1. History of textile production

Textile-like materials were made even in prehistoric times. E.g. The Incas used quipus (or *khipus*) made of protein fibres like wool or hair alpacas or llamas and camels or from a cellulose fibres like cotton thousands of years ago.

The speed and scale of textile production grew rapidly with the industrialization.

However, for the main types of textiles – plain weave (prostá plátnová vazba), twill (keprová vazba) or satin weave (saténová vazba), there is little difference between the ancient and modern methods.

2. Uses of textiles

Textiles have several uses, the most common is ***for clothing***.

In the household, textiles are used in carpeting, furnishing, window shades, towels, table covers, bed sheets, handkerchiefs, cleaning devices and in art.

In the workplace, they are used in industrial and scientific processes such as filtering.

Other uses include tents, flags, nets, kites, sails and parachutes or geotextiles.

Technical textiles are used ***for industrial purposes -*** for automotive applications, medical textiles (e.g. implants), geotextiles (reinforcement of embankments), agrotextiles, protective clothing (e.g. against heat and radiation for fire-retardant clothing, against molten metals for welders, stab protection, and bullet proof vests).

3. Basic division of textile fibres

The two basic types of fibres:

a. natural fibres
b. synthetic (or man-made) fibres.

They can be further dividend into the following groups:

A) natural fibres

1. plant fibres

a) fibres made of *seeds (semena)* , e.g. cotton (bavlna), kapok, also pineapple fibre

b) fibres made of *leaves (listy)*, e.g. Sisal, New Zealand flax

c) fibres made of *stalks (stonky)*, e.g. flax (len), hemp (konopí), bamboo

d) fibres made of *nuts (ořechy)*, e.g. coconut fibre (Coir)

2. animal fibres

a) *keratin fibres*, (gained from fur or hair of animals) e.g. wool and other animal fur or hair (mohair, cashmere, camel hair, alpaca wool)

b) *fibroin fibres*, e.g. pure silk and wild tussah

3. mineral fibres

a) asbestos and basalt fibres (used e.g. in fire blankets, sheeting, acoustic ceilings)

b) glass fibres (used in ironing boards, ropes, cables, for fireproof and soundproof materials)

c) metal fibres (used in cloth-of-gold or jewellery as well as in hardware cloth)

B) Synthetic (man-made) fibres

these include Polyamide, Polyacryl, Polyurethane or Polycotton fibres, Silone and others

4. Properties of selected fibres

Cotton

- the most widely spread textile fibre in the world
- firm, skin friendly, breathable, absorbs a lot of humidity, doesn't shrink
- inelastic, has low thermoregulation
- used for clothing which is washed often, e.g. linen
- usually combined with Elastan
- its production is rather unecological

Wool

- either from goat or sheep
- coated in lanolin which is waterproof and dirt proof
- has fine texture and good thermoregulation properties, keeps both warmth and cool
- hydrophilic – absorbs humidity, but breathable, antibacterial
- hypoallergenic, UV protective, elastic, naturally hollow fibre
- cashmere (from India), mohair from North Africa – very soft types of wool
- used for warm clothing, blankets, socks, insulation

Silk

- very precious fibre
- made of the cocoon of the Chinese silkworm
- spun into smooth, shiny, fine fabric
- doesn't crash, cools in summer and is warm in winter
- used for stockings and tights, usually combined with cotton and wool

Elastan

- sold as Lycra by DuPont since the 1960s or dorlastan by Bayer
- never used pure, always combined with other fibres
- improves elasticity of the cloth, resistant against sea water and light
- can expand 3-7 times compared to the original length

Polyamide

- firm and elastic, scratch–resistant 10 times more than cotton
- doesn't shrink, dries quickly

Polyacrilic

- fine fibre for knitted textiles, colourfast, chemical-resistant, easy maintenance
- often combined with wool for knitting

Viscose

- cooling and smooth fibre,
- usually combined with cotton or wool
- knitted textiles are usually used for summer clothing

The development of **nanomaterials** and nanoparticles has led to production of materials more resistant to water, stains, and pathogens such as bacteria. (Nano-Tex and NanoHorizons)

Textile production processes

1. ***spinning (předení)–*** a fibre is spun into a yarn (příze, nit)

2. **cloth-making processes: (výroba textílií)**
   a. weaving (tkaní) – fabric (tkanina) is woven from yarns
   b. knitting (pletení) – a knitted cloth
   c. crocheting (háčkování)
   d. felting (plstění)
   e. lace (krajka)
   f. plaiting (splétání)

loom – tkalcovský stav


Zleva: Jean Paul Gaultier, Polliny, D&G, Twenty8Twelve, Phillip Lim – kolekce pro podzim/zima 2010/2011.

3. treatments

- dyeing (barvení) – to make colourful textiles, consumes a large amount of water

- colour designs can be created by: woodblock printing, weaving together fibres of different colours (tartan), batik
- embroidery – adding coloured stitches to finished fabric
- bleaching – used to make textiles pale or white