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Textile Fiber

Plan

1. **Introduction of Textile Fiber**
2. **Classification of Textile Fiber**
3. **Comparison between Natural and Synthetic**
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Introduction of Textile Fiber

Textile fiber is a material mainly made from natural or synthetic sources. This material will be converted into the making of textile yarns and fabrics; woven, knitted, nonwoven, and carpets. It may be in a form of a pliable hair like strand or as the smallest visible unit of textile production. [1]

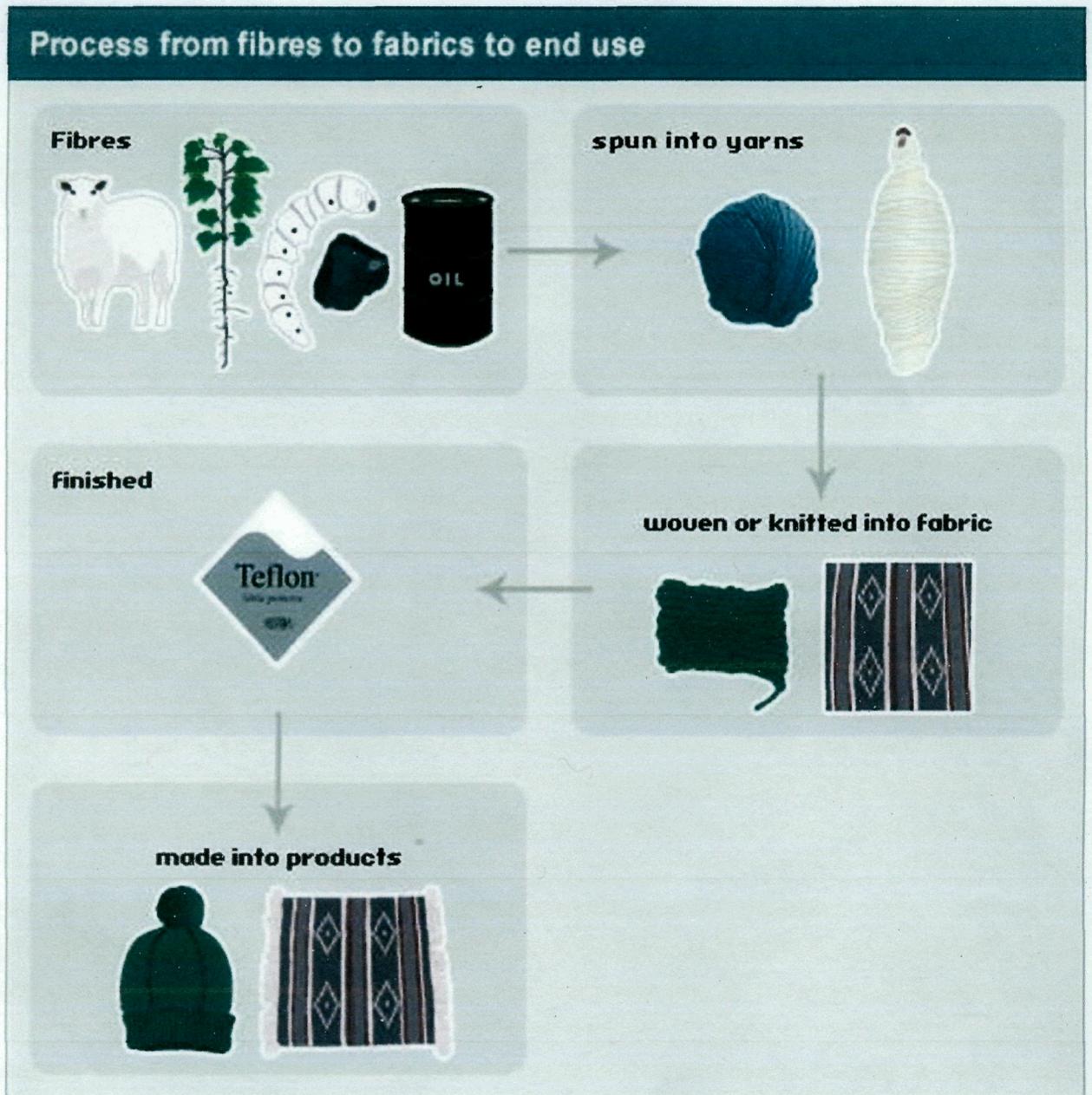


Figure 1 : Steps in Textile manufacturing

Classification of Textile Fiber

Since from the past, there are many types of textile fiber that have been used or developed in textile production such as cloth, rope, household and etc. In textile industry, fiber can be classified into two different types based

on their sources which are Natural fiber and Synthetic fiber or well-known as Man-made fiber. [2] [4]

Natural fiber

It is a fiber made from a material originated from natural sources. There are three main sources that can be obtained to produce this kind of fiber. Cellulosic fiber (origin from plant), Protein fiber (origin from animal) and also Mineral fiber. This kind of fiber could only produce a staple yarn (short fibers) in terms length which is not too long compare with Synthetic fiber. The dimensional structure of Natural fiber would be in hairiness surface because of their origin. Each kind of them has their own characteristic and end-use demands. [2] [4]

Cellulosic fiber could be obtained and categorized into three main types, Seed, Bast/Stem, and Leaf.

| Parts | Example |
|-----------|--------------------|
| Seed | Cotton, Kapok |
| Bast/Stem | Flax, Hemp, Jute |
| Leaf | Sisal, Abaca, Pina |

Figure 2 : Plant fiber

Protein fiber could be obtained from three categories, Hair, Wool, and Filament.

| Parts | Example |
|----------|----------------------------|
| Hair | Llama, cashmere, mohair |
| Wool | Sheep |
| Filament | Spider silk, and worm silk |

Figure 3 : Protein fiber

Unlike the other two sources, Mineral fiber is obtainable from varieties of rock source which is also known as asbestos fiber. It is a fibrous form of silicate made of magnesium and calcium. However, because of the risk of

health problem may occur the production of asbestos in textile industry have been decline [5]

Synthetic Fiber

The term Synthetic fiber refers to materials that is not originated in natural sources but are developed by human by using chemical and mechanical process. Thus, Synthetic fiber is well-known as the Man-made fiber. Unlike Natural fiber, the properties of this fiber can be determined or controlled early before the production occurs. Unlike natural, Synthetic fiber is produce in a filament yarn or filament staple yarn base on the end-use. The dimensional appearance can be varies according to the demands usage and in fact, it can be as same-like appearance and properties as the Natural fiber. [4] There are two base types of man-made that have been widely used by the textile industry, Natural Polymer base and Synthetic base.

Synthetic base refers to a fiber that has been made totally by the man-made process by using chemical substance as the sources. The properties of it will be determined totally at the initial for their demands by the manufacturer.

| Base | Example |
|------------------|--|
| Synthetic | Polyamide, Polyester, Acrylic and Modacrylic, Olefin, Elastomeric fiber |

Figure 3 : Synthetic fiber

Natural Polymer or also known as Regenerated fiber is differently from Synthetic base. It is manufactured fiber that is derived from natural cellulosic sources such as wood pulp or cotton linters. The composition of these cellulosic will be treated or alters with polymerized technique to regenerate into a new form of fiber.

| Base | Example |
|---------------------------------|--|
| Natural Polymer/ Regenerated | Viscose rayon Acetate and Triacetate Lyocell |

Figure 4 : Natural Polymer/Regenerated

Comparison between Natural and Synthetic

| Properties/Type of fiber | Natural fiber | Synthetic fiber |
|--------------------------|----------------|-----------------|
| Availability | Limited | Unlimited |
| Cost Production | High | Low |
| Life Expectancy | Short - Medium | Long |
| Chemical treatments | Less | High |

Figure 5 : General comparison

Fiber Availability

Natural fiber requires a long time to restock the production although it is renewable sources but in terms of continuous production, natural can't fulfill the needs. Unlike natural, Synthetic fiber takes a shorter time to restock the production but still because of the widely use of oil, it takes a much longer time to renew the oil sources. In terms of continuous production, synthetic could provide more than needs to fulfill the industrial requests.

Cost Production

Manufacturer needs a high cost in terms of production for Natural fiber. Several stages are required like harvesting and cleaning before the stock can be obtained to converts into textile products. This makes the Natural base products need to be sold at a high price compare with the Synthetic. While for synthetic because it is obtainable in the lab, lots of money and time can be reduced to produce the textile products. Unlimited stock makes the cost production will be much cheaper than natural.

Life-Expectancy

As well-known, natural fiber is originated from the natural sources which make it have the ability to degrade on naturally or with chemically helps. This would make the life expectancy of natural to be shorter than synthetic. As it is degrades naturally, natural fiber will contribute less to environment's pollution. But on the other hand, Synthetic requires chemically help to degrade the materials which will contribute to environment pollution because of the chemical treatment usage. This will make natural fiber tends to be green-earth in terms of life expectancy and environment's pollution. [2] [4]

Chemical Treatment

Synthetic fiber requires chemical treatment for the finishing process. Some of the chemical substances used have the serious possibility of health risk problem such as menopause and cancer [3]

Conclusion

In order to sustain the oil's stock on the production of synthetic fibre by replacing it with new sources, several research and developments have been done in order to do so. Soy fibre and Corn fibre are some of the new advancement in regenerated fibre's product base on their stock availability and good properties. Although natural fibre seems loss in terms of availability compare with synthetic, many countries already have their own farms or fields in order to meet the local and world demands such as China(wool, cotton), Australia(cotton,wool), Sudan(wool), and Greece(cotton). [6]

REFERENCES

1. McGraw-Hill Science & Technology Encyclopedia 2005
2. Muhammad Aleem Ahmed, *Textile Fiber*, Applied Chemistry Research Centre