

24. Principles of Wool Fabric Finishing

Mike Pailthorpe

Learning objectives

On completion of this topic you should be able to:

- Outline the use of wool fabric finishing flow charts
- Describe the various contaminants that may be present in greige state wool fabrics
- Describe the finishing methods employed to remove contaminants from greige state wool fabrics
- Describe the various forms of dimensional change that take place in wool fabrics
- Outline the finishing methods employed to control the dimensions of wool fabrics
- Describe the finishing processes employed to modify handle and appearance of wool fabrics

Key terms and concepts

Inspection, burling, mending, scouring, crabbing, carbonizing, milling, shrink proofing, bleaching, dyeing, hydroextraction, scutching, drying, conditioning, raising, shearing, singeing, pressing, decatizing, perching.

Introduction to the topic

The object of wool fabric finishing is to develop the desired properties in woollen and worsted fabrics that meet the specified end use requirements of consumers. Finishing is a sequence of processes that is carried out in a logical order. For example, finishing processes employing aqueous based treatments, also known as wet finishing, are grouped together, the aim being to minimise water consumption and to dry the fabric only once. The so-called dry finishing processes follow after drying.

There are four main objectives to be achieved during the finishing of wool fabrics.

- The removal, by scouring, of contaminants from the fabric. These contaminants may include lubricants and antistatic agents employed in yarn and fabric production, warp sizes and lubricants, machine oil stains, etc. In some cases the wool fabric may also contain vegetable matter (VM), in which case the process known as carbonising may be used to remove the VM
- The development of the required handle, softness, fullness, drape, etc.
- The control of the dimensional stability of the fabric, e.g. relaxation shrinkage, felting shrinkage, and hygral expansion
- The application of functional finishes, e.g. antistatic agents, flame-retardants, water-proofing agents, soil repellents, etc.

This lecture provides an overview of the principles of wool fabric finishing. The topic of wool fabric finishing is a very extensive one, and therefore can only be dealt with quite briefly here. Wet finishing and dry finishing are dealt with in more depth in Topic 25 Lectures 1 and 2, respectively.

The general references for this lecture are Rouette and Kitten (1991), Brady (1997) and Connell (2003). The Rouette and Kitten (1991) reference is a comprehensive book on the subject of wool fabric finishing.

24.1 Overview

Woven and knitted fabrics, taken straight from the loom or knitting machine, are known as greige (grey or gray) state fabrics. Greige state fabrics must be finished to produce high quality fabrics that are suitable for their intended use, e.g. suitings, knitwear, furnishing fabrics, etc.

Greige state fabrics contain a number of contaminants that must be removed by a scouring (washing) process. These contaminants may include residual wool grease that was deliberately left on the wool after raw wool scouring, processing assistants (spinning lubricants, warp sizes, warp lubricants, antistatic agents, etc), adventitious soiling (machine oils, factory dust, lint, etc) and unfixed dyestuffs (from stock or yarn dyeing processes). If the greige state fabric contains vegetable matter (VM), then it may be necessary to carbonize the fabric to destroy and remove the VM.

Greige state wool fabrics have very poor dimensional stability, and great care must be taken in handling wool fabrics through the sequence of wet finishing processes. Depending upon fabric type, it may be necessary to stabilise the dimensions of the fabric before the scouring process, using a process known as crabbing. The decision to scour first, or crab first, is based upon the experience of the finisher. One of the risks in crabbing first is that one might set the stains in the wool fabric, making removal of the stains in subsequent scouring more difficult. Additional dimensional stability, together with lustre and handle, are achieved later in the finishing sequence by a process known as decatizing.

Wool fibres, like all animal fibres, have surface scales that give rise to the so called differential frictional effect (DFE). DFE, in combination with other fibre properties, can lead to felting shrinkage in wool fabrics. Finishers can make use of this property in a process known as milling (or fulling) to achieve consolidation of the fabric, increased fabric weight, reduced air permeability, etc. On the other hand, felting shrinkage can be detrimental to the performance of wool fabrics and the finisher must shrink-resist the fabrics. Shrink-resist processes may be degradative or additive. Degradative processes use chemicals, e.g. sodium hypochlorite, to chemically etch away the scales and hence reduce the DFE. Additive processes use polymers to either mask the scales or spot-weld the individual wool fibres together.

Whilst dyeing is not normally considered to be a part of the finishing process; dyeing can have a great influence on fabric quality. Wool fabric dyeing can be carried out in rope form or in open width form. Dyeing in rope form can lead to a degree of milling (consolidation) and may even completely change the character of the fabric. On the other hand, dyeing in open width may lead to flat setting of the fabric.

Once all the wet finishing processes have been completed the fabric is dried. The first step in the drying sequence is the removal of liquid water from the fabric by mechanical means; usually by mangling or centrifuging. The second step is the removal of the remaining water by the application of heat energy; usually on a tenter (or stenter). The stenter controls the dimensions of the fabric during drying by holding the selvages of the fabric with tenter hooks or clamps.

After drying, the finisher will employ a sequence of dry finishing processes to develop the fabric characteristics required by the end user of the fabric. Such processes include shearing, pressing and decatizing.

24.2 Dimensional stability of wool fabrics

Introduction

Changes of dimensions during use, and the care-treatments of textile materials, particularly textile materials containing natural fibres, can be a major defect and is often the cause of unserviceability and consumer complaint.

The types of dimensional change that can occur when wool fabrics are treated during processing, or in use, can be placed into five general groups.

Changes of dimensions may be due to:

- (i) relaxation
- (ii) consolidation
- (iii) swelling
- (iv) felting, and
- (v) hygral expansion due to changes in moisture content.

Relaxation shrinkage

Relaxation shrinkage occurs when the stresses or strains imposed during the processing of the textile materials are relaxed in water or water plus soap or detergent, **without agitation**. Relaxation shrinkage is what might be called the first stage of shrinkage.

This form of shrinkage is common to all fibre types and fabric constructions and is **non reversible**.

Thus, there are special finishing processes to relieve these strains, e.g. tensionless drying of knitted goods and the crabbing process applied to worsted fabrics.

Consolidation shrinkage

The relaxation of residual strains in a fabric is frequently opposed by the many frictional constraints within the fabric brought about by fibre-fibre and yarn-yarn contacts within the fabric. Further shrinkage; called consolidation shrinkage; can be brought about by gentle agitation in addition to simple soaking. This process is **non reversible**.

In the case of knitted fabrics, consolidation shrinkage can occur with each washing. A bending of loops tends to occur due to the difference in twist at opposite sides of the loops. The strains are released upon washing and shrinkage occurs.

Swelling shrinkage

As can be seen from the data given in Table 24.1, when hydrophilic fibres absorb water the longitudinal swelling is negligible while the transverse swelling is appreciable. The transverse swelling can lead to dimensional changes known as swelling shrinkage. The problem is common to all hydrophilic fibres but is **reversible**.

Table 24.1 Swelling of Fibres on Wetting. Source: Pailthorpe, 2006.

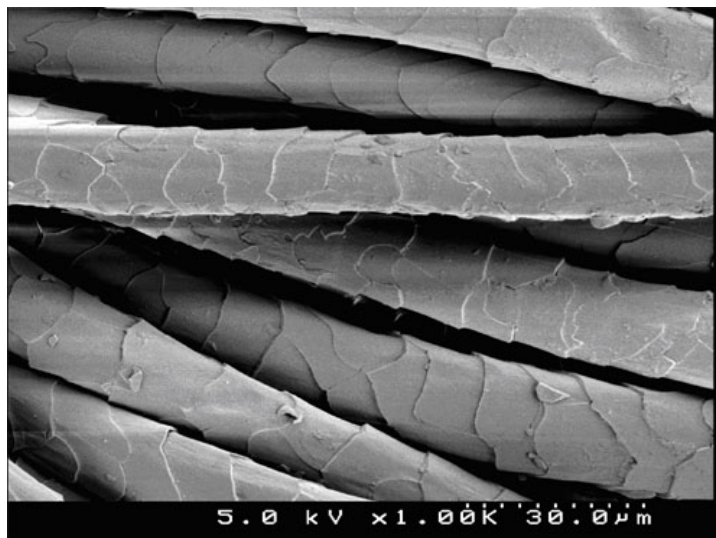
Fibre Type	% Length	% Diameter
Nylon	1.2	5
Cotton	1.2	14
Wool	1.2	16
Silk	1.7	18
Viscose	3.5	26

Felting shrinkage

When untreated wool in any form is treated in water with soap/detergent it will swell and consolidate. If, however, some mechanical action is applied, particularly in an acid medium, the fibres can mat together tending to give, in the end, a solid mass of fibres. The result is an irreversible shrinkage called felting shrinkage.

Wool fibres, like most animal fibres, have a series of overlapping scales on the fibre surface, as clearly shown in Figure 24.1. The scales point to the tip direction of the fibres, and the interlocking action of the scales, sometimes described as a ratchet-like action, causes the fibres to move preferentially in the direction of the root of the fibre.

Figure 24.1 Scanning Electron Microscope Image of Wool Fibres (1000 X).
 Photograph supplied by M. Pailthorpe, Canesis Network Ltd.



Felting shrinkage, once commenced, continues to progress as the washing time is increased but ultimately approaches a limit when the fabric has attained a limiting density characteristic of the particular washing process being used.

Factors contributing to felting shrinkage are:

- (i) Fibre friction (μ_A vs μ_W = Differential Frictional Effect)
- (ii) Fibre elasticity
- (iii) Fibre diameter
- (iv) Yarn linear density.
- (v) Yarn Twist
- (vi) Looseness of weave or knit
- (v) Finishes, e.g. chlorination and application of polymers in machine-washable wools

Hygral expansion

Hygral expansion is the change in dimensions that takes place in wool fabrics as a result of change in regain, and hence relative humidity. The dimensional changes caused by hygral expansion are reversible.

Measurement of shrinkage (dimensional stability)

There are many national and international standard methods in place for the determination of the dimensional stability of fabrics. For example, AS/NZS 2621:1998 "Textiles – Guide to the selection of care labelling instructions from AS/NZS 1957" specifies the following methods for the determination of shrinkage in laundering and dry cleaning processes:

AS 2001.5.4 – 1987 "Determination of dimensional stability of textile fabrics and garments – Automatic machine method" and AS 2001.5.7- 1986 "Determination of dimensional change on dry-cleaning in perchloroethylene excluding finishing – Machine method".

AS/NZS 2621: 1998 further specifies that:

- The dimensional change for laundering is inclusive of any change resulting from three laundering cycles followed by either line dry or tumble drying, and,
- The dimensional change for dry cleaning is inclusive of change resulting from three dry cleaning cycles.

The basic performance requirements for dimensional stability of textiles depends upon the end use. However; for most applications including apparel, industrial wear, furnishings, etc; AS/NZS 2621:1998 specifies that dimensional changes should be less than $\pm 3\%$ in both the length and width directions.

24.3 Flow charts

As can be seen from the above discussion, the wool finishing processes are based upon two principal areas, being wet finishing and dry finishing.

The wet finishing processes are not always carried out in the same order; but depend upon the type of wool fabric being processed and the nature of the required finish. Table 24.2 provides indicative finishing sequences for worsted, woollen and knitted fabrics.

Depending upon the finished fabric requirements some processes may be combined; e.g. scouring and milling. On the other hand, the finisher will either use milling to achieve consolidation via felting or use a shrink proofing treatment to prevent felting shrinkage.

Table 24.2 Examples of finishing sequences. Source: Pailthorpe, 2006.

Worsted	Woollens	Knitted
Inspection, burling & mending	Inspection, burling & mending	Inspection, burling & mending
Scouring	Scouring	Scouring
	Carbonizing (If necessary)	
Crabbing	Crabbing	Crabbing
	Milling	Milling
	Shrinkproofing	Shrinkproofing
Bleaching	Bleaching	Bleaching
Dyeing	Dyeing	Dyeing
Hydroextraction	Hydroextraction	Hydroextraction
Back-rolling	Back-rolling	Back-rolling
Scutching	Scutching	Scutching
Drying	Drying	Drying
Conditioning	Conditioning	Conditioning
	Raising	Raising
Shearing/Singeing	Shearing/Singeing	Shearing/Singeing
Pressing	Pressing	Pressing
Decatising	Decatising	Decatising
Steaming	Steaming	Steaming
Final Inspection	Final Inspection	Final Inspection

Inspection

The greige state fabric, after weaving or knitting, is inspected for various imperfections including yarn faults, weaving or knitting faults, knots, holes, stains, etc. If possible the faults are repaired, or marked for later identification. Knots are pulled to the back of the fabric, while small stains are removed with selected solvents and cleaning agents.

The term **mending** relates to the insertion of missed warp and weft yarn threads into a woven fabric and also to the correction of other faults by needlework, e.g. stitching. The term **burling** relates to the removal of imperfections.

Scouring

Depending upon the fabric type, and its dimensional stability, it may be necessary to pre-set the fabric before it can be processed in rope form in scouring and dyeing machines. Uncontrolled relaxation of worsted fabrics may cause severe distortion of the fabric during wet finishing, leading to cockling and running marks. For such a fabric, the fabric would be pre-set before scouring by crabbing or by decatising. However, pre-setting the greige fabric can set any stains in the fabric, making them very difficult to remove during scouring. One approach to solving this problem is to scour in open-width, followed by crabbing.

The aim of scouring is to remove the contaminants from the wool fabric and to relax the fabric. Depending upon the fabric type the spinning oil quantities present can vary from 1-2% (worsted) to 10% (woollens).

As a result of fibre migration during scouring, wool fibres migrate to the fabric surface, creating a softer handle. Furthermore, consolidation of the fabric during scouring causes an increase in the cover of the fabric.

Carbonising

The aim of carbonising is to remove vegetable matter impurities from the wool fabric. The vegetable matter may include burrs, seed and leaf matter from the shorn wool, and cellulosic fibres such as cotton and jute fibres.

Wools with high vegetable matter content are usually carbonised immediately after raw wool scouring. Thus woollen fabrics made from carbonised wools do not usually require fabric carbonising. If vegetable matter remains in the wool after combing, then it may be necessary to carbonise such worsted fabrics. According to Rouette and Kittan, it is common practice in the USA to carbonise worsted fabrics; but this is rarely done in Europe.

The carbonising process is based on the chemical differences between the protein of wool and the cellulose and lignins of the vegetable matter. Wool is relatively stable to high concentrations of acid while cellulose is readily hydrolysed by strong acids.

The wool fabric is first impregnated with a dilute solution of sulphuric acid (3-6%) containing a suitable wetting agent. The acidified fabric is passed through a carbonising oven in which the fabric is first dried (to evaporate the excess water and concentrate the acid) and then baked at 130-140°C. During baking the sulphuric acid converts the cellulose to dehydrocellulose, which is brittle and can be removed mechanically by crushing and beating.

Crabbing

Crabbing is a pre-setting process used to impart the required amount of permanent set in wool fabrics. The wool fabric is flattened and maintained under tension; and then treated in boiling water for 5-10 minutes. Finally, the wool fabric is cooled by passing the fabric through a cold water bath. The level of permanent set imparted to the fabric depends upon pH and treatment time and can vary from 40-85%. High levels of permanent set are required if the wool fabric is to be scoured and dyed in rope form.

Crabbing machines can be either batch or continuous type machines.

Milling (Fulling)

Milling is the finishing process that makes use of the natural propensity of wool fibres to migrate and become entangled within the yarn and fabric structures. Milling is also known as fulling. The scale structure of the wool fibres, combined with their elastic properties in aqueous media, favours preferential migration of the fibres towards their root ends. As a result, the fabric consolidates in both the warp and weft directions and becomes thicker; leading to a higher mass per unit area. Milling also achieves reduced air permeability, increased strength and a hiding of the weave structure (high cover).

Milling is achieved by intermittent mechanical action in the presence of a suitable aqueous liquor. Milling can be carried out under mildly alkaline conditions or under strongly acid conditions, using a suitable lubricant. Sodium soaps or synthetic detergents are used for alkaline milling whereas formic acid is commonly used for acid milling. Milling machines include stocks, rotary milling machines and combined scour/milling machines.

Shrink proofing

Whilst wool's natural propensity to felt and consolidate may be used to advantage in the milling process, for most other applications felting leads to undesirable shrinkage in wool fabrics. Shrink proofing is the finishing process that is used to minimise felting shrinkage in wool fabrics.

Shrink proofing treatments are commonly applied to wool in sliver form but may also be applied to wool in fabric form and to garments. The treatments may be divided into two main categories; being destructive and additive treatments.

Destructive treatments use selected chemicals, e.g. chlorination, to soften and round off the scales on the wool surface; whilst additive processes use polymers to either coat and mask the scales or spot weld the wool fibres together, or both.

Bleaching

Bleaching is a chemical process employed to destroy the natural creamy colourants in wool and produces a whiter wool. Bright white wool is required for certain market applications, e.g. baby's knitwear, and also for dyeing in pastel shades.

Bleaching may take place at the sliver, top, yarn or fabric stages of production. Hydrogen peroxide based bleaching recipes are commonly employed.

Dyeing

Piece dyeing of wool fabrics may be carried out either in rope form or in open width form. The dyeing of wool is an extensive topic and is covered in Lectures 4 and 5 in this topic.

Hydro-extraction

Hydro-extraction is the precursor to drying and relates to the removal of liquid water from textiles via either mechanical force (squeezing via pad mangle), centrifugal force (centrifuge) or suction. The efficient removal of liquid water from the wool fabrics greatly reduces the energy costs in drying.

Scutching

Scutching is the process employed in the textile industry to convert fabric from rope form to open width form. The twist in the fabric rope is detected electronically and the electronic signal is used to control an untwisting device which removes the twist from the rope. The now untwisted fabric rope then passes through opening rollers and guides to restore the fabric to the open-width form. The fabric may then be rolled up on beams or folded (cuttled) onto a mill trolley.

Back-rolling

When wool fabrics are scoured and dyed in rope form there is always the possibility of introducing creases or running marks in the fabric. Back-rolling, which is essentially crabbing (see above), is used to remove such running marks.

Drying

Drying is the process of removing water from the wool textiles via the application of heat energy. As is well known, the three methods of transferring heat energy from one object to another are conduction, convection and radiation; and all three methods are employed in the textile industry.

In conduction (drum) dryers the fabric is brought into contact with a series of large diameter heated cylinders. Whilst drum dryers are commonly used in the cotton industry, they have limited use in the drying of wool fabrics because of the risk of "glazing" the fabric surface that comes into contact with the hot metal surface.

Convection dryers employ hot air to dry the textile material. They are usually gas fired, and today the stenter would be the most commonly used, and most important, finishing machine. The stenter is fitted with two endless chain tracks that run the length of the stenter. The chains are fitted with pins (stenter hooks) or clips that hold the selvages of the fabric as it passes through the stenter.

oven. Thus the width of the fabric can be controlled by the separation of the chain tracks. The length dimensions of the fabric can be controlled by the relative difference in speeds of the feed rollers and the chain tracks. The wet wool fabric may be stretched by making the chains run faster than the feed rollers (underfeed); or allowed to shrink by making the feed rollers run faster than the chains (overfeed).

When wet wool is dried in this way the fabric becomes cohesively set. Cohesive set is quite temporary and is lost upon the next wetting out of the fabric. Cohesive set is dealt with in more detail in Lecture 2.

Conditioning

As a result of over drying in the stenter, the dried wool fabric may contain less than its normal regain moisture for the prevailing atmospheric conditions. For example, at 65% RH the moisture regain of wool is typically 14-16% and this level of moisture content is required to achieve good results in subsequent dry finishing processes such as raising, cropping, pressing and decatizing. Thus the dried fabric should be conditioned to normal regain before further processing takes place.

Wool fabric conditioning machines are based upon a number of principles including spraying water onto the fabric, passing moist air over the fabric and steaming the fabric (followed by cooling).

Raising (Brushing)

The aim of raising is to achieve desirable surface characteristics in the wool fabrics and to soften the handle. Raising is achieved using bristles (natural teazles) or bent metal wires to catch and lift fibres out of the plane of the fabric surface and make the fibres protrude as a pile or nap.

Since damp wool fibres are more pliable, and less fibre loss is suffered, the majority of wool fabrics are raised while damp. The typical wool regain employed would be 60-70% and lubricants may be also be used to reduce friction. Some fabrics may be pre-raised under damp conditions and then given a second raising after drying.

Examples of wool fabrics that are raised include blankets, fleecy fabrics and velours.

Shearing (Cropping)

Shearing, or cropping, uses a rapidly rotating cylinder containing 14-20 helical blades to cut the fibres projecting from the fabric surface to an even, or uniform, length. The helical blades are rotated in close proximity to a fixed, or ledger, blade creating a continuous scissor-like cutting action. The length of the cut fibres is determined by the distance between the shearing bed and the fixed blade. The shearing bed may be either solid or hollow, the former providing closer cropping.

Shearing faults are avoided by pushing the knots through to the back of the cloth and then first shearing the back of the cloth using a hollow shearing bed. Metal detectors are used to detect metal objects that may cause damage to the cutting heads. Modern machines may have two or more cutting heads so, for example, a three head machine can shear the back once and the face twice in a single pass.

Singeing

Singeing is a finishing process that uses a gas flame to burn away the surface wool fibres. Singeing is very common in the cotton industry because cotton fibres readily burn leaving almost no ash. Whilst wool fabrics are resistant to burning, it is possible to remove the protruding fibres using a high temperature gas flame.

Singeing cannot replace shearing because singed wool fabrics need to be scoured after singeing. Thus the high productivity of singeing can only be exploited on greige state fabrics. Another great advantage of singeing is that it removes fibres right down to the surface of the fabric structure.

Pressing

The objects of pressing are to improve the appearance and lustre of a wool fabric; and also to modify the handle by reducing the thickness of the fabric. Pressing produces a smooth, softer, handle. The effect is only temporary because pressing only imparts cohesive set to the fabric. Thus the effects of pressing are partially lost during steaming and completely lost when the fabric is wetted.

It is essential that the wool fabric to be pressed is at normal regain and is initially cool. Pressing then employs the combination high pressure and heat energy to achieve the desired result. The heat and regain moisture make the wool pliable, which allows the fabric to take up the configuration imposed upon it by the applied pressure.

There are essentially three types of pressing machines employed in the wool industry being the paper press, rotary press and belt press. These machines are discussed fully in Lecture 2.

Decatising

The aim of decatising is to stabilise the properties of the fabric developed in finishing; including the lustre and handle achieved in pressing. Decatising can also be used to improve the crease-resistance of wool fabrics.

In decatising, also known as blowing, the wool fabric is interleaved with a cotton, polyester/cotton or polyester fabric and rolled up onto a perforated decatising drum (or roller) under controlled tension. The fabric is steamed for up to ten minutes and then cooled down by drawing ambient air through the fabric roll. The piece is then reversed and steamed again in order to ensure that an even treatment is achieved along the length of the fabric piece.

There are several quite different types of decatising machines including batch decatising machines, continuous decatising machines, wet decatising machines and dry decatising machines (autoclave and lustre decatising machines). These machines will be dealt with in more detail in Lecture 3.

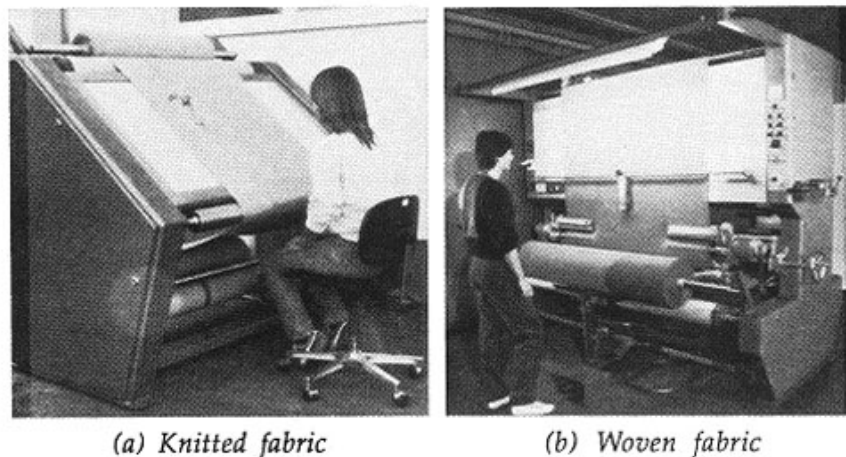
Steaming (Sponging)

As a final finishing process, steaming, also called sponging, is used to completely relax the fabric so as to achieve dimensional stability before sewing. London Shrinkage, a process in which the wool fabric was dampened with water and allowed to relax for 1-2 days, has been replaced by steaming machines. Steaming removes any tension put into the fabric during earlier finishing and hence reduces relaxation shrinkage.

Final Inspection

The final inspection of the fabric is carried out on a perch, so the process is known as perching. The fabric is run over an inclined or vertical translucent plate and illuminated from face and back, as shown in Figure 24.2. Serious faults are marked with “strings” or tags in the selvedge.

Figure 24.2 Perching machines. Photograph supplied by E. Wood, Canesis Network Ltd.



This is often the last quality control inspection. At final inspection, mending, spot cleaning, fault tagging, and downgrading are done as needed. Consistent standards of inspection, and between inspectors, must be maintained. Devices for measuring the length of rolls must be checked regularly, and inspection tables must be operated correctly so that fabric lengths, and hence invoicing, are correct.

Readings



The following readings are available on CD

1. oldandsold.com. An historical article on cloth finishing. Cloth finishing (originally published early 100s. Retrieved 20th August, 2006 from <http://www.oldandsold.com/articles04/textiles.22.shtml>.
2. DeBoos, A., 2001. Australian wool, competitive through innovation. CSIRO Textile and Fibre Technology. Geelong, Victoria. Assessed 15th May, 2002. Retrieved August 20th, 2006 from <http://www.tft.csiro.au>.
3. Novozymes A/S 2000-2005. The use of enzymes in the finishing of wool and silk fabrics. Retrieved August 20th, 2006 from <http://www.novozymes.com>.

Activities

Multi-Choice Questions

Useful Web Links

Assignment Questions



Available on WebCT



Submit answers via WebCT



Available on WebCT



Choose ONE question from ONE of the topics as your assignment. Short answer questions appear on WebCT. Submit your answer via WebCt

Summary



Summary Slides are available on CD

The object of wool fabric finishing is to convert greige state fabrics into fabrics that have the properties desired and expected by the consumer. Wool fabric finishing processes are divided into two groups, being wet finishing and dry finishing.

The wet finishing processes include scouring, crabbing, milling, shrinkproofing, bleaching and dyeing, all being aqueous based technologies. After wet finishing the fabric is hydroextracted and dried. The dry fabric is then processed through the dry finishing processes of conditioning, raising, shearing, pressing, decatizing and steaming.

Finally the finished fabric is inspected for faults on a perch, with the faults marked at the selvedge using strings or tags. The delivery contract between the manufacturer and the customer will specify the allowable number of faults per 100 metres. Faults in excess of the allowed number will suffer a penalty, e.g. one extra metre of fabric per fault.

References

- Brady, P.R., 1997, CSIRO Wool Technology, A Guide to the Theory and Practice of Finishing Woven Wool Fabrics, Ed. P. R. Brady, 1997, ISBN 0 643 06525 0.
- Connell, D.L., 2003, Chapter 11 – Wool Finishes: The Control of Shrinkage, in Textile Finishing, Ed. D. Heywood, Society of Dyers and Colourists, Hampshire, UK, ISBN 0 901956 81 3.
- Rouette, H-K. and Kittan, G., 1991, Wool Fabric Finishing, Wool Development International, ISBN 0 9517154 1 0.
- Textile Terms and Definitions, 10th Edition, 1995, The Textile Institute, ISBN 1 870812 77 8.

Glossary of terms

Back-rolling	The removal of creases and running marks from rope dyed fabrics.
Bleaching	The application of selected chemicals to increase the whiteness of wool fabrics.
Blowing	An alternative term for decatizing.
Brushing	An alternative term for raising.
Burling	The removal of imperfections.
Carbonising	The removal of vegetable matter from the wool fabric.
Conditioning	The application of moisture to dried wool fabrics to achieve a regain of 14-16%.
Crabbing	A pre-setting process used to impart the required amount of flat set in wool fabrics.
Cropping	An alternative term for shearing.
Decatizing	A setting process used to stabilise the properties of wool fabrics developed during finishing.
Drying	The removal of adsorbed water from wool fabrics by the application of heat energy.
Dyeing	The application of coloured compounds to wool fabrics.
Fulling	An alternative term for milling.
Hydroextraction	The application of mechanical force, or centrifugal force, or suction, to remove liquid water from wool fabrics.
London Shrinkage	A process in which the wool fabric is dampened with water and allowed to relax for 1-2 days.
Mending	The insertion of yarn into a woven fabric where the warp or weft is missing and also the correction of other faults by means of needlework.
Milling	The application of mechanical action to cause the required amount of fibre migration in wool fabrics.
Perching	An inspection process used to identify faults in the finished fabric.
Pressing	The application of force to improve the appearance and lustre of wool fabrics.
Raising	A mechanical process used to create a pile on the fabric surface.
Scouring	The removal of contaminants from the fabric by a washing process.
Scutching	A process used to convert fabric in rope form to fabric in open width form.
Shearing	The cutting of raised fibres to the desired height.
Shrinkproofing	The application of chemical and/or polymer treatments to wool fabrics to prevent felting shrinkage.
Singeing	The use of a high temperature flame to remove surface fibres from wool fabrics.

