

Research on Agile Manufacturing Industry Based on Chinese Manufacturing 2025

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Abstract: *This paper briefly introduces the concept and connotation of agile manufacturing, and points out the main problems and key technologies in the implementation of agile manufacturing strategy in China. The purpose is to provide theoretical guidance and model basis for the establishment and operation of the organization of the future enterprise. Agile manufacturing enterprises have put forward the development direction of our attention. This article also discusses and analyzes the agile manufacturing enterprises in China by combining the 2025 of China.*

Keywords: *Agile manufacturing; China manufacturing 2025; virtual manufacturing; enterprise organization form*

1. INTRODUCTION

Since the new century, a new round of technological revolution and industrial revolution is emerging, the global scientific and technological innovation showing a new development trend and characteristics. This change is the integration of information technology and manufacturing depth, with manufacturing digital, networked and intelligent as the core, the establishment of network and service in the network (services) on the basis of the superposition of new energy and new materials, the breakthrough triggered a new round of reform will bring profound influence to the manufacturing industry in the world. This change, just with China to accelerate the transformation of economic development mode, construction and manufacturing power to form a historic intersection, which is a great challenge for China, but also a great opportunity. On March 5, 2015, Premier Li Keqiang made the "government work report" was first proposed to implement the "2025 China manufacturing", persist in innovation driven, intelligent transformation, strengthen the foundation, green development, accelerating from a big manufacturing country to a powerful manufacturing country". March 25th, the State Council executive meeting to accelerate the deployment of the implementation of the implementation of China made 2025, to achieve the upgrading of the manufacturing industry. As a result, "made in China 2025" has become an important topic of concern in the economic field. "Made in China 2025" is considered to be the first ten year program of action for the implementation of the strategy of manufacturing power in china. This is also an inevitable way for China's manufacturing industry transformation, and strives to become the goal of manufacturing.

2. AGILE MANUFACTURING

2.1. The Connotation Characteristics of Agile Manufacturing

Because of the agile manufacturing (AM) is the advanced manufacturing mode for twenty-first Century just put forward internationally, and with other manufacturing mode, such as total quality management (Total Quality Management, TQM), lean production (Lean Production, LP) and other essential difference. TQM and LP are mainly from the tactical point of view, focusing on maintaining and expanding the existing market share, while the AM is from a strategic point of view, not only focus on the market today, pay more attention to adapt to change and control the future, thus agile manufacturing has no uniform definition.

2.2. The Relationship between Agile Manufacturing and Other Advanced Manufacturing Models

As an advanced manufacturing mode of agile manufacturing, compared with other advanced manufacturing mode, such as concurrent engineering, lean production and CIMS, the goal is the same, is to improve the competition ability of the product, to win the market competition, enterprises in

order to achieve FTQCS target; the difference is the integration mechanism, their the scope of integration and organization and mode of production. The main characteristics of various modes are shown in table 1.

Table1. Comparison of the Main Characteristics of Agile Manufacturing and Concurrent Engineering, Lean Production and CIMS

Main Characteristics	First Generation CIMS	Lean Production	Concurrent Engineering	Agile Manufacturing	A New Generation of CIMS
Integration Mechanism	Job oriented technology integration and function integration	Integration of organization and personnel	Personnel integration for product design, integration of CE working environment	Integration of human, technology and organization	People, technology, organization of a comprehensive integration
Mode of Production	In order to predict and according to the number of production	Order production in parallel mode	Order production in parallel mode	Order production in parallel mode	Order production in parallel mode
Organization Structure	Chinese multi-level organization management	Working group	Distributed organizational structure, multi-function working group	Dynamic multi-function group, The Virtual Corporation	Dynamic multi-function group, The Virtual Corporation
Integrated Range	Within the enterprise	Within the enterprise	Within the enterprise	Cross enterprise	Global integration
Human Action	Does not emphasize the role of people	Emphasis on the role of man	Emphasis on the role of man	Human centered view, give full play to the role of people	Emphasizes the role of human and the integration of human

2.3. Agile Manufacturing Business System

Since the term "agile manufacturing" appeared in 1991, the global manufacturing industry has changed a little. Taking the high-tech electronic industry as an example, the system of vertical division of labor has been very mature. For example, specializing in electronic manufacturing service production services (EMS, Electronics Manufacturing Service) industry, to provide design support services for Design Service and the vertical division of labor for the semiconductor industry most significant: contains Fabless, Fab IC professional IC design manufacturing, packaging and testing (Foundry). This system of vertical division of labor was significantly less in 1991. In the past, if you want to enter the manufacturing industry, the first must have their own factories to produce their own products. Now a business from beginning to end in the industry has seen a long way in the industry, which also shows the importance of virtual organizations in today's manufacturing industry.

2.4. The Level Structure of Agile Competitiveness

Draw lessons from the level structure of the enterprise's competitive power to analyze the level structure of the agile competitiveness, and the competitiveness of the enterprise is composed of a series of interrelated factors. These elements according to the different functions of their respective characteristics and has formed, from the inside, can be divided into three levels: structure based competitive resources, competitive advantage and performance management structure and competitiveness-marketing advantages from the base to the surface. These three levels through the former to the latter are support and the role of each other to form the framework of the competitiveness of enterprises.

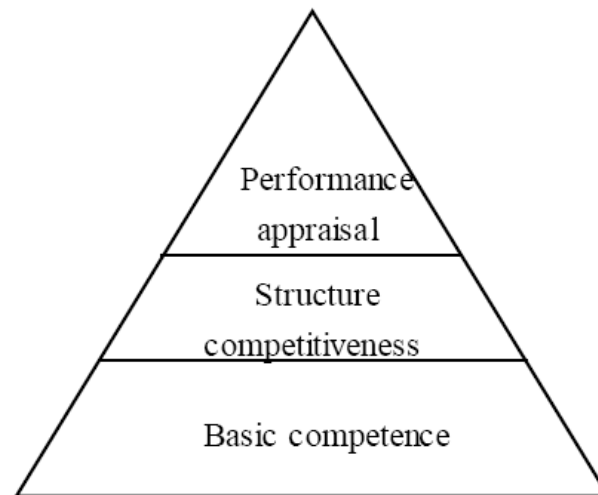


Figure1. *Agile Competitiveness Hierarchy*

For the agile competitiveness, it can be used for reference to the level structure of the enterprise's competitive power, and it is divided into three levels. First of all, based on the competitiveness of enterprises have the resources to have the agility. Resources can be broadly divided into 6 types: resource, human resources, technical resources, management resources, capital resources and information resources. Once the agile resources enter the field of production and operation, if the enterprise can fully and effectively allocate the resources to play its maximum value, it constitutes the enterprise's agility management advantage. Business advantages to support the marketing advantage and based on resource advantages, known as structural competitiveness, mainly including the cost advantage and differentiation advantage of the two basic forms. The advantages of agile management are directly reflected by the operating advantages of speed and flexibility, which is reflected by the cost and the advantage of differentiation. To build enterprise resource management advantage, must finally through marketing advantage to make from the potential state to the real state, marketing in a dynamic market environment changes, it must embody the good environmental adaptability. The establishment of agile marketing advantage makes the enterprise obtain a series of market performance in the market, brand reputation and market share, profit and so on; make the enterprise can survive and develop in the market and profit. And, by obtaining the agile marketing advantage gains further supplement and enhance the agility of enterprise resource advantages, agile business advantage continued support, and marketing advantage to maintain competitiveness, agile will enter a virtuous circle.

3. THE COMBINATION OF MANUFACTURING 2025 AND AGILE MANUFACTURING IN CHINA

3.1. Key Problems and Technologies of Implementing Agile Manufacturing Strategy in Chinese Manufacturing Industry

3.1.1. Key Problem

Over the years, China's manufacturing industry in the construction of CAD, CAM, NC, CAPP, MIS and CIMS made an effort to have a degree of manufacturing system based on information processing and integration. According to the situation of our country and the status quo of the enterprise, the implementation of agile manufacturing strategy needs to address the following key issues: suitable for the actual situation of China's enterprises agile manufacturing cell technology; the suitable for China in agile manufacturing unit integration technology; information integration technology and the corresponding unit of agile manufacturing major feature matching.

3.1.2. Key Technology

In agile manufacturing system, people, organization and technology are the three most basic elements. The construction and implementation of agile manufacturing mode need many kinds of technical support, and the manufacturing mode should be matched with advanced technology to give full play to its advantages. Therefore, to solve the key problems, we must first have the key technology as the foundation.

3.2. Comparative Analysis of 2025 and 4 of China's Manufacturing Industry

The German "industrial" concept is put forward in the "Hannover industrial exposition", the purpose of Germany lay in the key technologies of the international leading position, to strengthen the core competitiveness of Germany, and networking, service network and data network will replace the traditional closed manufacturing systems, become the basis for future industry. Which things, service network and data network, also cannot do without the information technology and network support, in line with the international trend, and Chinese proposed "two integration" and "China manufacturing" concept agree without prior without previous consultation.

There is a big difference between the two countries in the industrial environment, Germany in the foundation, such as research and development are stronger than China, Chinese can learn from the experience of Germany, the construction of network and information technology, intelligent industry as a key development target, and with the German government and enterprises to communicate, to cooperate with each other. For each in the industry in the development of a breakthrough, to prepare for the industrial revolution again. Chinese manufacturing "from big to strong development path, China manufacturing 2025 with German industry 4 through comparison following different approaches but equally satisfactory results:

Table2. *Industrial 4 and China Made 2025 Contrast*

	Industry 4.0	Made in China 2025
Present State	Germany	China
Lead Person	SIEMENS Germany 2013	Chinese government 2015
Height	Fourth industrial revolution	Become an industrial power
Definition	Applying virtual network entity network system technology to manufacturing and logistics industry	Digital and intelligent manufacturing of information technology and manufacturing technology
Starting Point	World manufacturing power and leading export of manufactured goods	There is a big gap, the foundation is relatively weak
Strategic Points	Construction of a network (CPS) actively layout smart factory, to promote intelligent production"	Innovation driven, quality first, green development
Development Degree	Basically achieved 3, is from 3 to 4 development, that is, the production of automation to network information in this regard to go	There is a big gap between enterprises, and some enterprises have to fill 2 to 3 of this lesson, that is, from the electrification of the automation of this lesson
Strategic Target	Aimed at a new round of technological revolution in the development of measures, mainly focused on the manufacturing industry's high-end industries and high-end links	Overall planning for the transformation and upgrading of manufacturing industry
Same Point	Implementation of information technology and advanced manufacturing industry combined with or Internet plus the advanced manufacturing industry, promote the new round of development of the manufacturing industry	

According to the above figure, a careful analysis of the German made out of the "industrial 4" and the Chinese made 2025 can be found:

- (1) Germany is the world's manufacturing power and leading exporter of manufactured goods, manufacturing R & D strength even more than the United States and Japan, has the world's leading technology level in automobile, machinery, pharmaceutical and chemical industry, motor and electric etc.. And whether China's R & D investment or technical level, whether it is product quality or brand image, there are still a wide gap between the developments of the foundation is relatively weak;
- (2) The German industrial 4 focus on high-end equipment, proposed the construction of "physical information system" (physical information system (cyber physical systems, referred to as CPS) as a unified body of computation and physical processes, is the integration of computing, communication and control in one of the next generation of intelligent systems.) And actively layout smart factory, to

promote intelligent production". And China made 2025 proposed to promote information technology and industrialization depth integration as the main line, and vigorously develop intelligent manufacturing, construction of information technology under the conditions of the industrial ecological system and new manufacturing mode;

(3) "Germany now basically achieved 3, is now from 3 to 4 developments, that is, the production of automation to network information in this regard to go. And China, there is a big gap between enterprises, and some enterprises also make up 2 to 3 of this lesson, that is, from electric to automation this lesson";

(4) In addition, the German industrial 4 is aimed at a new round of technological revolution in the development of measures, mainly focused on the manufacturing sector of the high-end industries and high-end links. Made in China 2025 is not a special plan to deal with a new round of scientific and technological revolution, is the overall planning of the transformation and upgrading of manufacturing industry;

(5) But it can be said, from the big direction, is, different approaches but equally satisfactory results agree without prior without previous consultation. Place the two the same, is the implementation of information technology and advanced manufacturing industry combined with or Internet plus the advanced manufacturing industry, promote the new round of development of the manufacturing industry.

4. CONCLUSION

The main mode of enterprises in twenty-first Century will be the mode of agile manufacturing enterprises, the original enterprise can be rapidly converted into the agile manufacturing enterprise, will determine an enterprise, a region, even the future and destiny of a country. Into the agile manufacturing enterprise from the original enterprise transformation, not a business work can be done in their range, need the efforts of all sectors of society, the government needs to legislation from the law, intellectual property protection, financial system, and accounting system and so on, creating a dynamic enterprise integration environment. Agile manufacturing can be said to be a star of modern manufacturing technology, but also a popular language in the current manufacturing industry. The big companies and even consultants or software companies claim to be able to support agile manufacturing. Agile manufacturing, however, is still a relatively conceptual concept, and there is not a very substantive definition of the functional level. Therefore, whether the IT system supports agile manufacturing, the relative lack of a more qualitative statement. In addition, agile manufacturing is the United States to strengthen the competitiveness of the country's manufacturing enterprises and the birth of the country. Of course, after many years of change and development, agile manufacturing can also be applied to the majority of domestic manufacturing enterprises. However, the main business pattern of manufacturing enterprises in our country is one of the virtual organizations in the implementation of agile manufacturing methods, which is not the main body of agile manufacturing. With the process of global integration, the United States gradually abandon the need for labor intensive and even harmful to the environment of the industry, while retaining the brand. The concept and the world in these applied virtual organizations (especially in China) OEM cooperation, the promotion of brand value, in some time is actually foundries with meager profits, even with a large number of countries on behalf of the factory at the expense of the environment in exchange for. So how to transform our country's enterprise into the theme of agile manufacturing is the subject that needs us to think deeply and make great efforts.

Our country enterprise development, agile manufacturing will be an important way, but the enterprise must have agile manufacturing strategy, only from the technical aspects above we can see that this is a severe challenge to China's manufacturing industry; but also absolutely cannot be applied mechanically in agile manufacturing strategy, China's manufacturing industry should be the advanced idea to solve the manufacturing enterprises in our country difficult and creative absorption of agile manufacturing together, not only to make full use of the existing manufacturing capacity and technical experience in effectively improving the production process and technical configuration, but also as soon as possible to establish the information network of enterprise strong, the promotion of information, tools and personnel integration, out of a Chinese manufacturing industry advanced and in line with China's national conditions the feasible way.

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