Research on PI Design of Power Products

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Abstract: With the development of productivity, the advancement of technology, the problem of product homogeneity is becoming more and more serious, and the product identification of enterprises is not strong, so the competitiveness is weak. The same homogenization problem exists in the products of power companies and no solution has been found. This paper regulates the PI design process and studies the differentiated design path of power products to improve product quality, enhance product and brand recognition, and provide reference for related companies and institutions.

1. Preform

With the continuous development of productivity, the monopoly of product development technology has become lower, leading to serious problems in product homogenization. Power companies also lack the identification design of product systems due to the variety of products, the use environment and related people, which in turn affects brand recognition and corporate competitiveness. This paper summarizes and summarizes the design process and specific practices through PI design and practice of power products.

2. General Process of PI Design and Existing Problems of Power Products

Product Identity (PI) is one of the effective design methods for product enhancement and expansion of intrinsic and extrinsic value, making enterprise products uniquely unique. As an efficient design strategy, product identification (PI) is based on corporate image recognition behavior and is the design work to achieve the unified identification of corporate image (Liu Lei, 2009). Product identification design works on products, people and markets, and shapes corporate image through "family product" (Lei Yang, 2017). Let the public gradually accept the brand information conveyed by the company and recognize the brand image in the contact and use of the product, which will bring greater market benefits to the enterprise (Lu Yan, 2014). Therefore, the role and status of product identification (PI) design in corporate competition strategies cannot be ignored. Under normal circumstances, PI design always starts from market research, combined with user research and analysis, brand style positioning, and then specific program design, and then design evaluation.

In the power products industry, the products design of Siemens, ABB, Schneider, GE and other brands have become mature and have formed distinctive brand characteristics. For example, in terms of product color matching, they often correspond to corporate brand logos. All products have Integrity, serialization, and familyization. Although domestic electric enterprises are gradually catching up with the level of foreign companies in terms of technology, the product model relies too much on drawing on foreign excellent products and lacks the awareness of product identification design, so that the product itself is weak. At present, the primary concern of China's electrical companies is how to make their products have brand characteristics and attract more consumers.

3. Power Product Identification (PI) Design Specific Operation Method

3.1. Product Identification (PI) Design Pre-Survey and Establish PI Design Concept.

Before conducting PI design, it is necessary to conduct preliminary research and analysis on the enterprise, and draw the PI design concept of the enterprise. The design concept will guide the enterprise to do PI design. The preliminary research mainly starts from the three aspects of industry research and analysis, enterprise research and analysis (product analysis), user research and analysis, and fully understands the competitors, design trends, brand value and then derives the PI design concept. These three aspects of research and analysis work are in no order, so in practice, if human and material resources are sufficient, they can be launched at the same time, saving a lot of time. The specific steps and contents are shown in Figure 1. Finally, a comprehensive analysis of the research results of these three aspects, as shown in Figure 2, the discussion summarizes the PI design concept.
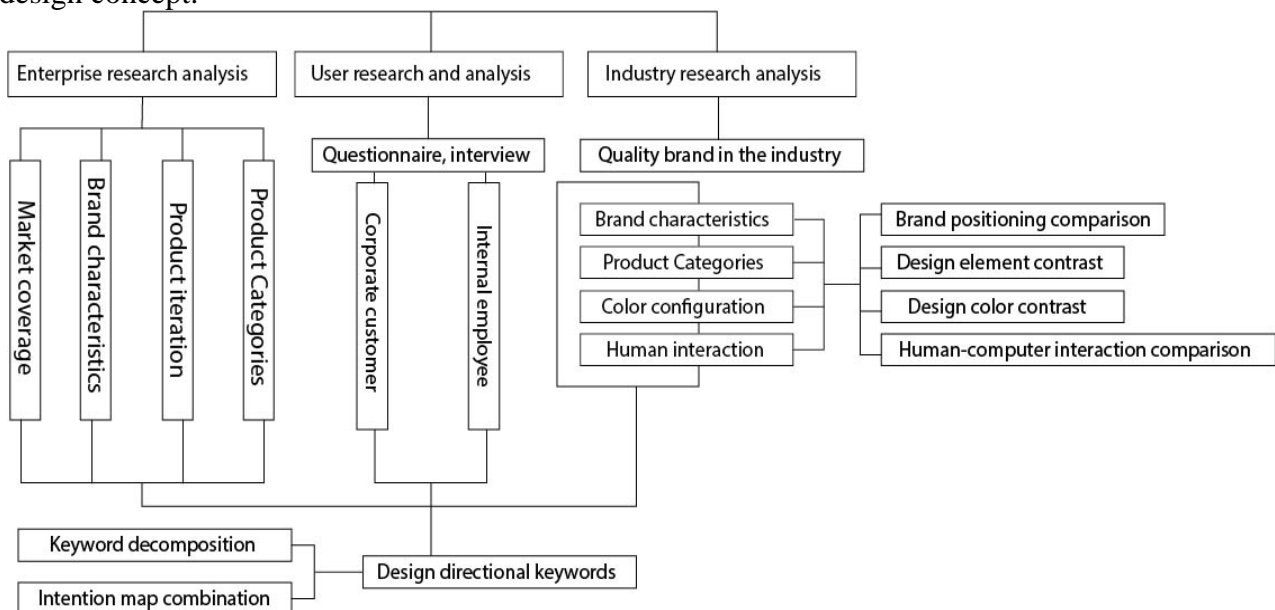
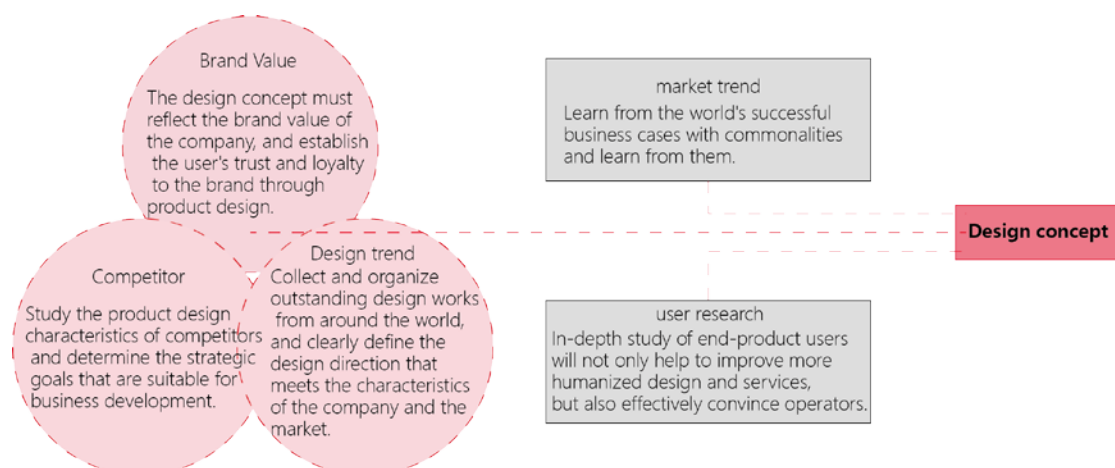Fig 1. Step diagram of preliminary research on product identification (PI) design

Fig 2. Source of PI design concept

3.2. Forming a PI design Strategy.

PI design is a process of visualizing abstract design concepts, including three key steps: (1) extraction and decomposition of keywords; (2) combination of imagery; and (3) extraction of feature elements.

Based on the preliminary research results, and comprehensive industry conditions and the

company's products, brands, services and other aspects of the elements, the power company's brand and product identification features condensed into "solid, letter, fine, Bo" four keywords, as shown 3 is shown.
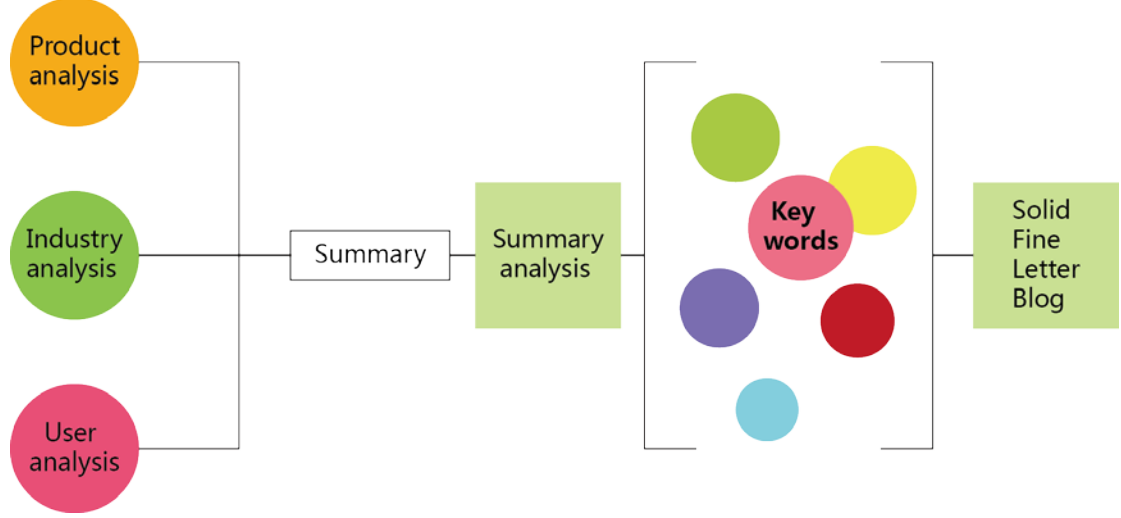

Figure 3. Shows the design of the directional keyword general process

After getting the keywords, in order to further obtain the accurate description and positioning of the brand and product attributes, it is necessary to decompose and reorganize the four keywords.

The decomposition of the keyword is to obtain a large number of image maps. As shown in Fig. 4, the four design directional keywords are decomposed twice by the form of discussion and analysis, and finally a total of four sets of three-level design directional keyword sinks are obtained. The three-level keywords can be decom osed from four aspects: modeling design, material technology, engineering design and user experience.
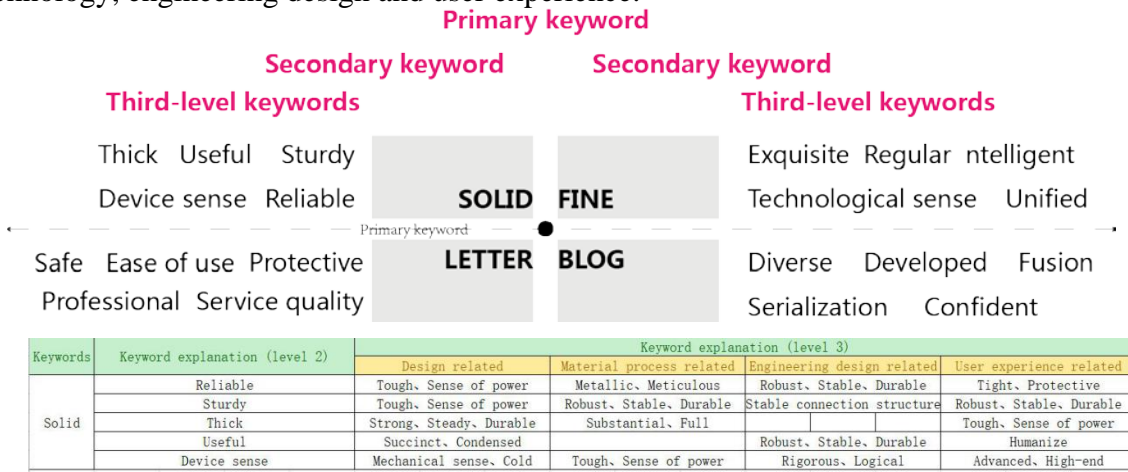

Keywords	Keyword explanation (level 2)	Keyword explanation (level 3)			
		Design related	Material process related	Engineering design related	User experience related
Solid	Reliable	Tough、Sense of power	Metallic、Meticulous	Robust、Stable、Durable	Tight、Protective
	Sturdy	Tough、Sense of power	Robust、Stable、Durable	Stable connection structure	Robust、Stable、Durable
	Thick	Strong、Steady、Durable	Substantial、Full		Tough、Sense of power
	Useful	Succinct、Condensed		Robust、Stable、Durable	Humanize
	Device sense	Mechanical sense、Cold	Tough、Sense of power	Rigorous、Logical	Advanced、High-end

Fig 4. Keyword decomposition details

3.3. Image Map Combination.

The work here consists of three parts:

The first is to give the three-level keyword exchange image map, this process can make the product design directional keywords gradually visualized and visualized. As shown in Figure 5, when acquiring the intention map, you should select the product map that reflects the basic elements of the product design, and avoid selecting abstract images that are not related to the product.
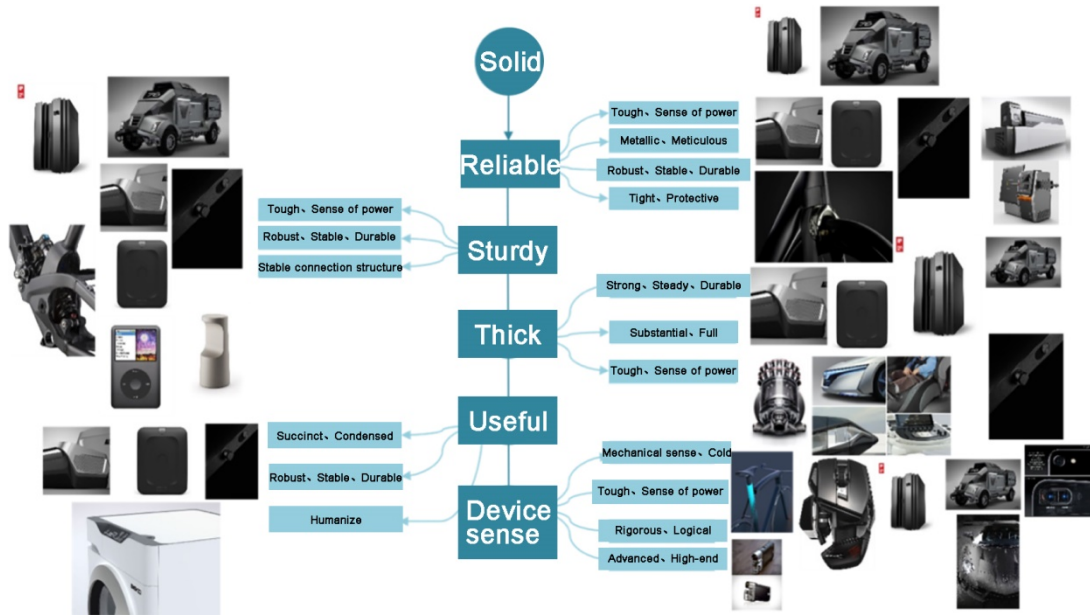
Figure 5. A set of intention maps corresponding to "solid"

Then, according to the characteristic typicality, the intention graph matrix is constructed. As shown in FIG. 6, a solid figure is created, and the number of sides of the figure can be determined according to the number of primary keywords. In this step, the three-dimensional figure in the figure can be constructed by using a foam board. From the bottom of the solid figure to the high-level construction matrix, each side of the solid figure represents a region of a first-level keyword, and the bottom layer of the region is a secondary keyword, and the vertical upward is a region corresponding to the secondary keyword, the region The number can be equal to the number of secondary keywords, and each region is divided into several squares of 20CM*20CM. Paste the finished image map into the corresponding square, and arrange it according to the degree of correlation of the image map. The higher the correlation, the closer to the corresponding keyword at the bottom. If there is a duplication of the intention map of different groups, in order to ensure the authenticity of the experimental results, it is not necessary to evade this phenomenon, and it is still placed in the area.
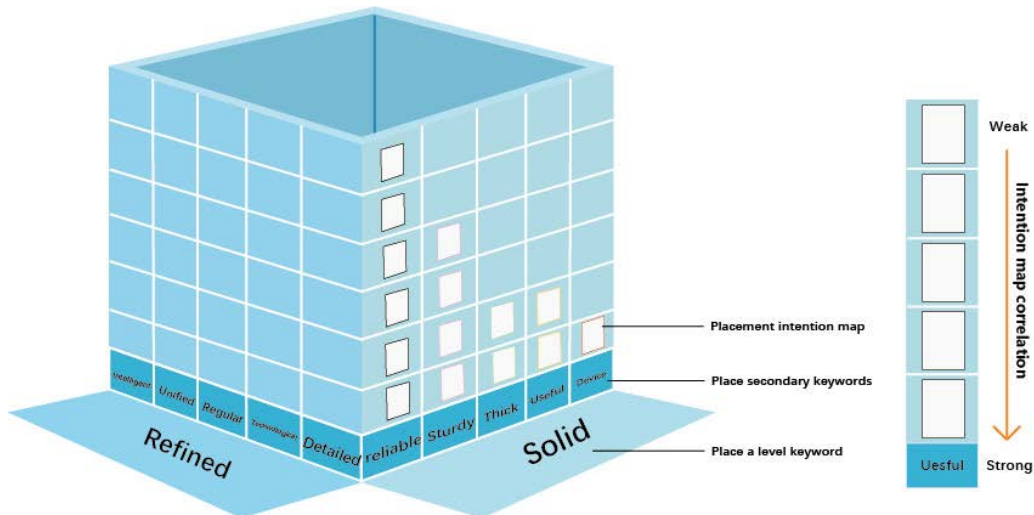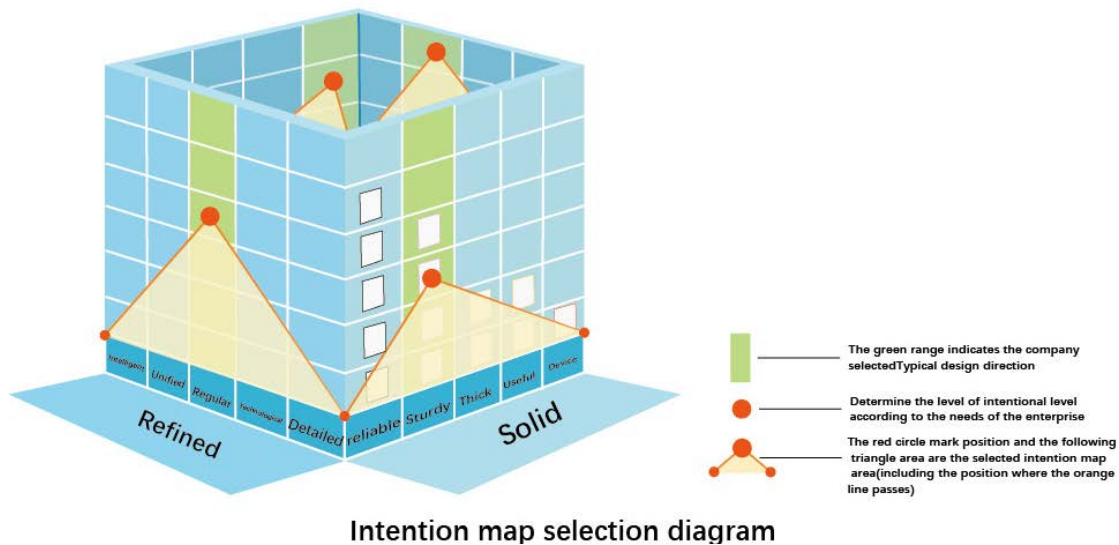

Intention map combination diagram

Fig 6. Schematic diagram of the intentional combination method

In the implementation process, the design style feature area is defined according to the characteristic tendency. Name the final output, such as "XX Feature Intent Diagram". As shown in Figure 7, according to the previous research on enterprises, users, etc., the typical design direction is

summarized and marked as a green area; then the level of the intention map is determined according to the needs of the enterprise, and the red circle is marked on the highest picture. Finally, a yellow triangle area is created by the red circle and the left and right endpoints, and any picture that is passed or contained by the yellow triangle will become the final intention map.

Fig 7. schematic diagram of the intention map.2ext

3.4. Feature Element Extraction.

The identification features formed by specific design elements in the product are visual symbols for corporate brand recognition (Wang Sze-Cheng, 2015). Through research on the product development line of the enterprise and research on the needs of target users, the designer obtains the feature elements that are easily recognized by the user, refines and interprets it for use in new product design, and reflects the concept culture belonging to a specific brand and enterprise. That is, through the easy-to-recognize feature elements to gain public recognition of brands and companies (Wang Yuqing, 2018). The process of extracting the basic feature elements from the "feature trend map" is a comprehensive reflection of the designer's artistic literacy and design level. In this design study, as shown in Figure 8, the designer extracts the local outline lines from the company's LOGO (flag) into PI design elements. Secondly, considering the overall style of the product, it is possible to add geometric shapes such as cubes and rounds to become basic modeling elements.Examples and bans on the use of basic morphological elements are shown in the PI manual to facilitate the specification of subsequent design work.
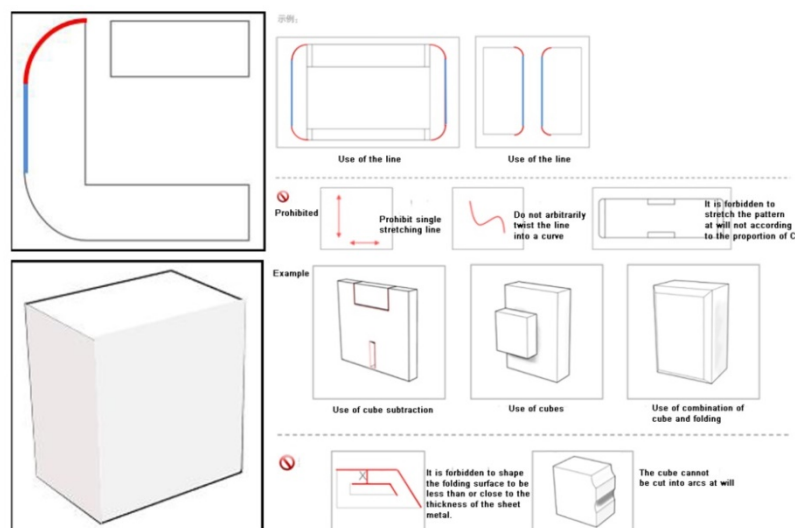

Fig 8. Examples and bans on the extraction and use of basic elements

3.5. Determine the Design and Display.

According to the above product design strategy, the work of enterprise power product PI design is carried out. Several representative products can be selected for specific analysis and display. It is worth noting that the selected products preferably cover all categories of the company's products. As shown in Figure 9, in the display process, from the product renderings, product design color specifications, new and old product comparisons, the expression of the brand logo in the product and the application of PI design basic elements in the design plan, etc.
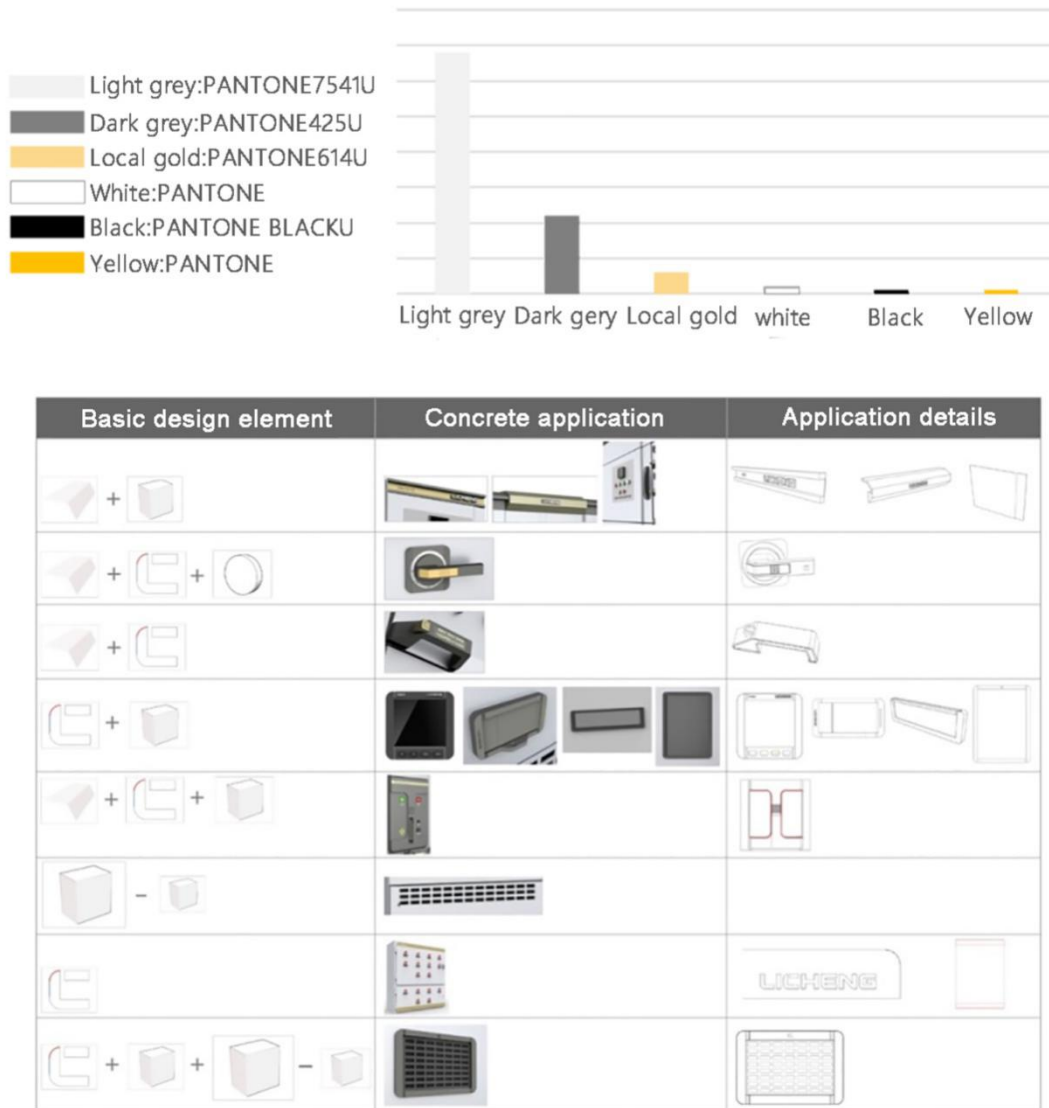

Fig 9. Product design color specification and PI design basic elements in the design of the application

3.6. Design Assessment.

When designing the product identification (PI), as shown in Figure 10, the user feedback and design experience obtained in the design process and design results should be collected and analyzed in time to assist and ensure the identification design of the new product in the future. To make the process more standardized and modular, we can build a design management team to take care of the process. In fact, the design management team is given the task of design evaluation, that is, combined with experience feedback, constantly improve the design rules and design implementation specifications to adapt to the ever-changing market competition environment, and integrate all product images of the enterprise. (Liu Yong, Sun Yuan, etc., 2017). This series of work is to obtain a comprehensive and quantitative evaluation of the final design of the product, which is
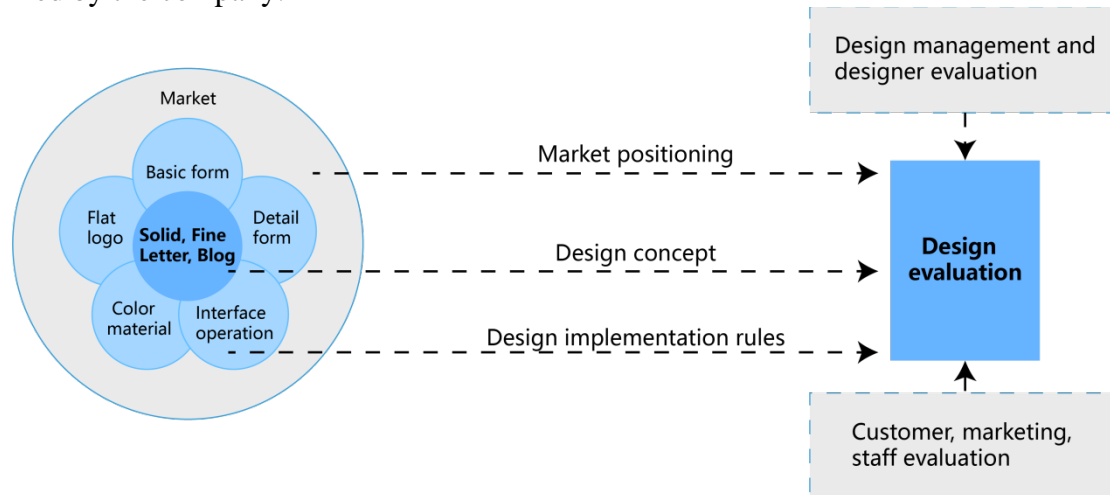
recognized by the company.

Fig 10. PI design evaluation framework

3.7. Writing PI Design Manual.

The PI manual is built based on the PI design to provide theoretical basis and support for the practice of product identification design. The PI manual is a product identification design that is completed or in progress, summarizes, summarizes, and refines the identification elements, and provides a visual, systematic, and standardized expression (Luo Qing, 1998). As shown in Figure 11, the PI design manual is generally written from the aspects of PI design concept source, design concept interpretation, basic element design, application element design, design evaluation, and introduction training (Zhao Wei, 2009).

Fig 11. PI manual part preview

4. Summary

PI planning and design of power products have great significance for the development of China's power industry. This paper focuses on the specific operation methods of the power product identification (PI) design process. The specific conclusions are as follows:

(1) Improve the process for power product identification (PI) design, summarize the specific operation methods of each work, complete the PI design of power products and get the approval of the enterprise. This process is more clear and specific than the traditional PI design process, providing a complete and systematic reference for other electrical companies.

(2) This paper forms an operational, executable, and easy to master PI design process and method. The combination of theory and practice has helped power companies to shape PI design and enhance their competitiveness. The application of PI design theory in the power industry has been explored and provided a basis for the improvement of theory.

Acknowledgements

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