

FIBRES AND FABRICS

PROPERTIES DETERMINING USE

To make decisions concerning the use to which a fabric may be put, it is necessary to know something of its properties, or its behaviour under certain conditions.

The main properties for consideration are strength, elasticity, moisture regain, resiliency, dimensional stability.

DEFINITIONS:

- STRENGTH* : The amount of force required to burst the fibre yarn or fabric.
- ELASTICITY* : The amount by which the fibre stretches under strain, and then returns to its original length.
- MOISTURE* : The amount of water present in a specific dry-weight of fibre
REGAIN under normal conditions.
- RESILIENCY* : The ability of a fibre to recover from creasing, wrinkling or crushing.
- DIMENSIONAL* : The ability of a fibre to retain its original shape and size
STABILITY under specified conditions.

PROPERTIES OF SOME NATURAL AND MAN-MADE FIBRES

- COTTON* : Soft but stronger when wet than dry. (Fabric shrinks)
Fibres do not shrink because of stresses during manufacture;
- Loses strength in sunlight;
Good conductor of heat;
Absorbs moisture easily;
Dyes easily;
Low lustre, low resiliency; and
Damaged by micro-organisms (mildew)
- FLAX* : High moisture regain;
Withstands high temperatures;
Very strong – stronger when wet;

High lustre, low resiliency
Expensive;
Uneven thickness lends typical feature to yarn;
Damaged by micro-organism (mildew); and
Gradual loss of strength in sunlight.

RAYON : Strength – variable and dependent on type of rayon;

Elastic recovery and regain – low for regular and cupramonium;

Resiliency – low unless specifically finished;

Moisture regain and absorption – higher than natural cellulose;

Dimensional stability: Regular rayons stretch easily during yarn and fabric manufacture leads to relaxation shrinkage on laundering;

Good resistance to dry cleaning solvent;

Regular rayons deteriorate on exposure to sunlight; and

Do not build up static charge.

POLYESTER : Very strong and resists abrasion;
Very resilient;
Low elasticity;
Low moisture regain;
Does not shrink if heat-set;
Liable to pill i.e fibre ends work up into little balls;
Resistant to sunlight when behind glass;
Builds up static, causing clinging of apparel;
Thermoplastic, can be heat-set into pleats; Absorbs and holds grease tenaciously; and
Not attacked by insects or micro-organisms

NYLON : Non-absorbent;
Good conductor of heat unless fibre is spun;
Very hard-wearing and resilient;
Dirt cannot adhere, so easy to wash;
Very strong;
Very elastic;
Does not shrink;

White or grey articles may become grey if washed with other articles;
Thermoplastic fibre, so can be permanently pleated.
Creased, embossed;
Accumulates static charges;
Sunlight has a destructive effect;
Resistant to insects and micro-organisms.

USES OF SOME NATURAL AND MAN-MADE FIBRES

- COTTON* : Apparel – high fashion and standard e.g daytime dresses;
Frequent choice to blend with man-made fibres contributing comfort and appearance;
Household and domestic goods;
Industrial applications.
- FLAX* : Apparel, drapery, upholstery of light or heavy weight. First choice for table coverings.
- SILK* : An incredible variety of fabrics for sports wear, suits, lingerie, outer garments for ladies, decorator fabrics for homes and offices;
Choice products – high cost;
- RAYON* : Apparel, home-furnishing;
High tenacity – industrial uses e.g automobile tyres;
- POLYESTER* : Wide variety available for:

Apparel – men’s, women’s, children’s;

Industry – conveyor belts, laundry bags, fire hoses, fish netting, ropes, protective clothing.

Medical – surgical implants.
- NYLON* : Apparel – chiefly hosiery and lingerie. Outerwear – mainly as blends to contribute dimensional stability, abrasion resistance, elastic recovery, shape retention;

Home furnishings – carpets, upholstery fabric, industrial.

CONSIDERATIONS IN MAKING A CHOICE:

The list of uses of fibres (above) suggest that basically, the end products are similar viz apparel, home and office furnishings, industrial products.

What criteria should the consumer use in making his final choice?

These may be summarised as:

- (a) The conditions under which the textile articles will be used;
- (b) The type of performance expected of the articles;
- (c) Costs in terms of what may be considered the best value for money

Performance and conditions of use:

The characteristics of both fibre and fabric are vital considerations in determining the performance of a fabric under a given set of conditions. In other words, it is the characteristics of fibre and fabric that determine the suitability to function.

Examples:

One would consider the following characteristics in choosing a fabric for:

APPAREL : Resiliency, moisture absorption, elastic recovery and dimensional stability, chemical properties, flame resistance, resistance to perspiration, ease of care.

FLOOR COVERINGS AND UPHOLSTERY: Resistance to crushing and soiling (should not show soil easily) ease of cleaning, retention of attractive appearance, reaction to heat and flame, resistance to pilling, resistance to insects and micro-organisms.

DRAPERY: Resistance to sunlight, reactions to heat and flame, drapability, resiliency, retention of attractive appearance, resistance to insects and micro-organisms.

MODIFICATIONS OF FIBRES AND FABRICS:

(1) Finishes

Much research goes into the finishing of textiles – i.e modification with change, improve, or develop the appearance of desirable behaviour characteristics of fabrics. Treatments increase the usefulness of the fibres allowing them to fill roles, which they could not, otherwise. Finishes may be applied mechanically or chemically. They may be permanent (durable) or non-permanent. They are

considered durable if they can withstand a normal amount of wear, by tests designed to simulate average use and care.

They may be classified as:

- (i) preparatory e.g singeing, bleaching, tentering, mercerizing (cotton);
- (ii) functional e.g abrasion resistant, anti-static, flame retardant, durable press and minimum care, stain and soil resistant, soil release, stabilization finished.
- (iii) Appearance – altering, e.g moiré, glaze, napping.

All fabrics undergo finishing to some degree. Some finishes are a part of normal processing for selected fabrics.

The consumer purchasing fabrics for garments is often concerned with:

- (a) stabilization finishes – ability of fabric to resist shrinkage on laundering.
- (b) Durable press and minimum care finishes include:
 - (i) wrinkle recovery – the ability to recover from folding deformation while the fabric is dry;
 - (ii) crush resistance - similar but usually referring to a pile fabric;
 - (iii) durable press - ability to retain an attractive appearance during wear and return its original smooth surface and shape after laundering.

(2) *Blends*

The production of blends offers another means of modifying the properties of textile.

Blends combine the best qualities of natural and man-made fibres to produce fabrics with more desirable characteristics than any single component fibre.

Examples:

Man-mades are easy to care for, but they are non-absorbent and therefore sticky and sweaty to wear.

Natural fibres have good thermal qualities and are very strong.

Polyester-cotton combines the tough crease-resistance of polyester and the cool comfort of cotton. The fabric is easily laundered, dries quickly and requires lower ironing temperatures than pure cotton.

CARE OF FABRICS

The care given a textile product is dependent on the fibre of fibres, which make up the fabric. Yarn structure, fabric construction, type of dye-stuff, and finishes also influence the maintenance of the product e.g. a complex yarn may be damaged by abrasion from equipment or other fabrics during the process.

Proper laundering techniques should be observed for all washable fabrics. Instructions on care labels contribute specific knowledge and should be followed.

Many factors influence laundry results: type of detergent used, length of wash cycle (in most cases, this should not be more than 10 to 12 minutes); selection of bleaches; the use of fabric softeners.

Colour is an important aspect of care; it may be lost during laundering. Consideration should therefore be given to the duration of soaking coloured articles. Proper maintenance in relation to colour results in continued good appearance.

Finishing substances, while improving the behaviour of fabrics, may also cause new problems. Some finishes respond well to laundering, but are destroyed by dry-cleaning; others are not affected by dry-cleaning but are damaged by laundry methods.

It is the responsibility of each consumer to evaluate the qualities of a fabric in terms of its ultimate end-use, and then make the decisions required concerning its use and care. A knowledge of a few basic properties, especially behaviour towards heat is of vital importance to the average consumer. These properties determine optimum washing and ironing temperatures.

Polyester, polamide (nylon) and acetate soften and melt at low temperatures.

Acrylic melts at a fairly high temperature. Silk, flax and cotton scorch at high temperatures.

Blends should be maintained according to the requirements of the most delicate component fibre.

LABELLING

Legislation aimed at providing consumers with important information on textile and textile products purchased has been enacted in Trinidad and Tobago.

National standards:

- (i) TTS 76: Part 3 – 1996 - Labelling of Garments
- (ii) TTS 21 10 500: Part 7 - Labelling of Textiles

These are both compulsory standards. It is hoped that:

(iii) TTS 21 10 500 Part 5 - Care Labelling of Textile Articles
will be added to this list of labelling standards. The retailer is responsible for the proper labelling of goods at the consumer level.

The decisions a consumer makes when buying should be the result of a personal store-house of textile knowledge, and the label information provided. Fibre content gives clues about basic principles of fabric care.

NEW DEVELOPMENTS IN FIBRES, FABRICS

Fibre manufacturers are continuously seeking to improve the performance of the fibres and fabrics being developed to cater to lifestyle needs. Uses are looking for improved performance in terms of comfort, ease of care and cost. Fibres are being engineered to give the comfort of the natural fibres and the lower cost and the serviceability of the synthetics.

Great strides have been made in the textile industry, Competition for the consumer dollar continues to engender the creation of new fibres and fabrics to compete, to stimulate interest new uses and buying activity. New fibre blends are constantly being created to combine many of the new fibres into new types of yarns with new names and trademarks, e.g. lyocell, a generic fibre classification for a cellulosic fibre produced by an organic solvent spinning process that converts wood pulp to a textile fibre with no chemical intermediates. New finishes are also being continuously developed to improve wear, hand and appearance of fabrics. This is a challenge to the consumer who is frequently confused when he sees the names of some of these fibres and fabrics and is unable to determine their origin.

The requirements of the industrial sector is also responsible for some of the new developments, as fabrics are needed for the medical sector that would lead to better health management and lower costs. Safety considerations also drive the need for fabrics with improved performance in the area of thermal, flame retardant and microbiological protection, while they are still required to be comfortable to wear; in this regard fabrics are required to be breathable, hypoallergenic and static free. Generally the trends are towards fabrics with improved

Softness

Stretch and Resilience

Ease of Care
Comfort Protection and
Friendliness to the Environment.

Some new Fibres

Environmentally friendly ----- PLA from Corn presently being test marketed

Comfort Du Pont's ---Coolmax and Optimers Dri Release.

Easy Care----PPT (Polytrimethylene Terephthalate) the scientific name for stretch polyester

Washable Wool

Washable Silk.

New fashion Direction -- Increased use of Spandex in fabrics for many different applications.