

Research on the Innovation Strategy of Snowboard Business Model Based on the Improvement of Connecting Elements and Self-embedded Connecting Technology

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Abstract: In recent years, the prevalence of skiing at home and abroad has enriched the application scenario of skis; and for China, where the penetration rate of ice and snow sports is less than 1%, its development space is very huge, and at the same time, since most of the ski connection technology is glued and polluted, its environmental design is urgent. This paper is based on a more environmentally friendly and efficient advanced connection technology, the business model innovation strategy research of snowboard in sports equipment. Through the open point hot melt system of snowboard equipment, customized self-embedding system, fully automatic and highly intelligent self-embedding connection process, can achieve the ultimate goal of better than the current connection manufacturing technology whether it is hand-made, or automated gluing. In terms of business model, a business model suitable for the characteristics of this technology and the ski market has been studied. Through the three target markets, from the agency or OEM model, we gradually develop into a pioneering enterprise involved in front-end equipment development. Through the way of stable direct sales revenue to ensure a healthy cash flow and eventually achieve a deep integration of nested products with customer companies.

Keywords: Thermoplastic (Thermoplastic Composite), Environmentally Friendly Connection Components and Technologies, Innovation of Business Model for Snowboard, Integration of Production and Education, Development of New Engineering

1. Introduction

With the continuous development of China's economy and the improvement of people's living standards, people's consumption concepts and levels have also been greatly changed and improved, the snowboard industry has been rapid development, in 2020 China's snowboard market size has exceeded 100 billion and the annual growth rate of not less than 10%. At the same time, China's ice and snow sports penetration rate is still less than 1%, compared to the 10% penetration rate of developed countries in Europe, there is huge room for development [1]. According to the "Ice and Snow Sports Development Plan (2016-2025)" (hereinafter referred to as "Development Plan") formulated by the General Administration of Sports, the total scale of China's ice and snow industry will reach 10,000 billion yuan by 2025, and we estimate that the CAGR will reach 12.22% in 8 years, exceeding the domestic sports industry. By then, the number of people involved in ice and snow sports will also exceed 50 million, and drive 300 million people to participate in ice and snow sports [2].

Snowboard market is hot, the fundamental reason for its application scene to get leapfrog development is the innovation of technology, safety and variety. The explosive growth of industry user demand has greatly enriched the application scenario of snowboard [3]. However, the current domestic ski high-end connection technology is still mainly monopolized by foreign enterprises, the connection technology is mostly glued and polluted. Its extremely high profit margins and strong bargaining power seriously affect the willingness of domestic mid- to high-end ski enterprises to develop independently [4].

The purpose of this paper is to use the latest patents for thermoplastic (thermoplastic composite) sheet-based joining elements and joining technology to produce equipment for environmentally friendly

joining of snowboard equipment materials. The core technology is to use the plastic deformation property of plastic metal sheet under the action of extrusion pressure and the softening and flowing property of thermoplastic sheet under the action of heat to produce mutual nesting between the materials, which can be applied to the national key development industries such as high-end equipment manufacturing and fill the gap in the domestic high-end connection technology market. Our company mainly adopts the direct sales model, and the way to obtain orders is mainly through the personalized sales of equipment to customers with different needs, and deep participation in the research and development of the ski, the user can directly purchase the components after purchasing the equipment, which will develop into a sustainable source of profit, and the sales method is in line with the concept of saving and environmental protection.

2. Planning for commercial operation of connection components and self-embedding connection technology

The core technology is to make use of the characteristics of plastic sheet metal which undergoes plastic deformation (permanent deformation) under the action of extrusion pressure and thermoplastic sheet metal which softens and flows under the action of heat, so that the material which undergoes plastic deformation (plastic sheet metal) / the material which softens and flows (thermoplastic sheet metal) and the geometric features of the connecting element are nested together. This is shown in Figure 1.

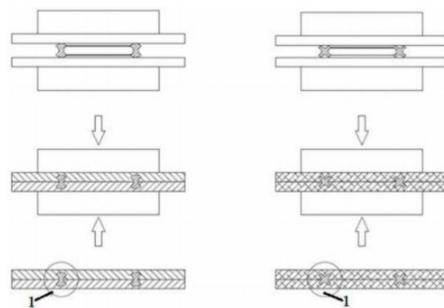


Figure 1: Schematic diagram of our core technology connection principle

The joining process can be divided into four stages: (1) partial flow of material from the joined workpiece (joined part) into the nested geometry on the joining element under the action of extrusion pressure (plastic sheet metal) / under the action of heat (thermoplastic sheet); (2) continuous and filling of the nested geometry on the joining element with part of the material on the sheet as the extrusion pressure is maintained; (3) holding pressure for several seconds to ensure that the material flowing into the nested geometry of the joining element is fully filled, nested and completely shaped, preventing this material from springing back and thus ensuring a permanent and reliable sheet joint. This is shown in Figure 2.

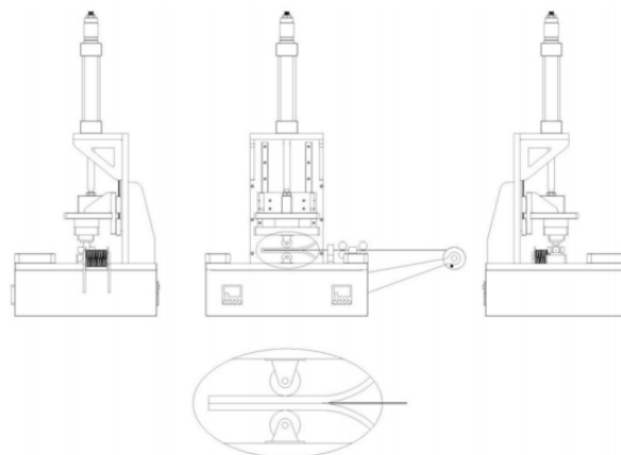


Figure 2: Schematic diagram of the connection between a plastic metal plate and a thermoplastic non-metallic plate

This innovation is also in line with the technical problems to be solved in "Lightweight Technology: Breakthrough in Performance Analysis, Forming and Connection of Lightweight Materials and Composite Automotive Parts" and "Efficient Connection" of the "Four Major Process Assembly Production Lines" in the "Green Paper on Technological Innovation in Key Areas of Made in China 2025".

It has the following advantages: (1) open point hot melt system; (2) customized self-embedding system; (3) fully automatic and highly intelligent self-embedding connection process; (4) no noise in the connection process, no health-damaging fumes, gases, sparks, or UV rays are generated during the process, and no splash cleanup is required; (5) simple connection operation, high connection repeatability, high strength and long life of the connection point. Because the interlocking amount (depth, width, length, volume ratio) of the connecting element and the connected workpiece (connected part) will be the key factor of the connection strength, so it can effectively solve the mechanical connection (including: riveted, screwed and special fastener connection), pull rivet connection, welding, gluing, advanced welding (such as vibration welding, ultrasonic welding, laser welding, induction (electromagnetic) welding, CMT welding), special mechanical connections (solid pressed self-riveting rivets, TOX, SPR, FDS, ring groove nails, self-tapping nails, etc.) and other disadvantages of the connection technology. As shown in Figure 3.

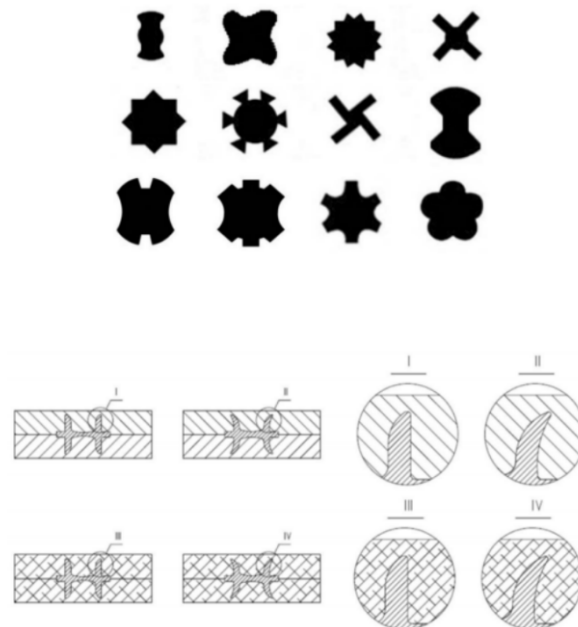


Figure 3: Schematic diagram of the structure of the geometric features of the connecting element

3. Snowboard business model innovation strategy

3.1. Industry Status

The development of China's ski industry has entered the fast lane, with more than 25 million ski trips in 2020 and a ski equipment market size of more than 200 billion yuan [5]. According to the "Ice and Snow Sports Development Plan (2016-2025)" issued by the General Administration of Sports and other four departments, the total scale of China's ice and snow industry will reach 1 trillion yuan in 2025, which will drive 300 million people to participate in ice and snow sports. At the same time, China's skiing penetration rate is less than 1%, far below the European and American ice and snow powers and Japan, South Korea and other developed countries in Asia. The market prospect is huge. As shown in Figure 4.

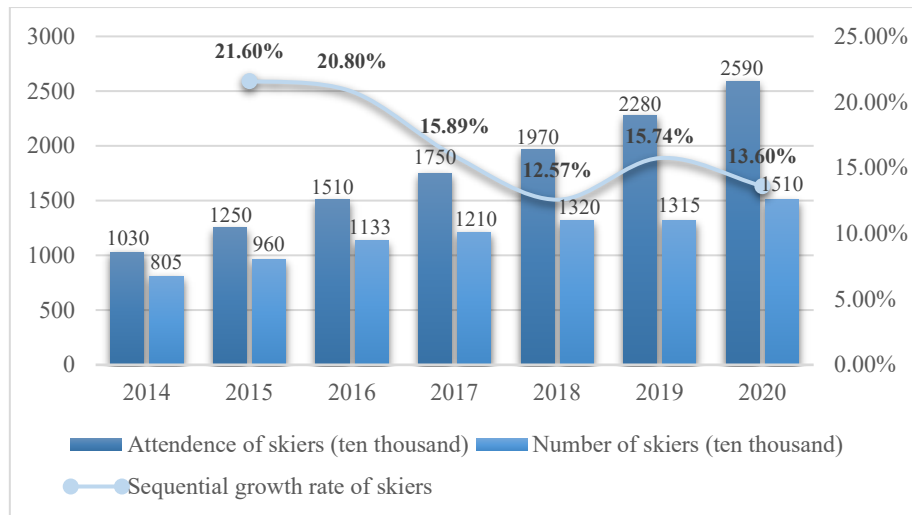


Figure 4: Skiing population and attendance in China, 2014-2020

In this opportunity, the snowboard industry has also been rapid development, the market size of China's snowboard industry reached 104.2 billion yuan in 2019, the market size of 111.2 billion yuan in 2020, the snowboard industry is under development, is expected to reach 210 billion yuan in 2025, 2030 will reach 310 billion yuan, the annual growth rate of not less than 10%[6]. As shown in Figure 5.

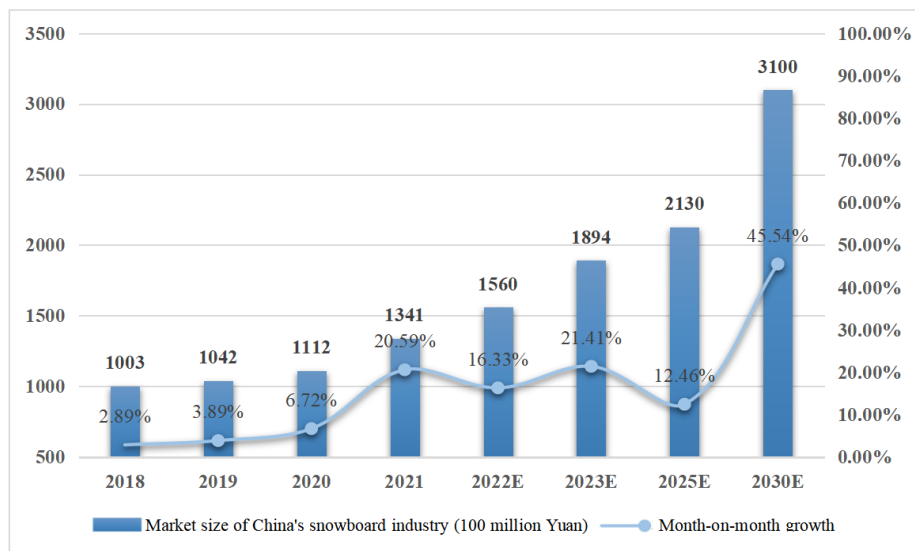


Figure 5: China Snowboard Industry Market Size

3.2. Target Market

The business of the target company is the sale to ski-related companies of joining equipment or machine tools equipped with joining elements for green plastic metal sheets and thermoplastic polymer sheets and self-inserting joining technology with transverse glued sheets and longitudinal nested joints. The target companies focus on mid-range and entry-level, non-manufactured skis, which can be produced in high volume, industrial conditions with an open spot fusion system, a customized self-inlay system, and a fully automated, highly intelligent self-inlay joining process to meet the carbon footprint of green production and increase production efficiency.

The first phase of the target market is in the low-end domestic ski manufacturing brands and domestic ski agency factories to provide customers with customized equipment based on snowboard products for each production line that meets the requirements, with the aim of capturing the ski equipment market and forming the initial customer stickiness. The company's healthy cash flow is ensured by the sales of the equipment body in the early stage and the stable supply of glue sheets and connections in the later stage. As shown in Figure 6.

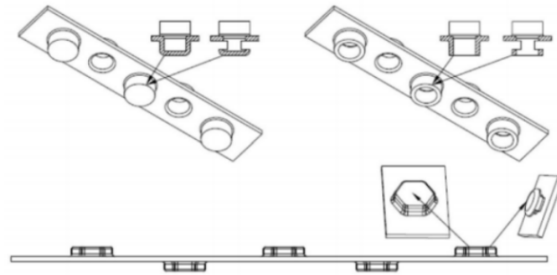


Figure 6: Diagram of some of the connector projects sold in the first phase of the company's target market

In the second phase, the target market is foreign ski equipment companies with OEM factories in China, where the company is responsible for gluing entry-level skis for traditional ski lines. During this period, specific and efficient gluing solutions will be developed for different materials such as poplar, light poplar, tung wood, beech and even special bamboo. At the same time, the company will carry out technical reinforcement of the interlayer-structure layer, reinforcement layer materials and structural technology of different snowboards. Modified materials are: Fiberglass, glass fiber, STS fiberglass, carbon fiber, Kevlar, Kevlar, etc.

The third target market will be to be able to provide connection equipment for all non-hand ski production lines and to master the ability to self-tune equipment parameters and participate in the front-end equipment development for some ski brands. Deep integration and nesting of our products with those of our customers' companies. During this period, our company will expand from just the initial largest market all-round board to a wide range of freeride boards, including: freeride board, freestyle board, all mountain board and four full versions.

3.3. Market Barriers

(1) Initial one-time investment is large, the company's early development difficulties.

The company focuses on new environmentally friendly joining technology, producing press-fit automated machines and adhesive sheets for innovative joining of plastic metal sheets/thermoplastic non-metallic sheets. Given the high threshold of interest points in the industry of the potential customers targeted, the initial investment is large and the company's initial development may be difficult.

(2) Crowding out from incumbent producers, which can be suppressed by established welding companies.

Exclusion from existing producers. The established company in each industry will crowd out new competitors by various means to prevent them from entering the market in order to maintain the consumer base and maintain substantial profits. It can then act as a monopoly and raise prices along the way. Our company, as a fledgling company with advanced connection components and connection technology, is likely to receive a crackdown.

(3) The market recognition is not high and marketing is difficult.

At present, the core technology supporting our company is an emerging technology, and no identical and similar connection components and connection processes have been retrieved from domestic, European and U.S. patent search sites, and has not yet been generally recognized in the market. In response to this problem, the Company expects to mainly adopt the direct sales model initially, and obtain orders mainly through personalized sales of equipment to customers with different needs, and users can purchase components directly after purchasing the equipment.

After gaining a firm foothold in the market, our company will open up the sales market with the high technology that is currently in short supply in China. After accumulating a certain amount of customers we will open a new way of customization to alleviate the problem of long production cycle caused by introducing characteristic customization when the company is just starting out.

Domestic molding machine transformation and upgrading, the company's product solutions are more difficult to adapt to different stages of flexible production lines and automatic production lines. Therefore, it is difficult to open the market in China.

4. Conclusion

This paper breaks through the core of the technology and obtains a patent for the joining element and joining technology based on thermoplastic (thermoplastic composite) sheets, and plans to use this technology as a technology to produce environmentally friendly joining equipment for snowboarding equipment materials. The paper also summarizes the three aspects of risk management, business strategy and future plans.

For risk control, we mainly adopt the risk control and risk transfer method for risk control. First of all, the company mainly adopts direct sales model, the way to obtain orders is mainly through personalized sales of equipment to customers with different needs, and the user can directly purchase components after purchasing the equipment, the sales method in line with environmental protection at the same time, its personalization also avoids the Company to aimlessly produce snowboard that does not meet the needs of users. Secondly, the personalization of customers with different needs requires the clear signing of relevant contracts at each cooperation to avoid misunderstandings later. At the same time, we purchase insurance for their patents and products to help reduce losses.

For the business strategy, it is divided into four aspects: market orientation, innovation, flexibility and corporate characteristics. At present, the ski market is hot, but at present, the domestic ski production connection technology is still mainly monopolized by foreign enterprises, while the thermoplastic composite sheet-based connection elements and connection technology can meet the various standards of medium and high-end ski production, while more energy-efficient, greener and more environmentally friendly, and can fill the gap in the domestic high-end ski connection technology market. The connection technology is the main innovation part, and will continue to insist on research innovation and technology improvement, to solve the problem of domestic ski products are too single, to create the domestic leading brand. At the same time always grasp the market trends, first focus on the domestic north, always pay attention to the market trends in the popularity of skiing, analysis of customer demand direction, and cooperation with the major domestic ski resorts, always pay attention to the domestic "dry snow" site construction. And excluding the special nature of technology, direct mode for the business characteristics of this enterprise, personalized can better meet customer needs.

For the future plan, the development will be divided into three phases, the first phase target market is in the low-end domestic ski manufacturing brands and domestic ski agency factories; the second phase target market customers are foreign ski equipment companies with OEM factories in China; the third phase target market is is able to provide connection equipment and front-end research and development for all non-hand ski production lines. The company will raise its own start-up capital and target financing of RMB 9.15 million through race prizes, college student start-up credit loans, and angel investment. It is expected to introduce the brand in 22 years, supply three thousand snowboards and get more than four long-term partners; after two years of growth stage, it is expected to supply more than seventy thousand snowboards and get ten times the number of long-term partners in 24 years.

Above, this paper is committed to using new green connection technology to break foreign monopoly, meet market demand, and promote the integration of industry and education, promote the development of new engineering, and strive to promote China's ice and snow industry to a new level.

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