Research on the Integration of Industrial Design and Mechanical Product Design

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Abstract. The purpose of this paper is to integrate industrial design into mechanical design, improve the core competitiveness of mechanical products, and become a benign development path for the transformation and upgrading of traditional machinery enterprises. To provide perfect and feasible ideas, theories and concrete methods and means for traditional enterprises; Through the research and analysis of the present situation of the development of traditional machinery industry, this paper finds out a series of problems existing in the upgrading and transformation of traditional manufacturing industry in the emerging stage, combined with the core ideas of informatization and industrialization under the background of industrial design 4.0, taking Anshan old industrial base as an example. An innovative development model suitable for the integration of industrial design and regional machinery manufacturing industry is developed. Relying on the platform of Anshan Industrial Design Center, the development model of "industrial design industrial alliance + association + university" led by the government is established. And take the industrial design public service as the support, adjust measures to the local conditions. Focusing on "public service, platform construction, design competition, talent training, publicity and promotion, brand activities, standard formulation, basic research" and other aspects, to achieve the integration of new industrial design industry ecological model of machinery manufacturing industry.

1. The present situation of the development of machinery industry
The traditional mechanical design method pays attention to the realization of functional structure, in order to meet the mechanical conditions as the main design criterion. With the development of computer technology, more and more auxiliary design software helps designers to complete product design. At the same time of improving the design efficiency, the homogeneity of the results of the machinery industry is serious, this traditional portable design method has been gradually unable to meet the needs of users and market demand. Most of the traditional small and medium-sized enterprises and old industrial design bases are faced with a series of problems to be solved, such as difficult transformation and upgrading, low industrial value chain and limited output of industrial achievements. In the face of such a situation, Many domestic experts and scholars put forward the concept of "integrating industrial design theory and method into mechanical innovation and development", which has greatly improved the brand recognition, product modeling, color painting, ergonomics and other problems of mechanical
products. Based on this concept, the value of traditional mechanical products is gradually returning to spring. However, on the one hand, designers limited by mechanical theory can not completely solve the defects in the current mechanical design, and some of the designs still remain in the category of structure and function. Based on the background of industrial design 4.0, mechanical products and industrial design will move towards the development trend of "innovation-driven, shared integration". On the other hand, although the concept of "combining the two and keeping pace with each other" has been put forward, most of the studies have only stayed at the superficial theoretical level. Failing to make an in-depth study and practical combination of the characteristics of the development of the regional machinery industry and the state's guidance on industrial design, the advantages between the two have not been maximized, and there is a lack of substantive innovation models and practical and effective guidance. As a result, there are some problems, such as "no cure, slow effect" and so on, in the transformation and upgrading of the traditional machinery industry.

2. The leading role of Industrial Design

2.1. Overview of Industrial Design
Design is a discipline that studies the changes and laws of form or style. Industrial design is defined as "a special service work." A creative activity that optimizes the shape, function, and use value of products and product families for the benefit of both users (consumers) and producers, and properly designs all human environments, It is a comprehensive applied discipline.

In the design activities, industrial design is more inclined to the study of product concept, shape, color collocation, visual interface and man-machine relationship. The core of industrial design is to "create a better life for mankind and create a better world." Through creative activities in industrial design, respond to economic, social, environmental and ethical issues, propose solutions, visualize and operationalize them, and build better product, system, service experiences or business networks.

2.2. The significance of the Integration of Industrial Design and Machinery Industry
The real economy of the development of machinery manufacturing industry has always been the mainstay of the healthy development of the national economy. With the concept of German industrial design 4.0 put forward, The United States, Britain, France and other developed countries have also put forward the strategy of "reindustrialization" one after another. In order to develop faster and better, We should speed up the planning and layout of manufacturing upgrading, put forward "made in China 2025" to strengthen the deep integration of industrialization and informatization, and vigorously promote China's transformation from a manufacturing power to a manufacturing power. The development of China's manufacturing industry is inseparable from industrial design. On the one hand, the upgrading of manufacturing brand has an urgent need for industrial design. On the other hand, the cooperation between professional industrial design companies and manufacturing enterprises is getting closer and closer, the mode of oriented service manufacturing enterprises has become more common, and some industrial design companies have the ability to produce customized products independently. Therefore, combined with the national conditions and the development of the design industry, the traditional machinery industry in the design level is in urgent need of industrial design theory to improve the grade of design products and increase the competitiveness of products in the market!

3. Research on Integration Mode of Industrial Design

3.1. Analysis on the background of Innovation and Development of Regional Machinery Industry in Industrial Design Integration
Since the 19th CPC National Congress, the development of machinery industry is facing new opportunities. In order to promote China's industry to move towards the middle and high end of the global value chain, cultivate a number of world-class advanced manufacturing clusters; In response to the call of the state, we should help to complete the advanced manufacturing cluster, which provides a
new development direction for the traditional manufacturing industry. All localities should adjust measures to local conditions and seek a new development model suitable for the region. Taking Anshan City, Liaoning Province as an example, this paper studies the innovative development model of industrial design and integration of regional machinery manufacturing industry. Anshan City relying on the iron and steel industry, the development of iron and steel as the center, other industries for iron and steel services industrial development cluster! How to better promote the economic development of Anshan, complete the transformation and upgrading of traditional enterprises, how to efficiently integrate industrial design into the traditional machinery industry, coordinate the use of resources, and help traditional enterprises to complete the upgrading and transformation, At present, it is an urgent problem for traditional manufacturing enterprises to solve.

3.2. concrete schemes for the innovative development of regional machinery manufacturing industry in the integration of industrial design

In order to give full play to the innovative and leading role of industrial design in the development of local industrial economy, and to promote the transformation and upgrading of manufacturing industry in Anshan, Anshan has set up an "Anshan Industrial Design Center" to rely on this platform. To establish a government-led "industrial design industry alliance + association + colleges and universities" form of development model. With the public service of industrial design as the support, adjusting measures to local conditions, focusing on "public service, platform construction, design competition, personnel training, publicity and promotion, brand activities, basic research on standard formulation", To realize the ecological model of machinery manufacturing industry with the integration of new industrial design industry.

In terms of public services, we should provide industrial design services for equipment manufacturing enterprises in Anshan area, improve the industrial design deployment of the manufacturing industry, achieve practical economic benefits, and gradually complete the new industrialization transformation of enterprises. Reshape the brand image of Anshan equipment manufacturing industry. It also creates research industrial design projects for heavy industrial enterprises, creates industrial design projects for product planning and modeling improvement design for manufacturing enterprises, and provides industrial design consultation and comprehensive services for small and medium-sized enterprises. Promote the formation of industrial design service market system in Anshan area.

3.2.1. Public service. 1. Mainly provide industrial design services for equipment manufacturing enterprises in Anshan area, use 5-10 years to improve the industrial design and deployment of the manufacturing industry, achieve actual economic benefits, and gradually complete the new industrialization transformation of enterprises. Reshape the brand image of Anshan equipment manufacturing industry. 2. To create research industrial design projects for heavy industrial enterprises, to create industrial design projects for product planning and modeling improvement design for manufacturing enterprises, and to provide industrial design consultation and comprehensive services for small and medium-sized enterprises. Promote the formation of industrial design service market system in Anshan area.

3.2.2. Platform construction. 1. Vigorously developing the public service platform for industrial design under the new situation is the practical demand for the adjustment of China's industrial structure and industrial transformation and upgrading. Facing the "Anshan characteristics" to change the scattered, weak and imprecise situation of the Anshan industrial design industry, Concentrate the resources of all parties, optimize integration, improve design quality, strengthen market competitiveness, reduce vicious competition, and create a municipal industrial design service platform. To enhance the guidance and driving operation of industrial design to the development of local industry. Impact on the direction of provincial industrial design center. In order to change the current situation of "provincial industrial design center" in Anshan City, so that the center can really play a practical role. In line with the principle
of "giving priority to characteristics and industrial agglomeration", condensing Anshan industrial design industry resources and characteristic advantage industries to form an effective interaction, so that advanced manufacturing industry and modern design service industry can integrate, promote and develop together. Work together to reach the provincial industrial design center. 3. According to the requirements of the "guidelines for the Establishment of the National Industrial Design and Research Institute" of the Ministry of Industry and Information Technology, the Anshan Industrial Design and Research Institute is established. Outstanding responsibilities and tasks include basic research, technical support, achievement transformation, consulting services, personnel training, exchange and cooperation of the key functions.

3.2.3. Design Competition. 1. Enterprise orientation competition. In order to promote the deep integration of industrial design and manufacturing industry, promote the development of industrial design to scale, specialization, high-end, internationalization and characteristics, and solicit design themes for "characteristic culture, characteristic industries and key products" in Anshan. Take the form of "enterprise registration + visit and investigation" to hold a special competition in the form of naming. 2. Set up the Anshan Industrial Design Award led by the government. To achieve a breakthrough in the zero industrial design award in Anshan City, and become the second city in Liaoning Province to have a government-led industrial design award, promoting the commercialization of the design of the award-winning works. And recommended to participate in the China Outstanding Industrial Design Award, China Red Star Design Award, China good Design, Germany IF Award, Germany red dot Award, the United States IDEA Award and other famous design competitions.

3.2.4. Personnel training. 1. Skills training and vocational certification. Including 3D printing advanced college training and certification, Solid Works global certification examination (CSWA) training and certification, two-dimensional graphic designer training, hand-drawn product effect map training and other skills training; We will start the pilot work of professional qualification certification for industrial design practitioners led by the municipal government, further broaden the scope of evaluation of industrial design practitioners, improve the evaluation system, innovate evaluation methods, and speed up the professionalization of industrial design personnel. 2. Special training. Support well-known design experts, excellent industrial designers, university teachers for manufacturing enterprises, design institutions, scientific research institutes, industry associations and other units related personnel, by category, field, level of industrial design innovation personnel training. 3. Establish a training base. Strengthen cooperation with industrial parks, leading enterprises, well-known design institutions and industrial design colleges and universities inside and outside the province, jointly build industrial design experiments and training bases inside and outside the university, and employ outstanding industrial designers to teach part-time in colleges and universities. Train compound applied industrial design talents. 4. Training Institute. Strengthen cooperation with famous design colleges and universities at home and abroad, introduce the concept of advanced design education, establish industrial design research institute, aim at the training of high-end and compound talents in the field of design, and establish a regional and industrial design talent training base. Strengthen cooperation with relevant colleges and universities and scientific research institutions to carry out professional training such as knowledge popularization and skills upgrading according to the characteristics of the industry. We should explore the open mode of talent training and promote the international and domestic two-way exchange and joint training of design talents.

3.2.5. Publicity and promotion. Organize and carry out all kinds of publicity and promotion activities, improve the understanding of industrial design in the whole society, shape the overall image of Anshan design, create "Anshan characteristics", enhance the competitiveness of Anshan industrial design, and set up a new business card of "Anshan design". 1. Publish design magazines and Anshan Industrial Design Yearbook in Anshan area. Matched with the "Design" magazine of the China Industrial Design Association, prepared to set up the "Anshan Design" magazine. Regular publication, regular release of
industry design information, explore the establishment of Anshan local economy design service system. At the end of the year, the Anshan Industrial Design Yearbook was published to establish the benchmark and example of industrial design in Anshan area. 2. To establish the official micro of Anshan Industrial Design Center. Set up a special person to be responsible for the establishment of the "Anshan Industrial Design Center" official WeChat and official Weibo, regularly push "design news, design cutting edge, design information related information, to create a" Anshan design "atmosphere.

3.2.6. Brand activities. 1. Forum exhibition. Strengthen cooperation with famous design colleges and universities, industry design associations, design industry parks and well-known design institutions at home and abroad to hold national or regional design forums and design exhibitions to create the brand influence of "Anshan Design". To the high-end, international, open direction of development. 2. Design docking. Relying on Liaoning Province Industrial Design Association, various Industry Design Associations, Anshan Industrial Design Association, Liao Anshan Industrial Design Center, related Industrial Design institutions and Manufacturing Enterprises, Co-organized "Design Forum, Design Exhibition, into the Industrial Cluster" and other forms of "Anshan innovative Design week" series of activities to enhance the brand influence of "Anshan Design".

3.2.7. Standard formulation. In order to strengthen the protection and supervision of intellectual property rights, design standards and design norms, and establish a good ecological environment for the design industry, a research group was set up. To formulate policies and systems related to design standards, design evaluation, market transactions, intellectual property protection, supervision and management, so as to provide fundamental protection for the development of creative and industrial design industries.

3.2.8. Basic research. Set up a research group to face the fields of "brand planning and image promotion, product design and strategy consultation, marketing planning and market operation", Carry out research and services in the direction of "industry research, operation analysis, concept promotion, planning research, policy publicity, knowledge popularization and education", and regularly publish white papers on industry design and development to provide support for government decision-making.

4. Conclusion
Based on the analysis of the development of traditional machinery industry at the present stage, combined with local characteristics, this paper expounds in detail the methods of the integration of industrial design and machinery industry in Anshan City, combining local characteristics and adjusting measures to local conditions to promote the development of regional economy. Anshan to find a suitable for their own development of the old industrial transformation of the road, the future of the traditional machinery industry will coruscate a new competitiveness.

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