A Review on Smart Factories

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ABSTRACT

Nowadays, the industry faces one of the greatest challenges is a production of goods in the given period of time. The available methods are suitable for the production but this is not said to be a smart method of production. The smart factors host smart method of production, such as of robots through the advanced software. The concept of smart factory comes due to the increasing amount of research in the industry. A smart machine does not just increase the amount of production but it will also help in reducing the number of accidents due to which there will be less risk of a life of the people working there. This paper provides the overall about the smart factories.

Keyword - *Smart factory, Industry 4.0, Manufacturing, etc….*

1. Introduction

A Smart Factories hosts smart manufacturing processes. A Smart Factory is futuristic in that it can produce and deliver productivity well beyond our expectations. If we look at how this is possible, we can see that Smart Factories are a bringing together of technologies that provide the optimum methods and techniques in manufacturing.

Furthermore, we can witness that Smart Factories are not just intelligent machines and robots communicating through an advanced software product. Indeed, these machines have advanced beyond M2M and are not just collaborating but also communicating through advanced software, algorithms, and industrial processes.

However, it is important to realize that Smart Factories, like Smart Homes, are not some futuristic vision they are with us today and have been for a decade at least. Therefore, before we go any further, let's look at how a Smart Factory works, and then we can see perhaps the benefits and the massive improvements in efficiency and productivity that they can bring.

2. Industry 4.0: An Overview

Since the invention of the mechanical capability enabled by thermal and kinetic energy at the end of the 18th century, the evolution of the industrial sector has reshaped our lives. The resulting inventions are known as the first industrial revolution. Consequently, inventions through the mid-19th century, specifically the emergence of the electrical technological production system constituted the second industrial revolution and reshaped the industry by enabling mass production. In 1969, the use of the Programmable Logical Controller (PLC) enabled synergy between information technology and electronics, facilitating an increase in industrial automation that continues to this day. This development is recognized as the third industrial revolution

Today, manufacturing companies face multifaceted challenges such as a shortened innovation and technology life cycle and a demand for custom products at the cost of large-scale production. In addition, the presence of industry in emerging countries has created the competitive pressure of the global market. Such industrial companies have the capacity for technological absorption and present as manufacturing companies with low operating costs that will pull up the market away from developed countries (i.e., Germany, the US, and Italy)

The government and manufacturing sectors, specifically in Germany, are attempting to secure their market share through inventions toward the fourth industrial revolution a so-called I4.0. I4.0 will exploit existing advances in

information technology, communications, and automation and beyond to form a new industrial era. The goal is to create a national industrial sector with the ability to compete in the global market by creating high value-added products through the innovation of products and services. Innovations will empower companies by giving them a uniquely competitive advantage of increased efficiency, resource utilization and responsiveness to the needs of both customers and society.

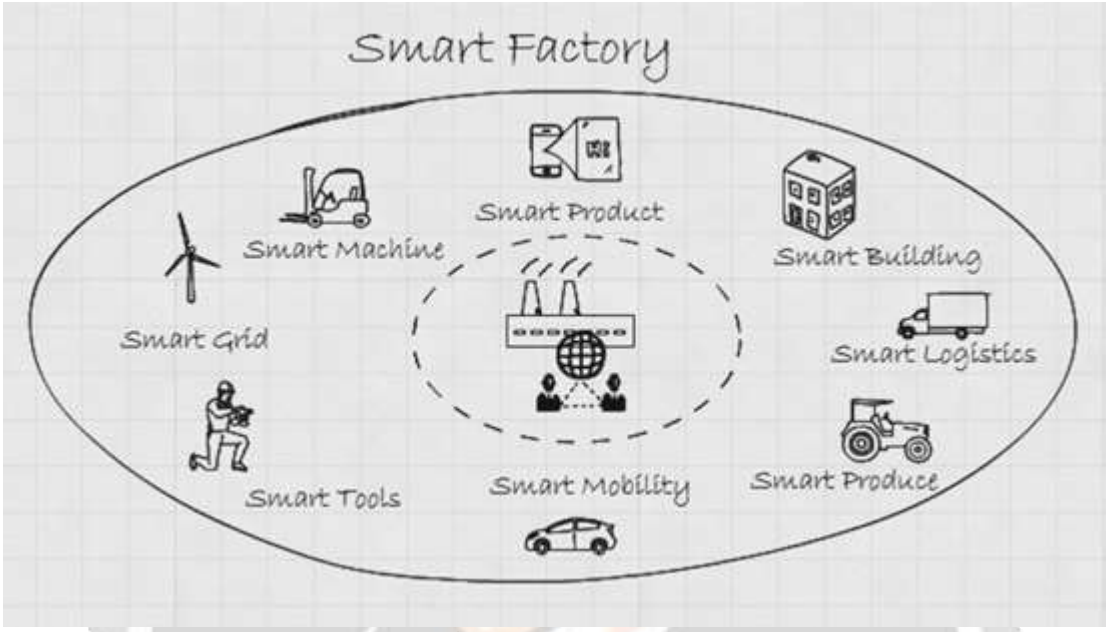

Fig -1: Smart Factory

3. Smart Factory –a meaning and conceptualization

All concepts and visions are very promising prospects of upcoming technological development. Nevertheless, even though both engineers and researchers are continuously working on those concepts, it still remains just a vision. Despite of all involvement and success stories there is a long and winding road to go and multidimensional problems to solve before we will transfer the vision of the smart factory into the reality. Zuehlke estimates the development enabling technologies for at least 5 - 10 years (from 2010)

3.1 Smart Factory features and characteristics

Before mentioned visions of a smart factor yare lacking to provide its clear definition. It seems that they focus too much on vague descriptions of used technologies like ubiquitous and Calm-systems or context-aware applications instead of providing more general characteristics of this solution. Moreover, based on previously mentioned visions, one could have an impression that (already old) Wi-Fi networks and RFID tags seem to be prerequisites for creating or implementing the smart factory solution. It sounds like a significant limitation to presented theories, mostly due to neglecting the possibilities of other available technologies, underestimating future innovative solutions, and omitting other dimensions (e.g. organizational).

There are many technologies which could be used in a smart factory setup, but instead of going into their scrutinize review; the focus here is on functionalities that this factory should perform. The report about the future manufacturing in Europe points out that in the future, manufacturing companies will depend even more on flexibility and low cost , so an exemplary approach to achieve both of those properties simultaneously, is to work with modules and platforms.

Another multidisciplinary trend, which is underlined by the European report, is collaboration across various types of borders e.g. cultural, geographical, cross-disciplinary etc. Those could increase the success rate of problem solving due to exchange of knowledge across many levels. Particularly in manufacturing field, those collaborative

Examples are still quite rare, but some have been reported in supply chain collaboration and in knowledge sharing in collaborative engineering Scholars also suggest a combination of flexible and reconfigurable manufacturing systems and underline importance of agility and leanness .New emerging manufacturing trend, which could be very much linked to globalized factory is an adaptive or transformable manufacturing.

4. Why Smart Manufacturing Is Important

Creating this manufacturing revolution requires significant collaboration among companies, governments, and academic institutions. For example, in the EU and the United States, they have set up initiatives to fund and encourage smart manufacturing. The EU in particular is striving to re-industrialize and create a level of parity across a very diverse manufacturing capability of member states. Germany and Italy are modern industrial powerhouses that have well developed Industry 4.0 programs. Britain and France, on the other hand, have been de-industrializing for the last three decades and require a massive effort to re-industrialize. Ironically, it is France and the UK that are most likely to benefit from smart factories, as they can bring their manufacturing back onshore and subsequently enjoy great savings in costs and efficiency. In fact, Germany is unlikely to contribute much to the EU targets for increased efficiency and value-add to GDP, as they are already near optimum efficiency levels. The UK and France, however, can make significant contributions as their current performance levels in manufacturing are under performing and therefore these countries' manufacturing efficiency are ripe for improvement.

In a global initiative, the industrial internet consortium is sponsoring a number of pioneering collaborative projects, called test beds, which focus on different steps of the manufacturing process. For example, Infosys, working with Bosh, PTC, and Intel, are collaborating on an effort called the asset efficiency tested.

The term asset efficiency refers to reducing waste and improving the maintenance and uptime of any industrial asset in operations, maintenance, service, information, and energy. The test bed project is focusing on ways to use data from equipment and processes to give aircraft landing gear maintenance engineer's information with which they can forecast and correct potential failures.

5. CONCLUSIONS

In this paper, we focus on new trends in the manufacturing field, particularly the vision of I 4.0, which will revolutionize manufacturing systems. We focused on smart factory systems and investigated existing work that is leading towards such a system. The smart factory system is still only a vision, and there is no clear view of the requirements, the elements and the features of those elements that will help to realize this system. This conclusion motivated us to attempt to itemize the requirements of the smart factory system, investigate these requirements against the design principles, and review and classify the related literature on smart factory systems.

So far the smart factory is just a great revelation of future developments in manufacturing facilities. The concept still needs to progress before fully reaching its practical application in an industrial production set up. In terms of solutions for large companies, most of the technologies are not yet mature to serve the realization of smart future manufacturing vision.

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