

# Three-dimensional Theoretical Model of Advanced Manufacturing

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**Abstract.** From ultra-micro, meso and micro three-dimensional view a comprehensive summary. Advanced manufacturing is widely used in the advanced manufacturing technology, the use of advanced manufacturing mode and market network with advanced industrial production system. Advanced manufacturing industry is essentially a kind of advanced mode of production. Developing advanced manufacturing industry, it is not only a technology problem, nor merely a question of transformation and upgrading of industrial structure and industrial development, but a profound change in production mode.

**Keywords:** Advanced manufacturing, manufacturing technology, Theoretical model

## 1. Introduction

Manufacturing industry in the world always plays a leading role in the process of industrialization. In the economic globalization and information technology revolution, driven by the international Manufacturing Industry is undergoing significant changes of production mode. In recent years, major industrial nations have all kinds of development planning, on the one hand, speed up the development of high-tech manufacturing, on the other hand, and promote the traditional Manufacturing Advanced Manufacturing. Speed up the development of advanced manufacturing industry, has become the new trend of world manufacturing industry development.

At present, in terms of the advanced manufacturing industry, there are mainly two aspects. One is the forefront of advanced technology of manufacturing can be referred to as advanced manufacturing industry. The others is to use advanced technology upgrading and transformation of the traditional manufacturing can delimit to within the ranks of advanced manufacturing. With less of the former view of scholars, such as peng benhong(2009), namely the use of advanced manufacturing technology and advanced equipment, modern management methods and manufacturing mode, high technology content of manufacturing<sup>[1]</sup>. Li Lianshui, Du Zhanyuan (2005) for the first time will pay attention to scientific and technological innovation in manufacturing are expressed as "new manufacturing", namely, rely on scientific and technological innovation, reduce energy consumption, reduce environmental pollution, increase employment, improve the economic benefit and promote competition ability, to realize the sustainable development of manufacturing industry, and establish the evaluation index system of economy, technology and environment aspects of<sup>[2]</sup>. Qin Shijun (2004) is constantly absorbing advanced manufacturing, electronic information, computer and other high-tech achievements and used to develop the design, manufacture and service process management, obtained very good economic, social and market effect of the floorboard of the manufacturing industry. More and more scholars believe that, in addition to advanced manufacturing technology factors such as the most advanced industry, should also include some characteristics of traditional manufacturing part of the advanced manufacturing<sup>[3]</sup>. Chen baomin (2006) advanced manufacturing industry is constantly absorbing advanced technology and advanced management mode and modern management technology, integrated application of the advanced manufacturing technology to the floorboard of the whole manufacturing process, including not only as the new and high technology industries, also includes the advanced manufacturing technology and the application of advanced manufacturing mode has become the leading industry that part of the traditional

manufacturing<sup>[4]</sup>. Li hui, Cui Qianqian, Sun keqiang (2008) advanced manufacturing is defined as: constantly absorbing advanced technology and advanced management methods and advanced development model, the integrated use of the advanced manufacturing technology to the production process of manufacturing, including not only new and high technology industries, also including the application of advanced technology and management methods of a part of the traditional manufacturing<sup>[5]</sup>.

These explanations are reasonable, but it is not comprehensive and accurate. First, advanced manufacturing industry is inseparable from the advanced technology, but only the use of advanced technology, or only from the advanced technology to define, to reveal the connotation of the advanced manufacturing industry, also can't define a advanced manufacturing industry and advanced technology as the symbol of the difference between a new and high technology industries. In fact, the traditional manufacturing industry is the pursuit of technical progress. Second, advanced manufacturing industry is not only limited to the production process, should also include the whole process of prenatal and postnatal, but it is not enough to explain the advanced manufacturing industry is a new mode of production. Finally, advanced manufacturing these explanations are regarded as a closed system, ignored the modern networked marketing system and extensive connection between enterprises.

## 2. Construction of theoretical model

Must clear the connotation of the advanced manufacturing industry, if we want to develop advanced manufacturing. If the content is too broad, so in the process of the development of advanced manufacturing industry, inevitably lead to resource allocation unable to concentrate, is the result of the pursuit of a lot, will sacrifice the development of the manufacturing efficiency. If content is too narrow, and cause of industrial structure is not reasonable. It should be from ultra-micro, meso and micro three-dimensional perspective to theoretical generalization of advanced manufacturing, which combined with the development of the manufacturing industry in the international trend and characteristics of the development of the manufacturing industry in the advanced countries.

From ultra-micro enterprise internal point of view, namely advanced manufacturing industry first, show the technology advancement, is an ongoing technological innovation system of advanced technology. Can constantly absorbing the contemporary high-tech achievements to independent technology development, and be good at applying advanced technology to from the whole process of research and development, manufacturing to marketing and maintenance services. Advanced technology is the foundation of enterprise production and development, and is crucial to the development of manufacturing. It is on the basis of advanced technology, advanced manufacturing industry to realize the informationization, automation, intelligence, flexibility and ecological production.

From the micro enterprise overall perspective, namely advanced manufacturing performance for advanced production mode, is a kind of can adapt to market changes, constantly optimize the enterprise internal resources configuration, and can give attention to both ecological environment and social benefit of efficient production system. Such as flexible manufacturing system (FMS), computer integrated manufacturing system (CIMS), lean production (LP), cleaner production (CP), efficient, rapid reorganization of the production system, virtual manufacturing (VM), etc., is the most famous of the advanced manufacturing mode. It determines the way of enterprise specific configuration of various factors of production and efficiency, reflecting the close benign interactive relationship between enterprise and market, also reflects the enterprise and the harmony of ecological and social environment. It is this point in production mode, advanced manufacturing and traditional manufacturing utterly different.

From the perspective of medium, namely the industry system, advanced manufacturing performance for the advanced nature of the marketing network, is a mainly industrial chain, cluster into relying on the network of market organization. Advanced manufacturing is a modern producer

services and the developed market network for support. Advanced manufacturing within every industry sector and between enterprises, there exists a close relationship in terms of input and output, need through the integration of value chain and synergy, forming alliance of supply chain and industry cluster, forming efficient market system.

Through the above analysis, in summary, a concise definitions can be advanced manufacturing industry, advanced manufacturing industry is the wide application of advanced manufacturing technology, the use of advanced manufacturing mode, has advanced market network system of industrial production. Figure1 available to clear the theoretical model of advanced manufacturing.

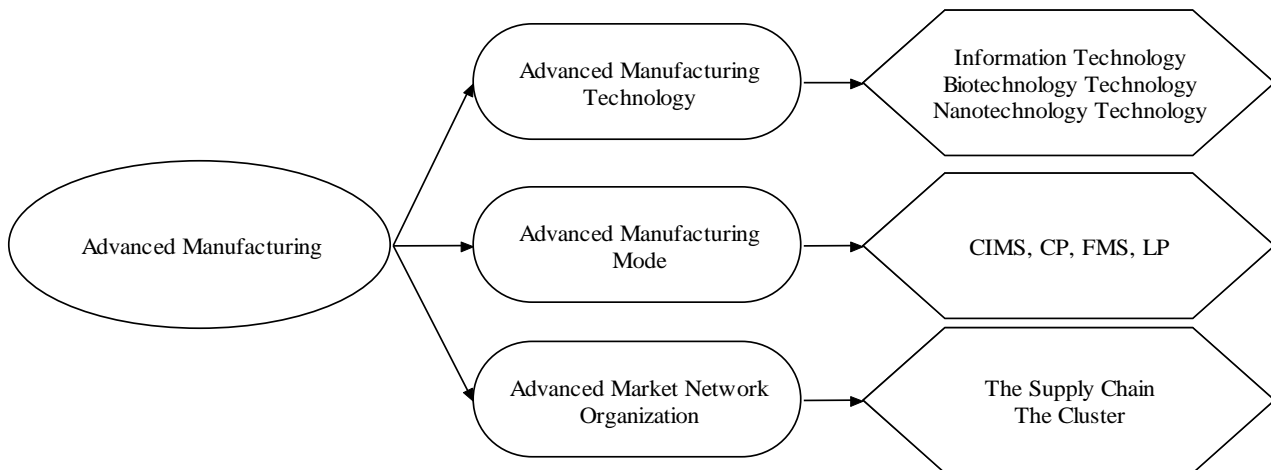


Fig.1 Advanced manufacturing three-dimensional theory model

### 3. Main Implications

Through the above analysis, we can be the basic characteristics of advanced manufacturing industry make a brief summary. Firstly, comparing with the traditional manufacturing industry, advanced manufacturing industry in the "advanced" is mainly reflected in the following points: in the mode of production, by the large-scale, standardized production of a single product, change to according to the needs of society, small batch, multi variety production, has better flexibility and adaptability in the relations of production. The advanced manufacturing industry more prominent between the industry production chain dynamic association and enterprise global production configuration, in the production concept, pay more attention to rely on scientific and technological progress, reduce energy consumption and environmental pollution, improve economic efficiency, increase the technology content of products; in terms of economic development, focus on the future, the ability to pay more attention to the degree of information, intangible assets proportion, technical innovation, pay more attention to saving, intensive and sustainable development.

Secondly, the advanced manufacturing industry is a concept of dynamic evolution, it changes along with the time development, space and. In the different stages of economic development, advanced manufacturing industry to industry manufacturing on different. In the three industrial revolution as an example, in the first industrial revolution, the advanced manufacturing industry in the textile, coal, metallurgy and other industries represented; the second industrial revolution, advanced manufacturing performance in power, steel, petrochemical and other manufacturing industries; in twentieth Century the outbreak of the 40's the third industrial revolution, electronic communication, aerospace, light mechanical and electrical integration, bio medicine, new materials industry as one of the advanced manufacturing industry developed rapidly in the world economy. [7] In space, advanced manufacturing industry in the different levels of economic development of regional performance in different industrial sectors, and therefore different regions in the advanced manufacturing industry development strategy needs to be combined with the actual situation of industry selection.

Once again, the advanced manufacturing industry is an open system. The open one is the performance for the process in a manufacturing industry is no longer confined to manufacturing, but open to the whole process including prenatal and postnatal, two is manifested through the network organization to the field of social economy comprehensive opening, especially for the manufacturing industry and producer service industry com. Three is the performance for the global manufacturing namely, the integration of resources in the global scope, the formation of global value chain and industry chain system.

Finally, the advanced manufacturing industry is essentially a kind of advanced production mode. The development of advanced manufacturing industry, is not only a problem of technology progress, also is not merely a question of upgrading and industrial development of an industrial structure transformation, but a profound transformation of the mode of production. If the development of the manufacturing industry of the world has experienced three stages, namely primary production stage, the processing assembly stage, the stage of independent intellectual property rights, so, the advanced manufacturing marks the development of the manufacturing industry has entered a new historical stage.

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