纺织专业英语

TEXTILE ENGLISH

李建萍 编著

四川大学出版社

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前　言

随着中国加入 WTO，中国纺织业加快了走向世界的步伐，国际间的技术交流和贸易往来更加频繁，因而给纺织高等教育提出了新的要求。为了提高纺织工程专业学生的专业外语水平，提高其阅读能力，编者特编写本教材，以满足纺织专业学生学习的需要。

本书编者从事纺织英语教学十几年，经过对教学经验的全面总结，精心编写了这本《纺织专业英语》教材。本书在原有教学讲义的基础上，根据教师和学生反馈的意见做了详细的修订。书中的泛文精选于原文资料，语言流畅。教材内容主要包括纺织原料、纺纱、机织、针织、非织造布等方面，涵盖了纺织专业常用的基本词汇。书中内容新颖，打破了以往专业英语教材的结构模式，没有对整篇文章进行翻译，而是对文中重点语句作了分析和翻译，并在每篇文章前加上内容提要，最后提出相关问题，引导学生用英文学习和思考专业知识。

本书是针对纺织工程本科专业及相关专业的学生编写，也可供纺织技术人员及纺织院校教师参考。

本书在编写过程中得到我校胡颖梅老师的大力支持和帮助，编者在此表示衷心的感谢。

由于编者水平有限，书中不当之处在所难免，敬请读者批评指正。

李建萍

2005 年 8 月

于成都纺织高等专科学校

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Lesson 1 Development of Textile Industry

Objectives

1. State the definition of textiles.
2. Introduce the development of textile industry.
3. State the major types of textiles.

The word textile comes from the Latin term *textilis* ("woven", and the verb *textere*, "to weave"). Today, the word textile is more generalized to refer to products made from fibers[1]. A fiber is defined, in a very general way, as any product (capable of being woven or otherwise made into a fabric). It may be thought of as the smallest visible unit of textile production. These definitions are quite broad, and it is often difficult for a textile technologist to delineate what is and is not a fiber or a textile.

Fibers (the usual starting place for a study of textiles), may be agricultural products (such as cotton or wool) or units (such as nylon or polyester) manufactured in a chemical plant. Fibers then serve as the raw material in the next stage of textile manufacturing. They may be spun into a strand, called a yarn, which can be used to knit a sweater, to sew two pieces of fabric together, or to weave a fabric. Fibers also may be made directly into a broad range of nonwoven fabrics such as felt for a hat or the underlayment for a modern highway.

Fabric is a planar structure produced by interlacing yarns in processes such as weaving, knitting, knotting, and braiding, or by binding fibers together to form a structure. Fabrics are produced in such forms as the flat sheets for a bed, the tubular body of a T-shirt, or the shaped nose cone of a rocket. Many of these fabrics are not aesthetically pleasing during the early stages of their manufacture. To enhance their appearance and improve their functional performance, fabrics can be dyed or printed, then treated with special finishes. The result is called dyed and finished fabric[2].

Understanding the broad variety of textile products available requires systematic study. This text introduces such a study by first categorizing products as fibers, yarns, fabrics, and dyed and finished textiles. Within these product classes, textiles are described by their primary end uses, most frequently by the primary textile markets: apparel, domestic and industrial. The delineation of the products within these market categories is not precise. Some statistics include all clothing products in the apparel classification; others place protective clothing and military uniforms in the

industrial textile category[3]. Domestic or household textiles include such products as towels, sheets, draperies, upholstery, and some carpets and rugs. The industrial textile market encompasses products as diverse as tire cord, filters, automotive upholstery, hot air balloons and parachutes. Carpets and floor coverings are such a large market in both the industrial and household sectors that the figures for floor coverings frequently are segregated as a fourth primary textile market.

The textile properties of concern to the consumer in each of these markets are likely to be quite different. For some apparel textiles, color and style may be more important than durability and requirements for care[4]. Color and moisture absorbency may be important criteria to a consumer selecting a bath towel. Durability, mechanical properties, and price may be the important criteria to the purchasing officer responsible for selecting the cord to be used in manufacturing tires.

Traditionally, the textile and apparel industries had consisted of small firms competing vigorously. Economics textbooks often used them as examples of perfect competition. By the 1940s, some firms had been consolidated in an effort to increase profits through economies of scale. In the 1950s, J. Sencer Love began to acquire the firms that would become Burlington Industries. Thirty years later, in the 1980s, Burlington Industries and its competitors were restructured through mergers, acquisitions and leveraged buyouts. Changes in ownership and in the corporate structure of the major textile firms are expected to continue into the 1990s.

After the consolidation of the industry in the 1940s and 1950s, manufacturing productivity increased. Individual firms gained control of a larger share of the market and concentrated their production efforts in specific areas. Larger firms could afford to modernize production facilities and to fund new product development. Recent modernizations have focused on the installation of highly automated equipment that reduces the number of employees in production areas.

Traditionally, the textile and apparel industries were referred to as labor-intensive rather than capital-intensive. The basic machines used for textile and apparel production were relatively inexpensive, but they required large numbers of skilled and semiskilled workers to keep them operating. Labor was cheap and plentiful in the textile-producing states. The number of people employed by the textile industry in the United States has decreased in recent years. Employment dropped from 709,000 in July 1990 to 667,000 in July 1991. The automation of the industry and increased importing of textiles from overseas are responsible for many of the changes in employment figures. The skill level of employees is changing as well, because workers responsible for highly automated equipment must receive special training.

Just as changes in textile manufacturing have occurred over the years, so has textile consumption changed. Between 1950 and 1955, the average worldwide cotton fiber consumption was 17,839,680 pounds. The United States was the major consumer, followed by Western Europe, Eastern Europe, China, India and Japan. Between 1985 and 1989, average cotton consumption was 39,760,320 pounds per year. China was the major consumer, followed by Eastern Europe, India, United States, Western Europe, Pakistan and Brazil. The world economy

is changing and the textile industry is at the forefront of that change.

In 1980s, fiber consumption in the United States increased 9 percent. Wool consumption increased 50 percent; cotton, almost 33 percent; manufactured fibers, 6.5 percent; and other fibers decreased 57 percent.

New Words and Expressions

textile	纺织品
fiber	纤维
spin	纺纱
weave	机织
knit	针织
sweater	套头衫，针织衫
fabric	织物
underlayment	铺层
knotting	打结
braiding	编织
dye	染色，染料
finish	整理
apparel textiles	服装用纺织品
domestic textiles	家用纺织品
upholstery	装饰
towel	毛巾
rug	小地毯
parachute	降落伞
tire cord	轮胎帘子线
filter	滤布
durability	耐用性，牢度
moisture absorbency	吸湿性
mechanical properties	机械性能

Notes to the Text

1. Today, the word textile is more generalized to refer to products made from fibers.
   现在“textile”这个词更多指用纤维制成的产品。
2. dyed and finished fabric

成品布

3. ...others place protective clothing and military uniforms in the industrial textile category.

"place" 在本句中是动词"放"的意思，protective clothing 是防护衣。

4. requirements for care

维护保养的要求

Questions on Reading

1. What are textiles?
2. What are the main kinds of textiles described by their end uses?

Lesson 2 Textile Fibers and Their Properties

Objectives

1. Define fibers and textile fibers.
2. Describe the classification of textile fibers.
3. State the essential properties of textile fibers.

Fibers, the primary materials from which most textile products are made, can be defined as units of hairlike dimensions, with a length at least one hundred times greater than the width. Many substances found in nature can be classified as fibers according to this definition. However, only a limited number of these materials are useful in the production of yarns and fabrics.

As is known to all of us, textile fibers may be found in nature or created by man. Those that are found in nature are known as natural fibers, which are taken from either animal, vegetable, or mineral sources. Animal fibers could be further subdivided into those fibers from the hair of an animal such as wool and those from an extruded web such as silk. Plant fibers could be further subdivided according to the part of the plant that produces the fiber: the leaf, a hair produced from a seedpod, or the stem. The latter are called bast fibers. Chemically, the classification might be protein for animal fibers, cellulosic for plant fibers, and names of the specific minerals (such as asbestos) for mineral fibers[1]. Using this scheme, wool is an animal, hair, or protein fiber and cotton is a plant, seedpod, or cellulosic fiber.

Those that are created by man through technology are known as man-made fibers[2], which are subdivided into two basic classifications. Regenerated man-made fibers[3] are made from natural materials that cannot be used for textiles in their original form, but that can be regenerated into usable fibers by chemical treatment and processing. These regenerated fibers are made from such diverse substances as wood, corn, protein, small cotton bits called linters, and seaweed. True synthetic man-made fibers[4] are made or "synthesized" completely from chemical substances such as petroleum derivatives. And it was not until 1885, when the first man-made fiber Rayon was produced commercially that man began to make use of both the natural fiber and the man-made fiber to produce textile products.

Whether a fiber can be utilized in the creation of a yarn or fabric depends upon the physical and chemical properties of the fiber. The essential physical properties or primary properties are those required for manufacturing or processing the fibers into yarn or fabric. They include a high

length-to-width ratio, adequate strength, flexibility, cohesiveness and uniformity. Many fibrous substances lack one or more essential qualities required of textile fibers. They may not, for example, be sufficiently long to be spun into a yarn. Or they may be too weak, too inflexible, and too thick in diameter to use, or too easily damaged in spinning and weaving. It is, therefore, clear that out of the fibrous substances found in nature, only those that have desirable properties, which have led to their great development as raw materials for the textile industry, have been utilized by man for the manufacture of textiles[5]. Hence the term textile fibers.

The secondary fiber properties help determined consumer satisfaction with a product influence the selection of specific end use, and affect processing. These include mass, fineness, luster, color, moisture absorption, elongation and recovery, resiliency, thermal properties, and abrasion resistance.

Each textile fiber has its own talents or eccentricities, silk has high luster, wool does not though with markedly superiority in the case of heavier fabrics; cashmere is exceptionally soft and luxurious to the touch; and the color of camel's hair cannot be removed easily. But comparison of fiber qualities and characteristics requires the use of certain basic terms and a technical vocabulary. Definitions of these terms and their meanings covering, in the main, length, fineness or diameter, strength or tenacity, elongation, elasticity or resiliency, cohesion, flexibility, absorbency or moisture content[6], twist, spinnability, abrasive resistance, and dimensional stability are of importance in textile engineering from the viewpoint of technological processes.

Being the fundamental units used in the making of textile yarns and fabrics, textile fibers contribute to the hand, texture, and appearance of fabrics; they influence and contribute to the performance of fabrics; they determine to a large extent the amount and kind of service required of fabrics; and they have much to do with the cost of fabric. Successful textile fibers must be readily available, constant in supply and inexpensive. They must, of course, have, so far as their properties are concerned, sufficient strength, pliability, length, and cohesiveness to be spun into yarns.

New Words and Expressions

hairlike	毛发似的，毛发状的
dimension	尺寸
width	宽度，门幅
classify	分类，分级
silk	丝
wool	羊毛
cotton	棉，棉花
asbestos	石棉

regenerate	再生的
diverse	多种多样的，多变化的
protein	蛋白质
linter	棉籽绒，棉短绒
seaweed	海草，海藻
synthetic	合成的
derivative	衍生物
rayon	粘胶，人造丝
talent	才能
eccentricity	怪癖；偏心率，离心率
superiority	优越，优势
cashmere	羊绒，开司米
soft	柔软的
luxurious	豪华的
touch	接触，手感
camel	骆驼
fineness	细度
tenacity	强度，韧度
elongation	伸长，伸长率
elasticity	弹性
resiliency	回弹力，弹力
cohesion	粘合力，抱合力
absorbency	吸水性
texture	组织，结构
pliability	柔韧性，可挠性
twist	捻度，捻回
spinnability	可纺性

Notes to the Text

1. Chemically, the classification might be protein for animal fibers, cellulosic for plant fibers, and names of the specific minerals (such as asbestos) for mineral fibers.
   从化学组成分类，动物纤维可称为蛋白质纤维，植物纤维称为纤维素纤维，矿物纤维以矿（如石棉）的名称命名。
2. man-made fiber
   又称为 manufactured fiber，化学纤维
3. regenerated man-made fiber

再生纤维

4. synthetic man-made fiber
   合成纤维
5. It is, therefore, clear that ...
   therefore 是插入语，可提前，表示“因此”的意思。It 是形式主语，that 引导一个主语从句。本句开头可翻译成“显然，……”
6. moisture content
   含水率，纺织材料的吸湿性指标。另一个指标是回潮率（moisture regain）。

Questions on Reading

1. What is fiber?
2. What are textile fibers?
3. What are the essential properties of textile fibers?
4. How the fiber properties influence the fabric performances?

Lesson 3 Natural Cellulosic Fiber—Cotton

Objectives

1. Introduce the major varieties of cotton.
2. State the main properties of cotton fiber.
3. Introduce the methods of measuring fiber length and linear density.

Cotton, which comes from seed-hairs, is the most widely used of the natural cellulosic fibers and is well known to most consumers. The cotton grows on the plant as long hair attached to the seeds (inside the boll).

There are numerous varieties of cotton grown all over the world. Such basic characteristics as length and fineness of the cotton fiber are dependent on the type of the seed used. However, fiber properties are also sensitive to changes in environmental conditions during the growth period. All variety of cotton inherently contains a small percentage of short fibers. But any drastic changes in climatic conditions can result in the unbalance of the normal properties. The proportions of short and immature fibers in cotton are a major factor in determining its quality and are a source of nuisance during processing[1]. Maturity of cotton is characterized by the degree of the development of the cell wall[2]. If a cotton fiber has a well-developed wall thickness, it is said to be mature; on the other hand, a cotton fiber with a thin and poorly developed cell wall is said to be immature.

Before yarn manufacture, cotton is graded, sorted, and blended to insure uniform yarn quality. Cotton is graded on the basis of its color, staple length, fineness and freedom from foreign matter. In American, cotton can be divided into seven-step scale from good-middling[3] (best) to good-ordinary [4] (poorest). Good-middling is the whitest, longest, finest, cleanest, and most lustrous of the lot. It requires the least amount of effort to produce high-quality cotton goods. Good-ordinary may be yellowish or gray, contain many bits of twigs and other trash, and is made up of the shortest, coarsest, dullest fibers.

The cotton fiber may be from 0.3cm to 5.5cm long. Under the microscope, it appears as a ribbonlike structure that is twisted at irregular intervals along its length. The twists, called "convolutions", increase the fiber-to-fiber friction necessary to secure a strong spun yarn. The fiber ranges in color from a yellowish to pure white, and may be very lustrous. However, most cotton is dull.

The cross-section of cotton fiber is kidney-shaped with a central hollow core known as the lumen. The fiber is found to consist of an outer shell, or cuticle, which surrounds the primary wall. The primary wall, in turn, covers the secondary wall surrounding the lumen.

Technically, the most important fiber length is called the "staple length".

There are several methods that have been developed over a period of years for the measurement of fiber length. These include:

(1) Individual fiber methods[5].

(2) Comb sorters methods (mechanical and semimechanical sorters).

(3) Scanning methods.

Method (1) is a very tedious and time-consuming one and is only used by research workers.

Although the comb sorters are very useful in providing information on the length distribution and in determining the amount of short fibers present in the sample, the method is tedious and time consuming too. To overcome these difficulties, a number of other devices have been developed in which a representative tuft of a material is scanned photoelectrically from end to end for a property linearly related to number. One of the most extensively used instruments in which the principle of photoelectric scanning is utilized is the Fibrograph developed by Hertel for the measurement of cotton fiber length. This method involves the presentation of the test specimen for scanning in the form of a pair of fiber tufts. The instrument is used mainly to obtain the average or mean length and the upper half mean length of fibers[6].

The linear density of a sample of fibers can be determined either by an individual fiber method or by the cut middles method. The former method can be combined with the individual fiber method used for measuring the fiber length, a known number of fibers whose length has been measured is weighed the weight divided by the total length then gives the linear density of fibers. The ASTM[7] standard method for cotton suggests the weighing of the groups of fibers of known length ranges. From each group, approximately 100 fibers are taken, and the weight and the count of the fibers are obtained (the two shortest groups and the fibers that weigh less than 2 mg are ignored). From the weightings, the mean fiber linear density (micrograms per inch) is calculated.

In the cut-middles method, a known length (generally 1cm) from the middle of tufts of parallelized fibers is sliced out by means of razor blades set in a holder at a desired distance. Fibers in groups of 100 are counted from each of the tufts and weighed, care being taken to avoid fibers shorter than 1cm. These methods are not suitable for highly crimped fibers because of the error introduced into the length measurement.

New Words and Expressions

seed-hair 籽纤维

species	种，物种
Gossypium	棉（属名）
environmental	环境的
inherently	固有的
immature	未成熟的
property	品质
nuisance	损害，伤害
maturity count	成熟度百分数
maturity	成熟度
mature	成熟的
textile	纺织品
staple	切断纤维
comb sorter	梳片式纤维长度分析仪
sample	试样
tuft	[纤维] 簇
Fibrograph	纤维长度照影仪

Notes to the Text

1. The proportions of short and immature fibers in a cotton are a major factor in determining its quality and are a source of nuisance during processing.
   棉纤维中短纤维和未成熟纤维的比例是确定纤维品质的主要因素，也是加工过程中纤维损伤的原因。
2. Maturity of cotton is characterized by the degree of the development of the cell wall.
   棉纤维的成熟度由纤维细胞壁加厚程度确定。
3. good-middling
   上级美棉，三级美棉
4. good-ordinary
   平级美棉
5. individual fiber methods
   单纤维测试法
6. mean length and the upper half mean length of fibers
   纤维平均长度和上半部平均长度
7. ASTM
   有两种意思，一个是 American standards of testing materials，即美国材料测试标准；另一个是 American society of testing materials，即美国材料试验协会。本句中是第一个意思。