Computer Graphic Study of Advanced Manufacturing Technology with Chaos Characteristic Analysis

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Abstract. This paper uses the characteristics of computer graphics to study advanced production technology and carry out chaotic characteristics. AMT applied to the scope of the whole manufacturing process, especially the goals and effects achieved. All reflect that this is a practical technology that is applied to manufacturing and plays a major role in the development of manufacturing and national economy. With the rapid development of computer technology, the research progress of advanced manufacturing technology is also very fast. Chaos is being combined with many disciplines, resulting in new edge disciplines. Scholars gradually use the graphical characteristics of computers to analyze the chaotic characteristics. This paper further researches and uses the computer's imaging features to analyze the chaotic characteristics of advanced manufacturing technology.

Keywords: Advanced Manufacturing Technology, Chaos, Computer Graphic

1. Introduction
In the late 1980s, the United States first proposed the concept of advanced manufacturing technology (Abbreviated AMT) in order to enhance the competitiveness of its manufacturing industry and promote national economic growth in accordance with the challenges and opportunities faced by its manufacturing industry. Since then, European countries, Japan and Asia's newly industrialized countries such as South Korea have also responded. In 1994, the four national key technologies were proposed by the National Key Technology Selection Research Group organized by the National Science and Technology Commission of my country, and AMT is one of them. In the past ten years, the manufacturing industry has continuously absorbed the achievements of information technology and management technology, and applied them comprehensively in the whole process of product design, processing and testing, management, sales, use, service and even recycling to achieve high quality, high efficiency and low consumption. Environmental protection and even flexible and diverse production. With the support of contemporary information technology, comprehensive automation technology, and modern management technology, AMT is still absorbing the fruitful results of various high and new technologies and enriching its content.
The development frontier of AMT mainly includes the following aspects: Integrating mechanical engineering, CAD, numerical control technology, laser technology, and material science into one, design ideas can be quickly materialized into prototypes with certain structures and functions or rapid prototyping that directly manufactures parts /parts manufacturing technology; Material net shaping technology that directly manufactures precision parts from raw materials; Ultra-precision processing technology for material processing, design, manufacturing, measurement, control and application in the nanometer range (0.1 μm ~100 nm); On the basis of automation technology, information technology and manufacturing technology, computer integrated manufacturing technology is organically integrated through computer network technology to various scattered automation systems required for all production management activities of the manufacturing plant; Integrated and parallel design of products and their Concurrent engineering (also called synchronous engineering) technology of manufacturing process and supporting process; Intelligent manufacturing technology that can partially replace human brain decision-making, monitor processing in real time, adjust processing parameters, and provide operators with human-machine integrated intelligent interactive interface; For customers and the market it has flexibility and rapid responsiveness, including agile manufacturing technology of virtual manufacturing and virtual enterprise concepts; Lean production technology that focuses on people and takes simplified means and perfection as the ultimate goal of optimization [1].

Chaos is a widespread phenomenon in nonlinear systems, and its important feature is its strong sensitivity to the initial value of the system [2]. With the continuous development of high and new technology such as electronics and information, and with the individualization and diversification of market demand, the latest trend of AMT development is to become more precision, flexibility, network, virtualization, intelligence, cleanliness, integration and globalization. Research shows that these small changes can cause major changes in system motion, leading to the appearance of chaos.

2. A Connotation and Types of Advanced Manufacturing Technology

In the late 1980s, the United States first proposed the concept of AMT in order to enhance the competitiveness of its manufacturing industry and promote national economic growth in accordance with the challenges and opportunities faced by its manufacturing industry. Since then, European countries, Japan and Asia's newly industrialized countries such as South Korea have also responded. But so far, there is still no unified definition of advanced manufacturing technology.

2.1. Definition of American FCCSET

The AMT working group of the Industry and Technology Committee under the Federal Commission for Science, Engineering, and Technology Coordination (FCCSET) proposed that it mainly includes three technology groups: The first is the main technology group, including product, process and factory design technology, rapid prototyping technology, concurrent engineering, and material production technology, processing technology, processing and testing technology, etc.; the second is the supporting technology group, including information technology, control technology, Testing and conversion technologies, standards and frameworks; the third is the basic technology group, including infrastructure, quality management, personnel training, interaction between production, supply and demand, global supervision; benchmark evaluation, etc.

2.2. Definition of the National Science and Technology Commission of My Country

In 1994, the National Key Technology Selection Research Group organized by the State Science and Technology Commission of my country proposed four key national technologies, and AMT is one of them. The research group believes that the backward manufacturing industry is the key to my country’s backward industrial development and lack of international competitiveness. The research team’s definition of AMT: Advanced manufacturing technology is traditional manufacturing technology that continuously absorbs the technological achievements of machinery, electronics, information, materials, energy and modern management technology, and comprehensively applies it to the entire manufacturing process to achieve high-quality, high-efficiency, low-consumption, clean and
flexible production, and achieve ideal technology General term for economically effective manufacturing technology [3].

2.3. Definition of Other Scholars
Noori (1990) defined advanced manufacturing technology as a new technology directly used by companies in the production process; Youssef (1992) and Gules (1998) distinguished advanced manufacturing technology into hardware and software. Hardware AMT mainly refers to engineering, processing and the physical technology in management; while the software AMT includes total quality management and just-in-time production.

Many scholars in my country have also given the definition of AMT: For example, Zhang ShenSheng believes that AMT is an organic combination of contemporary information technology, comprehensive automation technology, modern enterprise management technology, and general manufacturing technology. Zou Yuanchao believes that AMT is the general term for a series of advanced technologies used in products to make raw materials. It is the main technology for the survival and development of the manufacturing industry in the era of scientific and technological revolution, increasing global economic integration, and unprecedented international competition.

Based on the above definitions, it can be seen that AMT embodies the application of various contemporary technologies in the manufacturing field, and almost covers various new technologies used in the manufacturing field.

3. Chaos Characteristic Analysis of Advanced Manufacturing Technology[4]
Chaos arises from a deterministic system, but presents a phenomenon similar to random or unpredictable. Chaos theory builds a bridge between the two academic systems of determinism and probability theory [5], deepening the universality of mankind to nature and human society. Understanding of the law. Chaos phenomenon is widely present in biology, engineering, economics and many other scientific and engineering fields [6-10].

The chaotic state displayed by the dynamic system is harmful in some cases. For example, if the amplifying circuit is in a chaotic state, the amplifying circuit will produce undesired oscillations, which needs to be eliminated. In addition, the pseudo-randomness and traversal of chaos. The high sensitivity and high sensitivity to initial conditions and control parameters are of great significance in certain occasions, such as random signal generators, secure communications, and data encryption. Therefore, the application of chaos starts from the control of chaos, according to the application purpose Different, there are two different control ideas, one is called chaos control, that is, by introducing a controller into the chaotic system to suppress or eliminate the chaotic state of the system; the other is to use the pseudo Randomness and other characteristics are introduced into the system to make it into a chaotic state or its chaotic characteristics are further enhanced, we call it chaotic anti-control. In addition, if it is necessary to control the state of two or more chaotic systems to achieve phase Consistency means to achieve chaotic synchronization. Chaotic synchronization has broad application prospects in advanced manufacturing technology and other fields. It has been extensively studied in the past two decades and is currently a research hotspot in the field of chaos and control.

For example: Figure 1 shows the control of the SR165 robotic arm based on the chaotic ant colony theory algorithm. Wind energy is generally valued as a clean energy. China's wind power manufacturing and wind farm construction continue to occupy the position of the world's largest country. At the same time, wind power equipment is facing problems of improving operational stability and reducing failure rates, which have become constraints. The bottleneck for the further development of the wind power industry. China's wind power construction is shifting from focusing on scale and speed to a stable development model focusing on quality and efficiency. Therefore, early fault diagnosis and condition monitoring technology for wind power equipment is a very important research content. The working environment is very harsh. The speed of the impeller fluctuates with the change of wind speed, and the alternating load is transmitted to the entire wind power transmission chain. Various components are subjected to complex alternating shocks under rigid connections, and
various failures will occur. Research shows that the wind turbine transmission system vibration faults occupies a high proportion of common faults, so it is very important to monitor the status of the transmission system. At present, some commercial systems have been able to obtain real-time data of wind power equipment operation, with early warning and alarm functions, but Lack of the ability to analyze the fault of the transmission system. In addition, the characteristics of strong noise, instability and nonlinearity of wind power equipment also make some traditional fault diagnosis techniques have low fault diagnosis rates for wind power equipment, especially for some early faults. Based on this, chaotic fractals are used. Theoretical development of vibration data analysis, research on related fault diagnosis and state prediction is very effective for improving the wind turbine transmission system [11].

4. Conclusion
Advanced manufacturing technology emphasizes high-quality, high-efficiency, low-consumption, clean and flexible production. The core is basic manufacturing technology, which is developed from traditional manufacturing processes.

Realize partial or system integration with new technologies. This means that in addition to the high-quality and high-efficiency usually pursued by advanced manufacturing technologies, it must also address the challenges of limited resources and increasing environmental pressures faced by mankind in the 21st century to achieve sustainable development. Low-consumption, clean production. In addition, advanced manufacturing technology must also face the challenges of human consumption concepts in the 21st century, meet the increasingly "critical" market demand, and achieve flexible production.

Chaos is a term used to express the complex behavior of deterministic nonlinear dynamic systems. In this sense, chaos is the study of deterministic nonlinear dynamic systems with irregular and complex behavior. Chaos The nonlinear dynamics of motion is an important part of nonlinear science. The combination of chaos and advanced manufacturing technology is also being gradually developed and improved.

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