Kansei Engineering in the Design of Costume Fabric

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Abstract: Applying Kansei Engineering in fabric design requires the establishment of a common research platform in a design respect of view that involves both subjects. This platform can help designers investigate the methods to increase the added value of fabrics, and provides theories, techniques, and basis for designing. Kansei, which used to be considered as qualitative, immeasurable, irrational, and illogical sensible reaction can now be studied through a way that assumes Kansei and fabric are interconnected. Designers can even quantitatively and substantially apply Kansei into their design according to the consumers’ feelings on the fabrics, therefore enhance the fabrics’ functionality and rationality to meet the consumers’ requirements.

Keywords: Kansei Engineering; fabric; design; sensible factor; touch-based; sight-based

1. Introduction

Costume fabric is the basis of costume design and the origin of innovative design. The developments of both costume design and costume fabric are accordant and reciprocal. The usage and treatment of fabrics is becoming more and more important, especially for the fabric texture design, the most characteristic and unique part of costume fabric, which usually demonstrates the taste and ability of the designer in art. Many designers tend to represent the costume’s personality through the mutation of fabrics. Therefore, in a sense, how to make innovation in fabrics turns to be the key to a successful design. In this situation, applying Kansei Engineering in fabric research is an innovative attempt to explore how to increase the added value of fabrics and provide theories, techniques, and basis for design. This has become a newly emerging research area for the design of costume and textile art.

2. Concept of Kansei Engineering

The word “Kansei” comes from Japan. In Japanese, it represents perception, feeling, impression, and some other kind of emotions. Kansei Engineering became one of the favorite new subjects and trends of design in Japanese art academia in late 1980s and prevails in 1990s. Dr. Mitsuo Nagamachi, from Hiroshima University, defines Kansei Engineering in his bookmaking as “a consumer-oriented technology for new product development; a translating technology of a consumer's feeling and image for a product into design elements” [1]. It is a method or program system to convert people’s feeling for the products to the designers’ design elements or make them corresponding. Using modern computer technique, this method can measure those sensible reactions which used to be considered qualitative, immeasurable, irrational, and inconsequential, and the new generation techniques and products can be developed based on this [2].

For a long time, the development and research of costume fabric are totally resorted to peoples’ volition and imagination, quite elusory. Actually fabric design should follow a complete set of scientific and rational design methods. Costume fabric finally clings to the body, so it must farthest meet people’s requirements. Combining Kansei Engineering and fabric design together is to design costume fabric based on consumers’ feelings and intention. Former designs did care about consumers’ requirements, but only the requirements of costume modeling which come from the designers’ comprehension and demand. But now the design we are after is needed to come directly from consumers’ reactions and requirements. These reactions are slight, mental and latent. Sensible fabric design creates a new design pattern for consumers’ life style based on physiology, psychology and physics. This method measures consumers’ external physiological reactions, such as muscle activities, skin temperature, cold, hotness, sweatiness and fatigue, etc, when wearing costume. It also measures consumers’ psychological reactions, like vision, touch, language, expression and so on. On the basis of the fabric’s texture, roughness, reflection of light, feeling of handle and other characteristics of the material, it evaluates consumers’ physiological and psychological reactions together. According to consumers’ common sense this method makes measuring and reifying practice in fabric design to meet consumers’ fancy. In consequence, this kind of design will likely be a holistic design and successful design.

3. Researching Method of Sensible Fabric Design

Kansei Engineering is a technology combining Kansei and engineering. It designs products through analyzing people’s emotions, and produces products in terms of people’s fancy, so it is a consumer-oriented technology. Akira Shinohara said that “Kansei Engineering is the intercommunion from heart to heart, the technology to support people’s happiness” [3]. The researching method...
of sensible fabric design can be recapitulated that it collects, disposes, analyzes sensible information, and then converts the information into the main elements of design.

3.1. Collecting Sensible Words and Establishing Sensible Words Warehouse

Although sensibility is a dynamic process, it constantly changes along with times, tide and personality, which seems immeasurable and hard to grasp. But with modern technology, this basic sensible process can totally be determined, measured and analyzed. Its rules can also be mastered. There are many words when consumers appraise various fabrics, such as unique, elegant, soft, hollow, resilient, not cottony, fashionable, fresh, close-knit, earthy, magnificent, transparent, massive, warm, non-figurative, humoristic, metallic, crude, slick, smooth, concavo-convex, solid, empastic, ventilate, etc. Collect large numbers of such words for appraising fabrics, filter about a hundred of them that can most likely represent consumers’ feelings for the products, establish a measure table in terms of the different meaning between these words, appraise the products with the help of a map called semantic measuring map, analyze these data with the method of factor analysis, and then we get the result of the analysis which just represent these sensible words’ meaning. Based on the result, we can establish a colossal sensible words warehouse about fabrics. Every three or four years, the database of emotional engineering should be adjusted and new sensible data will be expanded to the database. These data are of great importance to research the trend of consumers’ favor change.

3.2. Processing and Analyzing the Sensible Information

First we must utilize advanced computer technology to found the systematic frame of Kansei engineering, and establish correlative database and computer inferencing system with the methods of artificial intelligence, neural network, fuzzy logic and geometry. Secondly, things should be proceeded with for the customer part or the designer part. While facing a customer, we ask him to express his desired product with appropriate words and input them into computer. The computer compares them with the words in the sensible words warehouse, examines and identifies them. If they are identified, the computer puts them into the database. During this phase, the inferencing mechanism works and decides every aspect of the design details through matching the database of formulas and the database of intent. The computer’s controller chooses the closest product style and color, and displays it on the screen. The computer system is able to help the customer to make choices according to his own desire. As for the designer, when he designs a new product, he should have got his imagination and concept for the product. After these sensible words are fed into computer, the result that emotional engineering computes will be displayed on the screen. If the shown fabric does not match the designer’s imagination, he could modify it with the modification program the computer aided system provides. The methodology to integrate the intent of both the customer and the designer is called “mixed emotional engineering”. In fact, when a designer is designing, he must synchronously pay attention to these two systems and make good use of them.

3.3. Checking the Relationship between Sensible Words and Design Elements

Projected experimentation and survey can be proceeded to check the relationship between sensible words and design elements. We have women’s underwear fabric as an example to show the experimentation. When a customer and a designer are selecting fabrics, they may input sensible words like soft, ventilate, comfortable and so on. They then select fabrics in terms of these words. After the costume is tailored and tried on, the wearer’s physiological reaction change should be measured. These changed values can be converted to the value of comfort, which is the basis to increase the degree of comfort for fabric design. Survey is a method to improve design by collecting feedback information. Its purpose is to find the elements in the market which make the product salable and keep using them or improve them in future designs. The survey also finds out the unpopular parts, and removes them in the next product. It is exactly “selecting the essence and discarding the dross”. We again use women’s underwear fabric as example. We make questionnaires and ask subjects to state their feelings after trying on underwear of different fabrics. In this way we can clearly understand the relationship between sensible words and design elements. With the two above-mentioned methods we can easily see not only the relationship but also how the sensible words can contribute to the design details. For example, a customer wants “soft” fabric. This sensible word corresponds to several design elements in the system database.

4. Researching Method of Sensible Fabric Design

While people wear or choose costume materials, they could receive kinds of information and get different emotions. The intuitionistic knowledge they feel from fabrics is commonly called the sensible phase of knowledge. If the design causes fabrics to bring people a pleasant experience in modeling, vision, texture, touch and so forth, or the design makes fabrics meet people’s feeling and intent, we name it Sensible Design of Costume Fabric. With this sensible design, researching the fabric wearer’s five senses (sight, hearing, smell, taste, and touch) can better develop costume fabrics and meet.
consumers’ requirements for delight and comfort, and therefore awaken consumers’ desire to purchase.

In costume design, a designer chooses proper fabrics and digs the beauty of the fabrics to express his individuality. Making full use of the fabrics’ characteristics and plasticity, creating special characters and details, can explain a costume’s individuality and essential beauty. The fabrics’ factors such as texture, roughness, reflection of light, transparency, etc. bring largely different physiological and psychological reactions to people. Some of the factors are sensed by sight, such as luster, texture, transparency, etc. Some are sensed by touch, such as roughness, rigidity, velvet, elasticity, etc. Accordingly, these factors can be divided into two kinds. One is touch-based, the other is the sight-based.

4.1. Sensible Design of Touch-based Fabric

The touch-based tactile can be simply divided into four types, mill finish, rough surface, convexity and velvet. Mill finish fabric is soft and smooth, making people feel silken, clean, and exquisite. Rough fabric is shaggy, making people feel ancient, earthy, and straightforward. Convex fabric is rough and uneven in surface, looks like a sculpture, and has solid feeling. Velvet fabric has floss on the surface, making people feel warm, steady and plumpy. These characteristics give the fabrics specific pattern. These feelings affect people’s senses and mentality and bring people specific psychological reactions. Silk, crepe de chine and chiffon are all exquisite in texture, giving us a noble, romantic, diaphanous and lightsome feeling. Rough and thick fabrics like woolen cloth, spun fancy silk and jeans, show a widely different fancy impression, not only simple and unaffected, but also modern and futuristic. Furthermore, fabrics have external sight-based attributes like smooth and roughness, lightness and heaviness, coolness and warmth, transparency and opacity, etc. Correspondingly, these attributes express sensible factors like exquisite and rough, dexterous and sober, rational and sensible, fantastic and realistic, etc.

4.2. Sensible Design of Sight-based Fabric

Because of the gap between touch and sight, sight-based tactile impression shows widely different characteristics. Sight-based tactile impression is the psychological phenomenon fabrics give people after man’s visual process, which is universal. Light and color are a fabric’s basis and some characteristics of the fabric’s surface, such as luster, texture, rigidity, etc. directly affect people’s senses, which become important factors of costume design. These characteristics also affect light and color in the feeling of warmth and coolness or color depth. People have different mental feelings. For instance, printed silk is exquisite and smooth when you touch it, but it can also give you feeling of roughness when you watch it. Vary touch-based fabrics and sight-based fabrics greatly differ in people’s psychology experience. Smoothness and roughness, hardness and softness, and such attributes correspondingly express the emotions of fluency and crudeness, strength and warmth, etc. We should find out the sensible factors which most affect and restrict costume, using these dissimilar feelings fabrics give us from either touch or sight. Therefore the sensible design of costume fabric will be strengthened.

5. Conclusion

To apply Kansei Engineering technology in fabric production, designers imagine themselves in the consumers’ positions, and start with consumers’ psychological characteristics, physiological characteristics and environments. They attach most importance to the consumers’ consciousness, personality, taste, multiplicity and comfort. The bypass limited functionality and decoration are replaced by compositive ones, which are all for the consumers’ profit. The most important is that functions and appearance are not uppermost, because they should always be designed in terms of people’s need. This is the focus of the Humanistic Design [4]. In order to better design and develop costume fabric, first we must grip consumers’ psychological requirements and only in this way can we find the exact market position for the product. Secondly, continuously new products and designs are needed to meet the continuously changing consumer psychology. The sensible design of fabric is a complicated system. More sensible elements there are, more added value there will be. This type of design also requires higher level designers who are not only good at technology, but also rich in thoughts, which is definitely a challenge for designers.

References