is to apply Kaizen methodology. As shown on Figure 4, performance level can be reached at very high level with Kaizen methodology, by improving working standards.

## 5. CONCLUSION

In a world class company, there are a few positive differences in many aspects from other companies. There is no short cut to become a world class one. The essence of success is to do right things thoroughly. Company should not make wrong efforts but

right efforts to become a world class one. To apply WCM gives a way to become a world class one. For this company must create competent leaders. WCM implementation is a matter of time. The main question is whether it is possible to have long term commitment of the top management?

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