INDUSTRIAL REVOLUTION – FROM INDUSTRY 1.0 TO INDUSTRY 4.0

Ashutosh kharb
Assistant Professor, BMIET, Sonipat, aashutoshkharb@gmail.com

Abstract

The transition of industries from manual manufacturing to automated and smart manufacturing is termed as industrial revolution. This paper provides a key insight on evolution of industries through different phases of industrial revolution. It provides a detail about various generations of industrial revolution, their key features and challenges associated with them.

Keywords: industrial revolution, industry 1.0, industry 2.0, industry 3.0, industry 4.0.

1. INTRODUCTION

system. Socio-economic, including agricultural improvements, distribution of wealth, and increase in trade internationally, social development leads to the development of cities, working class and finally, cultural transformations. This does not happen in one night but it is a long period of decades, divided into different generations from industry 1.0 to 4.0 as shown in Figure 1. Japan, Belgium, U.s etc. The major advances of industrial revolution are technological, due to the use of iron and steel, coal and steam engines, petroleum products, electricity etc. and factory industrialization and starts from Britain and consequently followed by France, Germany, manufacturing. This phase is known as Industrial revolution refers to the period of change, in history from man to machine

2. Generations of Industrial Revolution

This section discusses various generations of industrial revolution.

2.1 Industry 1.0

The first era of Industrial Revolution remains from 1760 to 1830, through the transformation of production using man to machines [1]-[4] is known as industry 1.0. The major outcomes of first industrial revolution provides the following benefits. a) in a textile industry, the production and efficiency of a factory increased drastically through the use of steam powered cotton spinning machines. b) the cost of iron production decreases due to the substitution of coal as a fuel on charcoal.
2.2 Industry 2.0

The second industrial revolution and also known as technological revolution leads to the industry 2.0 [5]-[10] during the period of late 19th century and in the beginning of 20th century. The industry 1.0 laid the foundation of industry 2.0. In other words, the industry 2.0 is built on the ideas and inventions of industry 1.0. The major contributions of second revolution are electricity and electric light, automatic signals, structural steel for construction.

2.3 Industry 3.0

In this phase the industries go digital. It happens after world war 2, when the digital technology developed and hence laid the foundations of industry 3.0. The major advancements are mechanical calculator, computers, development of communication technologies, the supercomputer. Smaller and practical products entered into our everyday lives with the use of computers and communication technologies in production processes.

2.4 Industry 4.0

The fourth generation of industrial revolution combines digital transformation with smart manufacturing, resulting in cyber-physical systems. The major industries that can be affected are process, oil and gas, logistics, chemical, energy, mining, smart cities etc[11][12]. The major contributing technologies in industry 4.0 is listed in Figure 2 and the steps of transformation for industry 4.0 is shown in Figure 3.

3. Conclusion

In this paper, various generations of industrial revolution are studied. It has been identified that almost all the industries ranging from manufacturing, production is affected and heading from manual processing to fully automatic control. The present era of industry 4.0 is most commonly referred as industrial internet and the era of smart manufacturing is rising soon as industry 5.0.
REFERENCES


