

Title of final report:

A Handbag that can be turned into a Chair

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Introduction

The goal of our team is to design a school bag that can be transformed into a chair, which is improved based on the traditional folding chair. With the rapid development of the current social economy, people's pursuit of spiritual wealth is gradually increasing, and more and more people are willing to use their spare time to do some outdoor activities. In addition, since 2022, the domestic epidemic control is extremely effective, and small programs such as travel code have been removed from the market, people's demand for outdoor camping and hiking will continue to increase as a very practical equipment for people to go out, folding chair has a huge market potential, which is also the source of inspiration for our group. At present, the function of traditional folding chair in the market is to reduce the size and save space. It is indeed convenient for people to take a rest at any time, but it is too heavy to carry a chair every time they go out. Through daily observation and many surveys, our group found that although people are reluctant to carry chairs when going out, most people need to carry handbags when going out. Therefore, in order to meet the social development and meet the multiple needs of consumers, we designed a handbag that can be turned into a chair. The product through connecting rod and connecting rod between the axis structure rotation, affect the other connecting rod force movement and deformation people in going out, can be used as a handbag normal load some of the items they need to carry in the process of outdoor activities, when people need to rest, through simple operation, handbag can quickly become a chair for users to rest. In this way, users do not need to carry extra handbags, but also can get a chair to rest at any time, which brings great convenience to users.

1. Problem Definition and Need identification

1.1 Product status survey

1.1.1 Product classification and characteristics:

Product			
Price	58 yuan	35 yuan	65.55 yuan
Brand	Xv Xiaojian ^[1]	SHAN DI KE ^[2]	OTHER ^[3]
Function	Convenient folding High strength bearing Double layer tear resistant	7075 aluminum alloy Non slip plastic foot cover Small storage volume	Additional hanging bag Light weight

Table 1.1 existing products in the market

After our group's market survey, we found that there are three types of folding chairs on the market:

- The first kind is the folding chair represented by Xv Xiaojian. The type of folding chair is large, the structure has the chair back and armrest, and the comfortable feeling is extraordinarily strong. The price is 50-60 yuan, which is easy to fold and has High strength bearing. The implementation of the characteristic folding function such as Double layer tear resistant is achieved by the action between the connecting rod and the rotating shaft.
- The second type is the folding chair represented by SHAN DI KE. This type of folding chair is small in shape, simple in structure, easy to carry and priced at 30-40 yuan. It is made of aluminium alloy, light in weight and equipped with a Nonslip plastic foot cover. The folding function is also realized by the action between the connecting rod and the rotating shaft.
- The third type is the folding chair represented by OTHER, which has a moderate shape and a hanging bag under the chair, priced at 60-70 yuan. The realization of the folding function is also achieved by relying on the action between the connecting rod and the rotating shaft.

In addition, we also investigated the main size of handbags and folding chairs on the market

Product	Length(cm)	Width(cm)	Height(cm)
Handbag	25~40	10~20	25~45
Folding chair	30~50	35~45	30~70

Table 1.1.2 the main size of handbags and folding chairs

1.1.2 Market prospects:



Figure1.1 Camping market analysis

Recently, due to the epidemic's improvement and economic development, people will have more opportunities to go out for outings. The data collection also shows that the popularity of camping in China has increased significantly since March 2022. It can be predicted that wild camping will become a new hot industry in the future, people's demand for folding chairs will increase, and the folding chair market will be expanded.

1.2 Problems with existing products

Through the analysis of the three folding chairs in table 1.1, the folding chairs on the current market have some shortcomings, such as slightly higher price, larger chair type, and not easy to fold and store.

At the same time, our group of students also conducted some questionnaire surveys, the results of which are shown in the figure below. At present, there are problems such as folding chairs which are a single function, are too heavy, are not easy to carry, and have low space use.

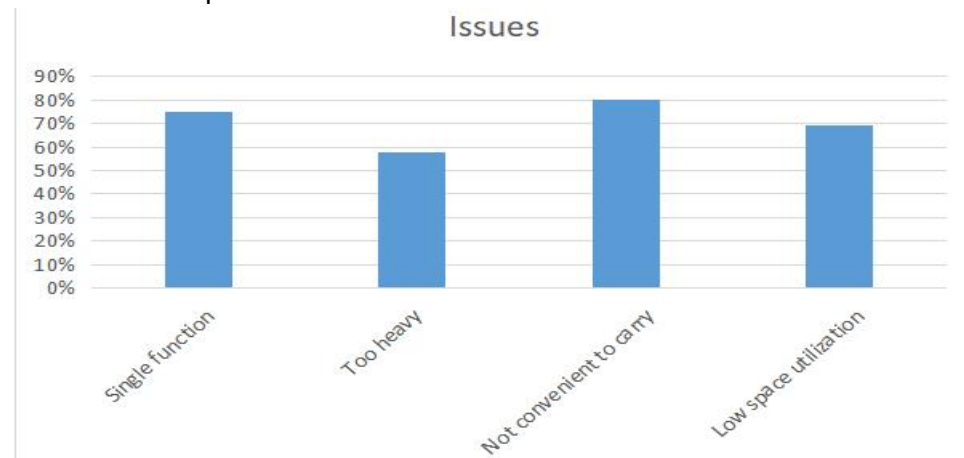
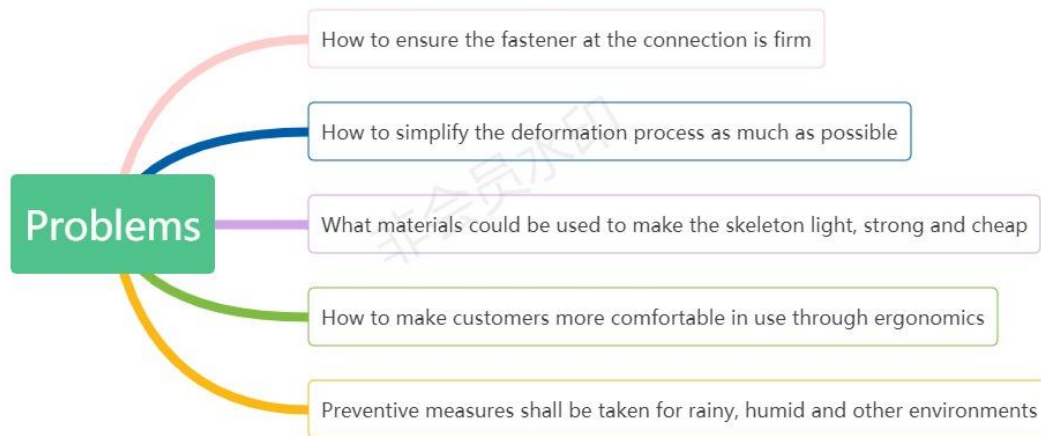


Figure1.2 Issues raised by users on folding chairs in the current market

The single function and not easy to carry are undoubtedly the two major disadvantages of folding chairs. While improving these two disadvantages, we should also take into full consideration other problems of the current product, including:



1.3 Explore customer needs

Through preliminary investigation, our team determined the structure of the consumer object of this product and the user demand, as shown in the figure:

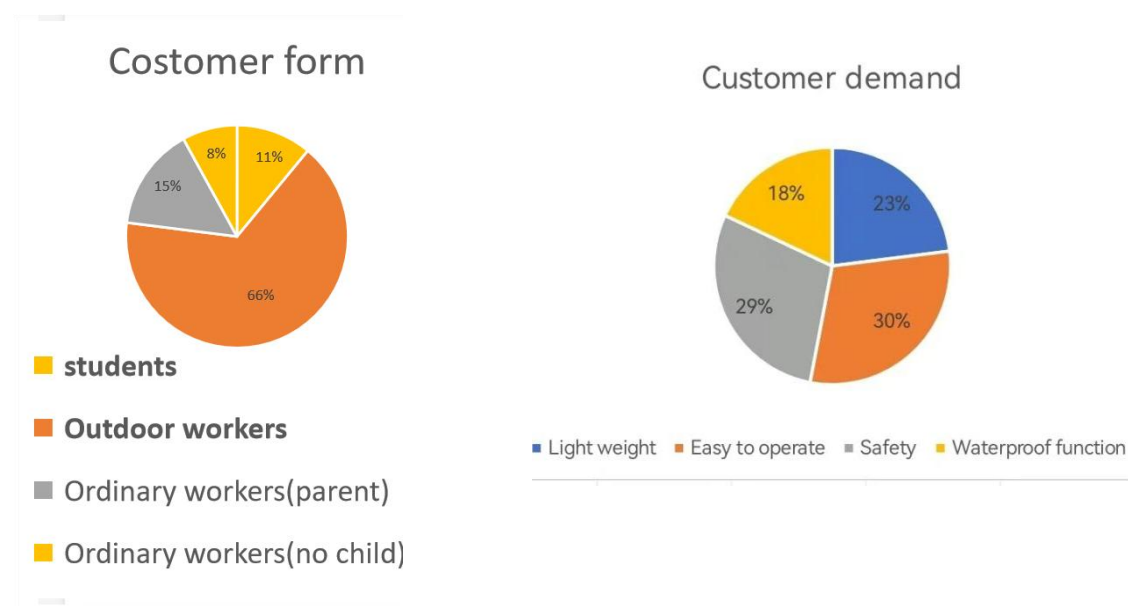


Figure1.3.1 Analysis by type of consumer group

Figure1.3.2 Costumers' demands

The consumer groups are outdoor workers and students. The main needs of consumers include light quality, high safety, effortless operation, waterproof and other multi-functional needs. By combining the consumption object and consumption demand, we made the pyramid of product performance demand, as shown in the figure:

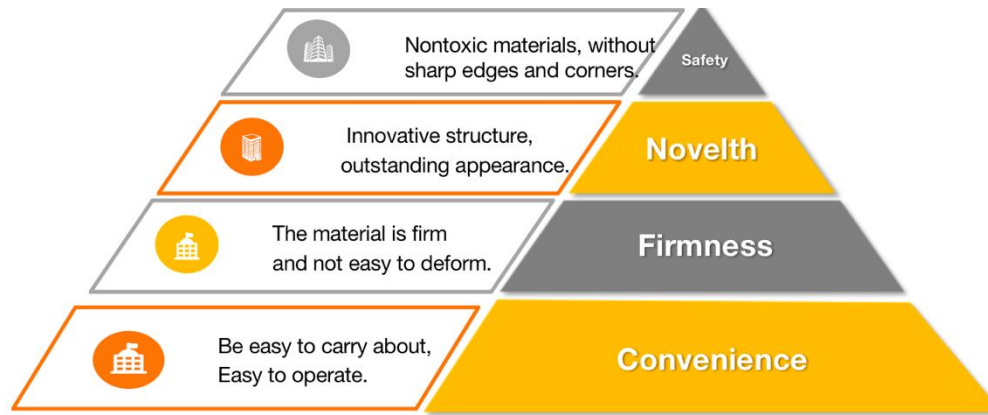


Figure1.3.3 Product performance requirements pyramid

Only by meeting the above four points in the design of folding chairs can we ensure that the products attract more customers and have sufficient competitiveness in today's market.

2. Information gathering

2.1 Product advantages

- 1) Comparative advantages: the functions of traditional handbags and chairs are separated. This product combines the functions of the two into one, which can not only supply the storage function but also form a chair through the structural change of the steel frame. It is convenient for picnics, outdoor adventures, and other scenes, with more functions and more convenient carrying.
- 2) Good ability advantages: The chair is made of magnesium aluminium alloy with high hardness, supplying stability and portability. At the same time, Magnesium aluminium alloy has low density, 30% lighter than aluminium, which is light enough to carry.
- 3) Advantages of environmental protection: The fabric of this product is Mylo, which is environment-friendly and can be degraded automatically and easy to recycle. Using environment-friendly dyes, such as environment-friendly reactive dye K-R, it will produce less chemical pollution.

2.2 Working principle

As a handbag, it can be either opened or closed and this function is achieved by a structure that resembles a human joint to ensure that the performance of the product as a handbag is satisfied. And when the original bag is open, turn the bag over, and the product will become a chair.

2.3 Industry regulations

"ISO/AWI 17406" prescribes performance guidelines for handbags. "ISO 7173:1989" laid down standards of strength and durability about chairs and stools. "ISO 7174-2:1992" laid down stability of chairs with tilting or reclining mechanisms when

fully reclined and rocking chairs. “QB/T 4582-2013” is the industry standard of picnic bag in China's light industry.


According to the above standards, the materials, stability, and strength of the product need to be tested to make it meet international standards. According to the above standards, the materials, stability, and strength of the product need to be tested to make it meet international standards. To make the product stable, the frame structure should be designed, and high-strength magnesium aluminium alloy should be used. As mentioned in the standard, we should conduct stress-strain tests on the products to ensure that metal fatigue will not cause danger to users during use.

2.4 Related patents analysis


Through searching on the European Patent Office, the following patents provide us with design inspiration.

2.4.1 Product structure design

(19) 国家知识产权局



(12) 发明专利申请



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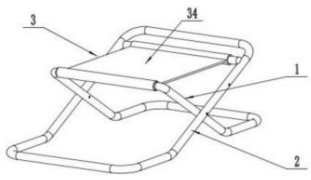
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(54) 发明名称
一种高低折叠椅

(57) 摘要
本发明公开了一种高低折叠椅,包括第一支
架、第二支架和坐垫片,所述第一支架的中段与
所述第二支架的中段通过铰接轴连接,所述第一
支架的下段和所述第二支架的下段均设有一定
弯折角度,所述坐垫片的两端分别与第一支架上
横杆、第二支架上横杆轴接固定;所述坐垫片有A
面和B面;当所述第一支架和第二支架呈X形展开
后,所述第一支架的弯折段和所述第二支架的弯
折段呈相向弯折(此时坐垫片的B面朝上)或背向
弯折(此时坐垫片的A面朝上)。与现有的高度可
调折叠椅相比,仅依靠将支架设置一定的弯折角
度就实现了高低调节和坐垫片的A面、B面的不同
选择,省去了专门的调节结构,从而结构上更为
简单,生产成本更低。




CN 115486650 A

Figure2.4.1 Folding structure of folding chair

The patent provides us with the inspiration for the folding structure of the chair. The middle section of the first bracket and the middle section of the second bracket of the product are connected by the hinge shaft and are unfolded in an X shape. This inspired us to adopt the X-shaped intersection method in structural design. The structure can realize the integration of backpack and chair functions through deformation. At the same time, the structure has the stability to ensure safe use.

2.4.2 Package design


(19) 中华人民共和国国家知识产权局



(12) 实用新型专利

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(45) 授权公告日 2020.11.03

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(22) 申请日 2020.04.03
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(51) Int. Cl.
A45F 3/04 (2006.01)
A45F 3/46 (2006.01)



(54) 实用新型名称
一种多功能野餐包

(57) 摘要
本实用新型公开了一种多功能野餐包,包括野餐包包体,野餐包包体后设有后包体,后包体下方设有杂物储放包,野餐包包体上对称设有背带,可拆卸内垫层内设有弹性连接布片,弹性连接布片上设有数个刀叉固定套,弹性连接布片下方设有连接横片,连接横片下方位于可拆卸内垫层内对称设有玻璃杯放置套,玻璃杯放置套底部开设有槽口,野餐包包体内设有内容纳腔,内容纳腔下方设有冷却箱,冷却箱顶部可拆卸设有密封板,冷却箱内设有冷却液垫,冷却液垫的两端分别设有进液管和排液管,冷却液垫下方设有隔热底板,有益效果:这样的装置结构简单,使用方便,可以有效的对需要保鲜的食品进行保鲜,防止因温度原因变质,同时可以分类防止物品。

权利要求书1页 说明书3页 附图3页

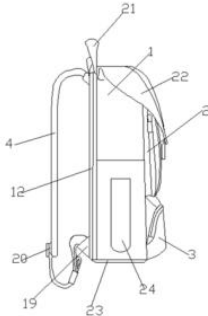


Figure2.4.2 Design of multi-functional picnic bag

The patent is designed for the picnic bag body and partitions the functions of the picnic bag. This supplies the inspiration for our bag design. In our package design, debris storage bag and debris fixing sleeve are also added. Partitioning the package functions can improve the product's convenience and make full use of the storage space.



3. Concept generation and evaluation

3.1 Concept generation and evaluation

To perfect the product structure as much as possible, our team put forward four design schemes through brainstorming, then compared the advantages and disadvantages of each scheme, and finally selected the most proper scheme as the final model of our product.

Here are four proposals we have put forward:

1. Backpack: The whole body is composed of six plastic plates of the same size, and two straps are installed on one plastic plate. When it is necessary to turn it into a stool, turn down the four plastic plates, fix them at the connection with buckles, and then turn up the plastic plate with straps as a chair back.
2. The single-shoulder bag: Some changes have been made to the backpack. In this design, the plastic plate that should have been used as the cover was discarded and replaced with a waterproof cloth. When it is converted into a stool, the four plastic plates around it rotate around the axis of the bottom surface to the bottom, becoming the four supporting surfaces of the stool. In this process, the straps fixed on one side are naturally turned to the inside.
3. Handbag: This design uses three planes connected by two shafts. Each plane is composed of two light metal rods, four Velcro, and a piece of waterproof fabric. The metal bar at the top of the plane on both sides is made of magnetic material. When used as a handbag, the two sides are composed of planes and the other two sides are composed of velcro. The two magnetic rods at the top will automatically close when they are close. When you need to turn it into a stool, undo the Velcro and turn the two sides down.
4. Cart: Based on the design of backpack, four wheels are installed at the bottom, and a push rod is connected to the front plastic plate. Other operations are the same as the backpack design.

Through consulting materials and market research, we have concluded that portability and ability are the most desirable attributes for users. In addition, the difficulty of cleaning, the safety of use and the cost are the most concerned aspects of users. By analyzing user needs, our team analyzed the design concept and designed the corresponding statistical chart.

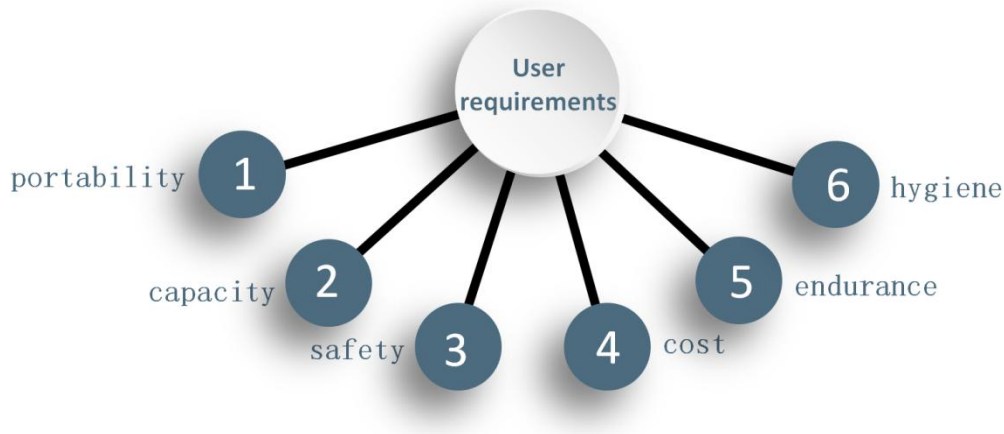


Figure 3.1 Main aspects of user requirements

We brainstormed and listed the customer-oriented requirements of the product - the evaluation table of the main functional parameters of the product. The functions of these products come from the main needs of using our daily life. For example, when we carry this chair, we want it to be lighter and more reasonable so that it can be portable; Security is not a negligible part, for example, whether the tip or protruding part of the chair is threatened; For convenience, waterproof or antifouling is a factor worth considering. In the above table, we have listed the customers' needs, and to improve them, we have also listed the corresponding solutions.

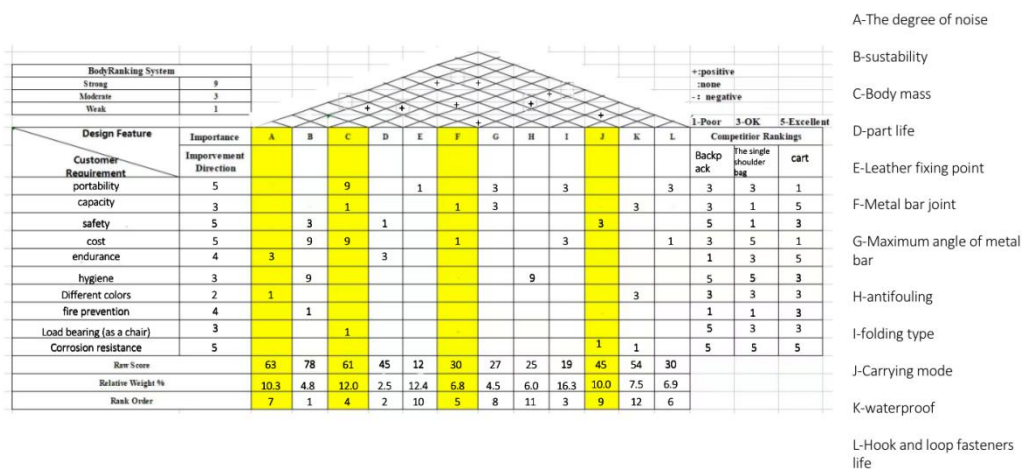


Figure 3.2 QFD method of user demand analysis

For these four schemes, we use tables to score their important performance (0-5), which can form an intuitive comparison.

	portability	capacity	safety	cost	endurance	hygiene	total
Backpack	3	4	5	3	2	4	21
The single shoulder bag	3	2	1	4	3	4	17
Handbag	5	3	5	5	4	3	25
cart	1	5	3	1	5	3	16

Table 3.1 Scoring table for user requirements

From the perspective of portability, handbag design is the most convenient, while cart design is the most inconvenient.

In terms of ability, the cart is designed to carry most things. Although the design of the shoulder bag and shoulder bag can free the user's hands, it is troublesome to use, and the hard rod may hurt the back.

For the cost, the handbag is the lowest and the cart is the highest.

The cart has the highest endurance and the smallest backpack.

For hygiene, handbag and cart are not easy to clean, while backpack and single shoulder bag are easier to keep clean.

To sum up, our group finally decided to use the handbag, which is the most suitable design for users.

3.2 Evaluation results

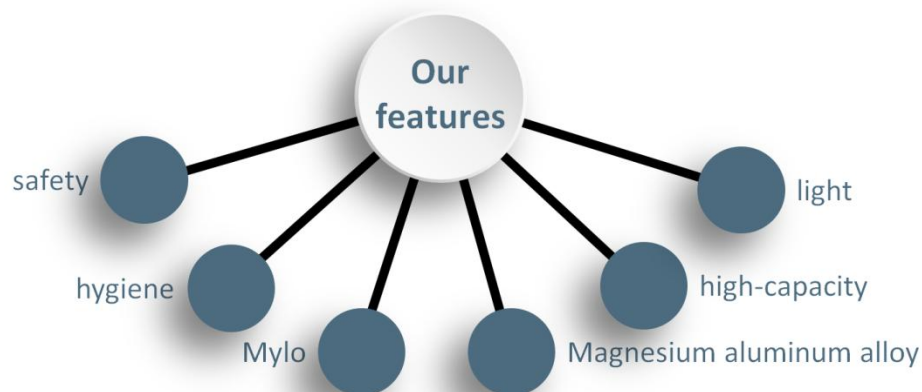


Figure 3.3 Features of our products



3.2.1 Safety

Product safety is the first element of product design. Safety means that the product will not cause any harm to users during use, and users can minimize errors in case of misoperation to protect users. The security of this product refers to the security attribute of the product itself to the user's operation process. For example, the tip is exposed, and the arm is scratched; Or the support in the wrong position will hurt the back when it is lifted.

3.2.2 portability

Portability is the product function most concerned by users. The portability value is whether the product is light enough and easy to carry, whether the shape and size are reasonable, and whether the portability changes after deformation.

In the design process, product structure modelling must meet the physiological needs of users. This product is a handbag, with a magnesium-aluminium alloy skeleton, and mylo leather. Therefore, keep away from ignition sources when using this product. At the same time, the structural points of the aluminium magnesium alloy skeleton should be wrapped as much as possible to prevent sharp parts from stabbing users.

4. Product architecture

4.1 Design features and functions:

User requirements	Design feature
Portability	It can be folded and the material is light.
Safety	The connection point is fixed firmly and the material is strong.
Corrosion resistance	The supporting structure and external wrapping materials need to be resistant to corrosion.
Endurance	The joint structure is rounded, and the friction at the joint is reduced.
Capacity	Through deformation, the capacity can be adjusted.
Hygiene	Simple structure, easy to clean
Load bearing (as a chair)	The material of the chair surface is strong and cannot collapse.

Table4.1. Design features and functions

4.2 Main system:

4.2.1 Structure introduction:

The main structure of the product consists of four horizontal bars at the bottom and four vertical bars at the side that can move around the bottom bars they relate to. In the middle of two opposite sides, each has a structure that can rotate around the center point. The structure is made of two horizontal bars with a hollow circle and a screw with a diameter slightly less than the diameter of the hollow circle, which is like a human joint.

4.2.2 Advantages of structure:

Due to the existence of a joint structure, the two horizontal bars connected with each central axis can rotate around the axis, and pull the vertical bars around the axis, as shown in the figure, so that the bag can be in two states of open and closed, perfectly satisfying the functional requirements of the product as a bag.

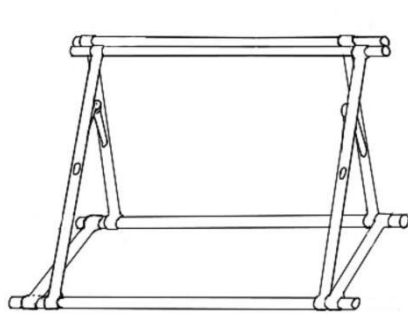


Figure 4.2.1 Handbag closed state

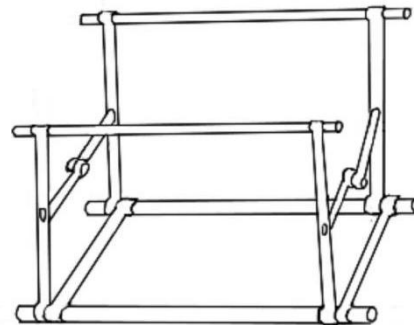


Figure 4.2.2 Handbag open state structure

When the opening of the bag reaches the maximum, that is, the horizontal bar is in the horizontal state, and the product is turned upside down, the original bag becomes a chair, the original bottom of the bag becomes the stool surface, and the original poles around the bag supporting the bag become the structure supporting the stool standing. The center screw of the movable rod used to control the stretching and closing of the handbag on the original side is tightened to make the movable rod become a fixed rod to prevent the chair from collapsing.

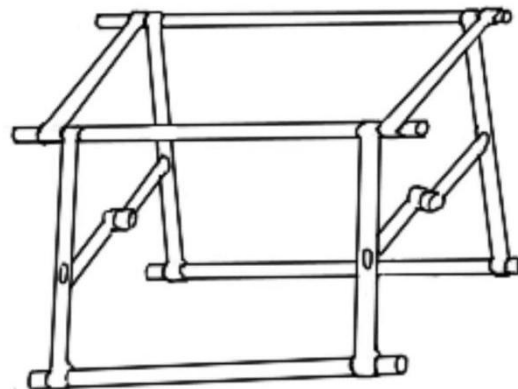


Figure 4.2.3 Chair state structure

4.3 Subsystem:

4.3.1 Hook and loop fasteners:

- Introduction: The external leather of the product is connected by Velcro. Because of the rotation of the vertical bars around, the outer wrapping cannot simply use leather directly to cover the skeleton but should make the leather can change with the main skeleton changes. Obviously, the leather itself does not have this capability, so structural design is needed.

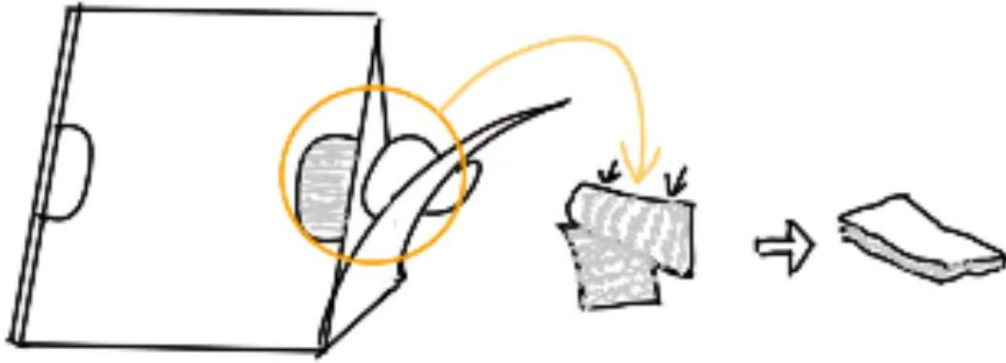


Figure4.3.1 Diagram of Hook and loop fasteners operation

- Advantages: As shown in the picture, the connection of leather wrapped outside the product will be connected by Velcro. Velcro adhesive buckle is convenient and fast to use, economical, has good temperature resistance, and no change, but also conducive to leather to fit the changing skeleton, to meet the structural needs.

4.3.2 Foldable leather:

- Introduction: The leather on the sides of the bag folds over. When the product is used as a chair, the leather is turned over from the side to the bottom and becomes part of the stool surface. At the same time, the entire leather surface can be removed.

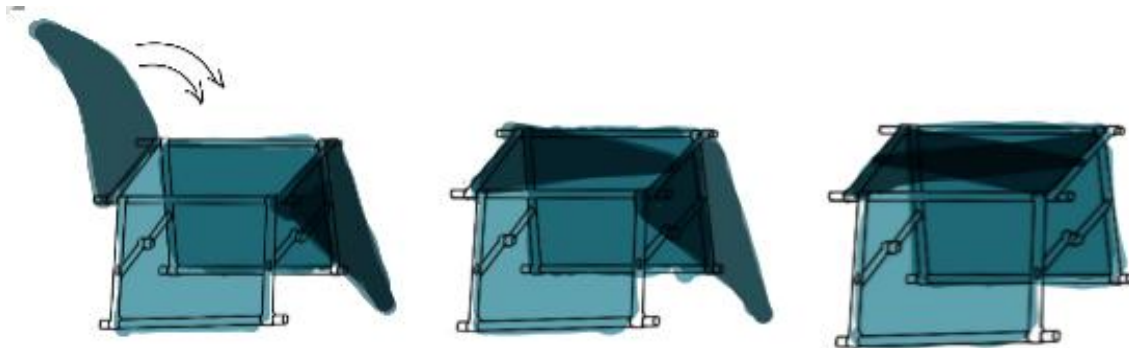


Figure4.3.2 Leather folding diagram

- Advantages: As shown in the picture, on the one hand, improve the bench surface comfort, On the other hand, it is easy to clean.

4.3.3 Magnetic buckle:

- Introduction: A magnetic buckle is added to the middle part of the top crossbar. When the product is in the closed state as a package, the closed state is supported by the magnetic buckle structure in the middle of the top cross bar.
- Advantages: This structure ensures that the product can be opened and closed normally and conveniently when used as a package.

4.3.4 Leave holes in the side:

- Introduction: There are semicircular holes at the top of each side, through which the human hand can pass. Outside, because of the existence of the hole, the bag can be lifted by people.

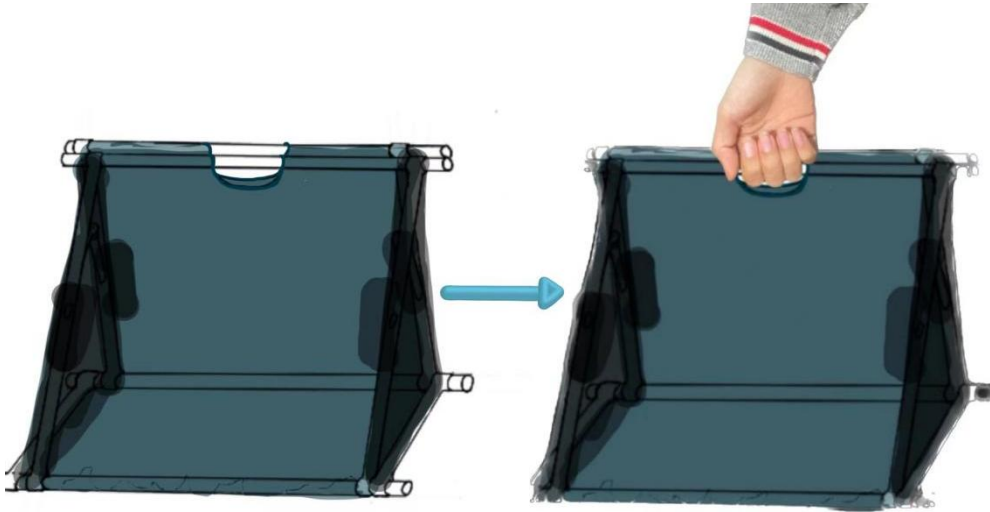


Figure4.3.3 Diagram with holes in the side

- Advantages: Perfect for the performance requirements of the bag being lifted by people, but also simple and clever construction, not in the way when the handbag transforms into a chair.

4.3.5 Adsorption plate:

- Introduction: There is a flat plate at the top. The center of the top bar is provided with a magnetic buckle to tightly adsorb the top plate.

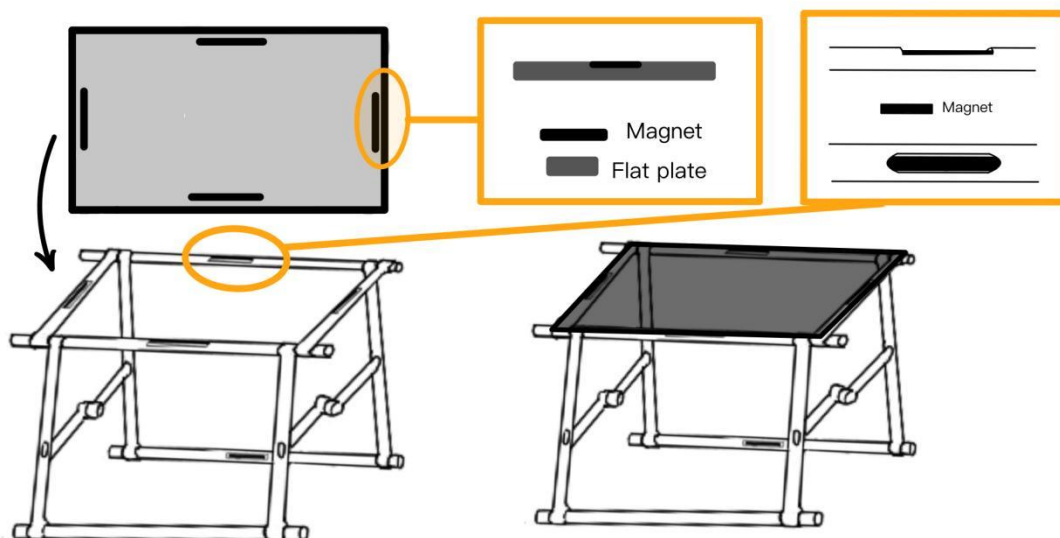


Figure4.3.4 Diagram with Adsorption plate

- Advantages: On the one hand to adjust the bag type, make the handbag beautiful, can store more items without collapsing. On the other hand, it can make the product bear more weight when it is used as a chair.

4.4 Product parameter:

4.4.1 Preliminary consideration:

Outing or camping people often need to carry a large number of items, so the capacity of the handbag can not be too small, at the same time from the point of view of light, should not be too large.

4.4.2 Determined parameters:

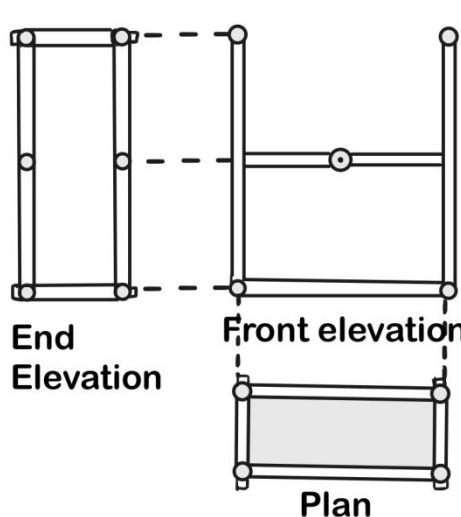
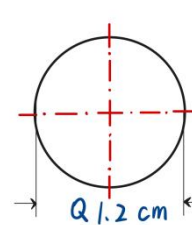
	Parameter	Parameter diagram
Length	41cm	 <p style="text-align: center;">First angle projection</p>
Width	32cm	
Height	40cm	
Pole diameter	Diameter= 1.2cm	

Table 4.4 Determined parameters

5. The 3D model and analysis

5.1 The 3D model and components

As shown in figure 5.1.1 and section 4, the whole structure includes the bottom, vertical, middle, and top parts.

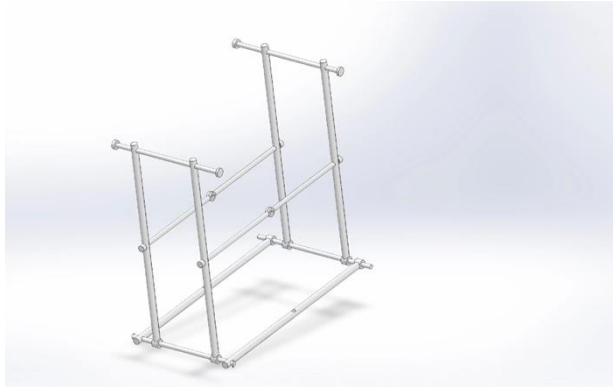


Figure 5.1.1 The image of 3D model

The top part is shown in figure 5.1.2, we modelled it to be served as our switch of product. The thin and smooth tube can be attached by some sticky things. To keep the pipe from pulling away, we installed cylinder parts to reinforce that.

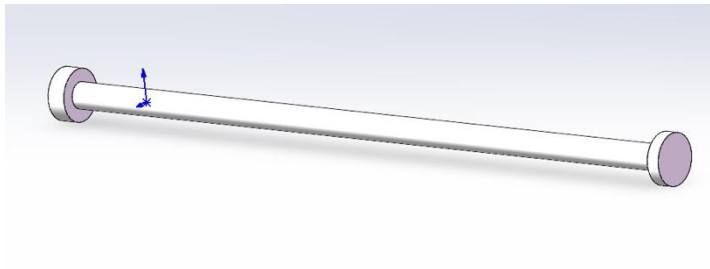


Figure 5.1.2 The top component

The vertical part is ingenious and has 2 holes and a cylinder ring. The 2 holes can connect the middle and top parts and the cylinder ring can encase the bottom rods, which can achieve the free rotation around the bottom.

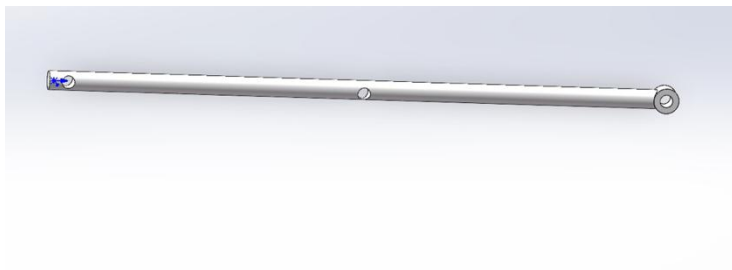


Figure 5.1.3 The vertical and bottom part

The bottom parts consist of 2 types. One type is the same as the vertical part, which can achieve connecting another type of bottom parts and adjusting the rotation degree to a proper state.

Another type of bottom parts is only tube served as the base of vertical rods.



Figure 5.1.4 A type of the bottom parts

The middle part is stretchable, which can control the rotation degree and reinforce the chair when the middle part has already been stretched.

5.2 The force transmission of the product.

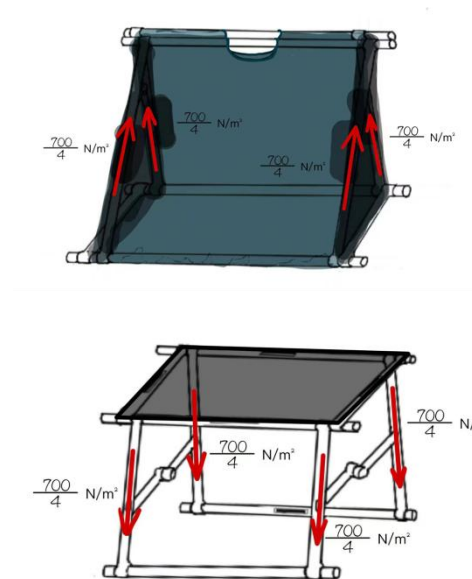


Figure 5.2 The force transmission of the product when the bottom is applied for force.

5.3 The stress analysis of product when bottom plane is applied stress

Figure 5.3 reveals that the stress distribution of the product when the bottom is applied force. As shown in figure 5.3, the bottom rods bear the most stress, which can reflect via the distinction of colors. We sectioned over 20000 nets of bottom to apply the large stress that is beyond 700N/m^2 , which simulates the loading of 70kg. The result of simulation reminds us that to manufacture the bottom rods, we need to consider the toughness of materials and manufacture process carefully. Moreover, we should focus on the vertical and middle as well, which are also bearing enough stress.

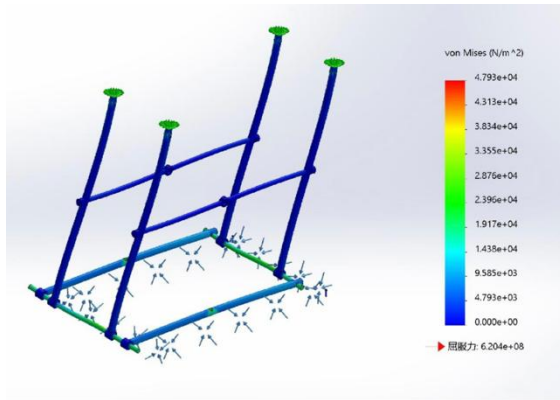


Figure 5.3 The stress distribution of the product when the bottom plane is applied force

5.4 The corresponding strain simulation of the product

The result of strain corresponds with the stress simulation, which reflects the bottom rods experience the most strain as well, figure 5.4 shows that. The strain of vertical and middle rods behaves less, while the bottom rods are hard to compress. It also suggests that we need to consider the selection of bottom rods deeply to achieve a stable, safe, and convenient product.

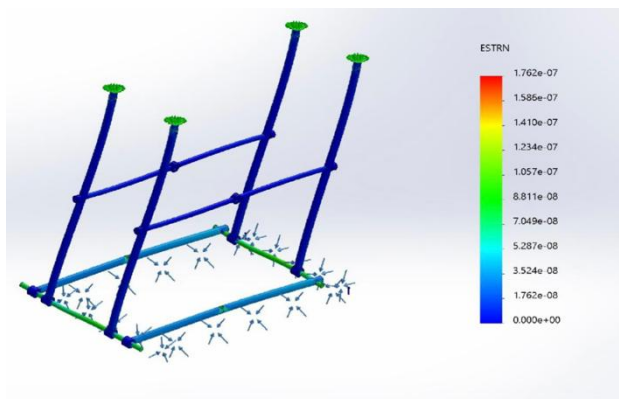


Figure 5.4 The corresponding strain simulation of the product

5.5 Conclusion of section

Based on the 3D model, we succeeded in constructing our target product, we began with the construction of parts first. We decided to build top, vertical, middle, and bottom parts to make a rotatable and convenient product.

After that, we simulated the stress and strain distribution with the addition of the stress toward bottom plane to test the safety and toughness of product.

According to the results of simulation, we can be directed to choose the perfect materials and manufacture process to fill the backward of our construction design.

6. Configuration design

6.1 Material analysis

According to different material selection, the product is divided into four structures, one is the main support structure, the second is the middle of the top cross bar, the third is the external leather, and the fourth is the flat plate.

The main support structure is made of aluminum alloy. The product needs to be light and can bear heavy objects, and aluminum alloy just meet the requirements. Aluminum alloy has the characteristics of low density, high strength, good mechanical properties, good machining performance and easy recovery.^[4] Low density can make the total weight of the product light, but also reduce the production cost. Higher strength can make the product have good bearing capacity. It is also very stiff and performs well in crash tests. Aluminum alloy is more durable than aluminum and can extend the service life of products. It has a lower melting point.^[5] It requires less energy to manufacture, so it is relatively cost-effective.

A magnet material is used in the middle of the top crossbar.^[6] In the form of a handbag, the bag's closure needs to be able to latch on tightly, and magnets can do that. Because of its magnetic force, it performs good. Magnets come from a wide range of sources and are ridiculously cheap. This will keep the cost of the product low.

The exterior leather is made of mylo material.^[7] It has the following advantages: It can degrade hydrocarbons. Reduce the mutilation of animals and protect biodiversity. It is easy to recycle and reuse. It degrades automatically. It can replace existing high-pollution materials and reduce environmental pollution. It is a very ideal material.

PP plastic is chosen as the material for the flat plate.^[8] PP plastic has the characteristics of lightweight, heat resistance, high strength mechanical properties and good wear-resisting properties. Its sources and applications are very wide and easy to obtain. This reduces the cost of the product. Its excellent mechanical properties can well withstand the weight of the human body. It can be recycled to waste PP plastics for treatment.

For both sides of the leather, we use Velcro to fix and fit. Velcro is a common and easily available material.

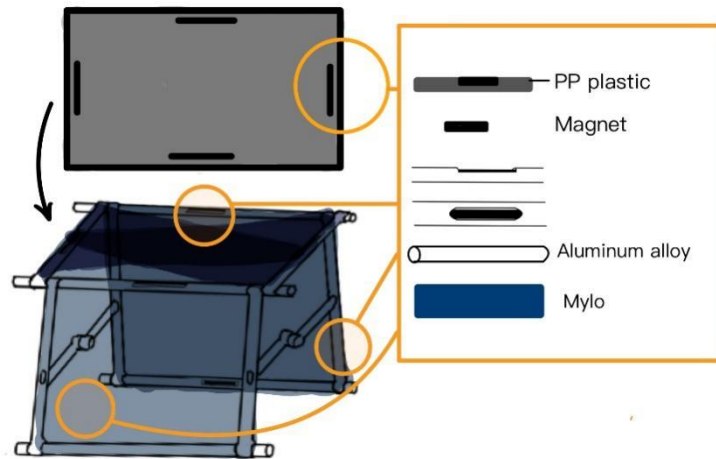


Fig.6.1 Materials for each part of the product

6.2 Manufacturing process

Aluminum alloy adopts the economical and efficient die-casting method (hot chamber die-casting method). Die casting can produce correct size, high surface finish products, can be processed without damaging the surface integrity of the workpiece, can improve the labor intensity and productivity of workers, can reduce the consumption of raw materials, can make the weight of the product, and can improve the mechanical properties of the product. These features can reduce manufacturing costs. Because of different temperatures, die casting can be divided into hot and cold chambers. The chamber method using indirect pressure can be small and suitable for lightweight products. Cold chamber methods using direct pressure can be large and well-suited for producing large products. This product belongs to the small portable, processing hot chamber method.

Magnets are manufactured using common manufacturing processes.^[9] The manufacturing steps are as follows: batching, smelting to make ingot, pulverizing, pressing, sintering, and tempering, magnetic testing, grinding, pin cutting, electroplating, magnetization, and finally the finished product.

Mylo, we follow the cultivation process, then process, and finally into leather. The detailed process of production is as follows: Spores of mycelium cells were harvested and planted. Give it proper growth conditions, such as feeding organic matter, ambient temperature, and humidity. When it grows into a foam layer, harvest it. Processed and dyed harvested mycelium.

PP plastics are manufactured by liquid phase bulk method.^[10] The steps are as follows: without any other solvent in the reaction system, the catalyst is directly dispersed in the liquid phase propylene bulk polymerization reaction. The polymer is precipitated continuously from the liquid propylene and suspended in the liquid propylene as fine particles. The concentration of polymer particles in liquid propylene increased with the increase in reaction time. When the conversion rate of propylene reaches a certain level, the unpolymerized propylene monomer is recovered by flash



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evaporation, and the powder polypropylene product is obtained.



Discussion and Conclusion

Through our observation of life, we found that some groups of human beings have a need for both a bag and a stool, so we have a prototype concept. The product needs to be able to switch between the two forms to meet the two requirements. We chose a handbag as the shape of the bag and pulled and turned the bag into the shape of a stool. We did research on the industry in which the product is found. Search for industry pain points and user needs through data inquiry, questionnaire survey and street interviews. On this basis, the concept and function of the product are further designed. For example, the product is light enough to support the weight of an average human body. We searched and researched related patents and industry standards. Based on relevant information, the concept and function of our products are evaluated, as well as the size of the product and other hardware conditions are refined. After the preliminary work is done, we complete the design drawings, modelling, and choice of materials for the application. Now the product basically meets our design concept and envisaged function. But we think we can also perfect the structure design and make the product more beautiful. At the same time, when the product is in the handbag form, we can perfect the way the side structure is fixed to make it firmer.

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