

Introduction of industry 4.0

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Abstract: This paper deals with the latest trend in the industry around the world. The industry is progressing across the various dimensions and Internet of things and smart Factory is the buzzword in today's context. An overall Industry 4.0 is looked into this chapter to give a various positive aspect of the Industry 4.0 while the manpower is to be equipped with the latest technologies giving training as per the new requirements of the skill set to have a total rhythm of benefit the company can get in due course of time. The industrial revolution has taken place from different stages from Industry 1.0 to Industry 4.0. The customer requirements can be fulfilled by increasing productivity and quality aspects by Industry 4.0 that has been highlighted in this chapter.

Keywords-Design, Internet, Production, Quality, Skill set, Smart

1.1 Introduction

The production is an integral part of any economy. As days goes on, the market is becoming more competitive and customers are looking for latest modern products with lots of integrated features. The productivity and quality are the crucial areas for any production unit and to be properly maintained in the factory.

Automation is also the new aspect of production that produced the products with high level of accuracy and robots are used now days in this regard. The modern day's production is becoming complex and the Industry 4.0 is going to play a pivotal role in this aspect.

Modern production technology will meet those needs in a better way than that of the traditional manufacturing process in the factory as we used to follow for production purposes. These technical aspects of these are regulated by cyber-Physical systems (CPS) and Industrial Internet of Things (IIoT) in industrial production systems. Connection to CPS building blocks is an Industry 4.0 implementation plan. Anxiety blocks of embedded systems with separate controls and advanced communication that trade and collect real-time information with the goal of locating, tracking, optimizing and monitoring production processes. Manufacturing execution systems (MES) and enterprise Resource Planning (ERP) are comprehensive software based on transitioned versions. Another important part is managing large amounts of data from processes, products and equipment. All this data is stored in cloud storage. This database requires extensive analysis to obtain useful useful information and ultimately in actions that lead to a flexible and continuous production process for self-preparation.

Industry 4.0 comes from Germany, first such initiative that is very helpful for any country in the global scenario to move ahead in the competitive world.

Industrial Internet was first introduced to North America by General Electric Company in 2012. It is a strong integration of physical and digital terminology that combines 'big data analysis with IIoT'. IIoT concepts cover a broader area of operation such as Industry 4.0 and includes the generation and distribution of electricity, health care, manufacturing, public sector, transportation and mining.

In France, the concept of 'Industrie du futur' was introduced as the core of the future French industrialization strategy. Created with scientific and industrial support and built on five pillars: 1) it supports French companies, especially small to medium, adapting to new technologies, 2) advanced technology with additional production, virtual crop, IIoT, and unpopularity of taxpayers, 3) strengthening international cooperation internationally regarding industrial values, 4) comprehensive training of workers, and 5) the promotion of future French industry. The next similar campaign 'Made in China 2025' was launched in 2015.

This paper focuses on Industry 4.0 concept, development plan and implementation in our industrial sector to improve overall productivity and quality aspects.

2. The Industry 4.0

The Revolution of Industry from 1.0 to 4.0

Before moving further into the Industry 4.0 how exactly the industry evolved from the 1800s is really a tough journey. Before industrial evolution the world has encounter till date as follows:

2.1 The First Industrial Revolution

It happened in the late 1700s and early 1800s. At that time, the manufacturing industry focused on manual labor by workers, animals, and humans with streamlined forms of work performed by humans using water and steam engines and various machine tools.

2.2 The Second Industrial Revolution

The Second Industrial Revolution of the early 20th century began with the use of steel and electricity in factories. By using electricity, manufacturers can increase efficiency and increase factory productivity. At this time, mass production was introduced.

2.3 The Third Industrial Revolution

This evolution started in 1950s, as the more electronic and computer-oriented technology are incorporated in the factory. A new experience is being seen shifting from mechanical and analog oriented technology to digital and automation-oriented machinery and technology.

2.4 The Fourth Industrial Revolution, or Industry 4.0

The fourth Industrial Revolution began decades ago as Industry 4.0. Digital technology has begun at a new level for decades with the introduction of IoT, access to real-time data, and cyber-physical systems. Industry 4.0 implements a more connected, comprehensive and holistic manufacturing approach. Business owners better manage and understand all aspects of their operations, improving productivity and processes for further improvement / growth.

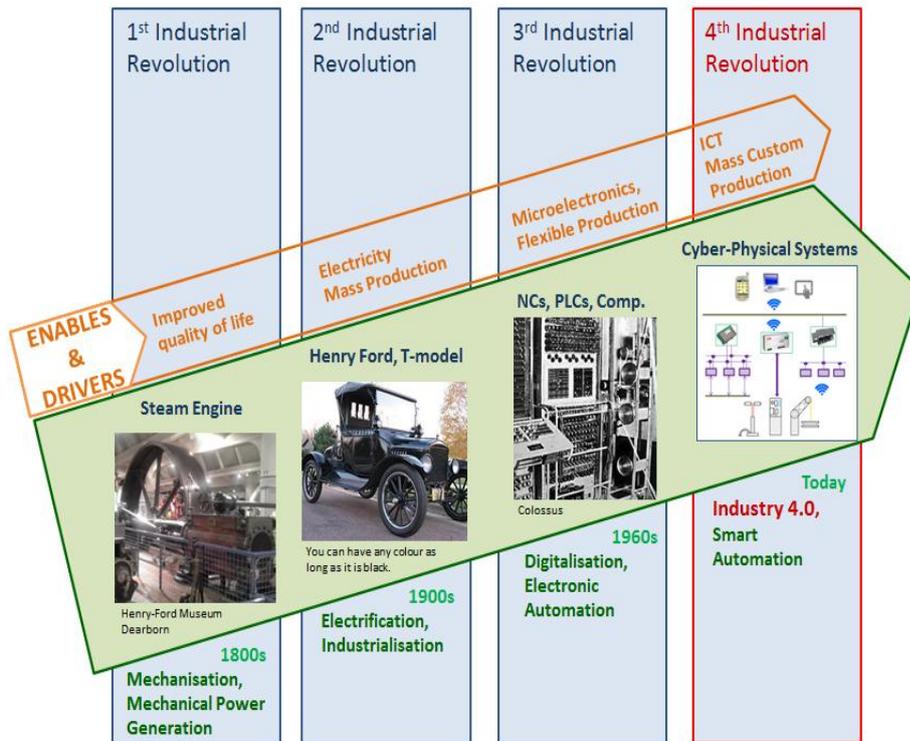


Fig. 2.1 The Revolution of Industry from 1.0 to 4.0

2.1 Smart Factory- Production System as per Industry 4.0

Industry 4.0

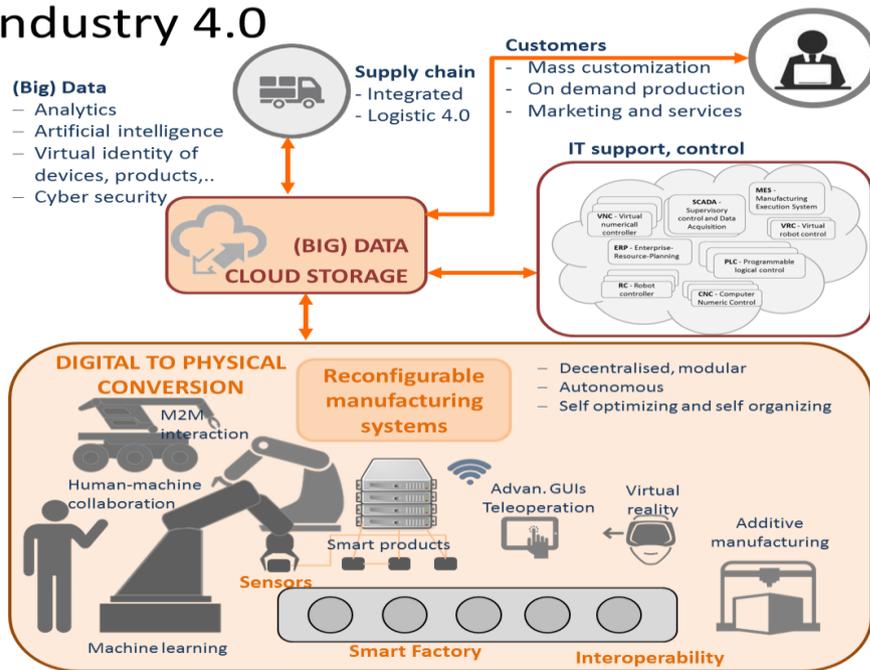


Fig. 2.2 Smart Factory- Production System

2.2 Design Principles of Industry 4.0

The main transformation to Industry 4.0 done by design principles. The following are the concern principles:

2.2.1 Interoperability: To communicate through the IoT and the internet of people, objects people and machines are needed. This is one of the important principles.

2.2.2 Virtualization: CPSs that is going to create and simulate a copy virtual in nature of the real world. It is also to monitor objects in the nearby environment. A virtual copy of everything is put simply in that way.

2.2.3 Decentralization: To work independently is future of CPSs. It is going to give some for customized products and problem solving. A more flexible production environment is created in this way. The matter is delegated to a higher level in cases of conflicting goals or failures.

2.2.4 Real-Time Capability: Real time data to be connected or store or analyze for a smart factory and new decision according to be taken for latest findings. The internal processes are coming under it such as machine failure in production line. The different identification can be done by the smart object. The real time capability can be the flexibility and optimization of the production system.

2.2.5 Service-Oriented: Customer oriented must be the look out of the production. The internet of services must connect efficiently to people and smart devices for customer's specifications-based product to be created.

2.2.6 Modularity: It should be one of the essential ability for a smart factory. A week time is generally required for study of the market and production change accordingly. The fast adoption and sessional as well as market changes are the important feature of smart factories.

2.3 IT Support

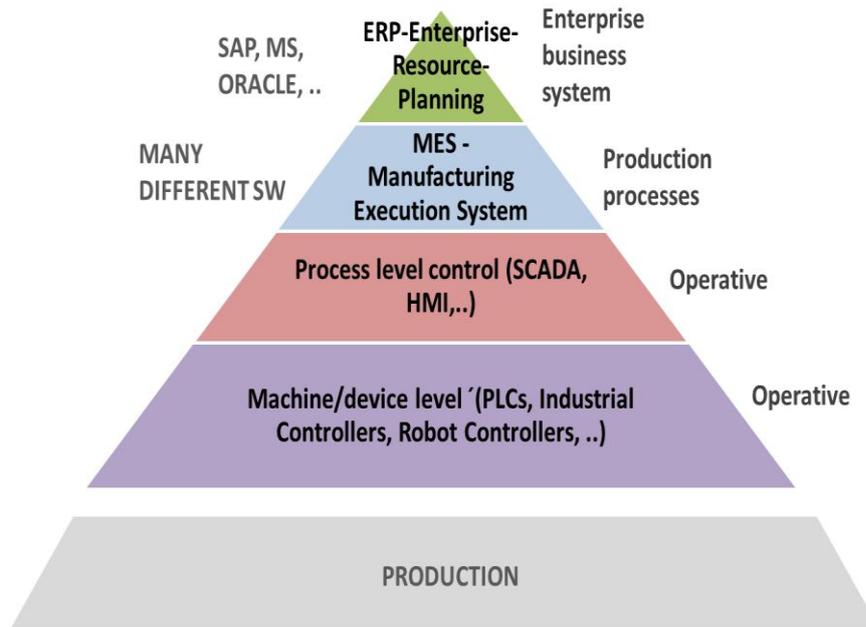


Fig. 2.3 IT Support

3. Benefits of Industry 4.0

The manufacturing processes work totally revolutionize because of Industry 4.0. There are many advantages and the challenges the concern industry to face as follows:

3.1 Advantages of Industry 4.0

3.1.1 Optimization: Industry 4.0 focusses on optimization. The various smart devices self-optimize the production that results in zero-down time in production processes. This is one of the vital aspects of high-end expensive manufacturing equipment. This will ultimately head to profit for the industry.

3.1.2 Customization: As the population is looking for fast and smooth delivery in a customer-oriented market being created because of the customization. The customer and manufacturer gap will reduce as a result of these aspects. The process of communication will be fast without any intermediary and this will be improved delivery process for production.

3.1.3 Pushing Research: The researcher in various fields will be accelerated because of Industry 4.0. A new industry will apply new skill set and requisite education and training will take place for the concern labors.

4. Challenges of Industry 4.0

4.1 Security: The IT security is one of the vital issues while implementing Industry 4.0. This online instigation will give chances of security beaches and leak of data. The cyber theft is also another aspect in these regards. The reputation, cause producer money is at risk. Thus, emphasis to be given on research related to cyber security.

4.2 Capital: As this transformation will require huge investment that should be consider by the particular industry by doing physicality study. The top-level management have to decide whether they would go for Industry 4.0 transformation or not as it requires huge capital for implementation the transformation.

4.3 Employment:

It's very premature to speculate on the arrival of Industry 4.0, as employees need to learn new skills to work in the world of the latest technology. A new training series to maintain the requirements of Industry 4.0. This can take some time to find a solution to the above problem

4.4 Privacy:

Both customers and producers need to be considered when it comes to aspects of Industry 4.0. This is an inert network industry, as such manufacturers need to collect and analyze data due to causality. Bridging the gap between the customer and the producer is a difficult task for both parties in the group.

5. Future workforce

Industry 4.0 is new to the world so regarding revenues and technological advancement is very difficult to predict. According to estimate the potential employment of the new workforce having new skill set is also difficult to predict.

The manufacturing is advancing technologically as Industry 4.0 but still different categories of machines are present in the factory. The approach of industry 4.0 to be analysed for finding out a conclusion on category of labour requirement for the future. This will help the labours to prepare for the future trends and develop accordingly.

This will do big data analysis and further requirement accordingly.

6. Conclusion

The Industry 4.0 is the latest requirement of the industry as the latest technology is being used in this fast-moving competitive world with Internet of things and other automation

gadgets. The integral part of the economy is very much in need for Industry 4.0. Modern manufacturing techniques will be applied from Industry 1.0 to Industry 4.0 after the Industrial Revolution. It implements a variety of Industry 4.0 design principles such as interoperability, virtualization, decentralization, real-time capabilities, service orientation, and modularity. The various benefits of Industry 4.0 are optimization, customization, and pushing the research aspect in the forward direction. There are various challenges to be faced also for implementing the new concept of Industry 4.0. Among it cyber security plays a sensitive issue in addition to that the huge capital investment and the employment of the present labourers is a tough task unless proper training and learning of new skill set takes place as per the requirement. The future work force to be made ready accordingly then only we can get the maximum positive aspect of Industry 4.0 by improving our productivity maintaining quality with a development of production capacity at a fast rate of production with the automation of machineries.

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