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GUILD OF CLEANERS AND LAUNDERERS

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TEXTILE FIBRES – MAKE UP OF A GARMENT

Various fabrics made from different fibres or from mixtures of fibres are used to make a garment. When we think of the cleanability of a garment, we tend to think of the way the textile used in the outer construction behaves, but much also depends on the other fibres used within the construction of the garment and also the types of garment accessories used. In particular remember that the properties of different fibres with respect to dry or wet cleaning and spotting chemicals are valid only for the fibre itself. Dyestuffs on the **fibres or fabrics** may not withstand a treatment which will leave the **fibre** undamaged.
To safely process garment we need to know how each fibre reacts under the conditions of process and what to be aware of.

Classification of fibres

A simple classification can be based upon the division of fibres into Natural and Man-Made, being sub-divided as below.

Natural Fibres

Animal (or protein) Fibres
Wool (the most important), mohair, cashmere, camel hair, angora (rabbit) etc.,
Pure silk (from the cocoon of the silkworm)
Vegetable (or Cellulosic) Fibres
Seed Hairs (cotton, kapok, etc.)
Bast fibres (i.e. fibres from the stalks of plants)
Leaf fibres: Sisal (used in carpets)

Man-Made Fibres

Cellulosic: these are fibres made by man from cellulose which is the "body- substance" of plant life living on land. Cellulosic fibres fall into two main groups
Regenerated cellulose such as viscose rayon
Cellulose derivatives such as cellulose acetate and triacetate.
Synthetic Resins : nylon, polyester, acrylics modacylics, polyvinyl chloride and elastofibres. These are complex chemicals built up from the by-products of coal or oil which are themselves derived from living matter.

Inorganic (non-living matter)
Metallic: Thread or yarn, gold wire etc.,
Non-metallic: glass fibres

BLENDS AND MIXTURES OF FIBRES

The term 'mixture´at present refers to the use of two different fibres in a fabric when each fibre is present in a separate yarn. For example, a cheap blazer cloth could be made having a cotton warp and wool weft, and is therefore a mixture of wool and cotton.
The term 'blend' refers to mixing fibres themselves so that the individual yarns contain two or more fibres. For example, a polyester/wool trouser material where the warp and weft yarns may be identical, each having been spun from a blend of 55% polyester staple fibre and 45% wool.
Mixtures and blends are used for a variety of reasons, **(a)** The cost of the fabric can be reduced by including a proportion of a cheap fibre with a more expensive fibre. **(b)** To obtain a particular fabric property, such as wearability, drape or handle, when no individual fibre can produce the desired result, but when two or more fibres can each contribute something so that the final result is nearer to the effect required. **(c)** Different fibres have a different appearance, lustre or texture and vary in their affinity for dye thus decorative and special colour effects can be produced.
It has been customary for many years to combine cotton and wool in certain fabrics. Cotton is cheap and strong and wool is more expensive and not very strong and thus a cotton warp will give added strength to a fabric with a wool weft which provides the texture and colour. Thus a stronger cheaper fabric can be produced than a fabric of equivalent weight made only of wool. Mercerised cotton yarns can be incorporated in wool suiting and costume clothes to produce a striping effect.
Blends or mixtures of wool with special hair fibres, such as mohair, or with spun silk are normally used to exploit the lustre and handle of the more expensive fibre and this time it is the turn of the wool to be the cheaper fibre incorporated for reasons of economy. Incorporating less than 10% of fibre in a blend will have little noticeable effect on the texture or handle of the fabric.

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Only if it has very special and distinctive properties will it begin to make its presence felt at 15% but at 20% or above theproperties of the fibre will begin to be reflected by appreciable differences in economy, texture and change in strength.
Nylon and polyester fibres have excellent strength and abrasion resistance and can be used to strengthen wool fabrics. They are much harder than wool and in considerable quantities change the appearance and handle of the fabric considerably.

Wool is also blended with acrylic fibres which in handle are much more like wool than are nylon and polyester, but the strengthening effect of the acrylic fibre is not so great.
From the viewpoint of the manufacturer blending fibres is not just a simple exercise but requires careful consideration of the properties of the individual fibres so that the proportions and type of fibre will confer the properties required on the fabric.

FROM FIBRE TO FABRIC SUMMARY OF PRODUCTION PROCESS

Staple Yarns

Man soon discovered how to make ropes be twisting vines together, and the step from rope to twine to a yarn for weaving is only a matter of refinement. Try to do it yourself. Take some purified and prepared cotton (surgical cotton wool) in your left handa pinch a few fibres between the finger and thumb of the right hand (moisten your fingers first), twist the pinch of fibres, pulling away from the mass of cotton wool at the same time. You will probably produce a coarse yarn about two inches in length. With practice you should be able soon to produce an arm's length of finer and uniform yarn. The friction between the fibres binds the yarn andthe twist brings the fibres closer together and increases the friction and makes the yarn stronger. Fine yarns require more twist thancoarse ones, and smooth fibres need more twist than rough fibres like wool.
This is just what the spinner does, except that he uses mechanical methods. Before spinning, however, much purification and preparation of the fibre is necessary. Wool is scoured or washed to remove the grease, sweat and dirt, and may then be oiled witha thin oil to lubricate the fibres in processing. Cotton is not usually washed or scoured at this stage for the natural wax on the cotton is a good lubricant. The wool, cotton, linen or man-made staple fibres then pass through a series of processes as follows, though not all of these processes may be employed:
Carding : To straighten out the fibres in the mass and make them lie more or less in one direction.
Combing: To remove short unwanted fibres.
Gilling: To make ropes or slivers of fibres more uniform in thickness and density.
Spinning: To reduce the slivers in size to usable spun yarns. Spinning may be a one-step process (woollen yarns) buy may also be a multi-step process (worsted yarns)
Doubling: Twisting individual yarns together for strength or colour effect. If you unravel a piece of cloth and untwist some of the yarns you will probably find them to be 'doubled'.
When we speak of woollen and worsted we think of wool fabrics – but today these words have other meanings and viscose, acetate rayon, polyester and nylon staple fibres can be spin on the worsted or woollen systems to produced fabrics that look rather like wool fabrics.
Woollen-spun yarns are coarse, non-uniform, rough and hairy, for the processes of combing and gilling have been omitted in their manufacture. Worsted yarns are very uniform in thickness and smooth and non-hairy. Woollen yarns are used to make tweeds and felted (or 'milled') fabrics such as overcoatings, blankets, meltons, etc. Worsted yarns are used for 'worsteds' fine smoothfabrics, hosiery etc.
Yarns of either type may be made of 'blends' of fibres e.g. 50% wool 50% viscose.

Filament Yarns

Making a filament yarn is much easier for it is only necessary to twist long filaments together in a process similar to the doubling described above. This is called 'throwing' in the case of pure silk. Filament yarns for weaving are usually sized or stiffened to given them greater strength, but hosiery filament yarns may not be sized. They may however, be treated with other 'finishes' e.g. an anti-snag finish.

Textured Yarns

Garments made from filament yarns with the advantage of quick drying and in some cases drip-dry properties had problems of comfort and therefore, ways of putting air spaces inside the fibre were devised. There are many different ways in which textured yarns can be produced but basically the idea is to put a crimped or curled effect in the filament to induce it to spring-like formation which results in air gaps which take up moisture from the body. This process is known as 'texturing' or 'bulking'. The texturing process can also improve the drape and handle of the fabric and add bulk and in the case of nylon, the textured yarnscan be made to stretch and recover like elastic.

MAKING THE FABRIC

This can be done by weaving or knitting. Ancient man undoubtedly plaited leaves and twigs to make wattle fences or the wallsof his home. By stringing yarns on a frame and threading other yarns over the under with a bone needle he made simple clothes.
Weaving by modern standards is very little refined – it has simply been speeded up and mechanised. The warp yarns (i.e. those in the length of the fabric) are held on a beam enough to make many yards of fabric. Some of the yarns are lifted up whilst theremainder are kept down. The shuttle carrying the weft yarn then passes between the two sets of warp yarns and leaves a trail of weft.
If this one up, one down, motion of the warp yarns (called 'ends') is continued a plain weave fabric ('darning') will be produced

More complicated movements up and down of the warp 'ends' are required to make patterned fabrics.
Ancient man made excellent textiles in this way on primitive looms more than 7000 years ago. He also learned to knit several thousand years ago. But it was not until the year 1589 AD that man was able to devise the most simple of knitting machines.
Weaving is a primitive art, knitting is a modern mechanical process and is capable of great development. Ladies now frequently wear knitted suits for knitting is much more productive and can produce a cheaper fabric.

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It is not within the scope of this article to deal thoroughly with the details of fabric production by weaving and knitting. However the following sections provide information concerning special types of fabrics.

Cut Pile Fabrics

Fabrics with a cut pile may be produced either by weaving or knitting. Velvets and corduroy fabrics are made by weaving then cutting some of the yarns with special knives during the weaving operation. Special knitting techniques which produce large loops on the back of the fabric are available and when these loops are cut the pile is formed. Examples of this are seen in the artificial fur fabrics. These fabrics are more difficult and more expensive to make than the ordinary woven or knitted material in contrast to the materials mentioned in the following paragraph.

Bonded Fibre – Non-woven fabrics

This type of fabric is manufactured by taking the fibre off a carding machine whilst it is still in the form of a mesh it is impregnated with a bonding agent which is then allowed to set. The result is a flat sheet of fibres stuck to each other and running in all directions. Although the use of bonding agents is relatively new the idea has been used in felt production for many years by building up webs of fibres (mostly wool) into sheet of the required thickness and then causing the fibres to felt together into fabric by heat moisture, pressure and milling.

By using different processes, different types of thickness and consistency of web can be produced which can result in compact fabrics or lofty open fabrics which could be used for padding. Newer techniques with the filaments of man-made fibres can be used to produce webs which can be stabilised by heat without the need for any form of bonding agent to hold the fabric together. Non-woven fabrics are the cheapest type of fabric but are rather stiff with poor draping properties. They do not have an attractive appearance and for these reasons are not popular for apparel. Their main use, therefore, is for fabrics which are not seen. They are used frequently for interlinings and as fusible interlinings, they can be attached to fabrics without sewing. This is done by coating one side of the fabric with a thermoplastic resin which is fused to the outer fabric by the application of heat and pressure.

Laminated and Bonded Fabrics

In order to produce warmer fabrics which do not have the weight associated with very thick materials, the idea of combining a fabric with a sheet of plastic foam was tried. It was found that the foam increased the thickness and warmth of the fabric without increasing the weight to any great extent. Thus a cheap method of producing a slightly heavier but thicker material had been developed. Subsequently, it was found that two thin fabrics could be bonded together by means of a layer of adhesive or with a very thin sheet of foam to form in effect a triple layer of fabric.

This system offers a cheap and easy method of improving the stability to fabrics such as single jersey, by bonding two of them together. Loose open-weave fabrics can be made much more stable in wear by bonding them to a light-weight close woven or knitted fabric. However the stability of the combined fabric to cleaning is not improved significantly compare to the component fabrics.

FABRIC FINISHING PROCESSES

The processes applied to a fabric after its construction are many and varied. The cloth may need a thorough cleansing to remove dirt, sizes or lubricants used in manufacture or it may require bleaching and of course, if the fibres of yarns from which the fabric was constructed had not already been dyed then the fabric itself must be coloured by dyeing or printing. However, further development of the appearance and texture of the cloth often takes place. During weaving or knitting many fabrics are constructed in such a way that during hot wet finishing treatments particular effects can be developed, e.g. the crepe effect in fabrics made from natural fibres and other fabrics with embossed appearances such as pique, cord and seersucker effects. Undesired fibre ends protruding from the surface may be shaved off or burned off according to fibre to produce smooth fabrics. Where a surface fibre or nap is desired the fabrics are treated to raise the nap by plucking the fibre ends out of the fabric surface with fine wire teeth mounted on rollers (teaselling). Crepe effects and some other effects on man-made fibres can be created by embossing using heat and an engraved roller. Various chemical treatments may be given to the fabric during finishing to influence fabric handle or to create crease- resistant fabrics or to provide durable press effects, i.e. permanent creases in trousers. Other substances can be applied to make the fabric water and/or stain repellent or to make it flame-resistant.