



Unit - 1

Introduction to Woven Textiles



Chapter- 1:.....

Introduction To Textiles



Fig 1.1: Textiles for Apparel



Fig 1.2: Home Textiles

1.1. INTRODUCTION

Manufacturing of textiles is one of the oldest industry. Textiles play an important role in our daily lives. It caters for the fundamental human need for clothing and for protection and fulfils basic demand for decoration.

Other than this, textiles also have an assortment of other uses, like making containers such as bags and baskets; in the household, they are used in carpeting, upholstered furnishings, window shades, towels, covering for tables, beds, and other flat surfaces, and also art pieces. In the workplace, they are used in industrial and scientific processes such as filtering, as belts, etc. Miscellaneous uses include flags, backpacks, tents, nets, handkerchiefs, cleaning rags, transportation devices such as balloons, sails, parachutes, etc.

1.2. WHAT IS FABRIC?

A Fabric may be defined as a planar assembly of fibre, yarns or combination of these.

There are many methods of fabric manufacturing, each capable of producing a great variety of structures depending upon raw materials used. The particular fabric selected



for a given application depends on the performance requirements imposed by the end use and/or the desired aesthetic characteristics of the end user with consideration for cost and price. Fabrics, as stated above, are used for many applications such as apparel, home furnishings and industrial. The most commonly used methods for fabric - forming are interlacing, interloping, bonding and tufting.

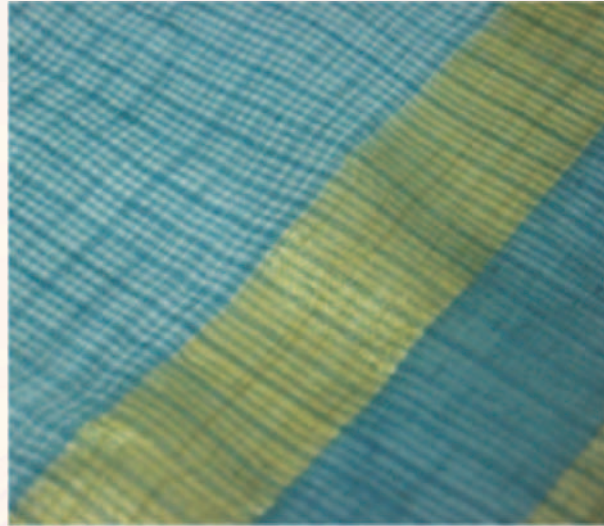


Fig 1.3: Close-up view of a Fabric

The words fabric and cloth are often used as synonyms for textile. However, there are subtle differences in these terms in specialized usage. **Textile** refers to any material made of interlacing fibres. **Fabric** refers to any material made through weaving, knitting, spreading, crocheting, or bonding that may be used in production of further goods (garments, etc.). **Cloth** may be used synonymously with fabric but often refers to a finished piece of fabric used for a specific purpose (e.g., table cloth).

1.3. THE RAW MATERIAL



Fig 1.4: Fiber and Yarn - The raw material for making a Fabric

The basic raw material used by the textile industry for making a fabric is Fibre. **Fibres** are delicate, hair portions of the tissues of a plant or animal or other substance that are very small in diameter in relation to their length. The essential requirement for the fibre to be spun into yarn includes a length of at least 5mm, flexibility, cohesiveness and sufficient strength. Many different kinds of fibres are used for making a Yarn. The strands of fibres are twisted or spun together to form a **Yarn** that is made into a Fabric.

Some of these fibres are being used since the earlier years of civilization till today, with modifications and enhancement. Some fibres have been developed over the years in laboratory and have acquired varied degree of importance in the recent years.

The factors influencing the development and utilization of all the fibres include their ability to be spun, their availability in sufficient quantity, the cost or economy of production and the desirability of their properties to consumer.

1.4. TYPES OF TEXTILE FIBRES



Fig 1.5: Animal
Fibre - wool



Fig 1.6: Vegetable
Fibre - Jute

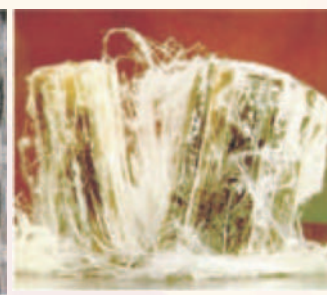


Fig 1.7: Mineral
Fibre - Asbestos



Fig 1.8: Yarns from Manmade
Fibres



Fig 1.9: Nylon Fibre - being
used as Racket Net

The textile fibres are of two types -

- 1.4.1. **Natural Fibre** - These fibres include those produced by plants, animals and geological processes. They are biodegradable over time. They can be classified according to their origin

- a) **Animal Fibre** - They are produced by animals or insects and are protein in composition, E.g.: Silk fibre and Wool fibre
- b) **Mineral Fibre** - These are mined from certain types of rocks, E.g.: Asbestos fibre
- c) **Vegetable Fibre** - They are found in the cell wall of plants and are cellulosic in composition. E.g., cotton fibre, jute fibre.

1.4.2. Manmade Fibre - These are derived from various sources. For instance,

- a) **Manmade Cellulosic Fibre** - The natural material of cellulose can be taken from cotton linters and wood pulp, processed chemically and changed in form and other characteristic to form manmade cellulosic fibre. E.g.: Rayon, Modal
- b) **Non-cellulosic Polymer Fibres** - They are synthesized or created from various elements into large molecules which are called linear polymers because they are connected in link-like fashion. E.g.: Acrylic fibre, Nylon fibre, Polyester fibre
- c) **Metallic Fibers** - They are composed of metal, plastic coated metal, metal-coated plastic or a core completely covered by metal. They are used as decorative yarn for various apparel and home furnishings.
- d) **Minerals Fibers** - Various minerals have been manufactured into glass, ceramic and graphite fibers having prescribed properties for specific use. E.g.: Glass fibers

1.5. CLASSIFICATION OF TEXTILES



Fig 1.10: Woven Fabric



Fig 1.11: Knitted Fabric
- used as Sweater



Fig 1.12: Non-woven Fabric
- used as Tissue

Fabrics may be classified on the basis of way they are formed. The most commonly used fabric forming methods are:

1.5.1. Interlacing - Weaving

Interlacing of lengthwise yarn (warp) with the width wise yarn (weft/ filling) which are perpendicular to one another. Example: Shirting

1.5.2. Interloping - Knitting

Interloping of one yarn system into vertical columns and horizontal rows of loops called wales and courses respectively with fabric coming out of the machine in the wales direction. Example: Sweaters, hosiery

1.5.3. Bonding (Non-Woven / Felting)

Bonding together of entangled fiber or filament or yarn, mechanically, thermally or chemically to form a sheet or web structure. Example: Lining in automobiles

1.5.4. Tufting

"Sewing" a surface yarn system of loops through a primary backing fabric into vertical columns (rows) and horizontal lines (stitches) forming cut and/or uncut loops (piles) with the fabric coming out of the machine in the rows direction. Fabric must be back-coated in a later process to secure tufted loops

1.6. TECHNICAL TEXTILES

Textiles used for industrial purposes, and chosen for characteristics other than their appearance, are commonly referred to as **Technical Textiles**. Technical textiles include textile structures for automotive applications (Tire cord fabric in tires), medical textiles (e.g. implants), geotextiles (reinforcement of embankments), agro textiles (textiles for crop protection), protective clothing (e.g. against heat and radiation for fire fighter clothing, against molten metals for welders, stab protection, and bullet proof vests).

They are designed to work for heavy duty and demanding applications. In all these applications stringent performance requirements must be met as any failure of an industrial textile can be devastating. For example, failure of an air bag in a car accident or an astronaut's suit during a space walk may be fatal.

Summary:

A textile is one of the oldest industries. There are various forms of raw materials required to make a fabric. There are many ways of making it. This chapter will introduce the student to the world of Textiles. It will define the fabric and the raw material used to make a fabric - yarn and fiber. It will tell in brief the classifications of fibres and various types of textiles. It will also introduce the student to the term Technical Textiles.