## **TEXTILES FINISHING**



#### INTRODUCTION

- Dyeing and printing is not the ultimate steps
- Something is required to make the fabric more suitable for end-use
- Quality of the fabric in terms of appearance, handle, functionally enhanced by some physical means or by chemicals
- Therefore, ultimate value addition is done to the fabric by finishing

## What is finishing ??????

- Finishing is a final process given to textile material to
  - Give a good appearance
    - Crease Free
  - Desirable feel
    - Stiffness
    - Softness
  - Impart certain durable properties
    - Durability in wash and wear
  - To impart some desired functional properties
    - Water Repellence
    - Fire Proofing.

#### **Classification of finishing**

Classification according to degree of permanence



#### Definitions

- Temporary finish: Are removed or substantially diminished the first time the article is laundered or drycleaned
- **Permanent Finish:** Usually involve a chemical change in fibre structure and do not change or alter through out the life of the fabric
- **Durable finish:** Usually last through the life of the article, but effectiveness becomes diminished after each cleaning; and near the end of the normal use life of the article, the finish is nearly removed
- Semi-durable finish: Last through several laundering or dry-cleanings and many are renewable in home laundering or dry-cleaning

• Physical or Mechanical Finish

Such finishes involve specific physical treatment to a fabric surface to cause a change in the fabric appearance, Also known as dry finish

• In Chemical Finish

In such finishes chemicals are used followed by curing or drying, Also known as wet finish

• Aesthetic Finish

These finishes modify the appearance and / or hand or drape of fabrics

• Functional Finish

These finishes improve the performance properties of fabrics

#### **Classification of finishing**

Classification according to performance



According to the nature of Finish

#### ✓ Physical or Mechanical Finish

- 1) Shrinkage Control (Over feeding-Sanforizing-Rigmel- Confined Passage)
- 2) Calendering
- 3) Raising/Emerizing/Napping/Sueding
- 4) Shearing
- 5) Softening
- 6) Corduroy Cutting

- 1. Mercerization
- 2. Water Proof/Repellant
- 3. Easy care/Crease resistant/Durable Press finish
- 4. Flame Resistant
- 5. Soil Release
- 6. Softening
- 7. Stiffening
- 8. Antistatic
- 9. Fulling
- 10. Plisse
- 11. SeerSucker
- 12. Antimicrobial/Antiseptic
- 13. Garment washing

#### Raising (Napping)

- The mechanical finish in which fibres being raised from woven/knitted fabrics by rotating teasels, wire covered brushes. The fibres plugged on the fabric surface in the piled form.
- Overall effect is a raised fibres from fabric surface with softer hand feel, better insulation properties due to more air trap.



- Effects on fabric properties:
  - Soft feel and fuller appearance
  - More absorbent
  - Warmth feel
  - Increase dye ability
  - Subdued weave and intermixing of color in printing
  - Decrease in strength
  - Subject to pilling due rapid rubbing at abrasive points (like sleeve ends, elbows, button holes etc.)
- Mainly used as blankets, winter clothing, further examples are cotton flannel, rayon flannel, woolen and worsted napped fabric.

- Raising Stages:
  - Gray fabric: Its not recommended due proceedings process of pretreatment.
  - Before dyeing: possibility of shade variation
  - After dyeing & printing: (In practice) shade become light after fabric surface damage.
  - After finishing: Disadvantage of shade variation.
    However, if the all other parameter in controlled than high quality raising can achieved.

- Requirements for Raising
  - Fabric should be soft, as hard fabric can damage the wire that can become a cause of unnecessary breakage and poor quality raising.
  - Fabric should be moist for softness purpose.
  - Fabric should be crease free to avoid incomplete surface raising.
  - Single action raising
  - Double action raising

#### **Raising (napping) machine**

1: Roller; 2: Rollers equipped with hooks; 3: Fabric;4: Nib cleaning brushes;5: Fabric tension adjustment



Raising (single action)



Raising the face and back of the fabric

#### Emerizing, Peaching, Microsanding, Sueding

- It is a mechanical finish similar to raising and produces a slight soft surface fabric
- High quality "Sand paper" like material is used instead of wire covered rotating cylinder.
- Increase the number of emery paper, higher the grade of emerizing
- Fine the emery paper and finer will be the quality of emerizing effect.
- Washing with addition of a softener before emerizing process.

#### Peaching Machine





#### **Shearing**

- A process to used to cut off surface fibers on fabrics
- Uniforms the surface of napped fabrics to provide uniform pile height
- High-speed cutting machine cuts the piles similar to that of a lawn mower
- The blades in the machine are stationary and the fabric moves through the cutting blade

#### **Fabric Shearing Machine**



#### **Shrinkage Control** (Dimension Stabilization)

#### **COMPACTING - SHRINKPROOFING**

- Shrinkage means reduction in length or width of fabric. Residual shrinkage is shrinkage ability of fabric after initial shrinkage.
- Controlled residual shrinkage is an important quality parameter for many fabrics. For example, excessive shrinkage is undesirable for fabrics to be made into garments.
- Here, the residual shrinkage should be less than 2% otherwise the garment will not fit after it is laundered.

#### Why Fabrics Shrink ???

- 1. Stretching/Tension.
- 2. Swelling of fibres

**Factors effecting:** 

- Count/Yarn Thickness
- Fibre Type
- Fabric Construction
- Laundering/Process temperature
- Twist:
- Low twist, low shrinkage
- No twist, no shrinkage
- High twist, high shrinkage
- Warp shrinkage is more because of?



#### **Shrink Controlling Method**

- **1. Conventional Methods**
- By washing 2-3 times and relax dry
- By wetting overnight and relax dry
- 2. Compressive Method
- Over feeding then Heat Set (Stenter)
- Sanforizing
- Rigmel
- Confined Passage
- 3. Chemical treatment

## **Over feeding-Heat Setting**

- Stenter machine is used for this purpose, Fabric is over feeded, heated and then cool done in relax conditions.
- 1. By swelling
  - Saturated steaming
  - Dry steaming
  - Super heated steaming
- 2. With out swelling
  - Hot air
  - Infrared radiation
  - Contact of heated roller



### Sanforizer

 The term Sanforized, is their registered trademark and is used to market fabrics that meet certain shrinkage specifications. The term Sanforized is now generally accepted to mean a fabric that has low residual shrinkage and the term Sanforizing is used to describe shrink proofing processes.



### **Sanforizing Process**

 The process, consists of arrange where the fabric is first moistened with steam, to make it more pliable, run through a short tenter frame (pup tenter) to straighten and smooth out wrinkles, through the compressive shrinkage head and then through a Palmer drying unit to set the fabric.



(1). Let-off (2). Steamer (3). Pup Tenter (4) Sanforizer Head (5). Palmer Unit (6). Fabric Straightener (7). Take-up

## **Compactor head**

- Mechanical compacting is one method of reducing residual shrinkage. The process forces yarns closer together and the fabric becomes thicker and heavier. As a result of this, the net yardage yield is reduced.
- The key to any compactor is the head where force is applied to move parallel yarns closer together. More fabric must be fed in than is taken off.

### **Compactor head**

 A Sanforizer uses a thick rubber blanket running against a steam heated cylinder as the compacting force. The thick rubber blanket first goes over a smaller diameter roll which stretches the convex surface of the blanket.



#### **Rigmel Method of Compressive Shrinkage**

Since the fabric is not elastic, an extra length of fabric is pushed between the rubber blanket and the heated cylinder. Friction between the rubber blanket and steel drum force adjacent yarns to move closer together until the unit length of fabric become equal to the unit length of rubber blanket it rests on. The blanket is cooled by spraying water on it after the fabric exits from the unit.



#### **Chemical treatment of Shrinkage Control**

- Resin application up to 3%
- Temperature 160-180 Dg cc
- That will form an elastic layer on fabric surface that will not allowed fabric to shrink.

#### Laundering Shrinkage of some fabric

- Normal dressing 4-7%
- **White uniforms** 6-8%
- Overalls/coats 6-12%
- Semi Stiff collar 6-8%
- Popplin Shirts 3-7%
- Furnishing cloth 6-16%

#### **Advantages of Shrinkage Control**

- Cloth become slightly thicker and fuller
- Slight less luster
- Limited shrinkage/Controlled residual shrinkage 1-2%

## **Softening**

- Required for more pleasant hand and better drapability
- Fabrics are harsher and stiffer because of their construction or due to some prior finishing process
- Softening can be done by either mechanical or chemical process
- Simple calendering produce softens handle, but it is temporary

# Calendering

## **Objects of Calendering**

- To improve the fabric smooth hand feel and appearance
- To impart a smooth silky touch and spun silk effect
- To compress the fabric and reduce its thickness
- To reduce the air permeability by closing the threads
- To increase the luster
- Surface patterning by embossing

#### CALENDERING

- Calendering is a process where fabric is compressed by passing it between two or more rollers under controlled conditions of time, temperature and pressure and used to produces different types of surface appearance
  - 1. Simple or Universal calendering
  - 2. Glazed or friction calendering
  - 3. Embossed calendering
  - 4. Schreiner calendering
  - 5. Moiré calendering



#### **1. Universal Calendering**

- Its high speed, high pressure pressing of fabric (100 yds / min)
- The high pressure flattens the yarn
  - Smoothen the fabric
  - Increases fabric lustre (fabric cover increases and more light is reflected)
- Over-calendering however is to be avoided

- Yarns weakened out due to very high pressure

- It is a temporary finish
  - Yarns return to its natural cross section after first laundering

#### **UNIVERSAL CALENDERING**





#### **2. GLAZED CALENDERING**

- It is a calendering finish to produce highly glazed / shined polished cotton
- The machine used is a friction calender
  - One cylinder of highly polished steel cylinder rotating at speed much higher than the fabric passing through it

#### FRICTION CALENDER





#### **2. GLAZED CALENDERING**

- Fabrics are first treated with starches or resins before calendering
  - The spaces between the yarns are thus filled up and glazed appearance is obtained
- Glazed calendering using starch are semi-durable
- Glazed calendering using resins are durable

 Glazing is a textile finish that adds luster and smoothness to the surface of the fabric. Many glazed fabrics are plain-woven cotton. A specialized calender (set of metal rollers) called a friction calender, literally rubs the fabric lustrous.
 Glazed chintz and polished cotton are examples of glazed fabrics.



## **3. Embossed calendering**

- It is a calendering in which a threedimensional design is created on a fabric
- This is done on a special embossing calender in which the roller cylinder is engraved with the embossing design
- The pattern is then pushed or shaped into the cloth when the fabric passes between the rollers
- Some embossed fabrics are made to copy more costly woven jacquard or dobby designs





 Embossed patterns of fabrics treated with resins and cured after embossing are durable

 Embossing of fabrics of thermoplastic fibres are permanent because the heated metal roll heat-sets the design







#### **4. Schreiner calendering**

- Schreiner calendering produces a low, soft-key lustre on the fabric surface
- Distinct from the high glaze of the glazing calender or the lustre shine of the simple calender
- To produce this effect, one of the steel cylinders of the <u>calender is embossed with fine diagonal lines</u>. These embossing are visible with naked eye



#### **4. Schreiner calendering**

- Widely used on cotton & cotton/polyester sateen
- Schreiner calendering finish
  - permanent if the fibre is thermoplastic
  - durable if the fabric is resin treated but not cured





#### 5. Moiré calendering

• The moiré finish produces a wood-grain design on the face size of the fabric





#### Methods of producing moiré

- Using engraved cylinder
  - In this case engraved roller is used on the calender roller
- Using smooth calender rollers
  - Two fabrics, each face to face, are fed through the calender



- Moiré finish can be temporary, durable or permanent
  - Cotton or rayon moiré finish is temporary without pretreatment with resin
  - Durable moiré finish requires initial resin treatment followed by calendering
  - Moiré finish on thermoplastic fiber fabrics are permanent if a heated roller is used for calendering



