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ScienceDirect

Procedia Manufacturing 20 (2018) 135–140

Procedia MANUFACTURING

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2nd International Conference on Materials Manufacturing and Design Engineering

REAL-TIME MONITORING SYSTEM TO LEAN MANUFACTURING

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Abstract

Future of the manufacturing industry is the combination of lean and cloud manufacturing which is a promising paradigm for next-generation manufacturing system. Lean practice is one of the best methods used by the manufactures around the world to enhance their competitiveness. It is believed that lean practice will result in reducing waste and control the essential processes related to the production. Even though lean manufacturing system is very reliable and trustworthy concept in large scale industries but still there are some flaws and challenges faced by SMEs industries to make it run successfully. To overcome these challenges and problems, we will rely on the cloud manufacturing concept while applying lean manufacturing methodology. Cloud platform will have a potential to collect the real-time production monitoring and will have a very close look at the inventory stock so that next order for raw material could be placed whenever it is required. With the combination of lean and cloud manufacturing, the new approach will provide us with a very flexible approach towards the production and will keep monitoring the scheduling the dispatching of the finished product as per the market requirement. In this paper, discuss a case study based on the cloud manufacturing and lean manufacturing system together to see how it will benefit and can be used to enhance productively in SMEs industry. With this combination of cloud and lean manufacturing and with the help of electronics system in it a partial automation system was established.

Peer-review under responsibility of the scientific committee of the 2nd International Conference on Materials Manufacturing and Design Engineering.

Keywords: Lean, Internet of things, Production monitoring system (PMS), Programmable logic circuit (PLC), Real-time.

1. Introduction

In today's competitive world, the customer wants accurate and quality products, there is no room for error. Delighting

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2351-9789
Peer-review under responsibility of the scientific committee of the 2nd International Conference on Materials Manufacturing and Design Engineering.
10.1016/j.promfg.2018.02.019

the customers and finding the new ways to exceed their expectations is the requirement for today's business world and for the SMEs industries it becomes necessary to be in business and sustain for the long period of time and they have to complete their task on time and with quality. With changing market requirements, the shorter life cycle of product and mass customization trend poses several tests for the SME industries. They must respond in an adaptive manner to manufacture and product as required by the customers [3]. These SMEs industries are the backbone of the manufacturing sector in India, Small and medium enterprise to constitute around 54% of the value added by manufacturing while they provide around nearly about 65% of employment in the manufacturing sector. Therefore, the Indian SMEs need to be competitive and adopt new technologies and moves toward automation, in order to keep up with the fluctuating and the unexpected demands from the emerging market needs [4], to meet the changing requirements of the market, production processes must be frequently changed and adaptable and agile as possible. With the modification of current production process with the integration of electronics, internet of thing and lean manufacturing process lead the process to partial automation of system.

Cloud manufacturing (CM) is the process of employing well stabilized manufacturing resources such as Enterprise Resource Planning (ERP) through the cloud and controlled it at any time or place. Cloud manufacturing allow us to achieve immediate deployment by automating the communication between manufacturing, scheduling and accounting. CM deals in deploying the software on the cloud i.e. "manufacturing version" of computing and check on the outlook, cutting across production, management, design and engineering abilities in manufacturing business [11]. Further, in this study CM monitored on Inventory management, machine-tool and control, production line, life cycle of product, programmable control unit (PLC) and connect humans with cyber world as shown in figure 1.

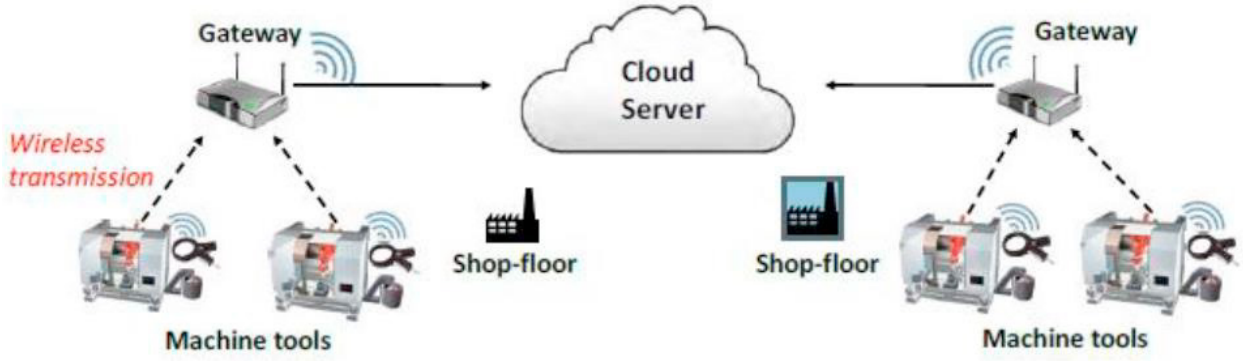

Fig. 1. Proposed monitoring [8]

Azian [10] implemented the Kanban system in manufacturing unit and found adequate results in operational costs, wastes, scraps and losses were minimized, over production stock were controlled with flexible work stations. The factors that hinder SME companies from implementing the Kanban system are identified as ineffective inventory management, lack of supplier participation and top management commitment. Claudio [8] reviewed an application of lean methodologies to Product service system (PSS) and found that there should be integration between agent technology and with web based technologies and grid computing for successful implantation of application in the industry in a near future. Mourtzis [9] presented the study that manufacturing data are mostly confidential and high value, security vulnerabilities and threats emerging from nature of networked systems, necessitates a systematic investigation of cloud manufacturing security issues. From literature survey it is concluded that CM and cyber-physical systems are progressing toward addressing the future challenges.

The objective behind real time PMS system is to improve the production efficiency, planning, forecasting of production and reduce waste generation. Its common practice in SMEs industry to create production schedules without taking consideration of resources while planning [5]. They also not assured of the time required for the production. SMEs industries in India have the major problem of skilled manpower, advances technology, resource utilization [1]. The data entered manually by the operator at the end of the day which can be manipulated by machine. For the sustaining in the competition, they have to compete with the large-scale industry and they have to adopt new technology and also monitor their production [12].