Chapter 2
Today's Global Manufacturing Issues:
Innovation of Manufacturing Fundamentals

ABSTRACT

Global manufacturing is currently facing major transformations. First is the shortened life cycle of products due to the diversification and sophistication of customers' needs. Because of this, the manufacturers need to realize the shortest lead time possible in cooperation with their suppliers from the product development stage, through to manufacturing, and finally to sales, so that they are able to respond to this change. Second, it is essential to create a new corporate management technology necessary for the deployment of global production, worldwide uniform quality, and simultaneous production and to manage such production in a systematic and organized manner. Based on this, the author believes it necessary to establish a new management technology toward innovation of manufacturing fundamentals for all the business processes of each department from upstream to downstream.

INTRODUCTION

The leading Japanese management technology that contributed most to worldwide manufacturing from the second half of the 20th century was the "Japanese Production System". This is typified by the "Toyota Production System" (TPS) (Ohno, 1977; Totota Motor Corp., 1987; Amasaka, 1988, 2002, 2006). This system has been further developed as production systems called "Just in Time" (JIT) and Lean System (Hayes and Wheelwright, 1984; Roos, et al., 1990; Womack, et al., 1991; Womack and Jones, 1994). The Japanese manufacturing represented by TPS constitutes the basis for the manufacturing carried out today worldwide (Refer to Chapter 3 in detail).

Conventional Japanese manufacturing has developed from in-house production to cooperative relationships with suppliers (parts manufacturers), but since the beginning of the 21st century, the production bases have shifted from domestic to overseas sites and the management technology has become increasingly complicated (Amasaka, 2004c, 2008a).

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The current task of today's manufacturing is to succeed in global production. A key to this is the deployment of supply chain management on a global scale that encompasses cooperative business operations, even with overseas suppliers, and the ever growing necessity for the systemization of such operation methods (Amasaka, 2000, 2004a,b, 2008a,b).

In particular, during the implementation stage the parallel use of partnering, Supply Chain Management (SCM), and digital engineering will become necessary as they are essential for the deployment of the main components of JIT, namely, TPS and Total Quality Management (TQM). Therefore, in-depth study of the kind of management technology that will be effective even for next-generation business operations is urgently needed as well. To realize this, specifically, the author believes it necessary to establish a new management technology toward "Innovation of manufacturing fundamentals" for all the business processes of each department from upstream to downstream (Amasaka, 2008b, 2009a).

On a concrete target, first is the shortened life cycle of products due to the diversification and sophistication of customers' needs (Amasaka, 2005; Amasaka Ed., 2007; Amasaka et al., 2008). Because of this, the manufacturers need to realize the shortest lead time possible in cooperation with their suppliers from the product development stage, through to manufacturing, and finally to sales, so that they are able to respond to this change (Amasaka, 2003, 2004c, 2005). Moreover, second, it is essential to create a new corporate management technology necessary for the deployment of global production, worldwide uniform quality, and simultaneous production and to manage such production in a systematic and organized manner (Amasaka, 2007a,b,c,e, 2014)

MANUFACTURING SHIFTING TO GLOBAL PRODUCTION

Advanced companies in the world, including Japan are shifting to global production to realize *uniform quality worldwide and production at optimum locations* for survival in fierce competition. To attain successful global production, technical administration, production control, purchasing control, sales administration, information system, and other administrative departments should maintain close cooperation with clerical and indirect departments while establishing strategic cooperative and creative business linkages with individual development, production and sales departments, and outside manufacturers (suppliers) (Amasaka, 2007a).

Today, consumers have quick access to the latest information in the worldwide market thanks to the development of Information Technology (IT), and strategic organizational management of the production control department has become increasingly important. Simultaneous attainment of quality, cost and delivery (QCD) requirements is the most important mission for developing highly reliable new products ahead of competitors (Amasaka, 2004a,b, 2005, 2008a,b).

This requires the urgent establishment of an innovative production control system for the next generation (called next-generation production control system). With a view to assuring that future management technology is a new leap forward for Japanese manufacturing, the progress of production control of plants in the manufacturing industry made so far by the manufacturing industry is summarized in Figure 1 (Amasaka, 2004a; Amasaka et al., 2008).

In the figure, the basis of the major production control methodologies, such as industrial engineering (IE), operations research, quality control, management of administration, marketing research, production control, and IT, are plotted along the vertical axis. Along the horizontal axis, some of the key elemental technologies, management methods, scientific methodologies, and so on are mapped out in a time series.