

**Materials****Natural Fibres And Leather****Introduction**

Natural fibres are either extracted from the leaf, the inner bark (bast) or fruit/seed crop, animal wool/hair, insect cocoon or mineral product.

Fibres are used either to form into threads, yarns and ropes, or weave into tapes or fabrics. In some applications natural fibres are replacing glass fibres in reinforced polymers, where the tensile strength of the fibre is not as important as the specific stiffness. Natural fibre reinforced polymers are generally restricted for use in non-structural products.

**Leaf****Seagrass**

General	Properties	Uses
Leaves of flowering plant that is grown in the sea or paddy fields	Hard Wearing Moderate cost Non-flammable Resistance to rotting Good sound and thermal insulation	Carpets Rugs Roof thatching in coastal areas

**Sisal**

General	Properties	Uses
Leaves of sisal tree	Medium-high strength 600MPa Expensive Specific stiffness comparable to E-glass Hard wearing	Hard fibre cordage Higher strength papers Luxury Carpets

**Abaca**

General	Properties	Uses
Also called Manila Hemp, abaca is produced from the leaf of the <i>Musa Textilis</i> tree	High tensile strength 900 MPa Good abrasion resistance Good resistance to mould and rot Good resistance to UV rays Good specific stiffness	Marine cordage, abrasive packing papers and tea bags

**Inner Bark****Flax**

General	Properties	Uses
Bast fibre from flax plant	High tensile strength 800 MPa Specific stiffness greater than E-glass Low moisture absorption	Linen and paper Flax straw used to make paper for cigarettes

**Seed****Cotton**

General	Properties	Uses
Cotton is the most widely used fibre.	Durable Medium to low tensile strength High water absorption	Clothing Fine papers

**Fruit****Coir**

General	Properties	Uses
Fibres from Coconut outer-shell (husk)	Highly rot resistant Approx. 20% elongation at failure Low tensile strength 220 MPa Low stiffness	Carpets and door mats Thermal and acoustic insulation boards

**Animal Wool/Hair****Wool**

General	Properties	Uses
Widely used Lambswool is taken from sheep that are less than 8 months old and is softer than wool taken from older sheep Contains 30 to 40% lanolin	Good wicking properties Low to medium strength Soft Good thermal insulation Absorbs water easily	Wide range of clothing Luxury carpets

**Alpaca**

General	Properties	Uses
There is two types of Alpaca, the Huacaya (smooth fleece) and the Suri (dreadlocks), the later being rare and more sought after.	Huacaya(H) fibres (27 microns) Suri(S) fibres (10-15 microns). Do not absorb water Resists degradation caused by UV rays. 3.5 times stronger than human hair Hollow hair fibres Durable Very light	Inner Clothing (S) Outercloting (H) Blankets

**Llama**

General	Properties	Uses
Hollow hair fibres of the Llama	Durable Warm and lightweight Luxurious feel Hollow hair fibres Fibres 20-40 microns	Outer clothing Blankets

**Mohair**

General	Properties	Uses
Angoran goat hair	Delicate Requires special attention when washing. Slightly stronger than human hair Fibres 25-45 microns	Luxury Clothing

**Camel**

General	Properties	Uses
Bactrian Camel (two humps) hair		Coats Sweaters Suits

**Cashmere**

General	Properties	Uses
Fibre from Kashmir goat Fine undercoat is used to produce fibre	Very soft Fibres 15-19 microns	Luxury coats and suits

## Insect Cocoon

### Silk

General	Properties	Uses
Mulberry silkworm cocoons which are heated in boiling water to release the single continuous filament. This filament is combined with 8 or 10 ten others to make silk thread	Soft and comfortable Very good tensile strength Excellent wicking properties Lightweight Excellent insulating properties Reflective appearance Poor resistance to UV rays Silk filament is approx. 3 microns	Luxury Clothing Thermal clothing Home furnishing

### Leather

General	Properties	Uses
There are two main types of leather, 'Skin' and Hide. 'Skin' is taken from small animals such as sheep and pigs, and 'Hide' is taken from larger animals such as cows and buffalo.	Depends on tanning treatments and area of animal taken from. Soft and flexible Or Hard and moderately stiff 'Chamois' leather is very soft and absorbs water readily.	Shoe soles and uppers Jackets Bags Belts Window cleaning cloths Luxury book bindings

### Internet Resources

The [School of Textiles and Design](#) at Leeds University is involved with education and research on all areas involved with textile manufacture and design. Research groups within the department are, Fibre Science Group, Textile / Process Engineering Group, Textile Design, and Management, Marketing, IT and Economics.

[British Wool Marketing Board](#) provides a network to promote best practices and market awareness, with the overall aim of providing better returns for UK fleece wool farmers.

[European Fine Fibre Network](#) is a dedicated group of researchers and manufacturers that are aiming to develop the processes of producing high quality animal fibres of European origin.

The [International Mohair Association](#) promotes the use of mohair in products and regulates the description of mohair and its concentration in mixed fibre fabrics.

The [British School of Leather Technology](#) provides course on leather production and related activities.