

TAPPI Tissue 201

Forming Fabric Options and Benefits

Presented by:

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15 Billion Gallons



500,000 Miles

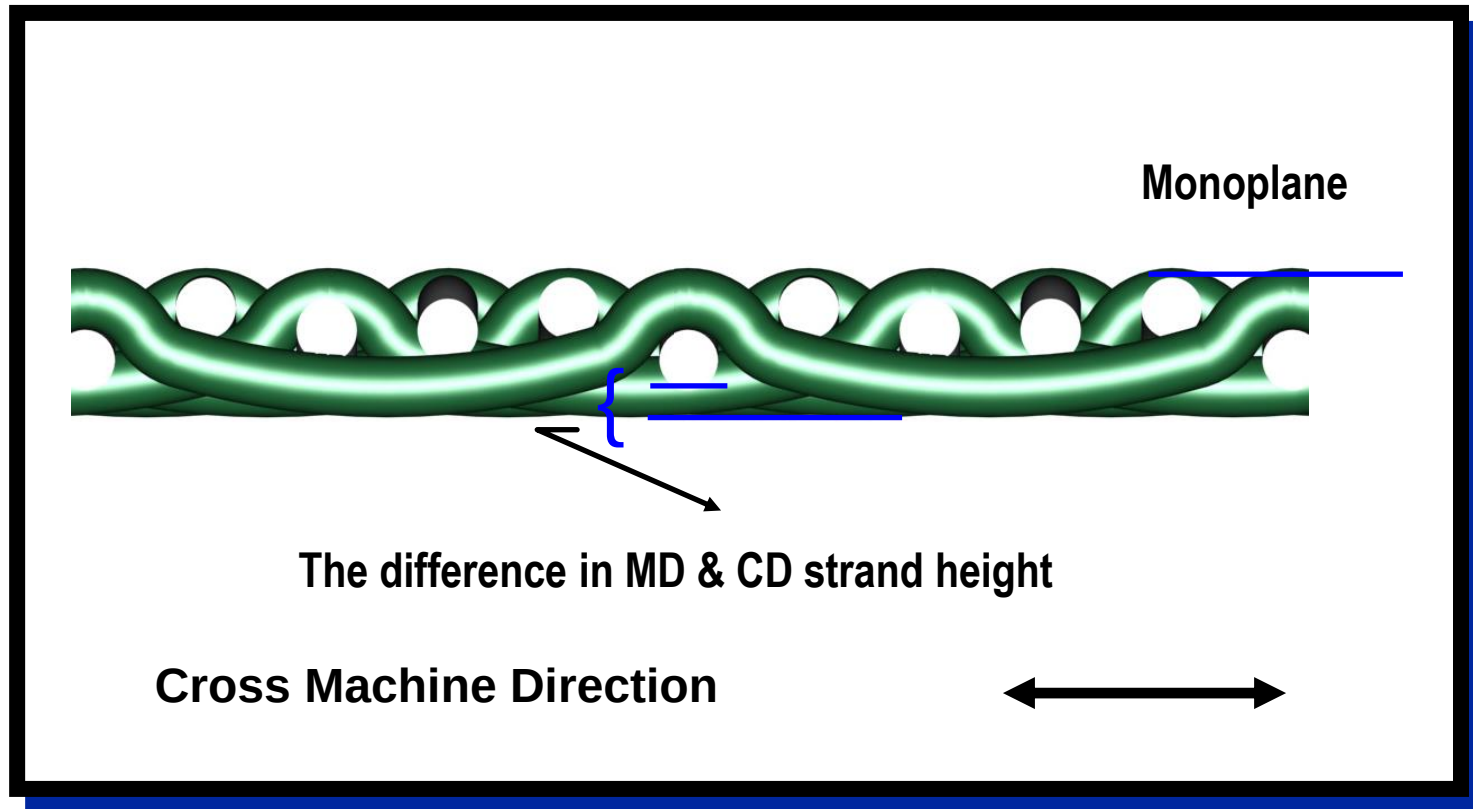


Learning Objectives

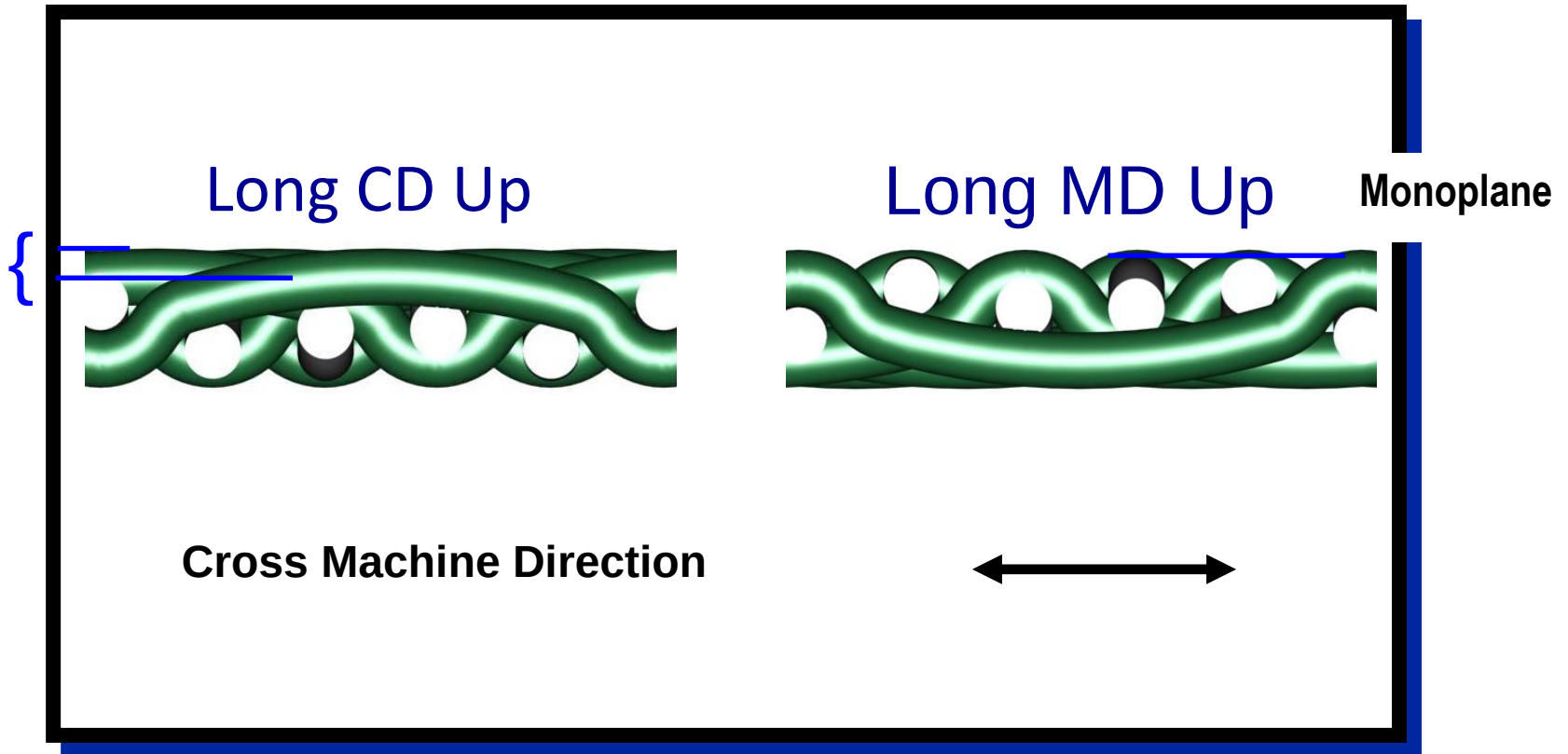
- Forming Fabric Definitions and Options
- Fabric Enhancements
- Applications by Major Machine Types

Forming Fabric Definitions

Plane Difference

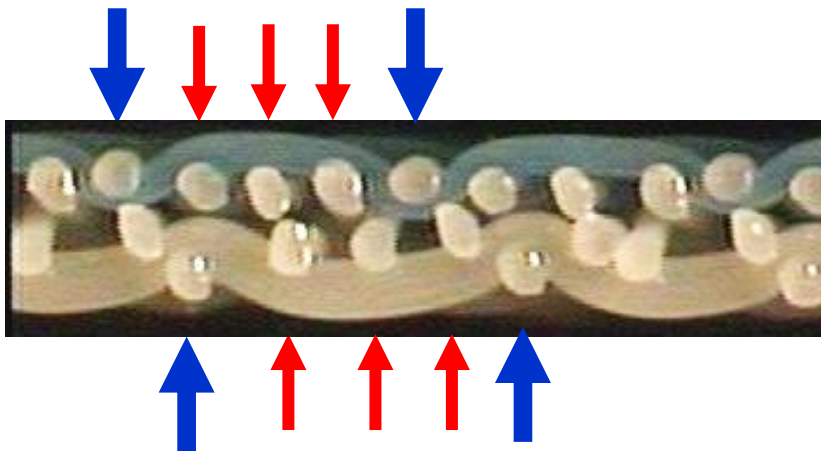


Plane Difference

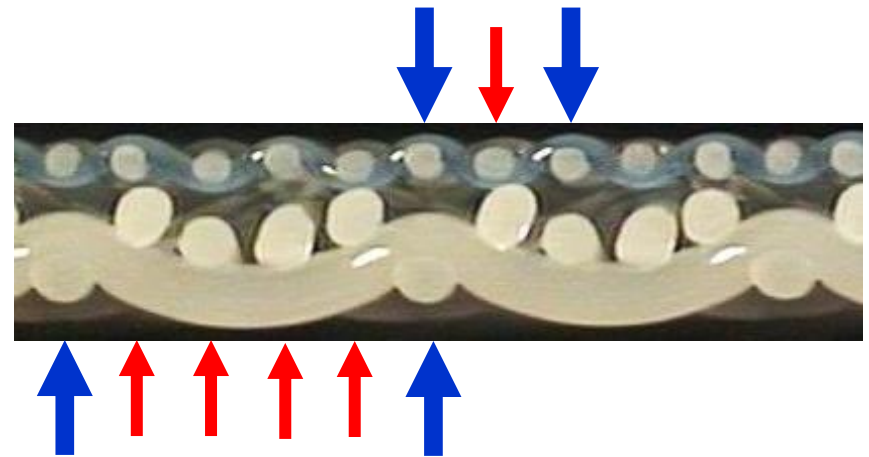


Shed / Surface Topography

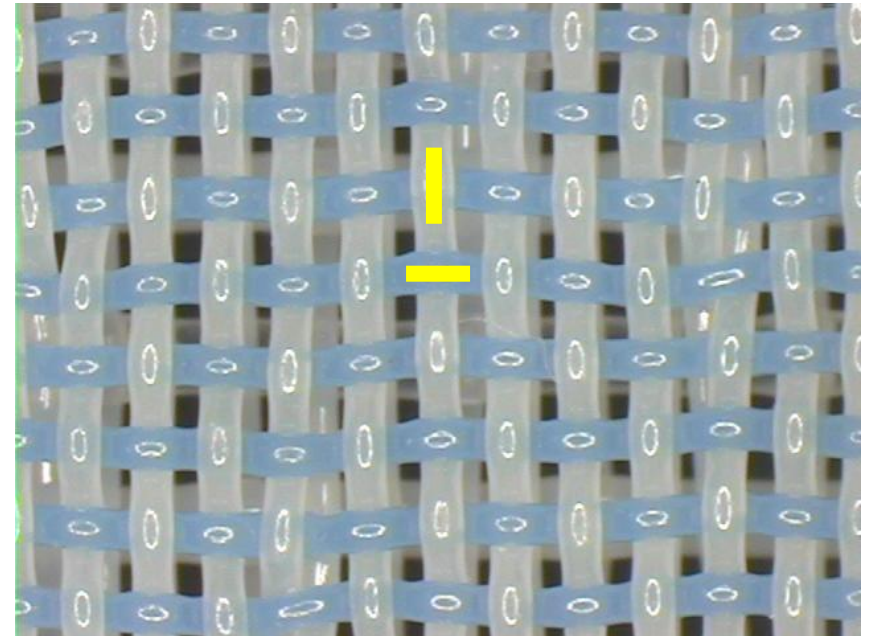
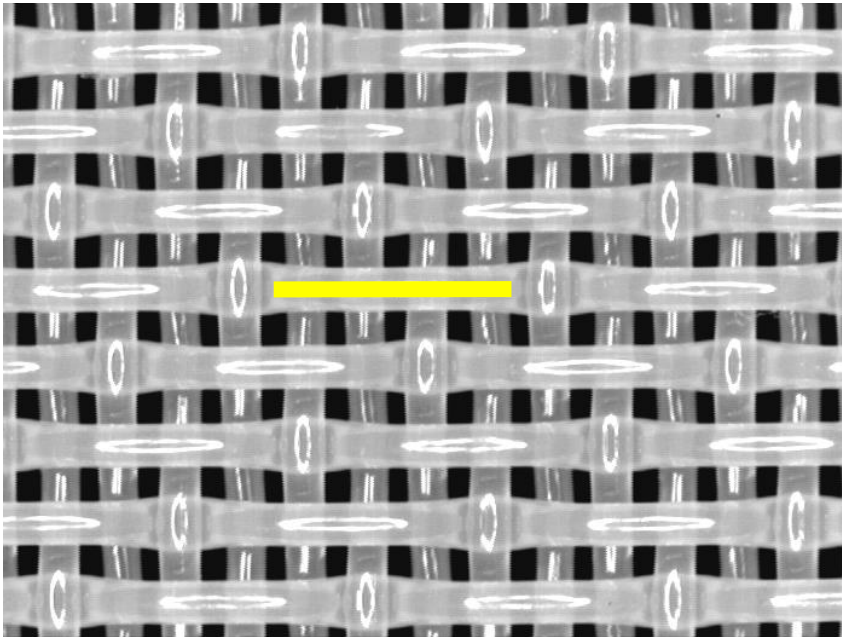
- CD Knuckle Oriented
 - 3, 4, and 5 Shed
- 2 Shed / Plain Weave



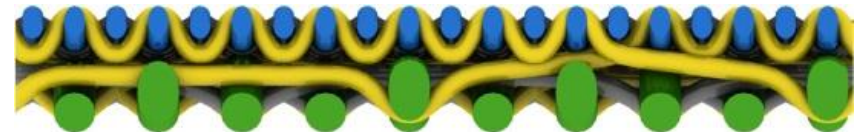
Cross Machine Direction



Surface Topography



CD Knuckle Dominant



**Uniform / Plain Weave
(2 Shed)**

Cross Machine Direction

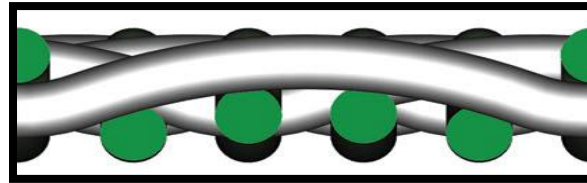


Surface Topography Advantages

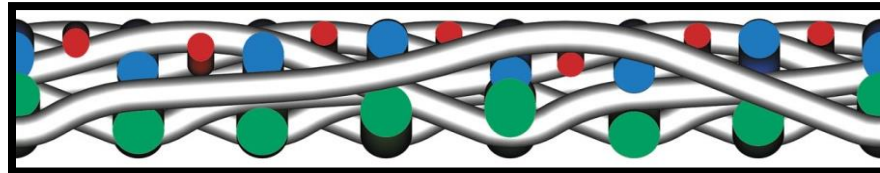
- CD Knuckle Oriented
 - Improved drainage & formation
 - Potential CD tensile gain
- 2 Shed / Plain Weave
 - Controlled drainage formation
 - Low headbox jet impingement sensitivity
 - Low fiber carryback
 - Improved sheet transfer / reduced pinholes

Fabric Styles

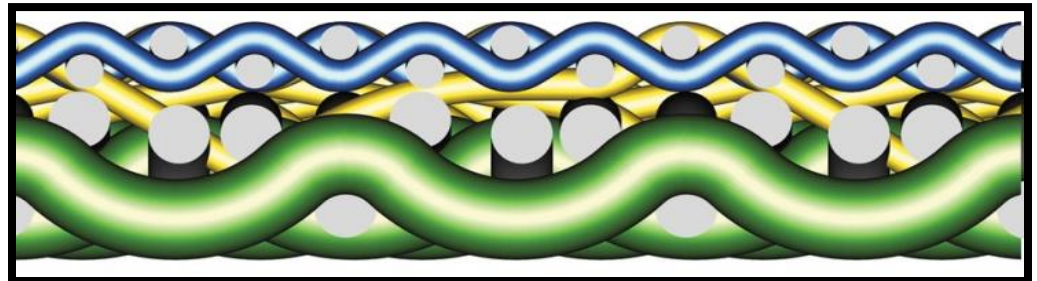
Single Layer



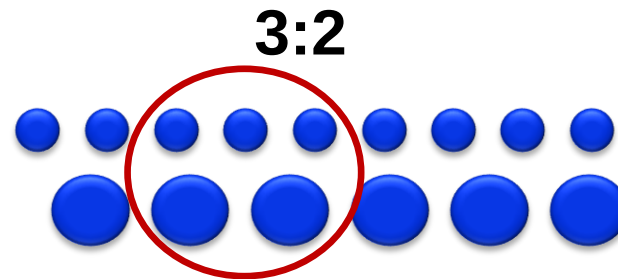
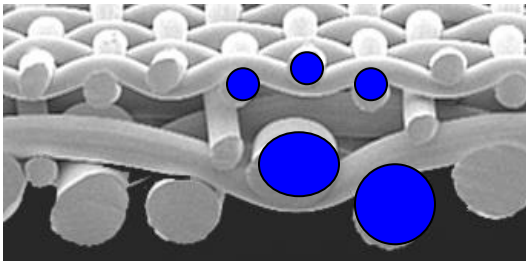
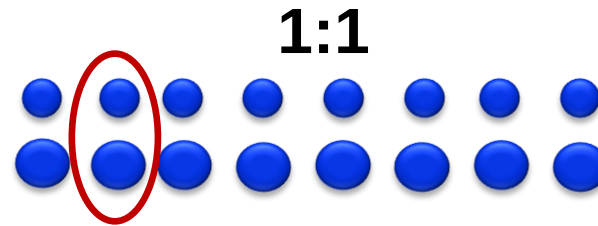
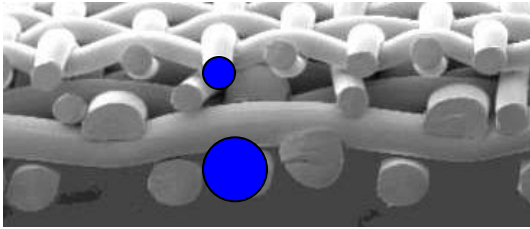
Double Layer



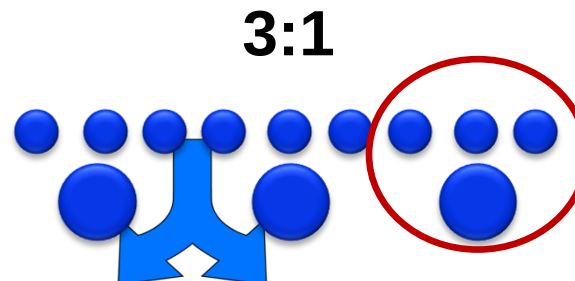
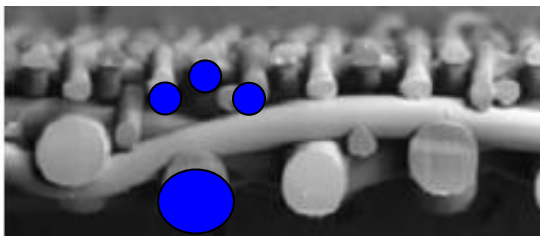
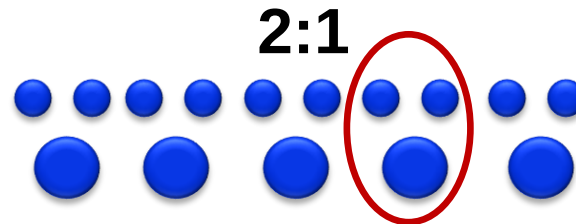
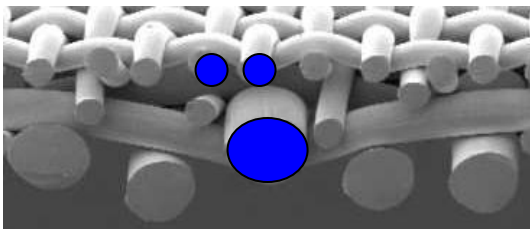
Triple Layer



Shute Ratio



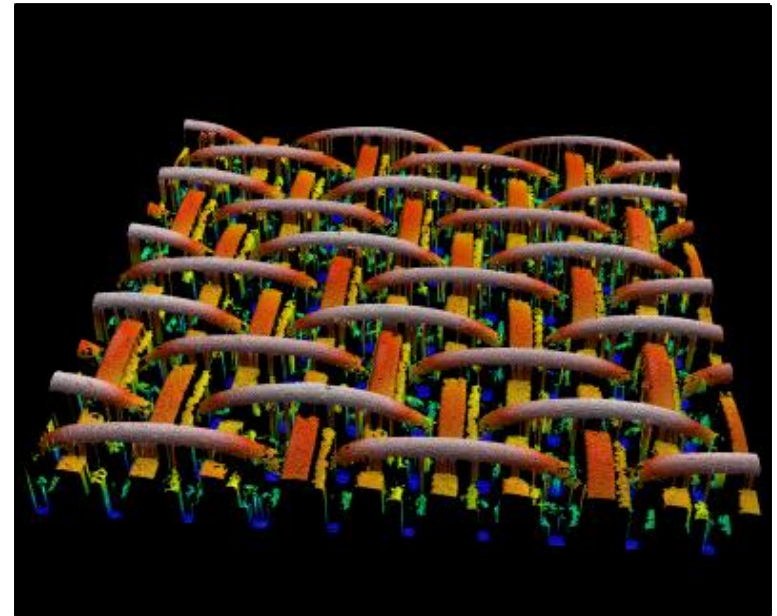
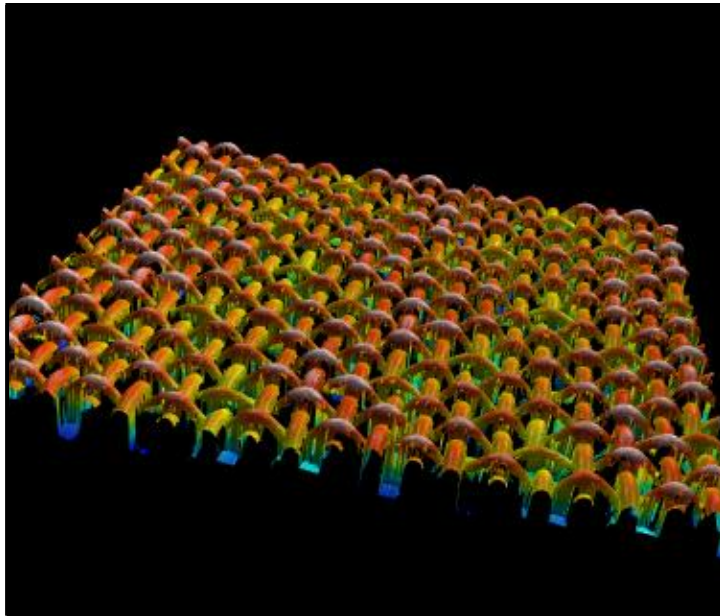
MD

Shute Ratio

- Lower Shute Ratio
 - Increased width stability
 - Increased seam strength
 - Reduced void volume
 - Reduced water carrying
 - Improved life
 - Drainage?
- Higher Shute Ratio
 - Increased fiber support
 - Increased retention
 - Reduced fiber bleed through
 - Drainage?

Square/Shaped Warp

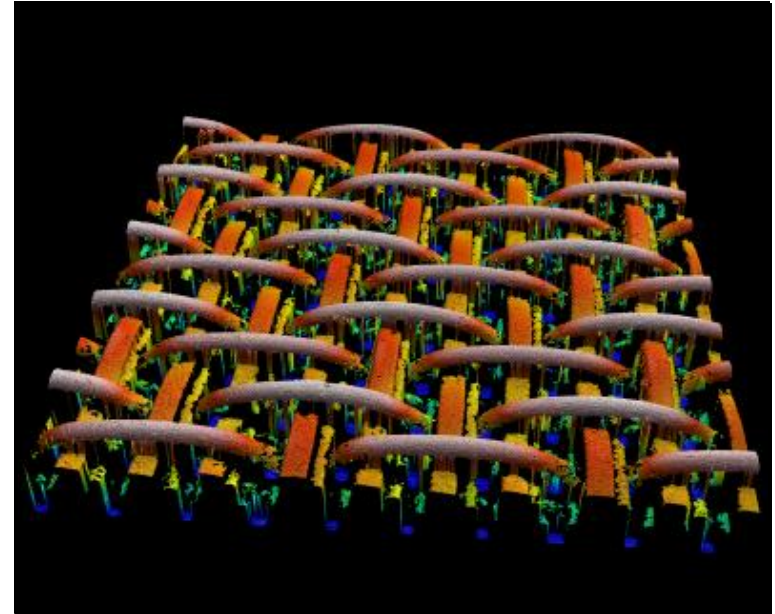


Square gives 27% more area.



Square Warp Benefits

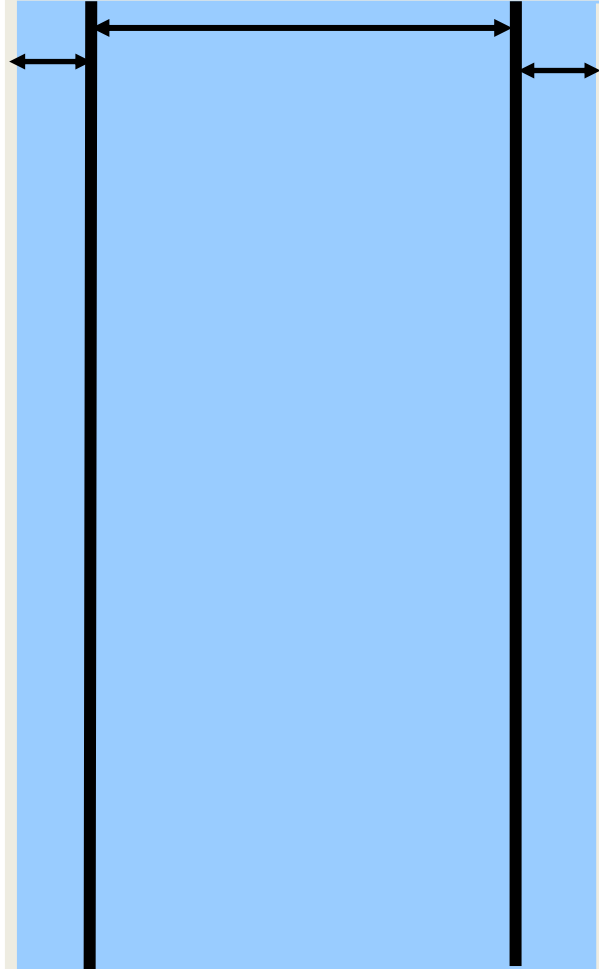
- Reduced caliper
- Reduced void volume
- Lower water carrying
- Higher fiber support
- Increased shear stability
- Increased seam strength



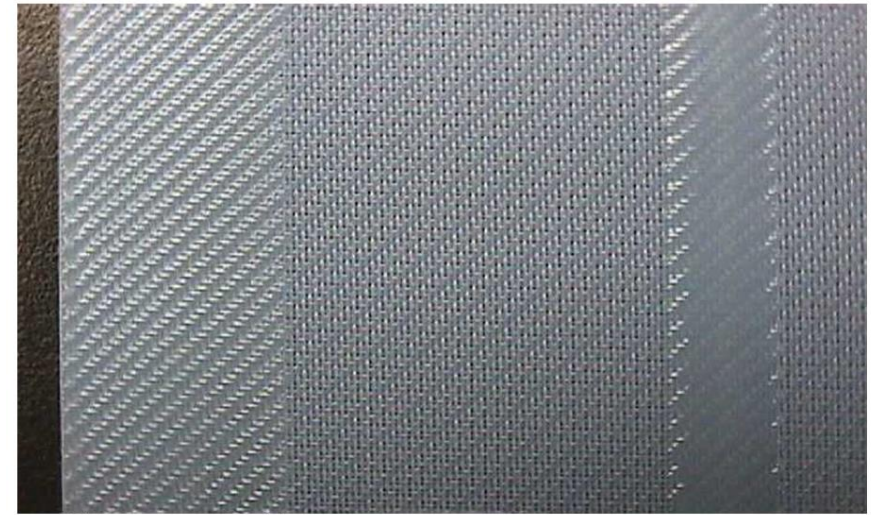
Forming Fabric Enhancements

Trim Beads

Waste Paper Sheet Waste Paper

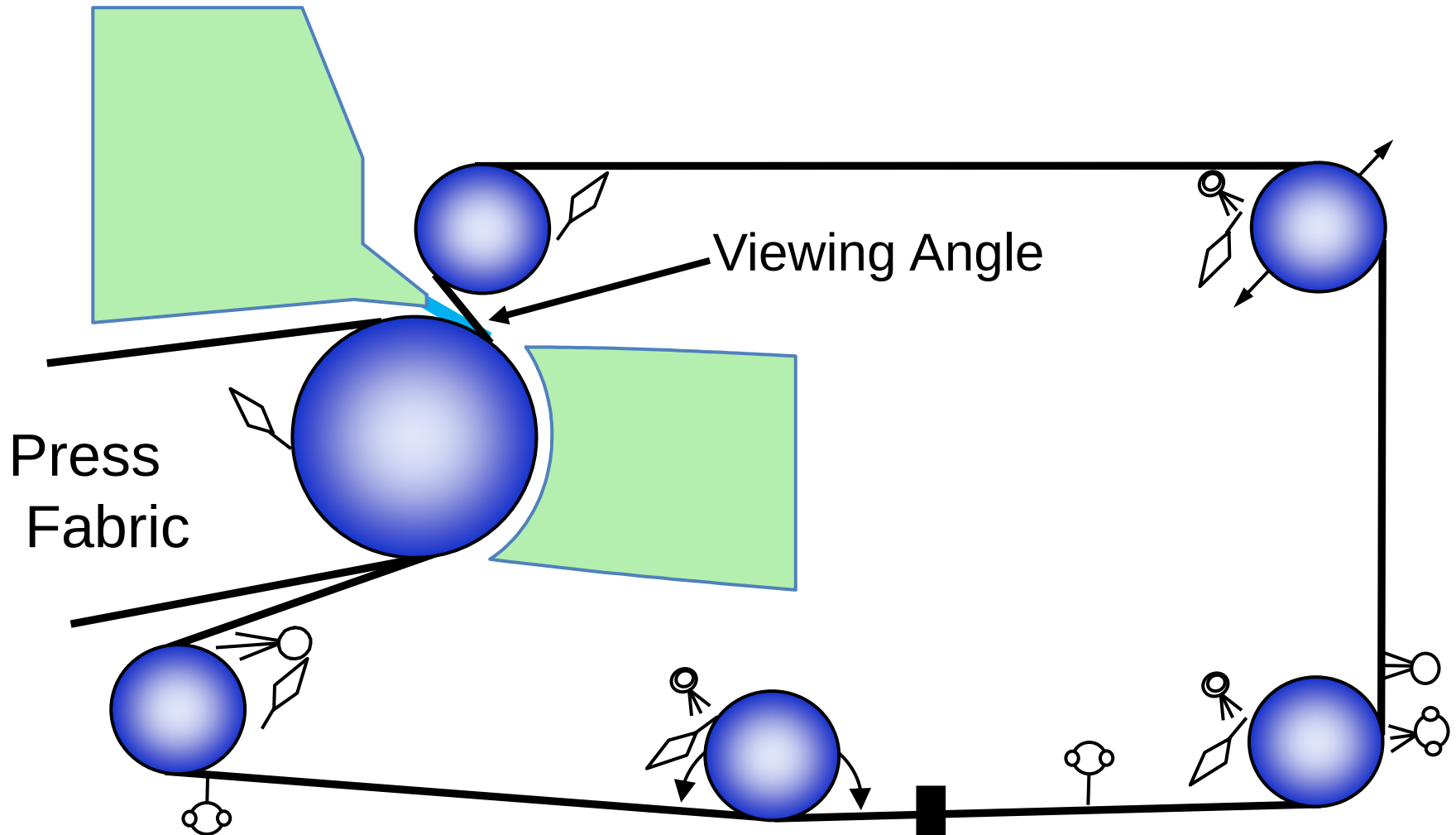


Two trim bead application

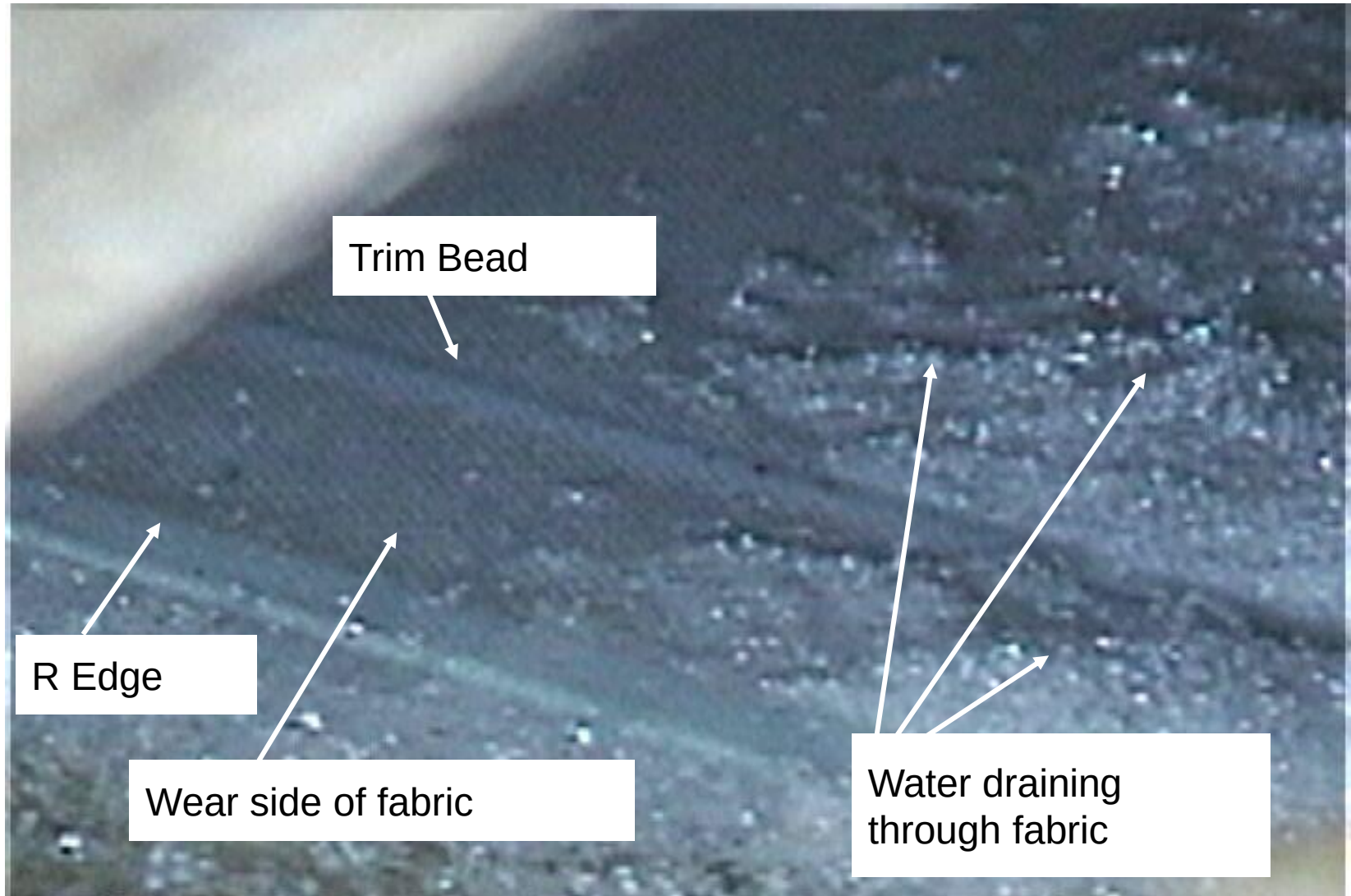


- Trim bead used to trim sheet.
- Used mostly on Crescent Former PM's to carry trim to the Yankee.
- In some cases Trim Beads are used to trim one edge, usually the back edge, eliminating the trim squirt.

Trim Beads



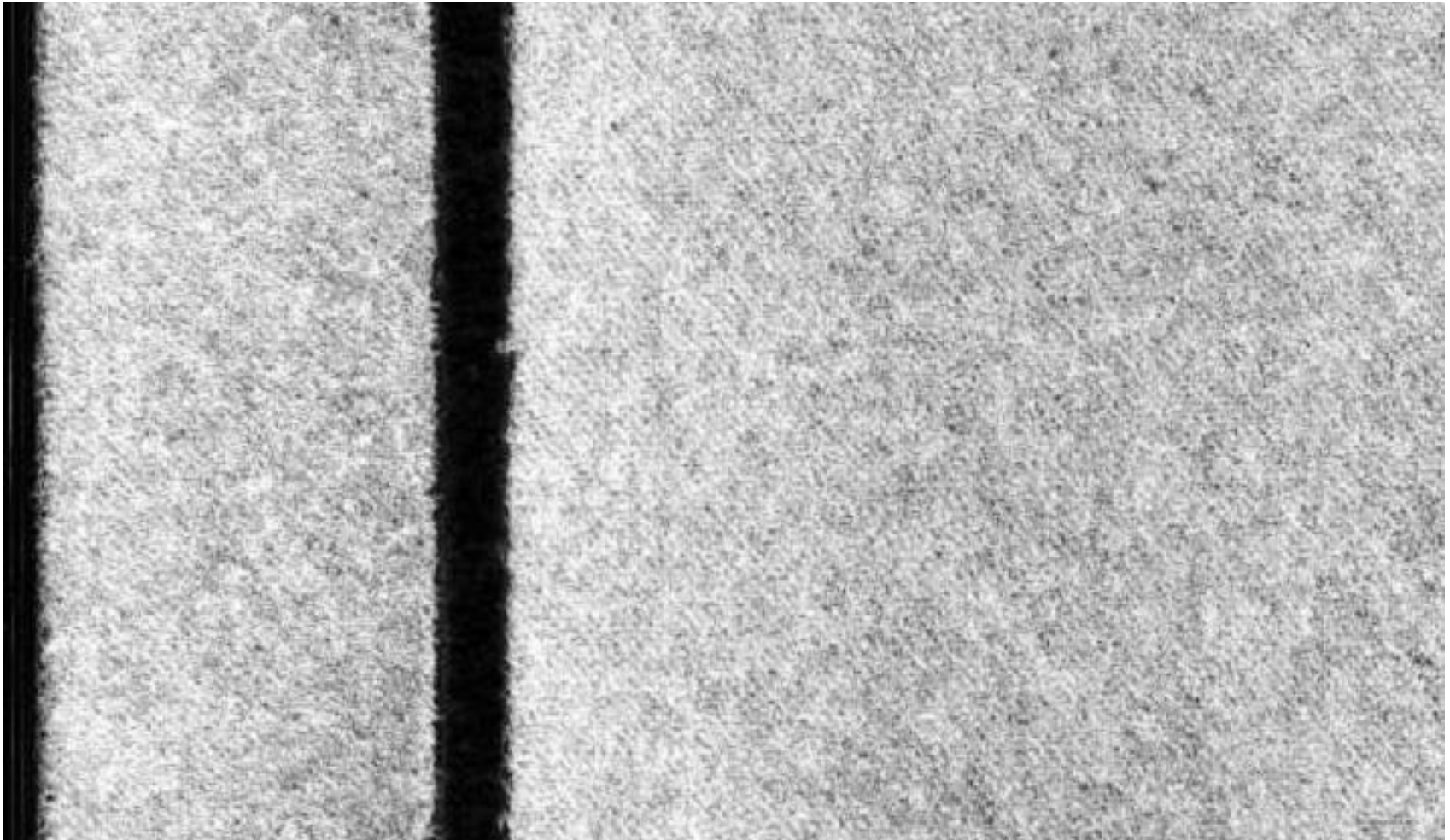
Trim Bead



Trim Bead

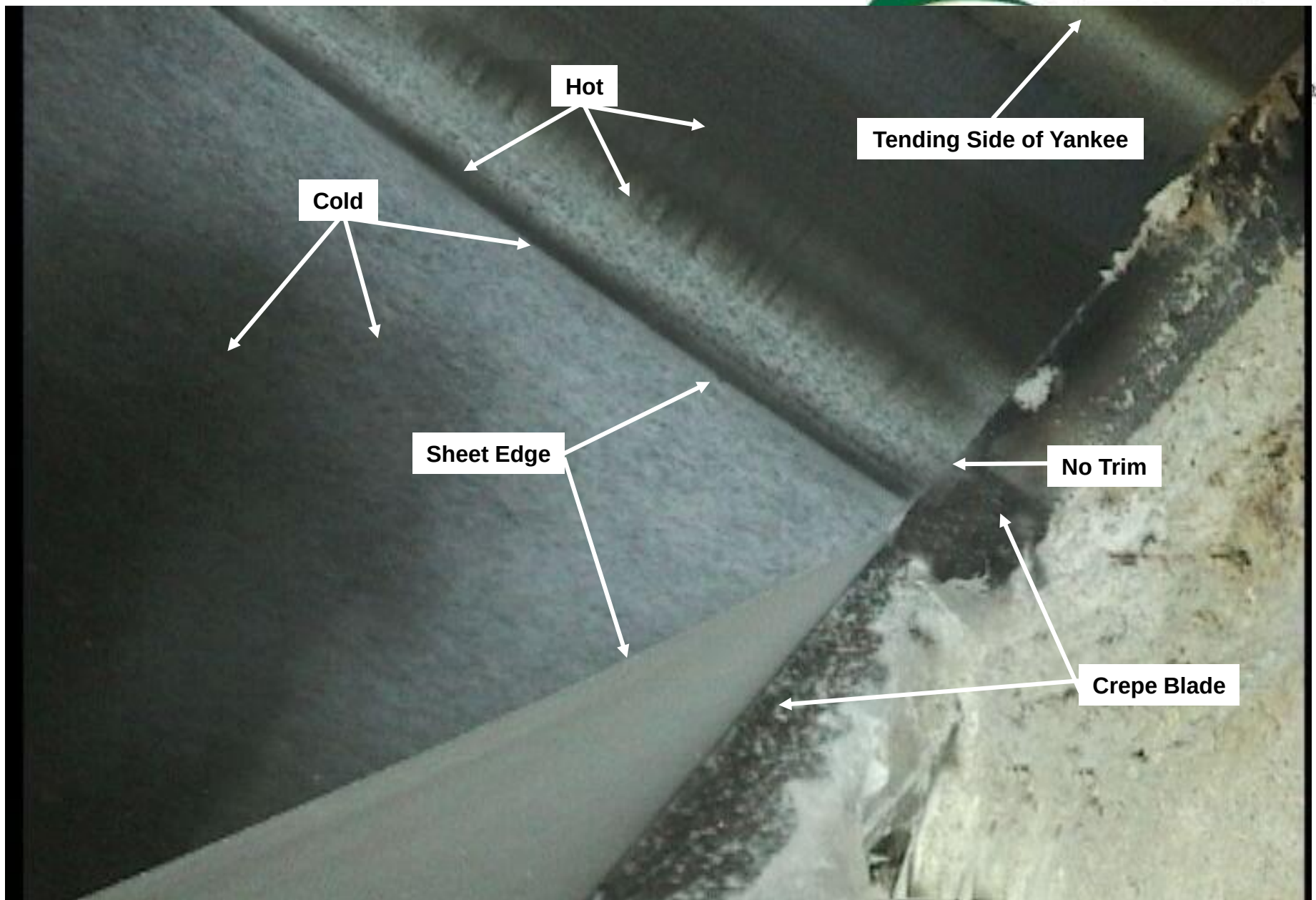


Trim Beads

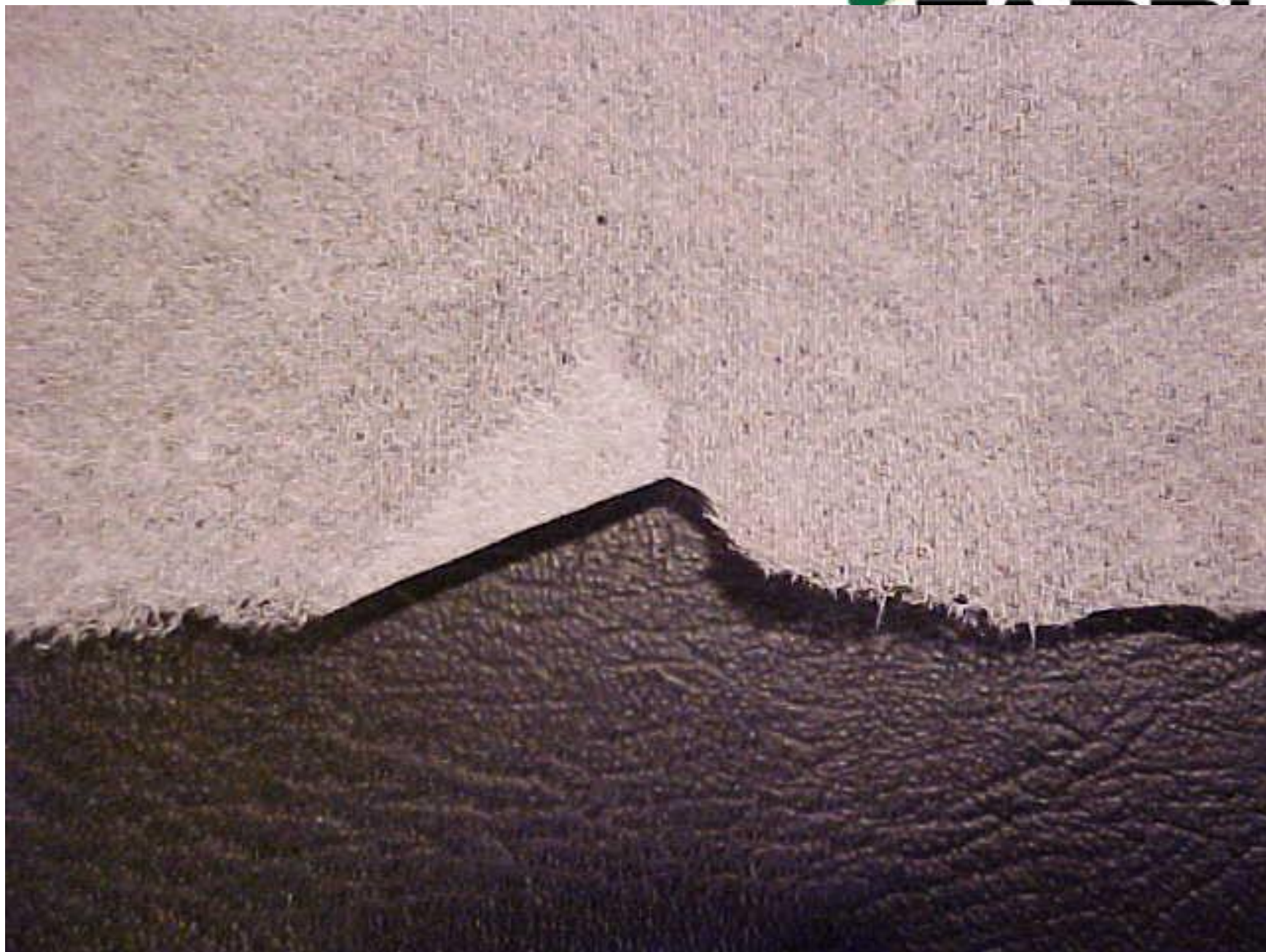


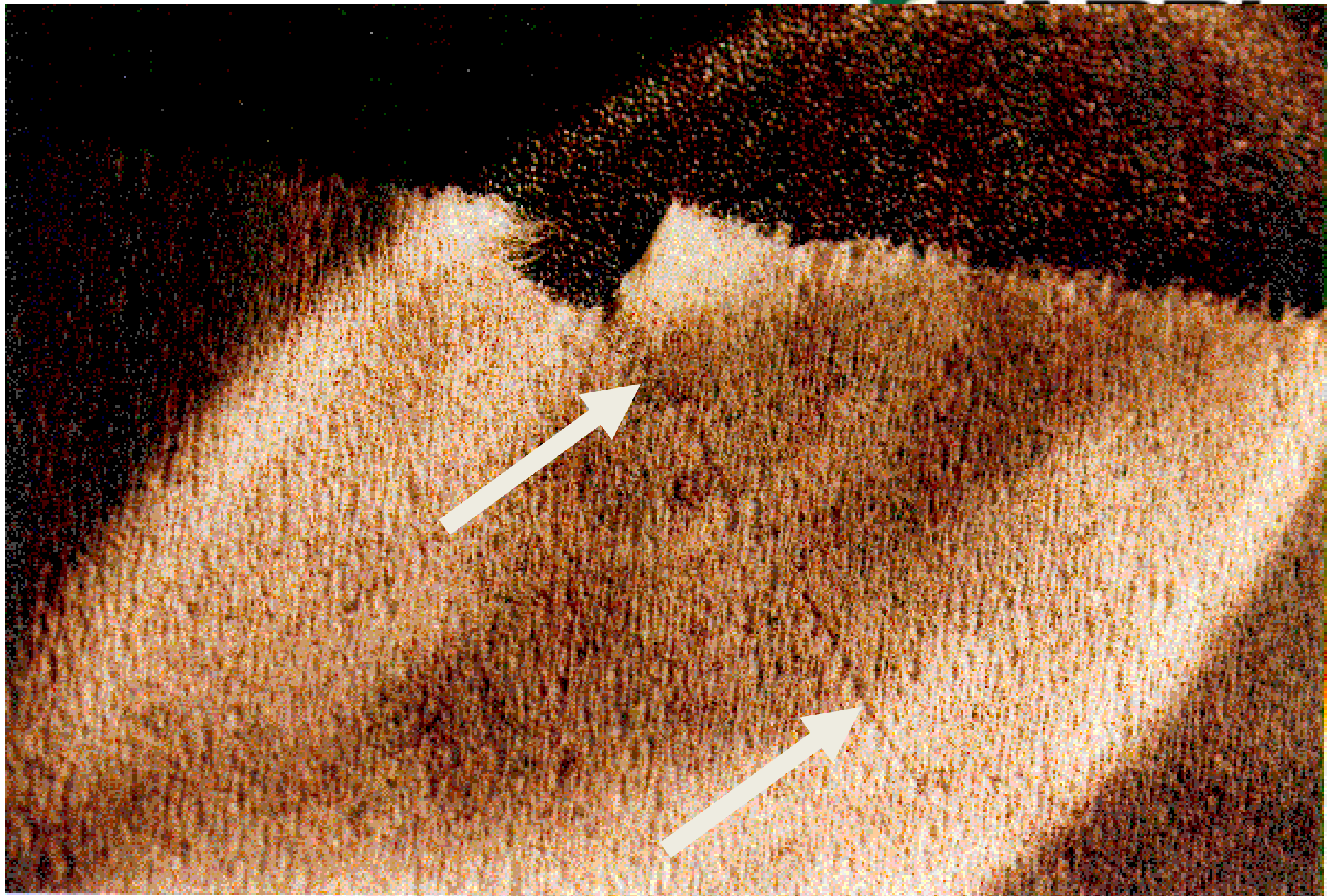
Trim

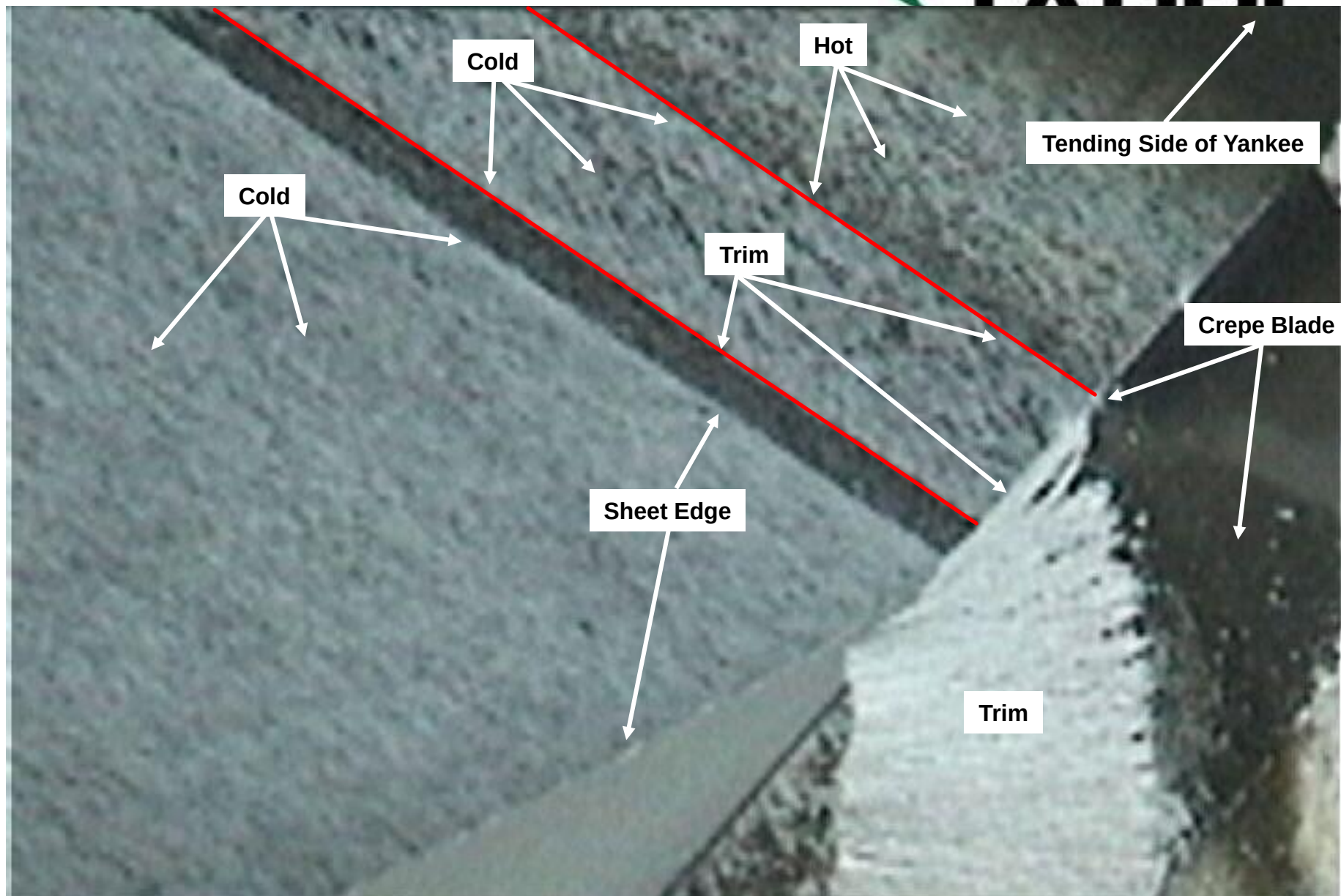
Sheet



Without Trim Bead







With Trim Bead

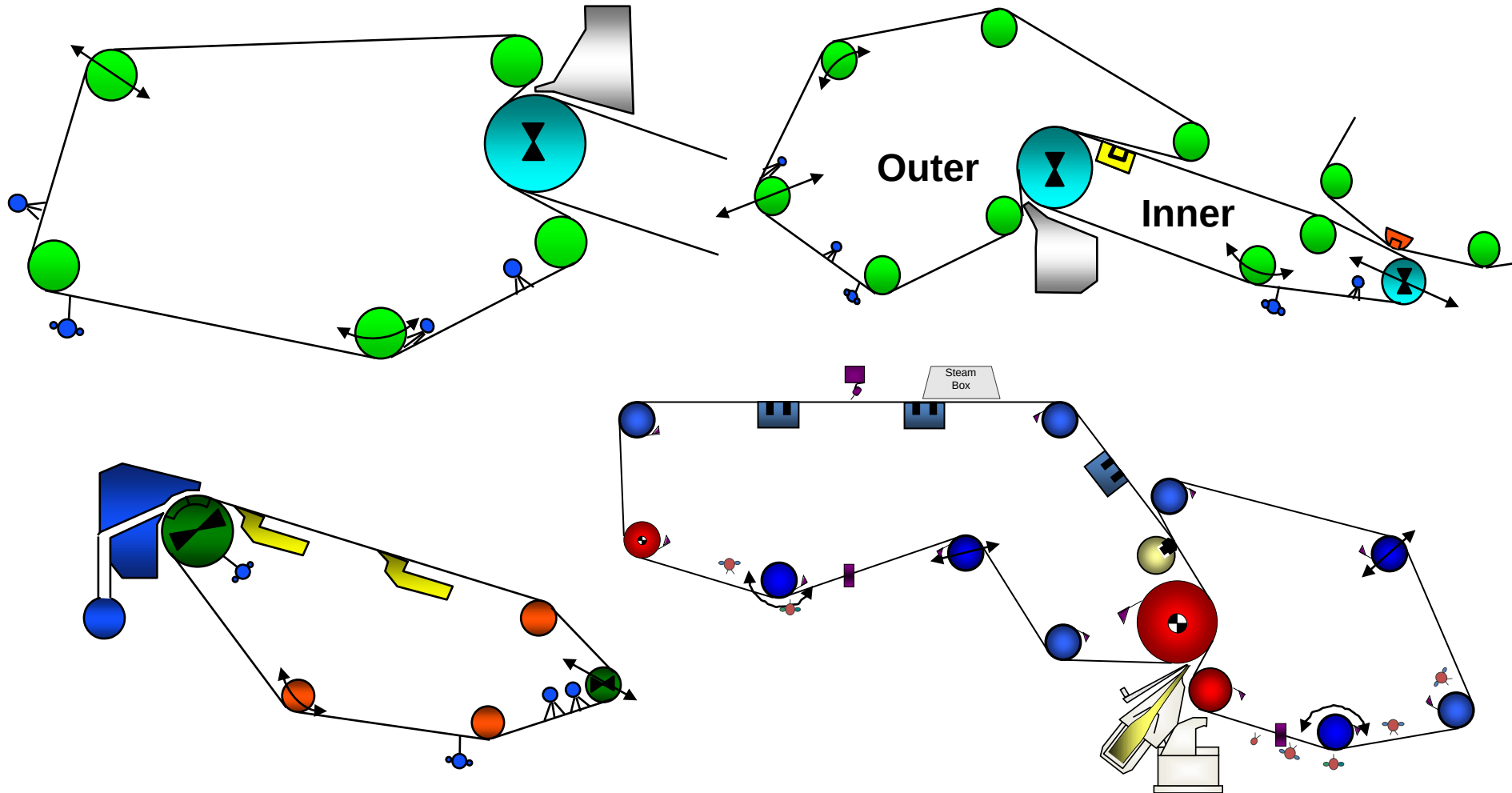
Trim Bead Considerations

- Trim Bead Width
 - Narrower
 - Smaller Hotspot on Yankee and/or in TAD
 - Potential Fiber Bridging
 - Wider
 - Less Fiber Bridging
 - Wider Hotspot on Yankee and/or in TAD
- Sheet Width and Shrinkage

Trim Bead Best Practices

- Regularly measure process variables affecting sheet shrinkage.
 - Grade, Speed, J/W, etc.
 - Reel width.
 - Forming fabric width.
 - Width of any trim and width of trim cut itself for trim that is cut using a trim squirt.
 - Fabric tension.
- Adjust fabric design based on machine conditions.

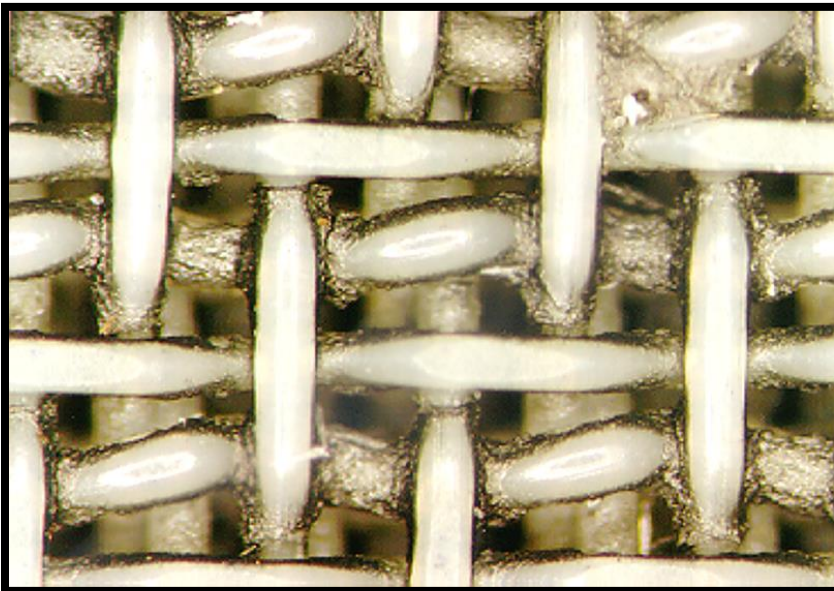
Machine Types for Trim Beads



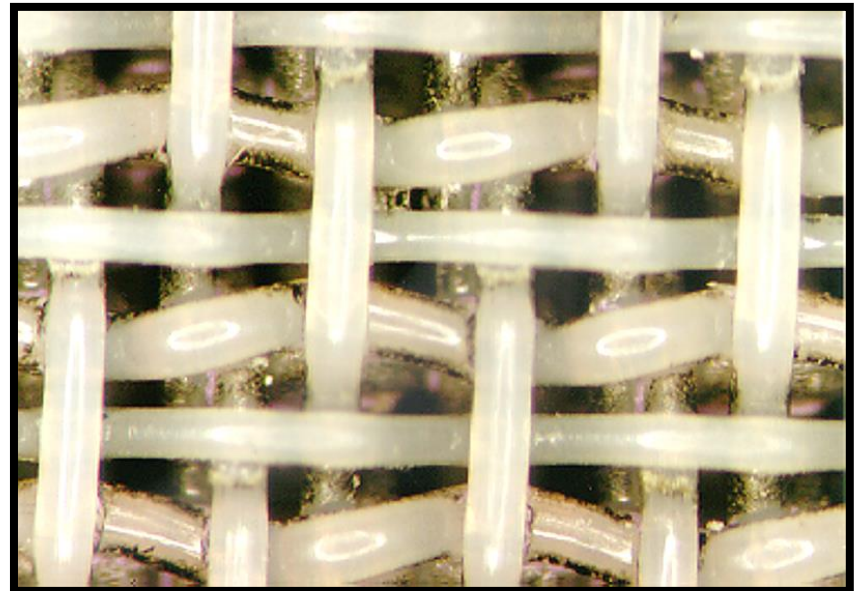
Anti-Contaminate

Sheet Side - 90 days

Uncoated

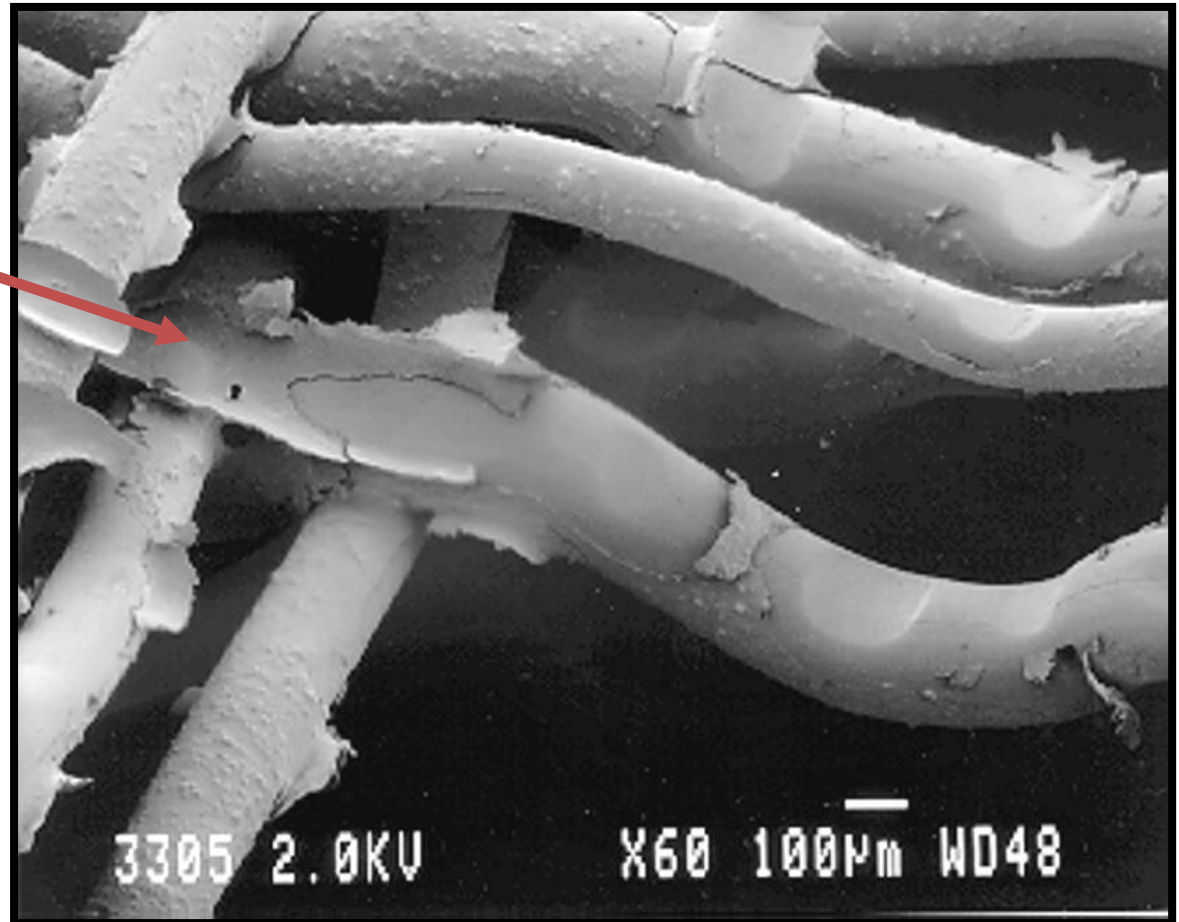


Coated



Anti-Contaminate Coating

**Thin film
still
present
after 91
days.**



Forming Applications by Machine Type

**Mesh
& Count**

**Weave
Patterns**

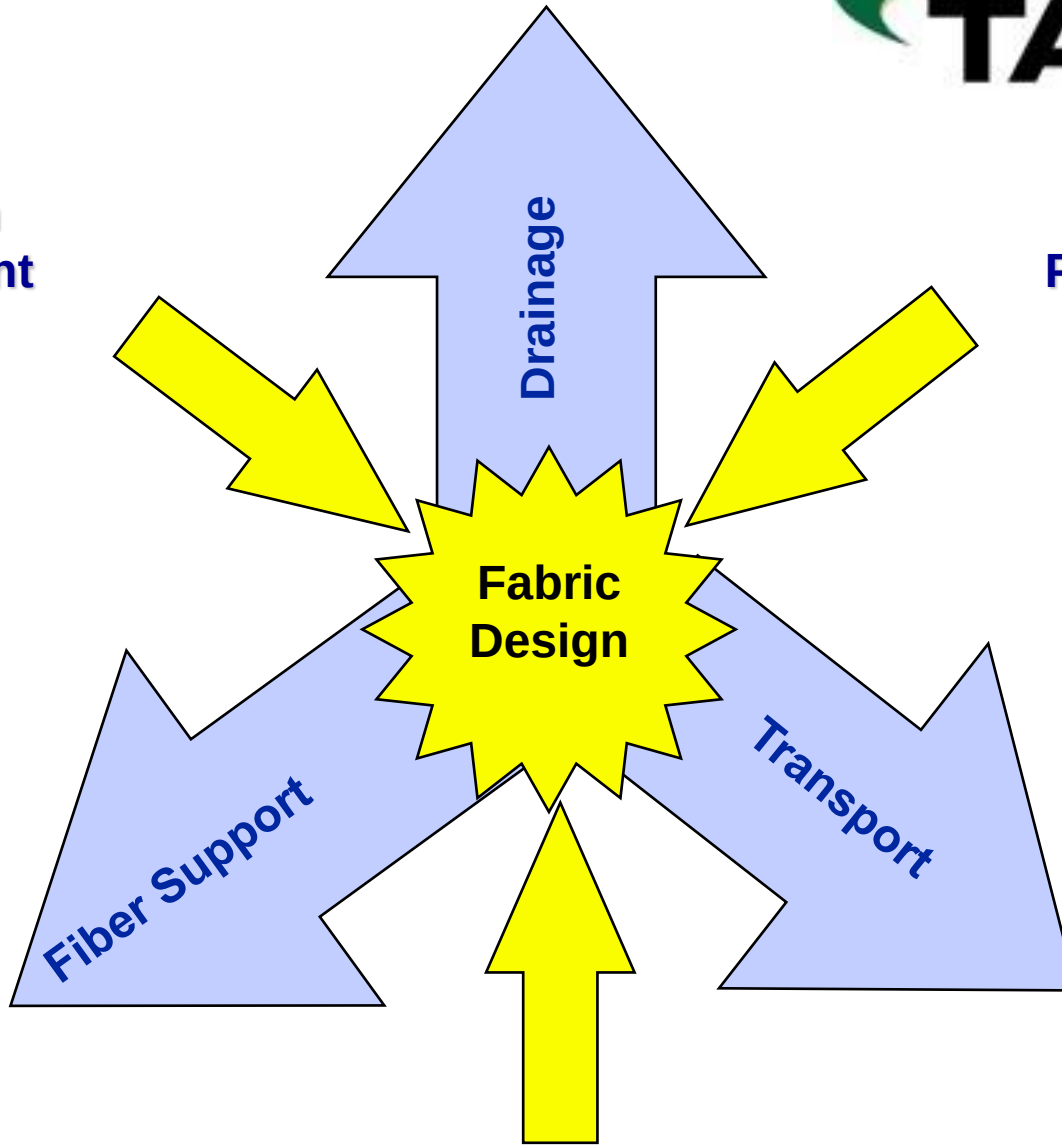
Drainage

**Fabric
Design**

Fiber Support

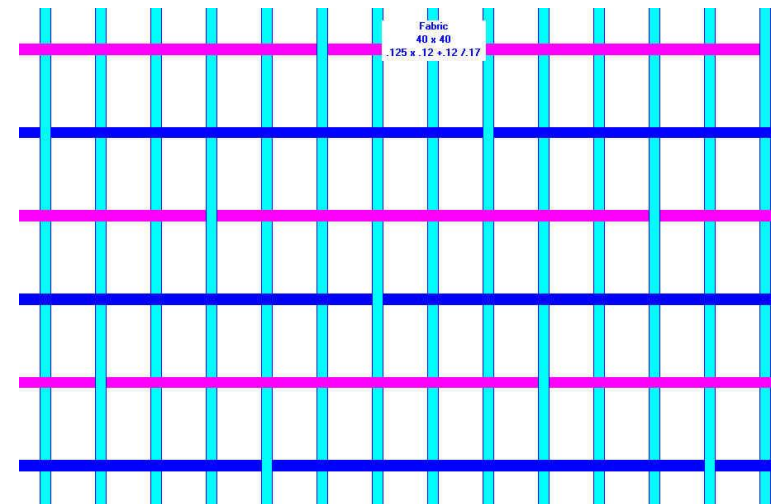
Transport

**Material
Diameter
& Type**



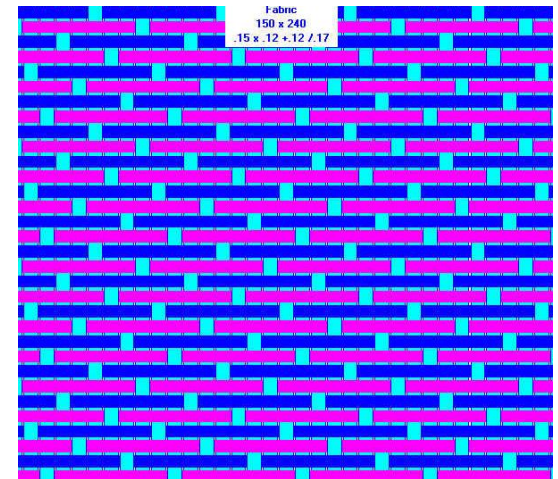
Forming Fabric Drainage

- Things that Affect Fabric Drainage
 - Style & Weave Pattern
 - MD x CD strands
 - Surface Topography
 - Air Permeability
- To get a High Drainage Fabric
 - Open Weave Structure
 - Fine Warps and Shutes (small dia.)
 - Lower Number of MD & CD Strands
 - Long CD Knuckles
 - Open Fabric (high air perm.)



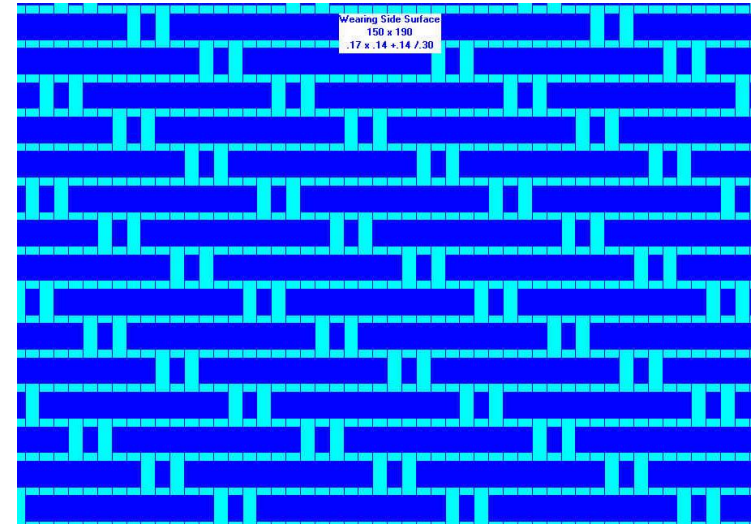
Forming Fabric Fiber Support

- Things that Affect Fiber Support
 - Style & Weave Pattern
 - Surface Topography
 - Top MD x CD strands
- To get a High Fiber Support Fabric
 - Multilayer Fabrics
 - High Mesh & Count
 - Lower Shed (at a given count)



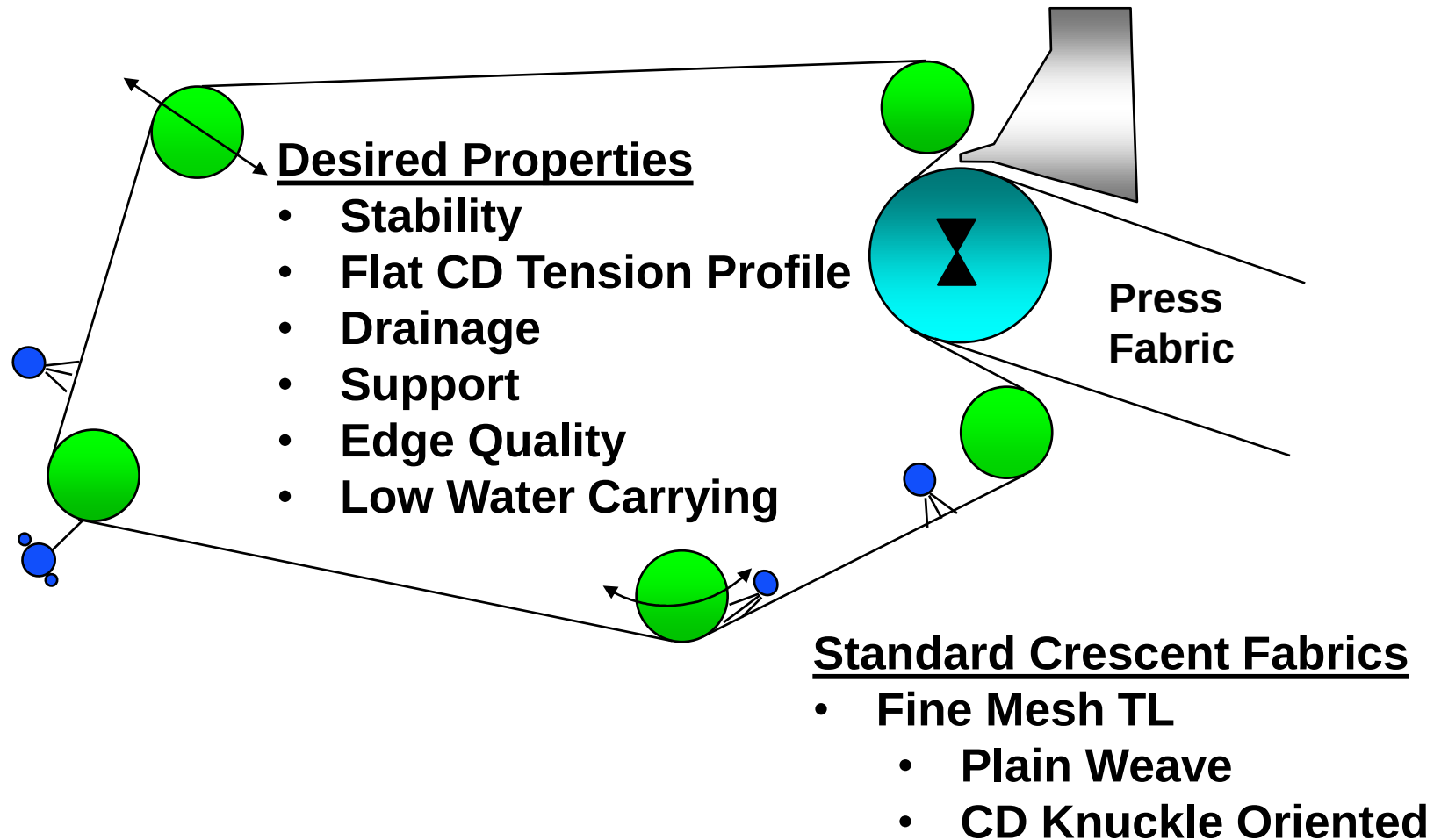
Forming Fabric Life

- Things that Affect Fabric Life
 - Bottom side strand size / material
 - Bottom side topography
 - Number of wear strands
- To get More Fabric Life
 - Larger CD (wear) Strands
 - Softer materials
 - Longer Bottom Side CD Knuckles
 - Higher Number of CD (wear) Strands

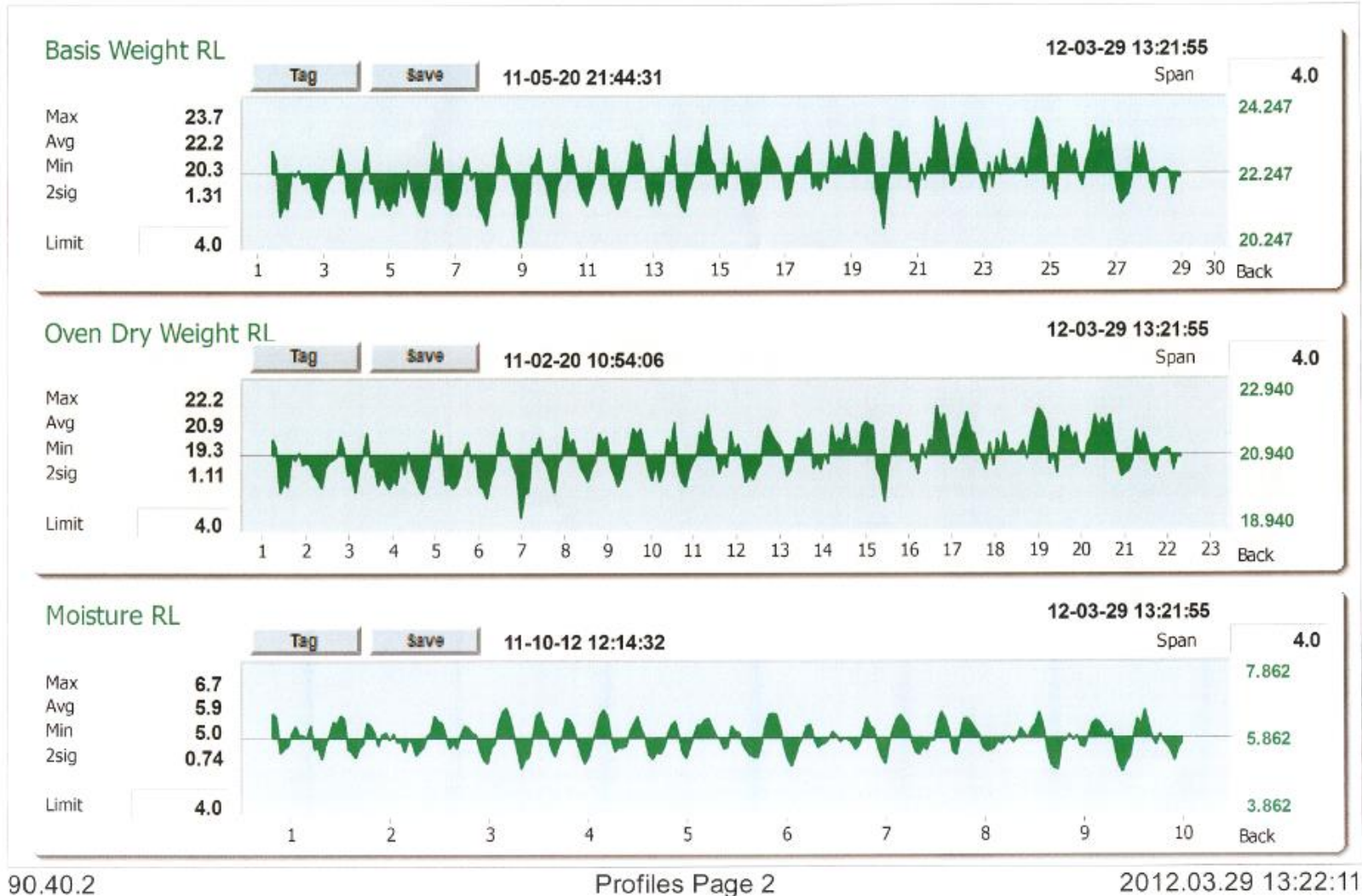


Crescent Former PM's

(and Hybrid Machines)

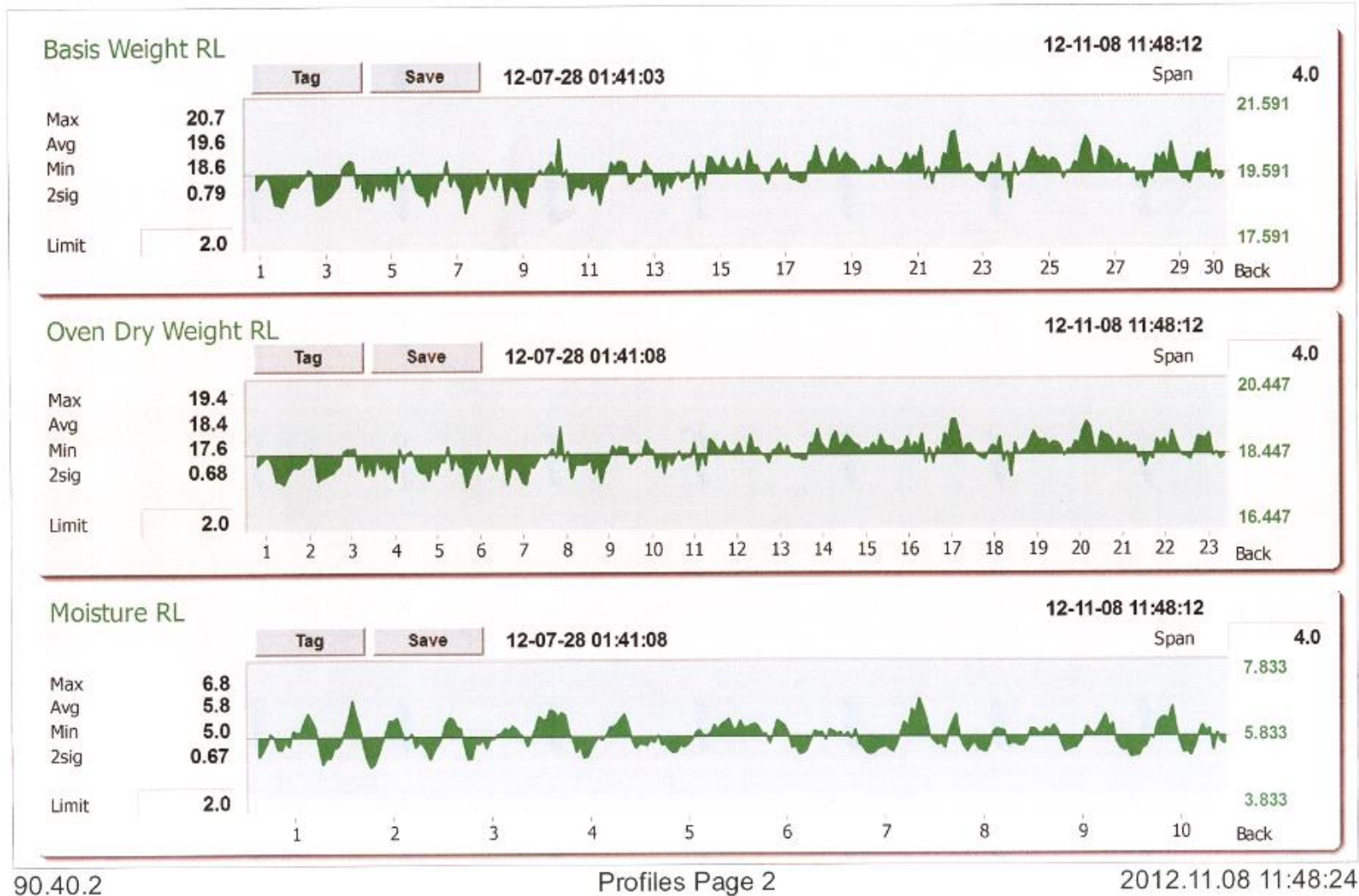


Poor Tension Profile



Basis Weight 2sig = 1.31

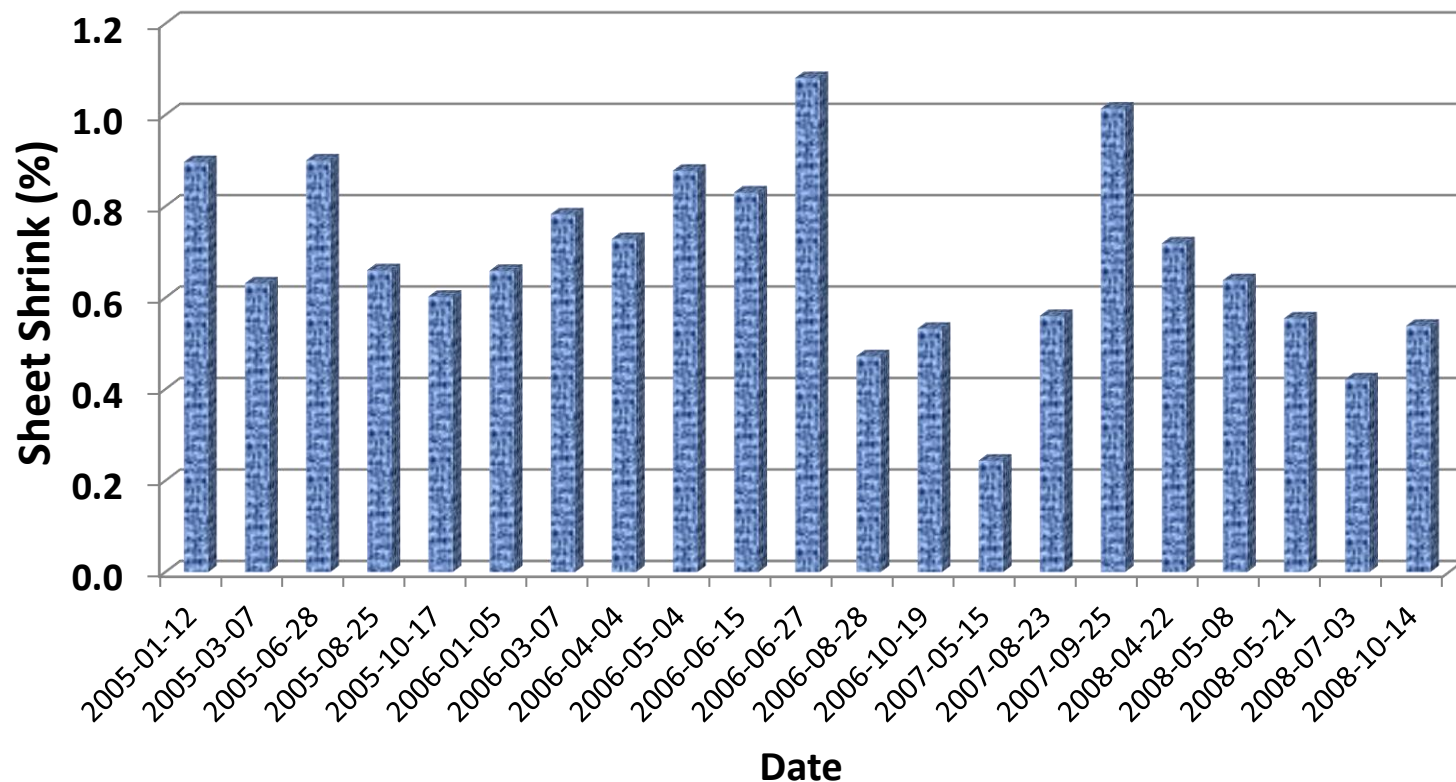
Improved Tension Profile



Basis Weight 2sig = 0.79

Sheet Shrink Variation Example (0.2 to 1.1%)

9.5 # Tissue



Sheet Shrinkage Variation

- Grade
- J/W
- Furnish
- Pressure Roll Loading
- Pressure Roll Cover Hardness
- Coating
- Dryness at Creping Doctor
- Dry End Geometry
- + Many More

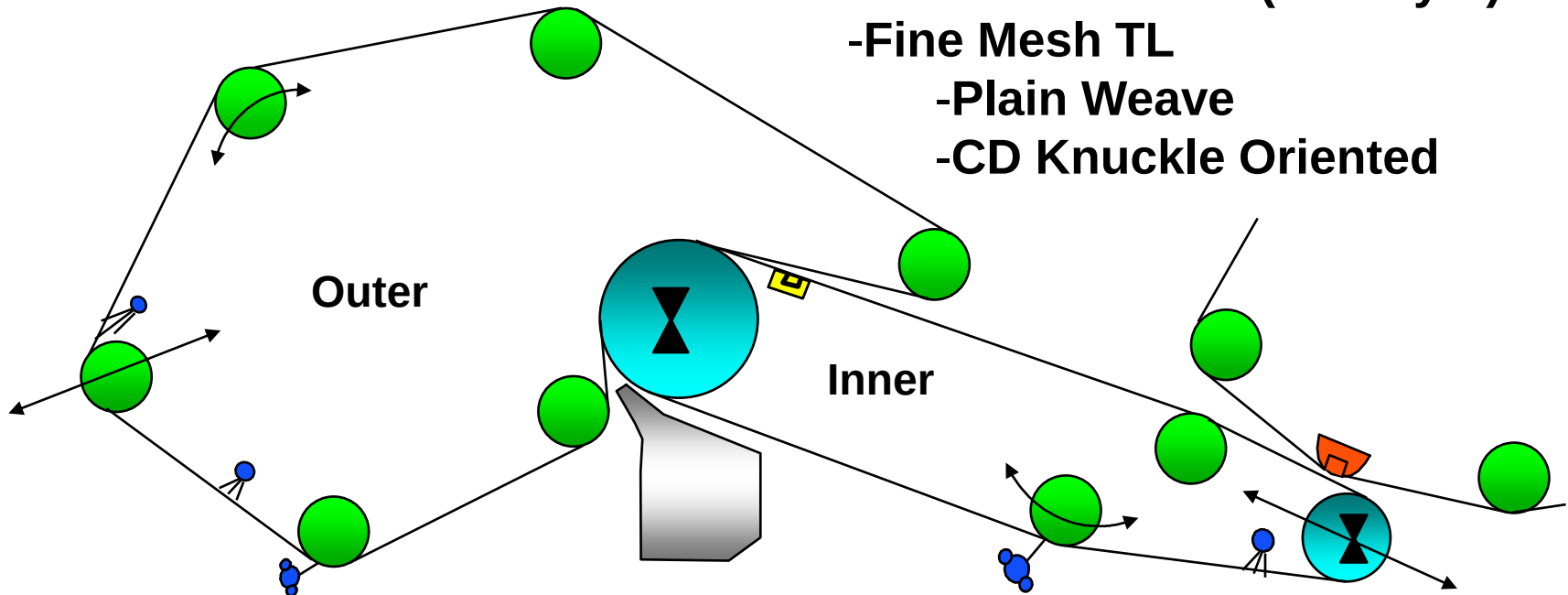
Solid C-Wrap Former

Outer Properties

- Drainage
- Fiber Support
- Flat CD Tension Profile

Standard Fabrics

- Fine Mesh DLSS (2.5 Layer)
- Fine Mesh TL
- Plain Weave
- CD Knuckle Oriented



Inner Properties

- Sheet Transfer

Standard Fabrics

- Fine Mesh SL, DL, and TL

TAD C-Wrap Former

Outer Properties

- Drainage – High Headbox Flow
- Fiber Support
- Uniform Tension Profile

Inner Properties

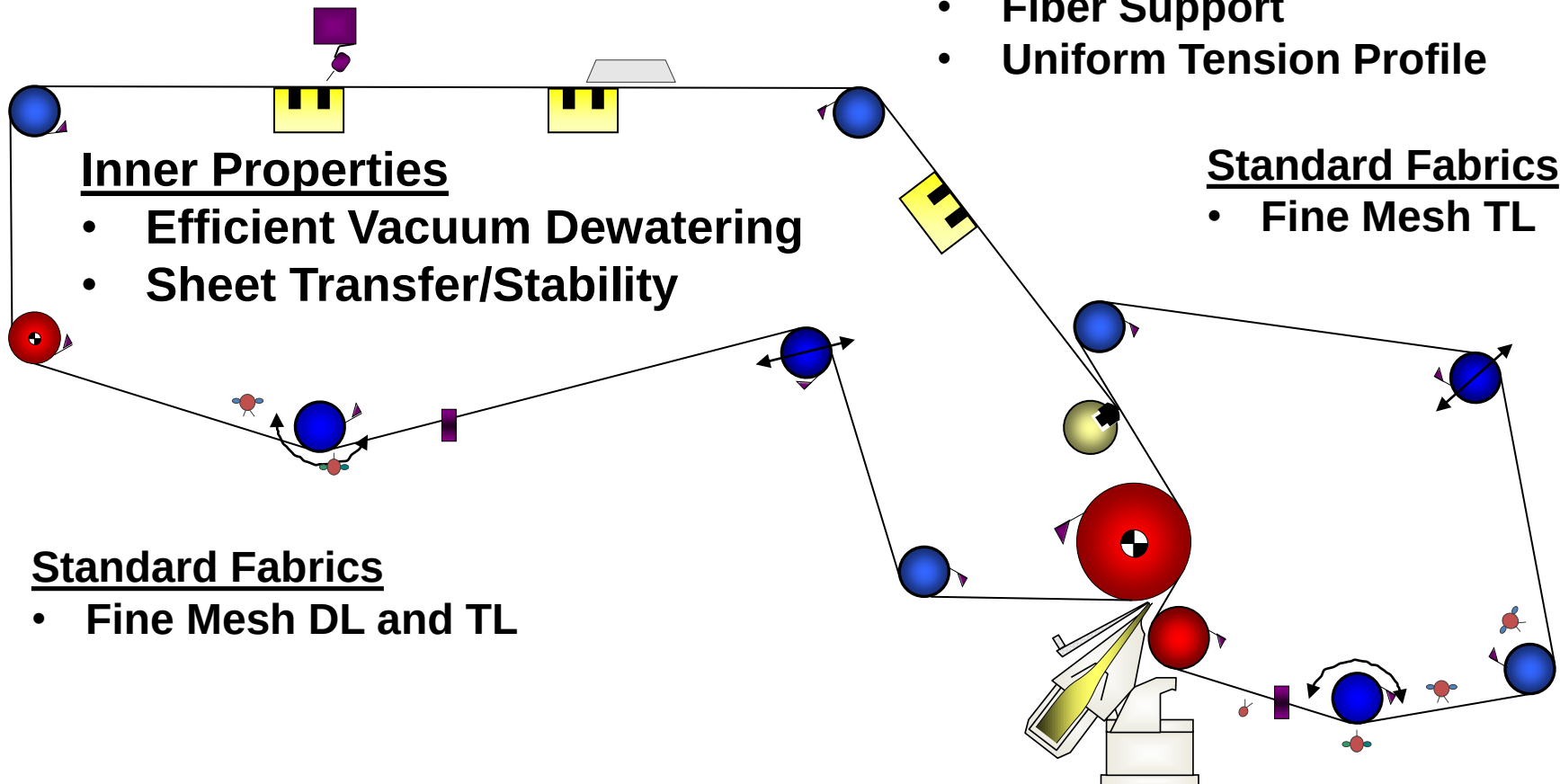
- Efficient Vacuum Dewatering
- Sheet Transfer/Stability

Standard Fabrics

- Fine Mesh TL

Standard Fabrics

- Fine Mesh DL and TL



Additional Considerations

- Grade & Sheet Property Considerations
 - Formation/Tensile
 - CD Tensile
- Furnish – Virgin or Recycled
 - Anti-Contaminate Coating
 - Retention
- Consumer vs AFH
- Machine Conditions
 - Wear/Mechanical
 - Headbox

Thank you

PRESENTED BY

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Forming Fabric Case Study

- Crescent Former
- Bath Tissue
- Recycled Furnish
- High Jet Impingement

