Market Research and Design of Integrated Cultural and Creative Processing System

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Abstract. In recent years, with the improvement of the material living standards of our people, the spiritual life has gradually improved. The integrated development of cultural and creative industries and manufacturing is an objective and necessary trend. With the gradual deepening of the integrated development of China's cultural and creative industries and manufacturing, the Chinese government has also given strong policy support to the integrated development of cultural and creative industries and related industries. In this context, the design of cultural and creative-related processing systems is particularly important.

Keywords: Cultural and creative products, manufacturing.

1. Research background
According to the strategic requirements of the State Council "Made in China 2025", China should carry out innovative design demonstration activities in key areas such as traditional manufacturing, strategic emerging industries, and modern service industries, strengthen the research and development of common key technologies in the design field, and develop a batch of independent intellectual property rights. The key design tool software. In terms of manufacturing, the "Planning" specifically pointed out that the appearance, material, structure, function and system design of products and key parts should be strengthened, and "traditional manufacturing" should be promoted to the high-end direction of "intelligent manufacturing and service-oriented manufacturing". Therefore, under the guidance of this policy, this article has conducted a certain research on the current situation of cultural and creative product manufacturing equipment and processes, and put forward its own views.

2. Current status of the cultural and creative market
For a long time, my country's manufacturing industry has been dominated by extensive economic growth. While reaping rapid growth, there are also problems such as high pollution, high energy consumption, low technology, and irrational scale structure. In recent years, the development of related manufacturing industries in China is gradually transforming from extensive management to intensive management. This is also the background of the formation of the driving mechanism of the integration of the cultural and creative industry and the manufacturing industry. The design background of the integrated processing system.
In this context, on the one hand, China’s manufacturing industry is currently at the bottom of the value chain, facing pressure from industrial restructuring and industrial upgrading and transformation. In particular, for a long period of time, the development of China’s manufacturing industry mainly depends on human and financial resources. Material investment drives economic growth, and less relies on design innovation and extensive development of brand value-added effects. In the "post-financial crisis" period, it is urgent to rely on cultural and creative industries to accelerate the improvement of the competitiveness of China’s manufacturing industry. The proliferation and penetration of cultural creativity into the fields of equipment manufacturing and consumer goods industries has accelerated the transformation of China’s manufacturing industry to “created in China”. Therefore, integration with cultural and creative industries is the need for my country’s manufacturing industry to adapt to the situation.

On the other hand, the consumption needs of the Chinese people are becoming increasingly diversified, and the proportion of cultural and creative industries in GDP has been rising year by year (Figure 1), which imposes increasingly higher design, technology, and quality for the cultural and creative industries and manufacturing industries. And brand requirements. It can be said that the increasing diversified consumer demand of the general public is the main force promoting the integration of the cultural and creative industry and manufacturing. In particular, with the increasing global energy shortage, society is paying more and more attention to energy saving, technological innovation, and pollution reduction. Consumer demand is gradually shifting to green design, green products, and creative marketing. These changes are mainly based on With the growth of cultural and creative industries, manufacturing companies will produce small but diversified products by integrating cultural and creative elements, thereby promoting the upgrading of consumption structure.

![Figure 1. The growth value of the cultural and creative industry as a proportion of GDP](image)

3. System design

3.1. System necessity
In recent years, the integration of manufacturing and cultural industries has gradually accelerated, which includes various forms of mutual penetration, mutual intersection, and mutual reorganization between manufacturing and cultural industries.

The cultural and creative industry itself can glue technologies in different fields together, which promotes technological innovation across fields. The combined effect of creativity and technology has
enabled companies to increasingly integrate multiple resources across industries and fields during their operations. Businesses and industries that seemed to be unrelated in the past have begun to have relationships, and the boundaries of industries have become increasingly blurred and industry integration. Accelerating more and more, new business systems were established. This allows companies to integrate various resources in a wider range, so that resources can be more effectively allocated, which can reduce the cost of the company and make it more difficult for competitors to imitate.

In addition, a good cultural and creative processing system can also ingeniously integrate symbols, colors, patterns, shapes and other cultural, creative and even artistic elements into the product itself as intermediate inputs, enriching the internal structure of manufacturing products. Appearance design and expression form, increase the cultural connotation and innovative appearance of manufacturing products, enhance the symbol value and style taste of industrial products, so as to improve the connotation of cultural and creative products, and also improve production efficiency.

3.2. Overall design
The system itself is mainly based on two working modes: model imitation and custom processing. Industrial robots, dual-mode cameras, 3D scanning and printing technologies are applied to the finishing of small products, and a cultural and creative integration based on 3D printing technology is proposed. Through the establishment of this system, combined with the robot calibration and kinematic analysis methods, with the help of two processing modes of imitation and customization, a new way of manufacturing cultural and creative products is proposed. The specific process is as follows:

![Figure 2. Work process](image)

3.3. Parameter calibration
In the application of industrial robots to the finishing of jewelry, how to accurately control the positional relationship between the robot, the workpiece and the grinding disc is the key to the
construction of the entire processing system. The establishment of the positional relationship is usually called the calibration of the robot system. The system uses the target method for calibration.

The target method can be used to calibrate the conversion relationship between the vision sensor coordinate system T and the robot coordinate system R. The target coordinate system E is used as the transition between the two coordinate systems, and the target coordinate system E is fixed in space, that is, only it is necessary to know the corresponding relationship $T_{et}$ between the image coordinate system and the target coordinate system, and the corresponding relationship $T_{re}$ between the target coordinate system E and the robot coordinate system R, which can be solved by $T_{rt} = T_{re} T_{et}$. The linear method can be used to solve the transformation relationship $T_{et}$ with $T_{re}$, only 4 feature points A, B, C and D need to be determined on the target. Take A as the center of the target coordinate system, namely (0,0,0), and B as (n,0,0), C is (0, n, 0), D is (0, 0, n), as shown in Figure 3. The coordinates of A, B, C and D in the robot coordinate system R are obtained by teaching methods $A_R$, $B_R$, $C_R$, $D_R$, and the coordinates $A_T$, $B_T$, $C_T$, $D_T$ in the visual coordinate system T.

![Figure 3. Target indirect calibration](image)

After adopting this calibration method, the processing accuracy of the system will be guaranteed, which will ensure that the imitation and custom processed products of the system can maintain high production quality.

4. Outlook
In the later period of use and improvement of this system, on the basis of the original physical buttons, MR virtual operation buttons will be added to try to combine the cultural and creative processing system with MR emerging technologies, and use HoloLens to control industrial robots for operations (as shown in the figure). While working efficiency, it also ensures the safety of the staff.
The author believes that after the completion of the upgrading of the cultural and creative product processing system, the market for cultural and creative products and related manufacturing industries will also be greatly improved and expanded. Great progress and development.

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