An Analysis on Agile Manufacturing System

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ABSTRACT - Through the modern years, opposition is intensified due to the globalization and the access of numerous players in markets. This circumstance has facilitated the modern customers to stipulate innovative products and models in varied volumes. In order to fulfill this customer demand, it is required for the traditional industrialized companies to practice agile manufacturing (AM) principles. On implementation of AM, a conventional company can demonstrate agility by which it reacts quickly to meet the customer’s dynamic demands. In this paper, we review a wide variety of recent literature on agile manufacturing. We critique these bodies of work and recommend directions for supplementary research and identify topics where fruitful opportunities exist.

Keywords: Agile manufacturing, Agile Supply Chain, Fuzzy Logic.

I. INTRODUCTION

Agile Manufacturing (AM) is a moderately new operations concept that is planned to recover the competitiveness of terms. Industrialized or examine processes based on AM are characterized by customer to supplier integrated processes for product design, manufacturing, advertising, and support services. It requires elevating of the customer cooperating with competitors and organizing to supervise modifies indecision and complexity and leveraging people and information. In recent years a number of research papers have been published in the area of AM. Though there are still some severe concerns that avoid companies from taking an entirely different direction from AM. Making an allowance for the probable importance of agile manufacturing in 21st century manufacturing competitiveness an attempt has been made in this paper to re-examine the scope, definitions and strategies of AM. In adding together a framework has been obtainable as a basis for understanding the major strategies and applicable technologies of AM.

Businesses are reformation and re-engineering themselves in reaction to the challenges and demands of the 21st century. The 21st century business will have to conquer the challenges of customers looking for the high quality, low cost products, and be responsive to customer’s specific distinctive and quickly changing needs. Agile enterprises correspond to a comprehensive industrial competition mode for 21st century manufacturing. Agility addresses latest way of running companies to meet these challenges. In a varying competitive environment there is a necessitate to develop organizations and facilities that are appreciably more flexible and approachable than existing ones. Agility requires the potential to survive and prosper in a competitive environment of continuous and unpredictable change by reacting quickly and effectively to changing markets, driven by customer designed products and services. The solution enablers of agile manufacturing consist of fundamental enterprise formation tools or metrics, actually circulated manufacturing architecture and teams, express partnership formation tools or metrics, synchronized engineering, incorporated product or production or business information system, rapid prototyping and electronic commerce.

Agile manufacturing is a revelation of manufacturing that is a ordinary expansion from the original concept of lean manufacturing. In lean manufacturing, it emphasis is on the elimination of waste. The condition for organizations and conveniences to become more flexible and responsive to customers led to the concept of ‘agile’ manufacturing as a discrimination from the ‘lean’ organization. This prerequisite for manufacturing to be able to respond to unique demands moves the balance back to the situation prior to the introduction of lean production, where manufacturing had to react to whatever
pressures were imposed upon it, with the risks to cost, speed and quality. Agility should be based on not only receptiveness and elasticity, but also the cost and quality of goods and services that the customers are equipped to accept. During the essential to link agile capabilities in manufacturing with product desires in the marketplace. Agility as a concept increases the emphasis on speed of response to new market opportunities.

II. LITERATURE REVIEW

In this segment, we investigate a variety of definitions and a range of concepts with the objective of developing a new and feasible concept of AM. The reason for analyzing the present conceptions and definitions of AM is to identify the gap between practice and theory in order to improve the confidence of practitioners. The focus is on the integration of critical functional areas with the help of advanced design and manufacturing technologies, and alignment among the strategies. According to Gupta and Mittal (1996), AM is a business concept that integrates organization, people and technology into a meaningful unit by deploying sophisticated information technologies and flexible and agile organization structures to sustain highly skilled, knowledgeable and motivated people. ‘Lean’ implies high efficiency and quality, but it does not automatically imply being responsive. ‘Agile’ on the other hand, stresses the importance of being highly responsive to meet the ‘total needs’ of the customer, while concurrently striving to be lean manufacturer whose primary goal is to be lean compromises responsiveness over cost efficiencies. Agile manufacturers place identical consequence on both cost and responsiveness. This is the major reason for incorporating cost and quality into agile competitive bases (Yusuf et al. 1999). Agile manufacturing can be said to be a comparatively new, post-mass production concept for the creation and distribution of goods and services. It is the ability to succeed in a competitive environment of continuous and unanticipated change and to respond quickly to rapidly changing markets driven by customer-based valuing of products and services (DeVor and Mills 1995). It includes rapid product realization, highly flexible manufacturing, and distributed enterprise integration. DeVor and Mills (1995) argue that technology alone does not make an agile enterprise. Companies should find the right arrangement of strategies, culture, business practices, and technology that are necessary to make it agile, taking into account the market characteristics.
As declared before agile manufacturing is determined by the require to react quickly to changing customer requirements. It anxiety a manufacturing system that is able to produce efficiently a large mixture of products and to be reconfigurable to provide accommodation changes in the product mix and product designs. Manufacturing system reconfigurability and invention variety are significant aspects of agile manufacturing. The concept of agility has an impact on the design of assemblies. To implement agile manufacturing, methodologies for the design of agile manufacturing are needed. Propose for agile assembly is accomplished by considering the operational issues of assembly systems at the early product design stage (Kusiak and He 1997).

According to Tu (1997), the manufacturing industry, that is OKP (One-of-a-Kind Production) industry, tends to be lean, agile and global. This predisposition leads to a new concept of a virtual company that consists of several sub-production units biologically isolated in the world as branches, joint ventures and subcontractors. Many OKP companies, such as those in ship construction have become virtual companies. For these virtual companies, conventional production control and management systems, methods and theories do not assure their requests for production planning and control. For some companies, therefore, there is a need to be altered into a virtual enterprise in order to become agile. Though, selecting partners based on flexibility and receptiveness alone will not lead to a reduction in cost and an development in the quality of products and services.

A much wider spectrum of factors desires to be taken into account. Agile manufacturing is an expression that is used to characterize the ability of a producer of goods and services. The changes required for agile manufacturers to thrive in the face of incessant change can occur in markets, in technologies, in business relationships and in all facets of the business enterprise (DeVor et al. 1997). Such changes according to Kidd (1996) are not about small-scale continuous improvements, but an completely dissimilar way of doing business. Agile manufacturing requires one to meet the altering market requirements by appropriate alliances based on core-complementary competencies, organizing to manage change and indecision, and leveraging people and information (Gunasekaran 1998, 1999a, Yusuf et al. 1999).

III. AGILE MANUFACTURING STRATEGIES AND TECHNOLOGIES

3.1. Strategic planning:

In routine enhancement is fast attention in all areas of manufacturing. The motivation for this is that it takes into version the enduring interest of the company in formative suitable business and operational policies. To accomplish agility in manufacturing, several sub-strategies are needed, together with virtual enterprise, rapid-partnership formation, rapid prototyping, and temporary alliances based on core competencies. Without appropriate business and operations strategies, technologies and systems alone are not sufficient to complete agility. Agile manufacturing can be achieved through customer-integrated multidisciplinary teams, supply chain partners, flexible manufacturing, computer-integrated information systems, and modular production facilities.

Fig 2. Agile manufacturing strategies/techniques.

3.2. Product design:
The agile manufacturing system is supposed to produce a mixture of components at low cost and in a minimum period. The design rule reduces industrialized lead times in successive changes of product models. Beside with changes of product models, machines are relocated allowing for the overall costs of material management and configuration. Agility in manufacturing requires a change around the configuration of product development teams. These teams include legislature with different proficiency such as design, manufacturing, quality assurance, purchasing, marketing, field service and support. Change has also incorporated relaxing those policies that inhibited design changes and as long as greater influence and accountability to members of design teams. Organization change in a manufacturing surroundings requires a more efficient method of at the same time as designing both the product and the downstream processes for production and support. It requires a rapid product design system with the purpose of switching over to new products as rapidly as possible. It desires a system to group a mixture of resources and products to reduce the non-value adding behavior and hence the time to reach market with the right products at the right time.

3.3. Virtual enterprise:

A virtual organization is the combination of corresponding core competencies disseminated among a number of carefully chosen, but real organizations all with similar supply chains focusing on speed to market, cost reduction and quality (Abair 1995). Normally a single organization recurrently may not be able to respond quickly to changing market requirements. Temporary alliances or partnerships based on core competencies of conditions will help to improve the elasticity and responsiveness of organizations. During synchronization and integration could be complicated. Apposite strategies and methodology, which will involve statement, training and education, and goal deployment, must be adopted for an efficient harmonization and integration of participating terms at dissimilar levels of cooperation.

Virtual Manufacturing (VM) is an incorporated imitation manufacturing environment used to improve all levels of decision and control in a manufacturing enterprise. The agile enterprise requires VM to respond to changing market requirements quickly. VM environments are being proposed to progress receptiveness to improve the product and process design, reduce manufacturing risks, improve manufacturing design and operation, support manufacturing system changes, augment product service and repair, increase manufacturing understanding and provide a vehicle for manufacturing training and research. The VE environment places a number of particular requirements on the process design activity. Since virtual enterprises are momentary such organizations must be easily assembled and disassembled. Individual partner organizations do not finish existing during their membership of the VE. This point highlights another important issue that of security. Security matters necessitate appropriate industrial legislation and legal protection to be established.

3.4. Automation and Information Technology:

Agile manufacturing desires intelligent sensing and decision making systems competent of repeatedly performing many tasks conventionally executed by human beings. Visual inspection is one such task and consequently there is a need for effective automated visual inspection systems in AM environments. The systems for AM should include mostly software or decision support systems for a variety of planning and control operations as well as materials requirements planning, design, manufacturing resource planning, scheduling, and production planning and control. Based on the nature of AM environments, we converse the various control systems required for AM environments. There are several computer integrated systems that could be used for AM; some of them are as follows: (i) MRPII, (ii) Internet, CAD/CAE, (iii) ERP, (iv) Multimedia, and (v) Electronic Commerce.

IV. CONCLUSION

In this paper an effort has been finished to review the literature on AM with the aim of revising the outlook for agility in manufacturing and identifying consequent major strategies and technologies of AM.
Two key characteristics of manufacturing companies discussed, in this paper are Agility the ability of a company to effect changes in its systems structure, organization and Responsiveness. The ability of a company to get together information from its commercial environment and to detect and anticipate changes, to recover from changes and to recover as a result of change. Being agile in such environments means being flexible, cost effective, and productive and producing with consistent high quality. All company will react in a specific and different way deploying its own agile characteristics. The problem of identifying, analyzing and evaluating agility is that no commonly accepted practical frame of situation or analytical structure exists. Most of the available systems that Is control and information are developed for conventional manufacturing environments where a static market behavior and resources have been engaged for producing goods and services.

REFERENCES