

A Study of the Formative Characteristics of Future Materials in Fashion Industry

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ABSTRACT

These days there are plenty of studies that predict a future with rapid technological development. The development of new technology also has greatly changed the fashion industry. Materials were developed with a variety of techniques, and recently as the exterior and property of materials have been brought into focus, regarding images as a trend of fashion. The purpose of this study is to consider the kinds and characteristics of diverse future materials developed by high technological advancement and to present a new course for future materials by analyzing the formative characteristics of future fashion with future materials.

The methods of this work are an examination by reference to theoretical study about the conceptions of futurism in fashion and a visual analysis of the materials in picture data. Another topic of study was the positive source of future fashion that actually applies to these materials.

The study makes an analysis of future characteristics expressed in modern fashion, looking at the background and developmental course of futurism. It considers the conception, types and characteristics of diverse new flexible materials such as metal, non-woven fabric, Styrofoam, rubber, glass fiber and polished fiber. With all of these works, we would like to express the course for the development of coming future fashion and the potential of an appropriate union between sensitivity and science.

Key Words : *futurism, future materials and future fashion*

I . Introduction

Diverse materials manufactured using new techniques have changed the fashion industry greatly with technological development. Standards in clothing have been changed by increasing interest in health, leisure and expression of the body. Therefore, material has a primary significance, and it takes a role as a mediator for expression in fashion design. This study analyzed the formative characteristics of future fashion on the exterior look in picture data, based on a conceptual theoretical study of futurism in fashion.

First, we looked at the concepts, kinds and characteristics of future materials developed by high technology and then studied future fashion using future materials by categorizing them according to their external characteristics.

II . Theoretical considerations

1. The background of futurism

The future means a certain time that has not yet happened or the living state of time. In this viewpoint, the future is not simply a subjective object that comes automatically as time goes by, but it is spread out according to what active meaning the agents who will live the time have and what they decide to do.¹⁾

The interest in the future, or the studies thereof, start from the assurance that the future can be altered through efforts in the present, that is, creativity and imagination.

Futurism is a trend of the fine arts that appeared in Italy in 1910. The expression was normally used as a terminology for aspects of the fine arts and design.

Italian Futurism, which tried innovating from the existing values and culture, expressed the speedy and dynamic beauty of a machine well-matched with the new age of machinery, on a screen as a formative art, completely denying a long-established custom and cultural frame, and glorifying a mechanical civilization.²⁾

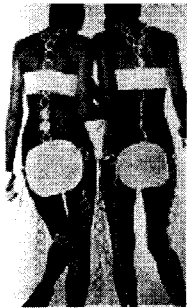
The spirit of futurism stimulated a search for creative design to meet the coming era. Italian futurism was a trial for composed materials³⁾, and it had a great influence on designs whose subject was the future integrating a variety of materials.⁴⁾ Aleksei Kruchonykh's opera *Victory over the Sun* was performed in St. Petersburg in 1913 and Kasimir Malevitch took charge of the stage costume. He took an interesting approach to costume design by utilizing the geometry of solids. He used an alien or a robot that could symbolize an icon of the future, by using aluminum to express mechanization.⁵⁾ The appearance of the stage costume reflecting the ideology of mechanization had no small impact on the fashion industry.



<Picture 1> Malevitch, The stage costume in *Victory over the Sun*, 1913

2. Futurism expressed in fashion

Scientific civilization developed a chance to change the vague dream of future to a reality. The first manned space flight by the U.S.S.R was successful in 1961, and the subsequent American Apollo 11 was the first manned mission to land on the Moon,



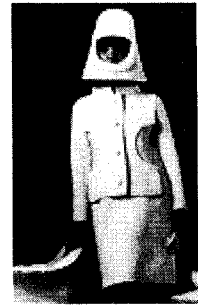
<Picture 2> Andre Courreges



<Picture 3> Andre Courreges



<Picture 4> Andre Courreges,
1967



<Picture 5> Pierre Cardin

so citizens of world concentrated their attention on space. Everything related to space science gave new inspiration. Chief among these new objects was the space suit, which provided novel imagination to forward-looking designers. With the fever and interest in the new space age, Andre Courreges, Pierre Cardin, Paco Radanne and Rudi Gemreich, considered futurists in the fashion industry in the 1960s, exploited the space age for dress and ornament based on structural knowledge using very unusual materials for the time.⁶⁾ The 'space look' that appeared in the 1960s can be estimated as a true sense of artwork deeply reflecting the current of the times.⁷⁾ It also introduced the possibility of fashion as a harmonious interchange between scientific civilization and clothes art, as a reflection of daily-developing high technology aiming at the world of the unknown that has unlimited possibilities.⁸⁾ Symbolizing the future, the simple and functional design of the space look appeared in the fashion industry that set the trends.

Andre Courreges was an avant-garde artist with a practical sense and a pioneer of the space look.⁹⁾ He used stiff and polished new materials as a future-oriented look, taking a hint from astronauts' gear, and tried progressive styles like geometrical silhouettes, expressing a rare visual effect.¹⁰⁾

<Picture 2>, <Picture 3>

In 1967, Andre Courreges expressed an interest in space and experimented with future fashion in his work *New Body*. He utilized elastic and transparent materials such as vinyl and silver tape and metal. He valued the exactly-sited sense of form with new cutting skills and ironing, which assumes a perfect form after removing darts.¹¹⁾

Pierre Cardin once worked as a pattern designer in Christian Dior, and created futuristic clothes using the miraculous cutting skill that he obtained as a former cloth-cutter. The *Cosmo Core* look is a Pierre Cardin's space suit style which made its timely appearance when America announced launch plans for a manned spaceship in 1966. The distinctiveness of the *Cosmo Core* look took a hint from the mechanical space suit and the material is processed on the surface to yield an effect like aluminum, surprising the fashion world with a linear silhouette and modernistic sense of geometrical structure. It humorously emphasized the shoulder, waist and neckline, and the mainstream of the cutout is a round shape as a geometrical form. <Picture 5>

Paco Rabanne, one of the pioneers of futurism and an architect, was infatuated with materials other than textile fabrics, so he exhibited clothes using plastic or metal materials. Although he announced



<Picture 6> Paco Rabanne



<Picture 7> Paco Rabanne

<Picture 8> Rudi Gernreich,
1970<Picture 9> Rudi Gernreich,
1970

his resignation at the end of the millennium, giving himself up to eschatology, he has been exhibiting futuristic dresses in every year's collection. The hallmarks of his expression, such as weaving techniques with metal, plastic and chain, greatly affected some designers in the 1990s.¹²⁾ <Picture 6,7>, <Picture 7>

The American designer Rudi Gernreich created a graphic pattern and an epoch-making color scheme with innovative ideas. He also pursued a novel future-oriented design, breaking with the revival of existing styles of all time. Known for his pure futurism,¹³⁾ he strived to achieve exposure for the works of his fertile expression, most notably through the unique silhouette and materials of his designs. He bemoaned the fact that futurism in 1960 was still considered an abstract subject for design, thus he titled his design *Lunar Look* and through it visually confirmed the possibility of space in our future.¹⁴⁾ <Picture 8,9>

The interest in future clothes representing futurism is found even today. Expectations of the future are rising again with the rapid development of computers - this time has even been called the 'second stage' of the computer revolution. In addition to this, the 'Cyber' look appeared and can be interpreted as a reaction to the ecology trend that

picked up at the end of 1980s. It emphasized a future world seen through the computer, and it was exhibited as future clothes that differed slightly from the space look.¹⁵⁾

Besides these, there were a variety of fashions such as the Techno Cyber look utilizing a future sense of material, the Kinetic fashion and the Cyber Punk look of the age of the computer and advanced telecommunications, and the Psychedelic look, adding to the sense of confusion of the end of the century and millennium.

III. The Formative Characteristics of Future Material

Amazing new techniques of modern textile industry are closing the gap between Art, Design, Engineering and Science. Realizing that choosing a material is important in their activity, many fashion designers begin their designing process with the textile. Some designers collaborate closely with textile designers who offer specially devised new materials for their clothes and who have their own works.¹⁶⁾

In fashion design, material is a foundation of the creation and its significance is extremely important. The development and adaptation of new material

via high technology has resulted in the appearance of several new materials. The development of artistic textile depends on technology and the demands of the artist's sensitivity, and a combination of heterogeneous materials creates a novel creation. Designs with fantastic aspects rather than realistic ones, with unusual rather than usual qualities, present a future-oriented image. A representative designer, Paco Rabanne, is one of the more innovative fashion designers of the 1960s. He introduced a unique method to make costumes and new materials, by making plastic fashion with an Origami-like structure, composed of modules <Picture 10>.



<Picture 10> Paco Rabanne

Material is the parameter of fashion where futuristic factors are best presented. Among these materials are such as glossy materials, coated textiles, fabrics that have smooth surfaces such as metallic fabrics, transparent vinyl, acrylic fiber, plastic, and cellophane. A glossy material like transparent cellophane presents a futuristic sense. In addition, stainless steel coated steel, aluminum board, plastic panel, which are not fabrics, are used in moldings structure to express innovative futurism. Also highly bright metallic materials like lame, which produces an elegant effect owing to the accelerative development of fiber technology, and the advent of materials that show fluid flexibility matching movement and light, give novel, creative ideas to futuristic

fashion designers.

Thus designers compound new fluid materials such as metallic material, unwoven fabric, foaming fabric and rubber, with various textile techniques to obtain a futuristic image. Let's look at these more closely:

1. Metallic Materials

The word 'metal' originates from the Latin 'metallum'. According to the dictionary, it is "Generally called ironware or gold ware, a generic term of substances which have particular luster, conduce heat and electricity well, and spread out and lengthen easily."¹⁷⁾

Metallic fiber, a synthetic textile made from inorganic matter, has been used as decoration material for aristocrats for a long time and up till now it has been mostly lamé,¹⁸⁾ except stainless steel fiber which is pure metal, and is characterized by high incombustibility, since it is a conductor of both heat and electricity.¹⁹⁾

Metallic thread is a general term for threads that have metallic gloss. Lame refers to metallic thread, usually polyester or acetate film with aluminum leaf glued on or aluminum foil sprayed in a vacuum. It can be colored not only gold and silver but also other colors.²⁰⁾ Metal fasteners are also important details used in clothes. There are alloyed materials such as nickel silver, copper, brass, and aluminum, generally used with the same color.²¹⁾

We can produce beautiful, functional material if we combine the aesthetic and physical characteristics of metal with textile. Mainly used are a fabric compounded with a new material and a traditional one made with wool & copper or silk & stainless steel.²²⁾ Fabric which is made by fine scattering of chrome, nickel, or metal liquid on flat polyester not only has the softness of silk but also



<Picture 11> Andre Courreges, 1994/95



<Picture 12> Alexander McQueen, 1996



<Picture 13> Mark Eizen, 1996

a very smooth and flexible metal surface. As it has a physical quality not unlike sculpture, it constantly maintains its shape, and it vivifies a silhouette comfortably instead of tightening the body when it is used as clothing. The metal coating of textiles not only improves function but also creates new beauty. Fabric which is scattered with stainless steel can easily adapt to different weather conditions. And a thin copper coating blocks the invasion of bacteria and creates a fragrant textile.²³⁾

Andre Courreges, who used a compound-bonded jersey in the 1960s, still inspires today's avant-garde fashion. This costume not only protects the wearer perfectly from external environments but also utilizes a metallic textile that presents a dramatic space age look<Picture 11>.

Alexander McQueen's piece evokes the space age by combining the outward appearance of metal and the mobility of silk by making a synthetic product of sprayed stainless steel. He accents the supernatural effect by covering the model's face<Picture 12>.

Mark Eizen's vest is made from metal processed textile and changes a simple form into remarkable futuristic and up-to-date fashion. <Picture 13>

2. Nonwoven Fabric (Felt)

In a broad sense, this expression connotes textile which is made by a mechanical operation, or which is tangled by using heat adhesion or chemicals, and the one that does not pass through a thread stage in the production process.²⁴⁾

The early forms of felt used natural fibers, but nowadays all kinds of fibers can be used in non-woven fabric using newly developed scientific technologies, it is also possible to use regenerated fiber and synthesized fibers.²⁵⁾ Felt mostly has the quality of thermo plasticity, so it can have a complex structure. Dupont's Tyvek, for example, has constant form maintenance, can be water washed, and is durable with respect to the majority of chemicals.²⁶⁾ Tyvek does not loosen, and can thus be easily pierced, and is easy to cut in complicated shapes, making it a suitable material for the latest fashion products.²⁷⁾ Because the production cost for non-woven fabric itself is low, one of the strong points is that the designer can afford to invest extra budget in other parts of the designing process.

Fashion designer Hussein Chaylayan used industrial non-woven fabric to stress a novel beauty differentiated from the ordinary dresses of the 1960s's. The dress is made of Tyvek paper, a synthesized paper also known as 'envelope paper' <Picture 14>.



<Picture 14> Hussein



<Picture 15> Straight Jacket,
Catherine Frame, 1995



<Picture 16> Maria Blaisse



<Picture 17> Steven Puller

It is durable and water and chemical-resistant, unlike the disposable clothes of the 1960s, because Dupont had originally developed it for protective clothes. In the fashion industry, non-woven fabric has been generally used in collars, sleeves and the unseen linings of hemlines. These new materials, which are not produced by traditional methods, when used to make the entire costume, can offer strong features to consumers and are able to show their strengths externally, namely the image of 'protection'.²⁸⁾

Catherine Frame's 'Straight Jacket' (1995), made with non-woven fabric, was artistically inspired. It emphasizes the lightness and natural drapable quality of the material by forming a cocoon-like exterior. The material is formed with silver wire <Picture 15>. Due to lack of demand, it appears that non-woven fabric would be disappeared from the market, however the amount of it used has increased dramatically among fashion designers, surprising related industries.

3. Foaming Fabric and Rubber

Synthetic foaming fabric that is developed from unwoven fabric has been an area of recent intense

research. Because most of it is derived from synthetic polymer, it has the quality of heat plasticity; thus lending itself to many practical possibilities. Its texture varies from warm, light, and very soft to extremely hard. By mixing with other textiles, it is possible to make material that has heightened intensity and elasticity.²⁹⁾

The synthetic foaming fabric of Maria Blaisse's 'black circle' is material that displays body movement well. These garments, which were made for the dance troupe 'Kuma Guna', choreographed by Susan and performed in Amsterdam, and were made by an industrial vacuum closed-cell process. Simple circles form sunken and swollen three-dimensional shapes relating to the human body, and the circular form can be adjusted by tightening a special control. <Picture 16>.

Elasticity has also become an important characteristic of materials, being the main reason that natural rubber and synthetic rubber are used. Natural rubber is extracted from the Hevea Brasiliensis tree, but recently synthetic rubber is used more often.³⁰⁾ Synthetic rubber is compounded with several other materials to diversify the aesthetic sense, feeling and function. Rubber's thermo-quality and soft na

<Table 1> The characterists of future-oriented material

Material Classification	Designer	Technique	Character
Metal	André Courrèges	Metal process textile	Comfortable Silhouette Present space style Protectible from outside environment
	Alexander Mcqueen	Scattering silk and stainless steel	Inspiration of space Combination of metal appearance and silk flexibility Excellent adapting ability to various weathers Effective prevention of static electricity
	Mark Eizen	Metal process textile	Presenting simple shape and futuristic image
Nonwoven fabric	Hussein Chaylayan	Synthetic paper (TYVEK)	Permanent maintenance of shape, Washability
	Catherine Frame	Correction by Silver wire	Natural draping, Lightness
Foaming & Rubber	Maria Blaisse	Vacuum forming & Synthetic foaming	Warm and light, Various kinds of softness, Changeable by special clip
	Steven Puller	Forming latex	Skin-like Silhouette, Characters of heating & softness, recyclability

ture is ideal because they are suitable for the human body, because both natural and synthetic rubber are able to be reused, they are ecological materials. Steven Puller offers an artificial skin-like silhouette by expressing body curves favorably with red transparent elastic latex³¹<Picture 17>.

Below is a table of the plastic characteristics of future-oriented material as mentioned above.

IV. Conclusion

The textile material that is novel in appearance, smooth texture and function has caused a tremendous boom in the world of fashion. Futuristic fabric has been produced as scientific technology has been developed and it is excellent not only in esthetic but also functional aspect. The purpose of this study is to examine material characteristics which

can be used to present a futuristic image. For this, we have studied the general future and background of how *futurismo* appeared and we have also studied futuristic materials applied to fashion, flexible materials used for expressing a futuristic image, namely with the characteristics of metal, nonwoven fabric, foaming and rubber. It was the 1960s when designers in the world first became interested in futuristic materials. Pierre Cardin used fabrics made by vacuum forming and moulding, André Courrèges used bonded jerseys and synthetic fabrics and Paco Rabanne designed clothes by connecting fabrics with metals and covering them with chains. Rudi Gernreich has always tried not to merely follow traditional styles instead looking for completely new, futuristic designs. Such designers created futuristic dress and ornaments that used radically novel for the 1960s. As was mentioned earlier, futuristic

material combined various methods developed by high technology such as metallic thread, nonwoven fabric, foaming, rubber etc. Nowadays, fashionable items are still designed using such flexible materials. Beautiful, functional material can be created by compounding the aesthetic and physical characters of metal and textile. Fabric which is made by fine scattering of chrome, nickel or metal liquid on flat polyester has not only the softness of silk but also a very smooth and flexible metal surface. As it has an almost sculpture-like quality, it constantly maintains its shape. Metal coatings on textiles improve functionality, e.g., fabric which is scattered by stainless steel is easily adapted to different weather conditions and a thin copper coating blocks invasion of bacteria and creates a fragrant textile. Fabric coated by metal prevents the material from generating static electricity and reduces the static electricity coming from television or computer monitors. Metallic material was a symbol of the futuristic image in the fashion of André Courrèges, Alexander McQueen and Mark Eizen.

Felt mostly has the quality of thermo plasticity, so it can have a complex structure. Tyvek for example, maintains a constant form, can be water washed, and is durable with respect to the majority of chemicals. Tyvek does not loosen, and can thus be easily pierced, making it a suitable material for the latest fashion products. Because the production cost for nonwoven fabric itself is low, one of the strong points is that the designer can afford to invest extra budget in other parts of the designing process. Fashion designers such as Hussein Chaylayan and Catherine Frame used nonwoven fabrics instead of textiles woven in the traditional way. Most synthetic foaming derived from nonwoven fabric is highly useful due to its thermo plasticity. Its texture varies from warm, light and very soft to ex-

tremely hard. By mixing it with other textiles, it is possible to make material that has heightened intensity and elasticity. The synthetic foaming fabric of Maria Blaisse's 'black circle' is a material that displays body movements well. Elasticity has also become an important characteristic of materials, being the main reason that natural rubber and synthetic rubber are used. Synthetic rubber is compounded with several other materials to diversify the aesthetic sense, feeling and function. Rubber's thermo-quality and soft texture is ideal because they are characteristics suited to the human body, and because both natural rubber and synthetic rubber are able to be reused, they are ecological materials. Steven Puller offers an artificial skin-like silhouette by expressing body curves with elastic latex.

Through this study, we have examined materials which are one of the important components in the foundation of creativity and various techniques based on designers' creativity have been presented. We have also seen that fashion designers realize that thread techniques will be a big part of future fashion and having a creative, challenging attitude instead of a stereotype that clothes material should be traditional fabric is a very important part of designers' creative work with the development and choice of material reflected by emerging science technologies. The subject researcher recognizes the importance of material which supersedes older materials in functionality and in active wear characteristics; namely, the comfort of humans in future-oriented fashion design. New technology offers new clothing material and solutions for the future. Furthermore, we would like to show the direction of material development in future fashion and the possibility of proper combination of emotion and science.

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- picture
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