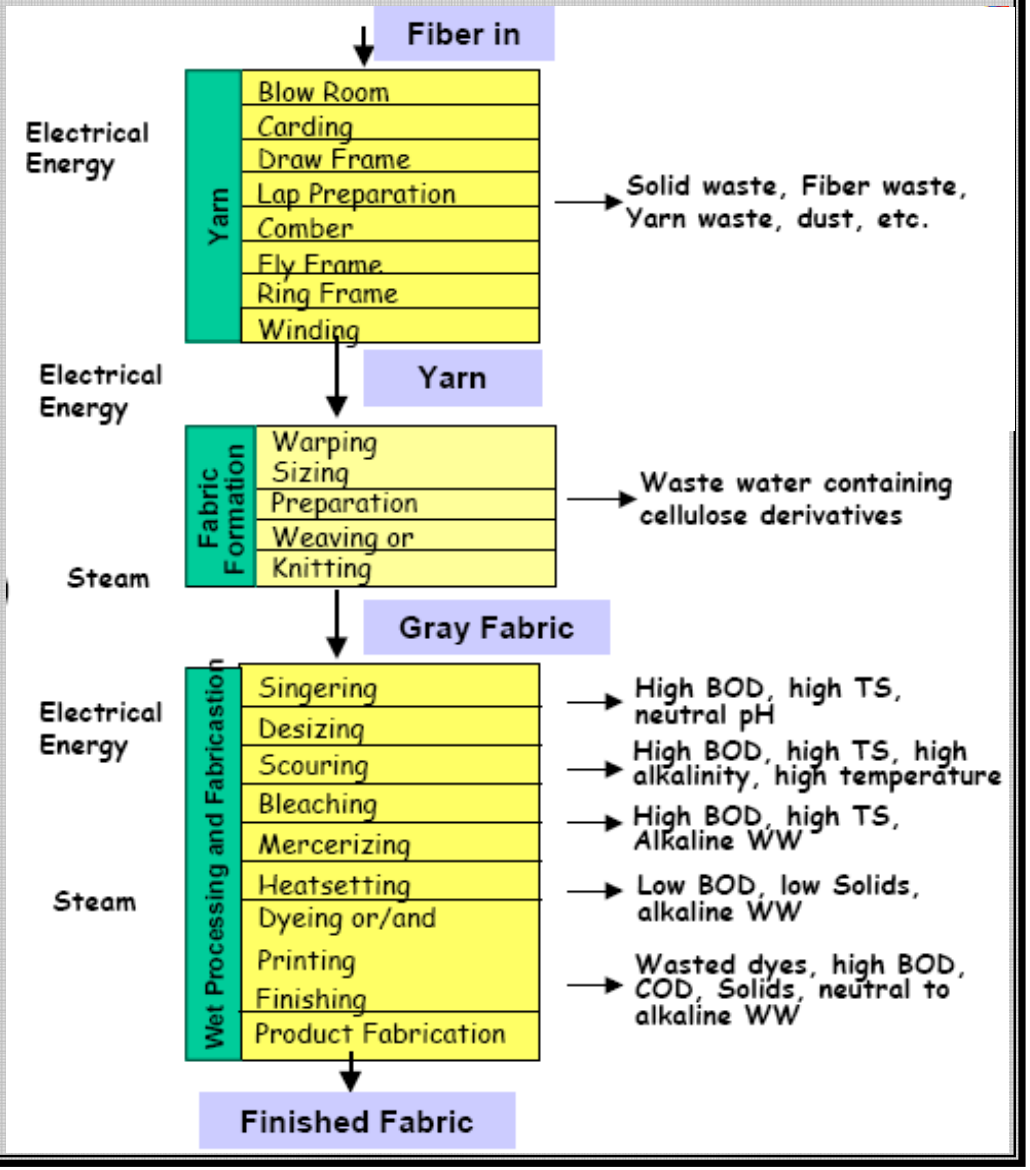
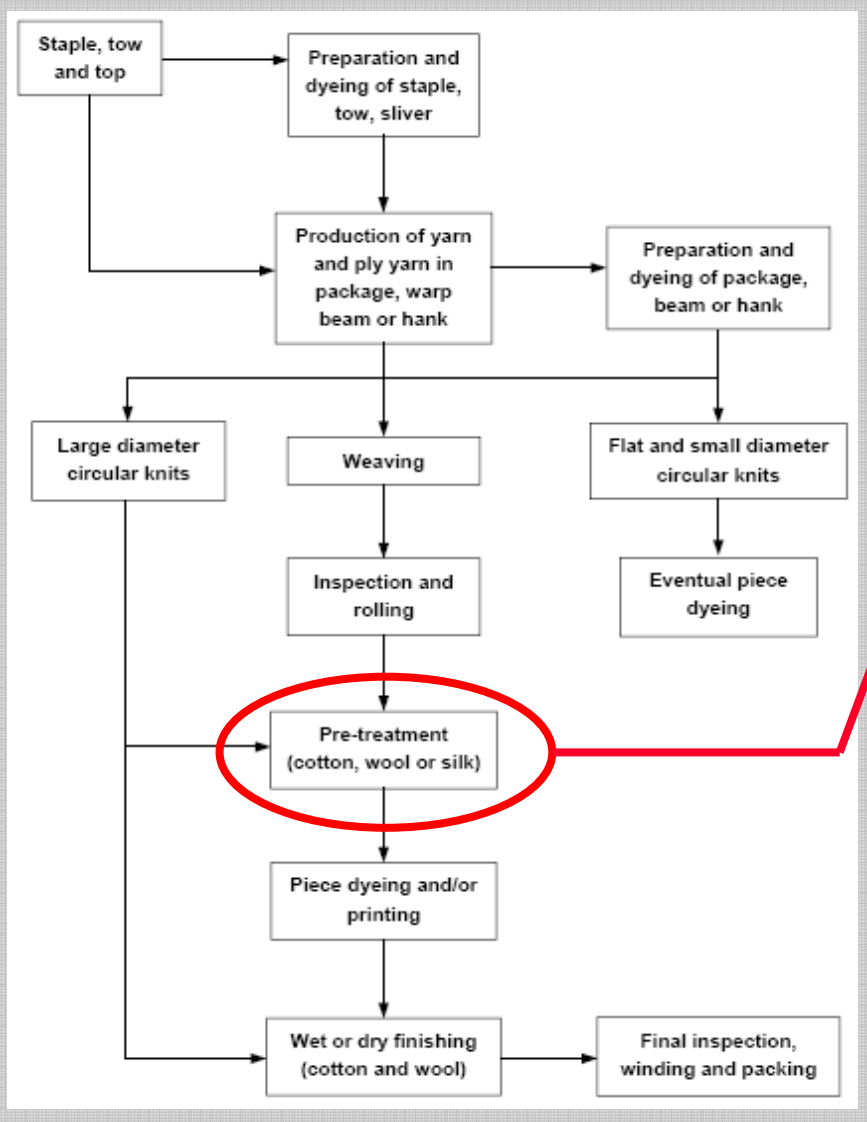
Introduction in pretreatment of textiles

TEXTILE PROCESSING

- **Yarn formation** (fiber production, spinning)
- **Fabric formation** (weaving, knitting)
- **Wet processing** (dyeing, printing, finishing) and fabrication (garment)



TEXTILE FINISHING STAGE

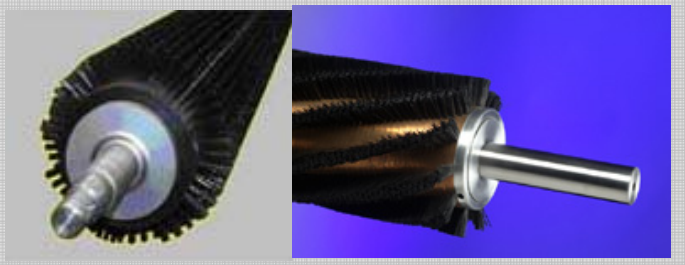


Pretreatment is important !!!

70% of problems during dyeing and finishing is caused by pretreatment.

PREPARATION BEFORE CHEMICAL PROCESSES

- **Inspection**
- **Sewing**
- **Mechanical Cleaning of Fabrics**



  - Brushing

(The purpose of brushing is to remove the short and loose fibers from the surface of the cloth. Brushing is mainly done to fabrics of staple fiber content. Brushing before cropping minimize pilling.)

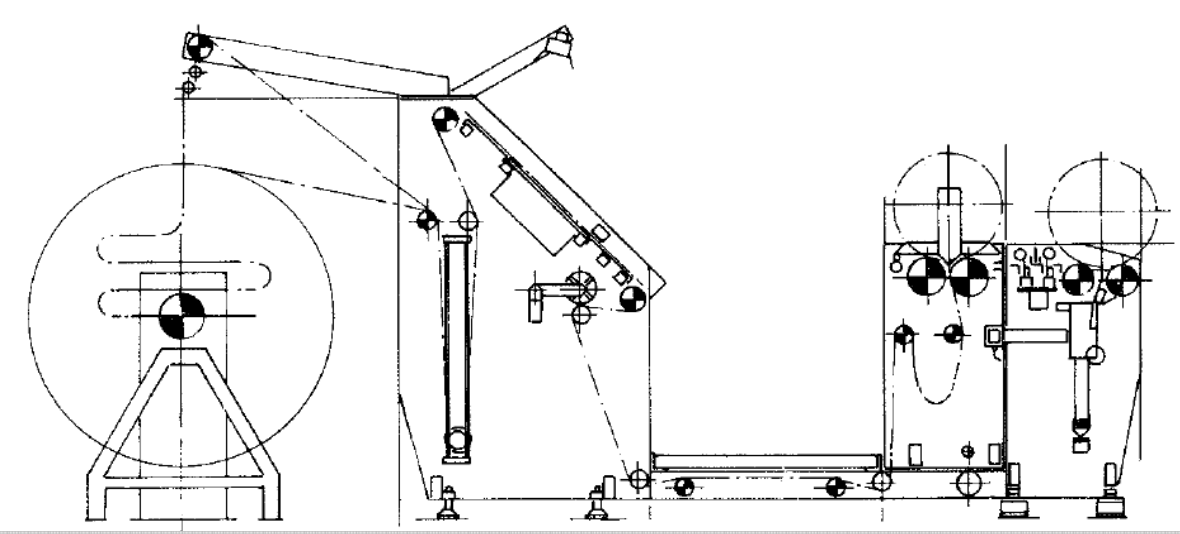
  - Cropping and shearing

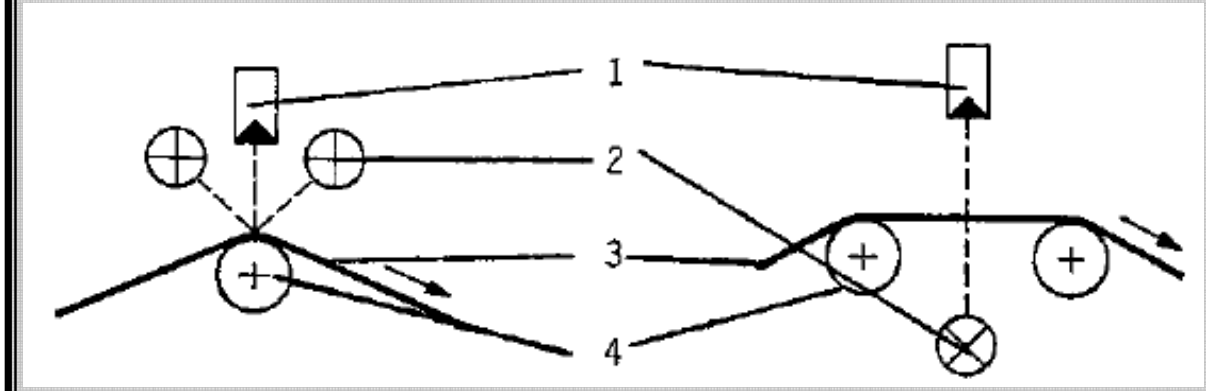
(Shearing is an operation consists of cutting the loose strands of fibers from either surface of a fabric with a sharp edged razor or scissors.)

- **Singeing**

(The aim of singeing is to bum-off the protruding fibers and hairs from the fabric surface. The spinning process produces hairiness of the yam and lower the yarn counts (Ne 26/1 - 36/1) greater is the degree of hairiness.)

INSPECTION





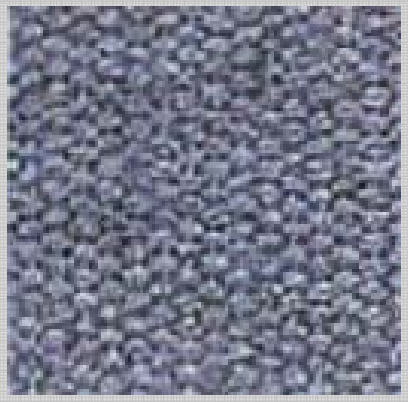
Manual systems:

-visual detection of faults

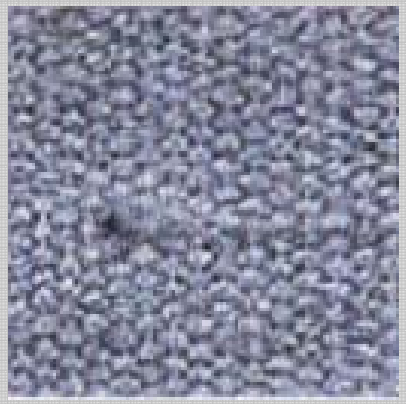
Automatic systems:

– laser scanner
(telecentric and divergent)
– light scanner
– CCD camera systems.

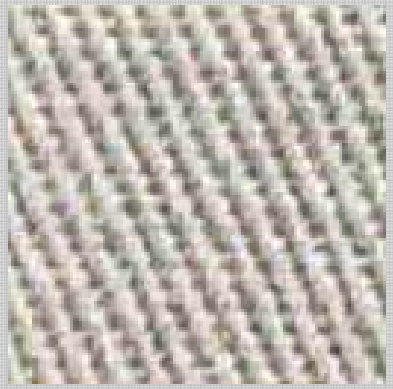
EVALUATION OF DEFECT



Normal fabric



Knot with Halos



Normal fabric

Fabric with knot

Mispick

Oil stain

SINGEING I

The aim : a smooth and fiber-free surface

The smooth surface obtained exhibits the following improved properties in the textile fabric:

– clearer visualization of the particular textile fabric,

– reduced soiling with subsequent processing,

– more stable fabric appearance in the dyeing with plain colors due to reduced diffuse light reflection,

– sharp contours to the printed pattern with print fabrics,

– anti-pilling finish obtained, especially with fabrics made of polyester or cotton/polyester.

SINGEING II

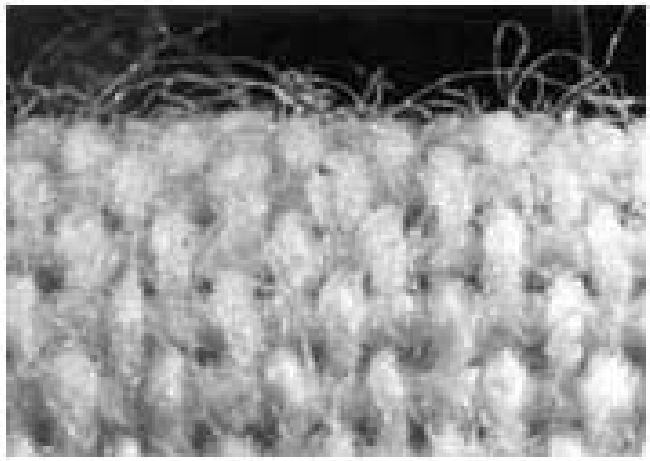


Fig. 1a. Fabric before singeing

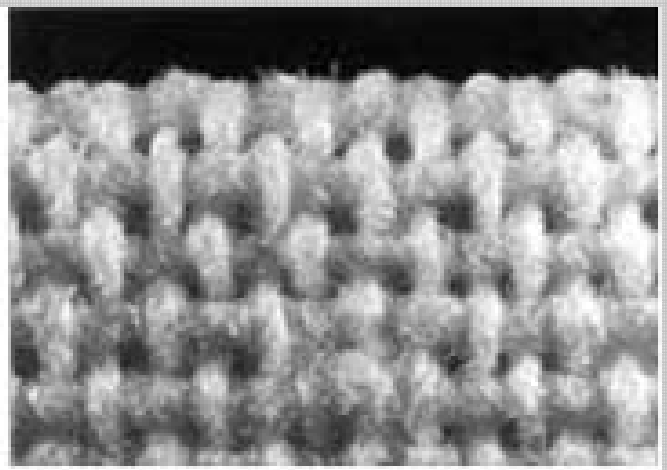


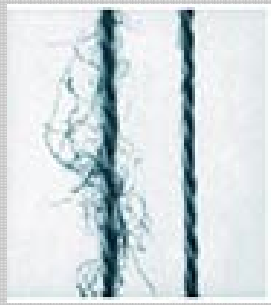
Fig. 1b. Fabric after singeing

(Pic. by Osthoff-Senge)

A distinction is made between direct and indirect processes:

Direct

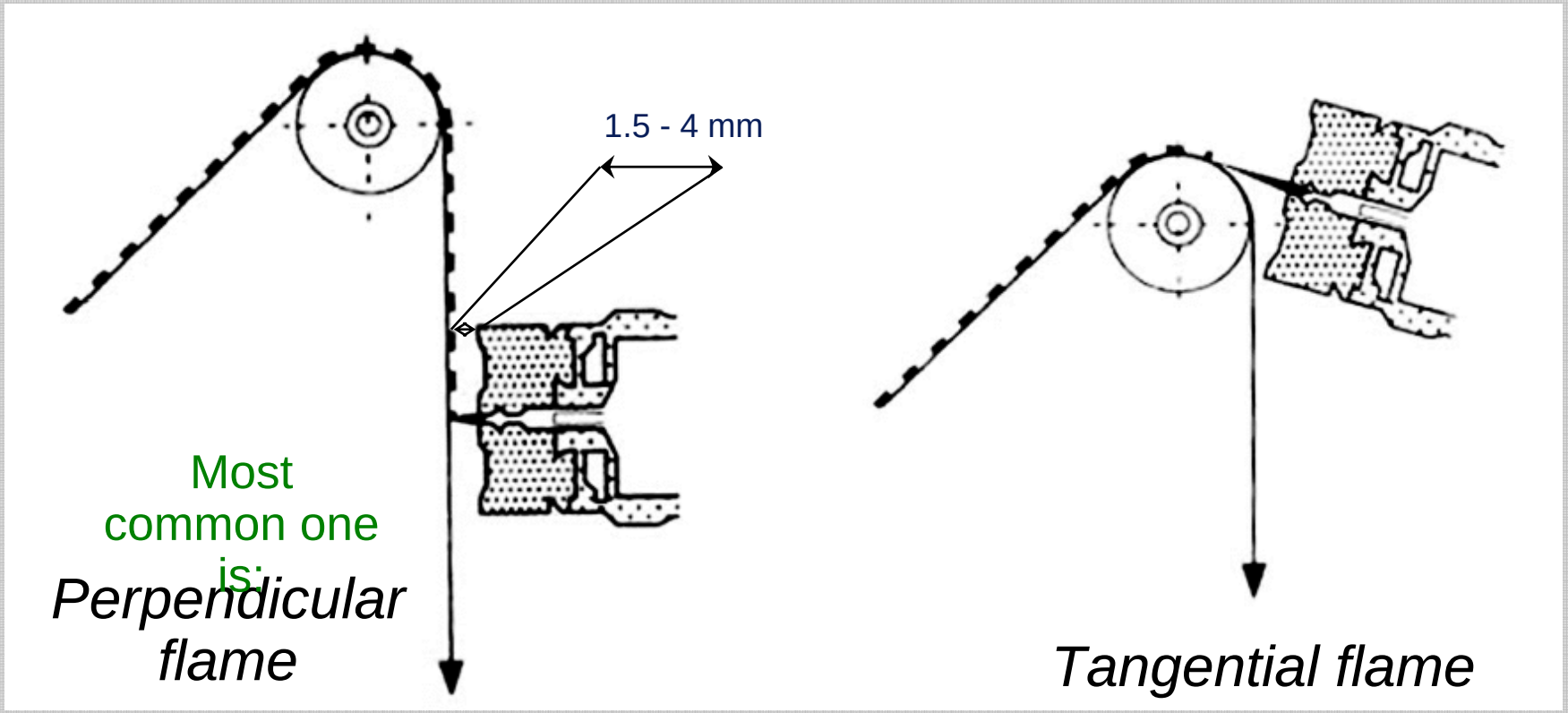
Indirect



Singeing is a process of burning protruding fibres from a textile structure.

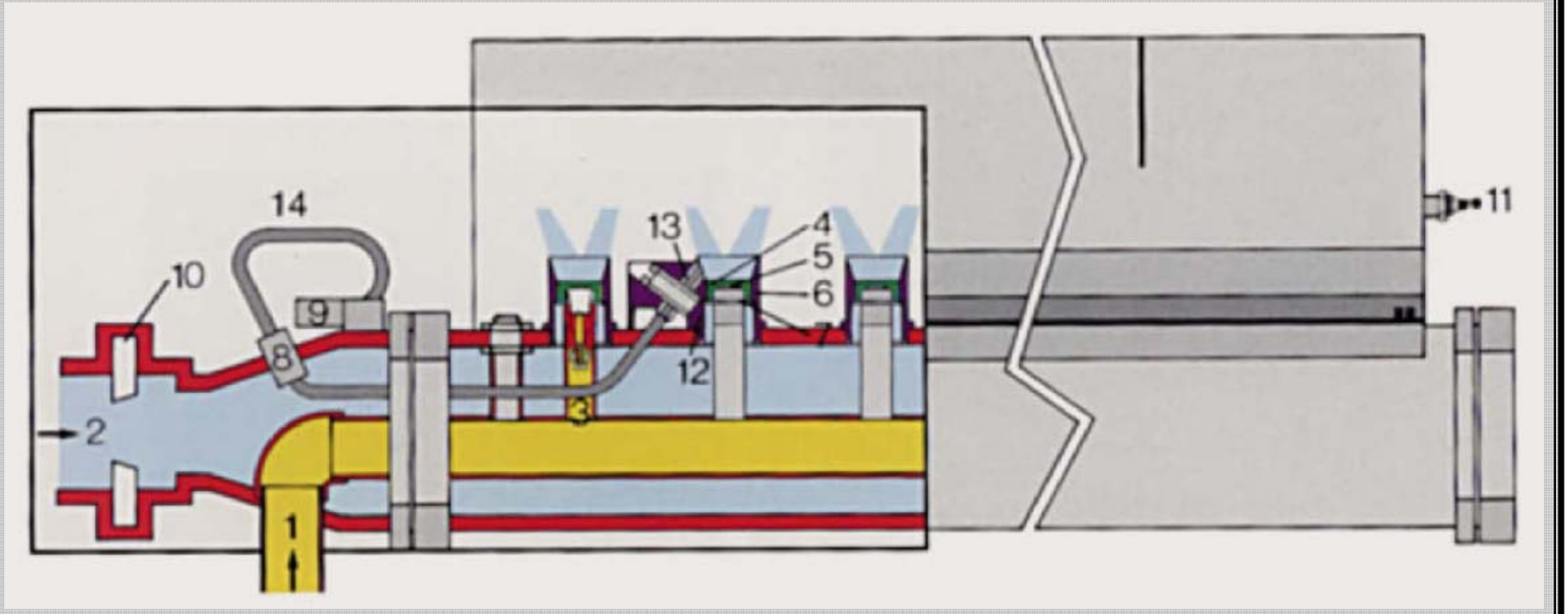
DIRECT SINGEING I

- With this treatment fuzz and fiber ends are burnt off in order highlight the fabric weave.



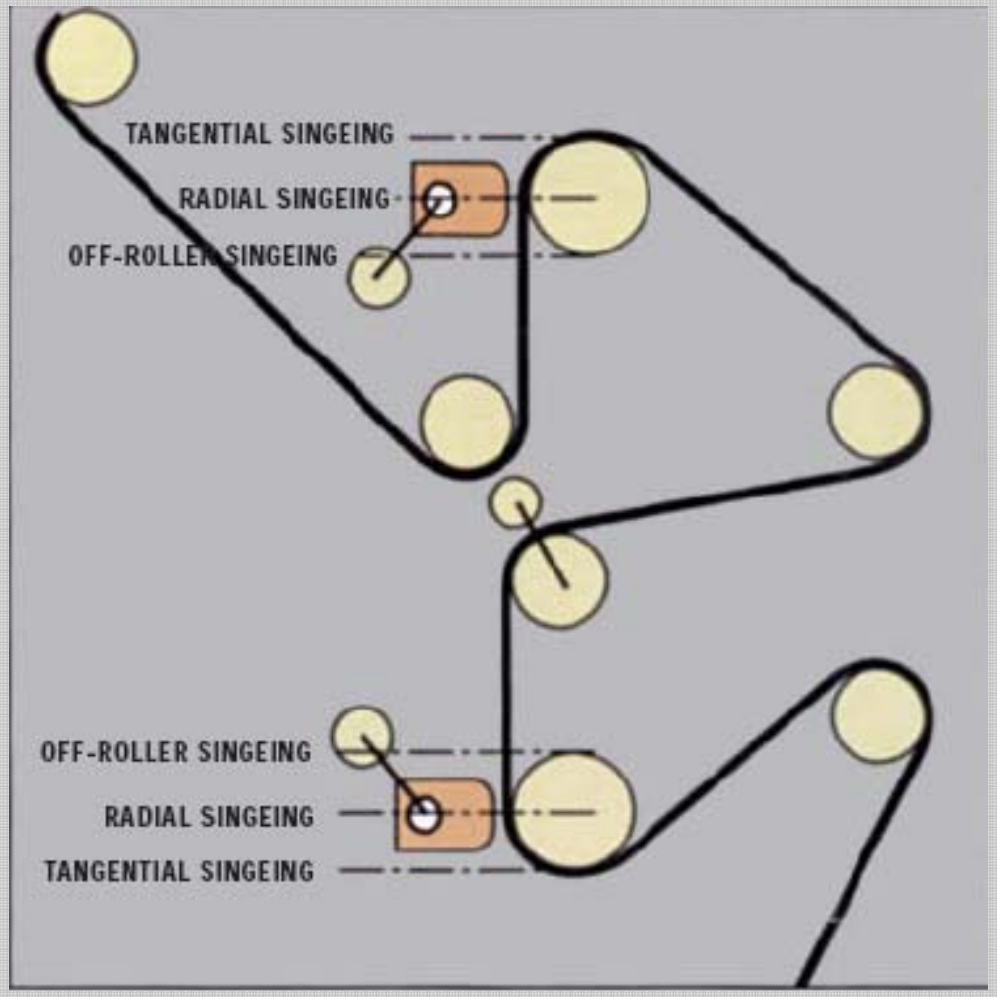
Fabric speed can range from 50 to 200 meters per minute

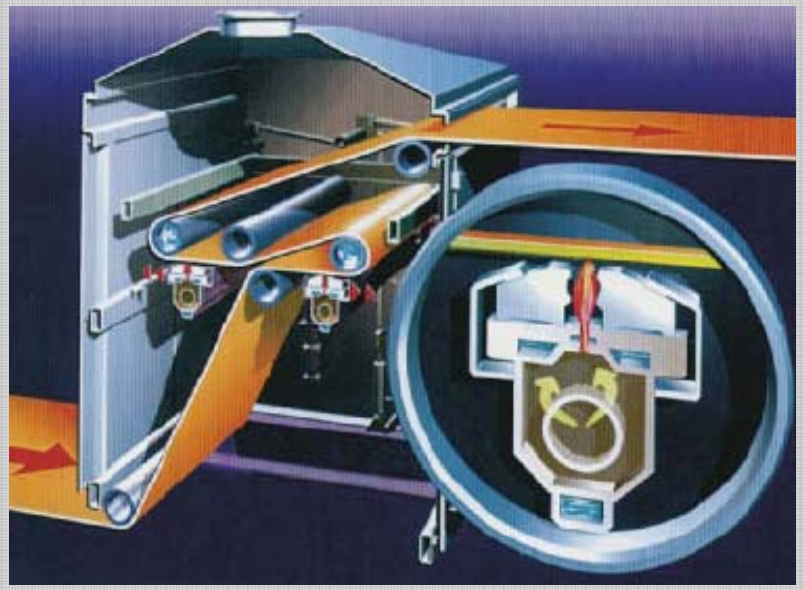
DIRECT SINGEING II



1 = gas; 2 = combustion air; 3 = calibrated opening; 4 = premix zone; 5 = open jet gas injector; 6 = observation port;7 = turbulence ring; 8 = special glass fiber exit via stuffing box; 9 = signal converter (converting the optical into an electrical signal);
10 = pin diaphragm for limiting combustion air quantity; 11 = ignition plug; 12 = plug-in connection for ultra-violet flame detector; 13 = special glass fiber entry side; 14 = special ultra-violet glass fibers.

DIRECT SINGEING III



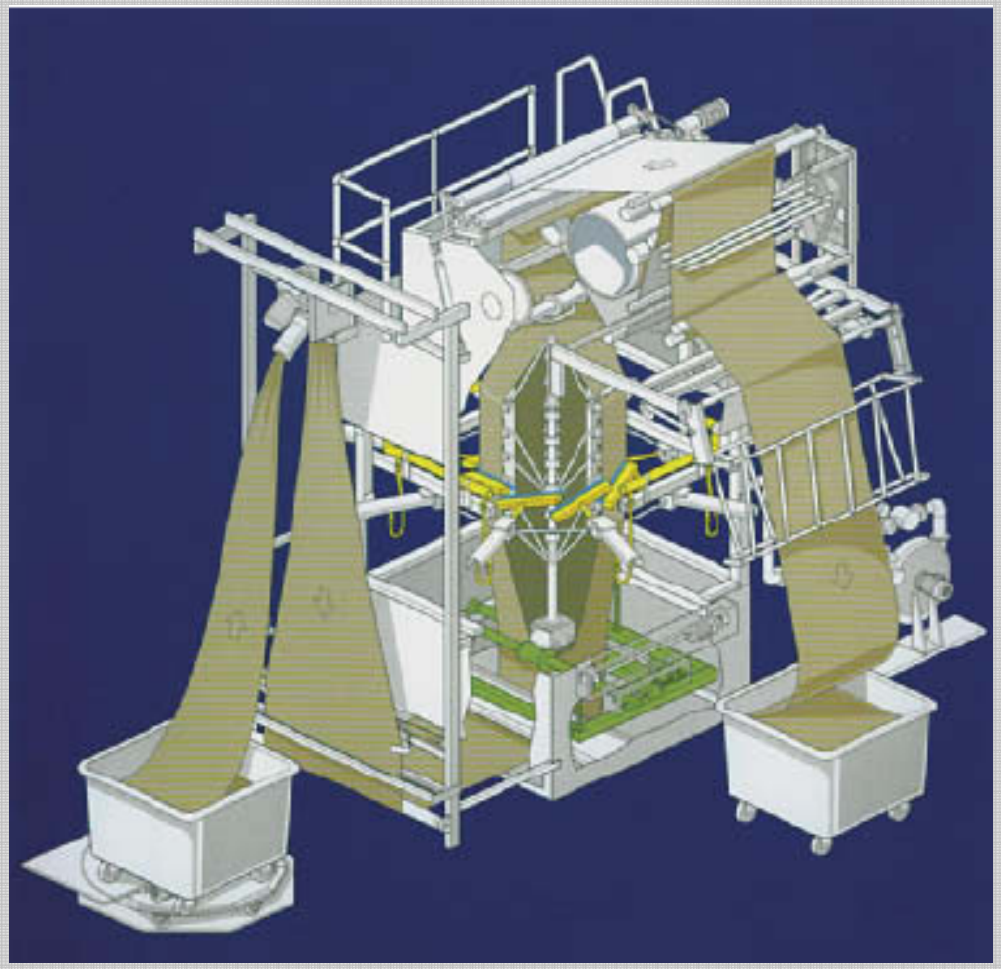


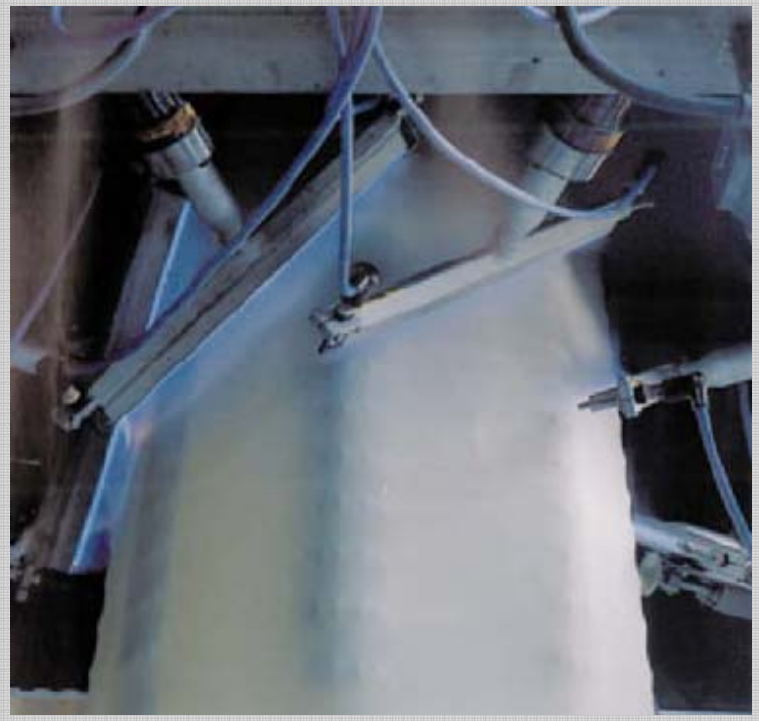
Singeing unit (Küsters)

The singeing machine is preferably used for cord

DIRECT SINGEING IV

- **Singeing machine for tubular knit goods**





Dornier singeing machine, type EcoSinge

Common problems in GAS singeing and their causes I

A. Incomplete Singeing

- Too low flame intensity
- Too fast fabric speed
- Too far distance between the fabric and the burner
- Inappropriate (i.e. less severe) singeing position
- Too much moisture in the fabric incoming for singeing.

  If the fabric incoming for singeing has too much moisture in it, a significant amount of thermal energy will be used up in evaporating the fabric moisture rather than burning the protruding fibres, resulting in incomplete singeing.

B. Uneven Singeing Across the Fabric Width

- Non-uniform moisture content across the fabric width
- Non-uniform flame intensity (uneven flame height) across the fabric width
- Uneven distance between the burner and the fabric

  This may be due to misalignment or improper setting of the guide rollers
- Uneven smoke evacuation over the burners

Common problems in GAS singeing and their causes II

C. Uneven Singeing Along the Fabric Length

- Non-uniform moisture content along the fabric length
- Non-uniform flame intensity along the fabric length
- Change in fabric speed during singeing
- Change in the distance between the fabric and the burner along the length

D. Horizontal Singeing Stripes

- Rollers with an un-centered rolling action Sudden fabric tension increase

E. Vertical Singeing Stripes

- Total or partial blockage of flame outlet

Common problems in GAS singeing and their causes III

F. Over-singing or Thermal Damage of the Fabric

- Too high flame intensity
- Too slow fabric speed or too long contact time between fabric and flame
- Too close distance between the fabric and the burner or too deep penetration of the singeing flame into the fabric
- Inappropriate singeing position

G. Formation of Small Beads of Molten Material

- Insufficient energy supply, when the thermal energy is not supplied quickly enough to be able to ignite the thermoplastic fiber rather than melting it.

INDIRECT SINGEIN