Building Leadership Excellence

Forming Fabric Applications for Tissue Making

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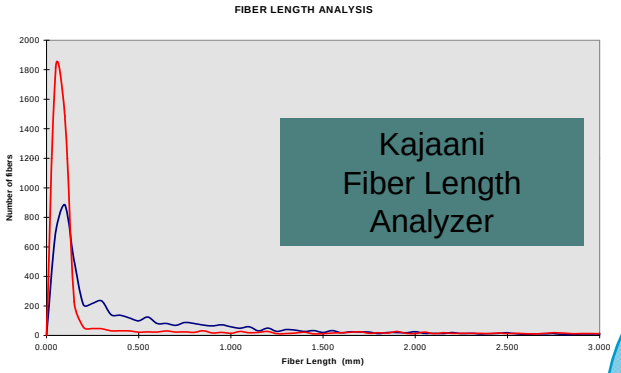
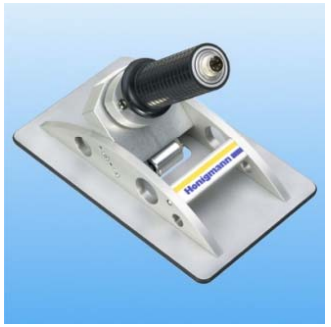
Key to Success → Engineered Approach



Drainage Pressure is defined as P=T/R

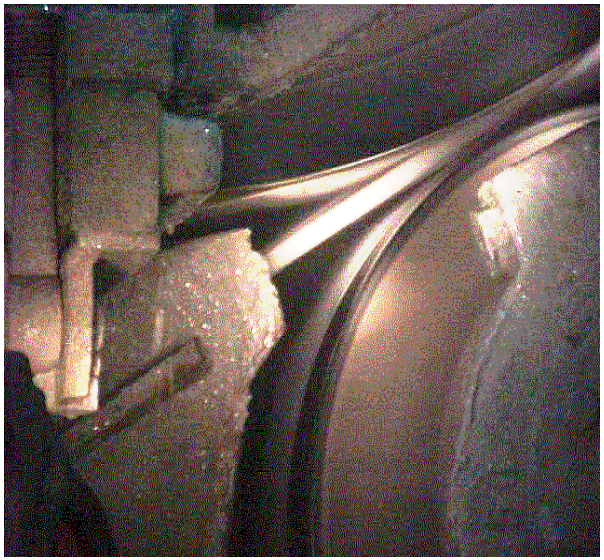


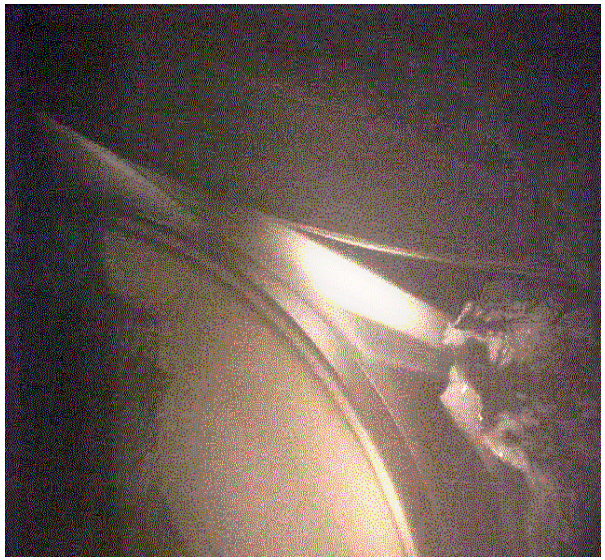
Tissue Forming Operations

Getting the most out of a any forming fabric design requires careful attention to the fabric run

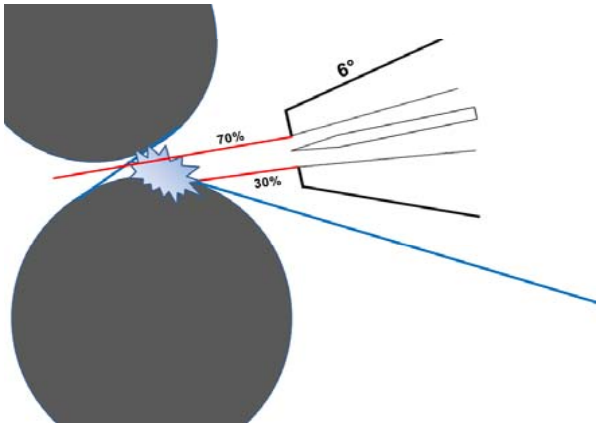
- Headbox set up and jet impingement
  - Crescent Former
  - Twin Wire
  - Stratification
- Fabric tension measurement and control
- Cleaning shower design and operation
- Separation Angles
- Know your furnish
  - Fiber length
  - Virgin vs. recycled
  - Contaminants
  - Chemicals
- Tissue Product Target

Jet Impingement – need to look from both sides

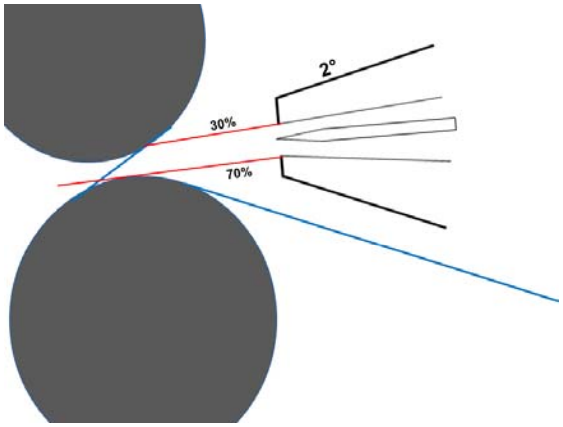




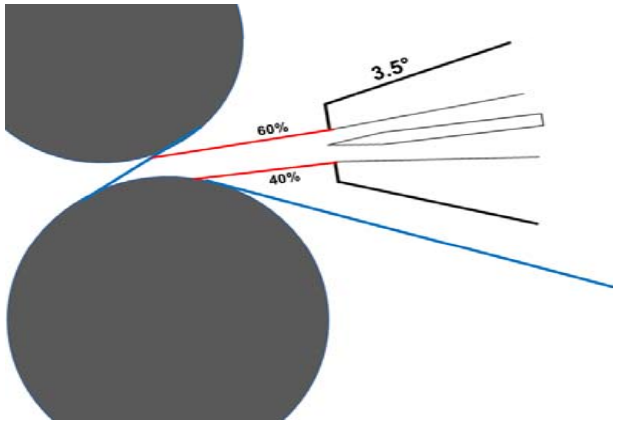
- Impingement control critical for good formation
- Jet tangential to drainage surface
- Avoid roll surface impingement
- Avoid mixing stratified furnish jets



Stock Splash – Flocculation
Poor Formation

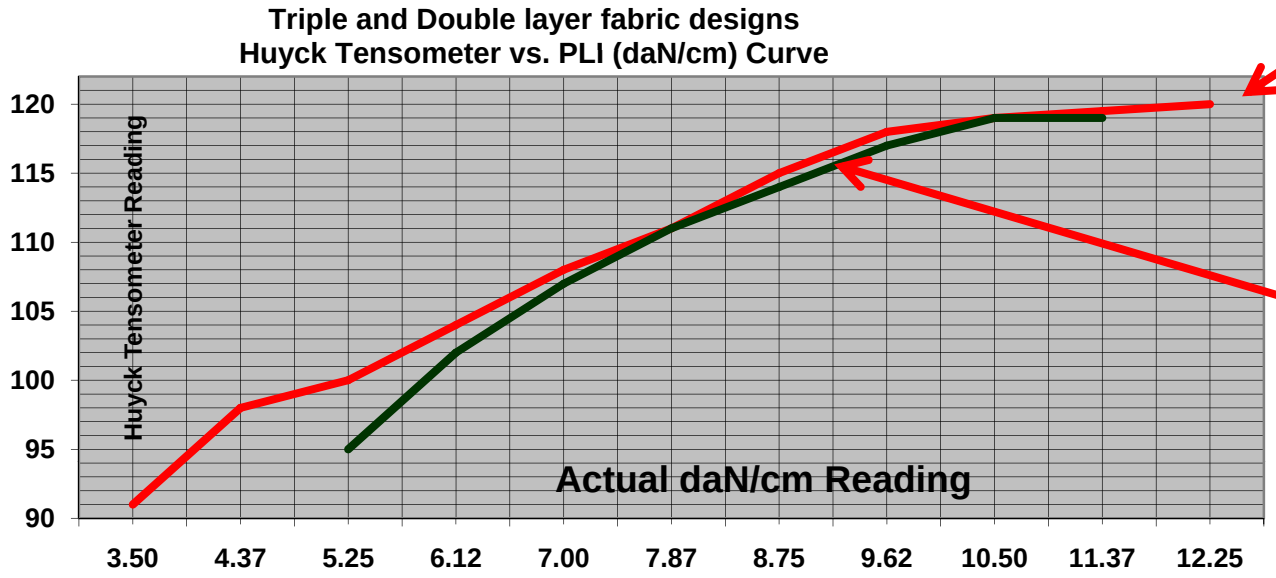


Fingering effect
Ridge the Fabric – Poor Formation

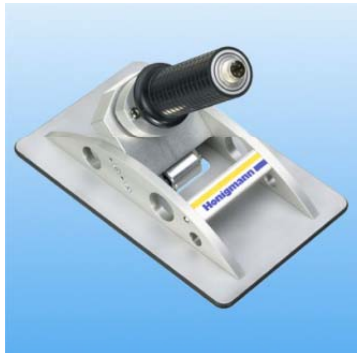


Good Formation

Fabric Tension Measurement



- New tissue formers designed for fabric tensions up to 14daN/cm (80pli)
- Huyck tensometer insensitive above 9daN/cm (60pli)
- Forming results greatly affected by the tension changes

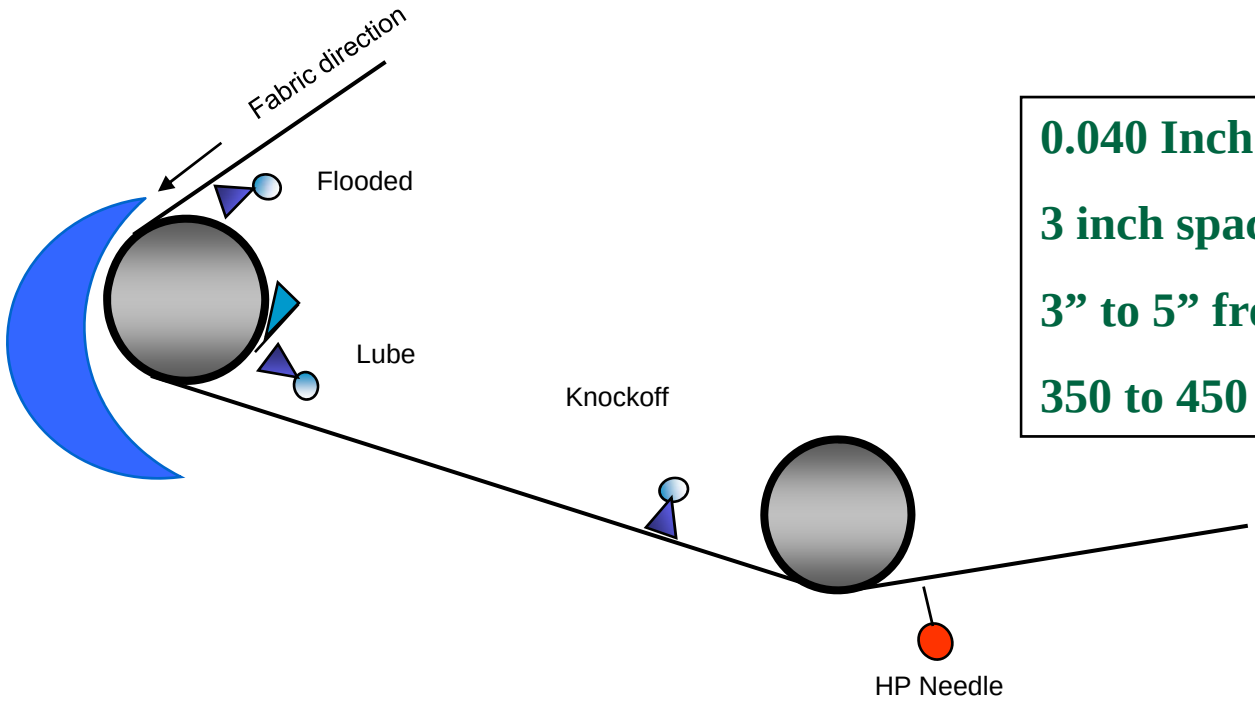


- Digital tensometer accuracy confirmed
- Measure slow or machine crawl speeds for safety,
- Calibrate the on-line system for high speed operation.

Shower Application

High Pressure Needle

- **Forming**
  - HP cleaning of fabric drainage channels
  - Removes contaminates from surface
  - Always locate near a roll for fabric stability
  - Should follow knock off shower when possible



0.040 Inch nozzles

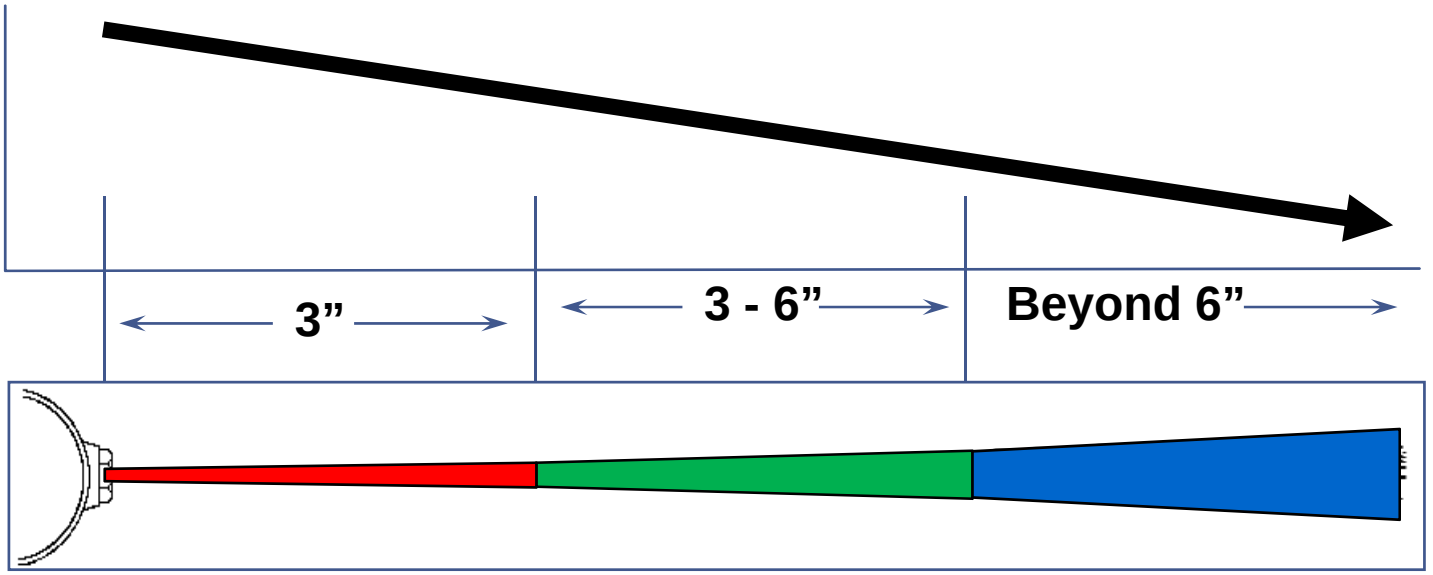
3 inch spacing - Oscillated

3” to 5” from fabric – 0-15 into run

350 to 450 psig pressure

Shower Application

High Pressure Needle Effective Cleaning Distance



Distance: **Comments:**

0 - 3” **Most effective cleaning – Distance & Pressure**
3 - 6” **Cleaning area: Medium cleaning action.**
> 6” **Jet breaks up: Hammer effect fibrillates yarns**

Shower Application

High Pressure Needle Shower Damage **= Warp Fibrillation**

Shower Application

Roll Lubrication Shower

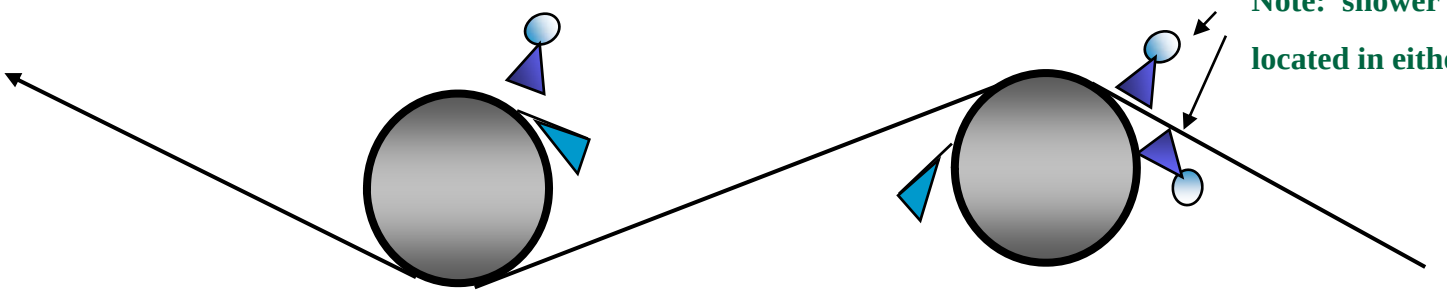
- Lubricates the doctor blade, allowing it to clean better and help reduce wear on the roll cover.
- Located as shown

45 degree nozzles

6” - 8” spacing

8” from roll (100% coverage)

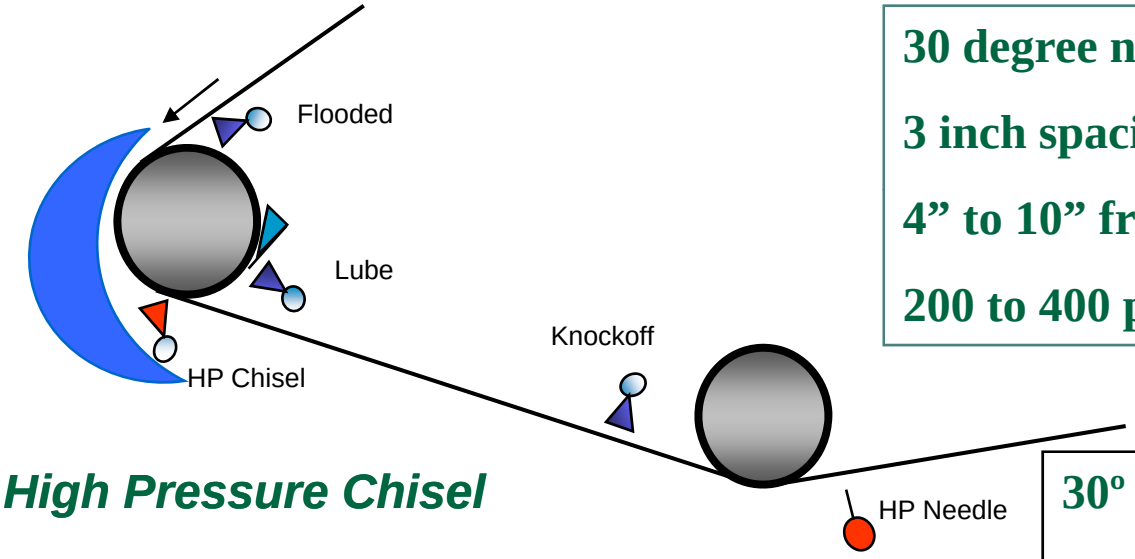
25 to 35 psig pressure



Shower Application

High Pressure Flooded Nip

- Push fibers out to sheet side – improve he chisel and HP showers efficiency
- Flush ash and other contaminates that plug and wear base of the fabric.
- Located in a nip with a good amount of wrap for better hydraulic action.



30 degree nozzles

3 inch spacing

4” to 10” from fabric (double coverage)

200 to 400 psig pressure

High Pressure Chisel

- HP cleaning of fabric drainage channels
- Removes contaminates from surface
- Locate near roll for effective cleaning
- Follow knock off shower when possible

30º Fan nozzles

3 inch spacing - Oscillated

5.5” from fabric

15°- 30º Angle into run

200 to 400 psig pressure

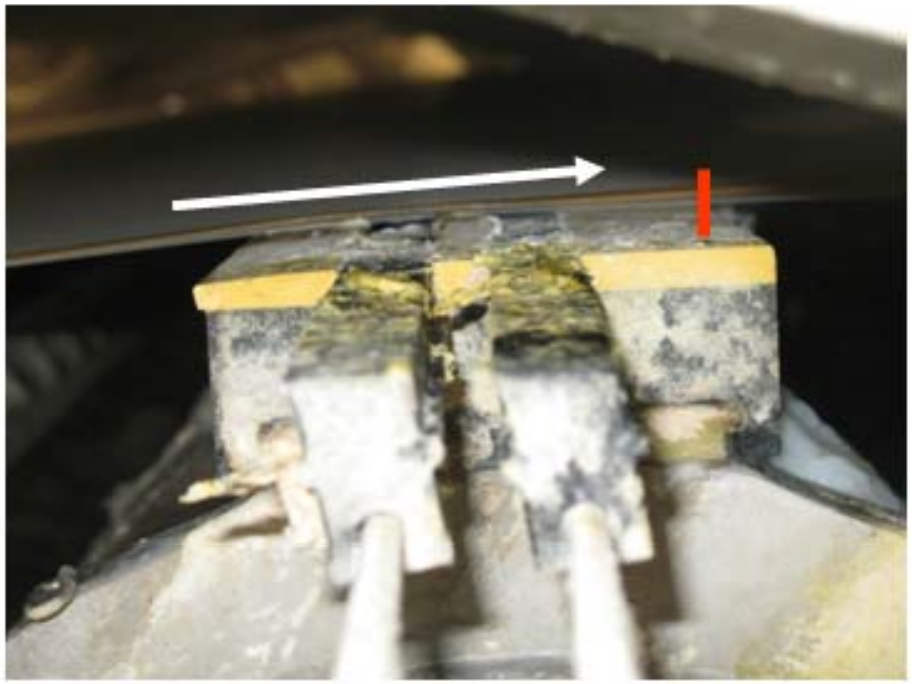
Shower Recommendation for Machine Clothing

No	Application	Function	Shower Type	Space Ø	PSI	GPM / IN	Nozzle	Distance	Water Quality
1	Fiber/Sheet Chisel	Knockoff Contamination	Stationary 30° Fan	3"	200 to 400 PSI	1.0 - 2.0	0.125"	3" - 4" With 30° angle	CWW
2	In-Side HPN	Fabric Cleaning	Oscillating Needle Jet	3"	200 - 300 PSI	.18 - .20	0.040"	3" - 4"	Fresh
3	Sheet Side HPN	Fabric Cleaning	Oscillating Needle Jet	3"	200 - 300 PSI	.18 - .23	0.040"	3" – 4"	Fresh
4	Flooded Nip	Knockoff Contamination	Stationary 25° Fan	3"	150 to 250 PSI	2.0 – 3.5	0.141"	4" - 6"	CWW <150-PPM
5	Lube Shower	Lubrication	Stationary 45° Fan	6" - 8"	25 - 30 PSI	.07 - .09	0.055"	6" – 8"	CWW
6	Headbox Apron	Fiber Build up Removal	Stationary 45° Fan	6"	30 - 40 PSI	.06 - .07	0.055"	8"	CWW
7	Release Shower	Coating Application to Fabric	Stationary 45° Fan	6"	40 - 60 PSI	.07 -.09	0.055"	8"	N/A
8	Tail Cutter	Threading the Sheet	Intermittent Needle Jet	N/A	60 - 80 PSI	1.5 - l/min	0.040"	5" - 6" Distance With 5° angle into Run	Fresh
9	Suction Breast Roll	Cleaning Contamination	Oscillating Needle Jet	3"	350 - 600 PSI	.21 - .25	0.040"	4"	CWW
10	Chemical	Cleaning	Oscillating 45° Jet	3"	40 - 60	Calculate	0.094"	4"	Fresh
11	Wire Edge Cleaning	Edge build-up	Stationary Fan 45º Tilt	N/A	150 – 200 PSI	Calculate	Calculate	3"	CWW
1	Edge Cooling Sprays	Cool the edge of the felt	Stationary 45° Fan	2"	15 - 25	.07 -.09	0.055"	4"	Fresh
2	Lube Shower	Lubrication	Stationary 45° Fan	6" - 8"	25 - 30 PSI	.07 - .09	0.055"	8"	CWW
3	Flooded Nip	Knockoff Contamination	Stationary 25° Fan	3"	150 to 250 PSI	2.0 – 3.5	0.141"	4" - 6"	CWW <150-PPM
4	In-Side HPN	Felt Cleaning	Oscillating Needle Jet	3"	200 - 250 PSI	.17 - .20	0.040"	3" - 4"	Fresh
5	Vacuum Box Lube	Lubrication	Oscillating 45° Fan	6" - 8"	25 - 30	.07 - .09	.055"	8"	CWW
6	Fiber/Sheet Chisel	Knockoff Contamination	Stationary 30° Fan	3"	100 to 200 PSI	0.5 - 1.0	0.125"	3" - 4" With 30° angle	CWW
7	Sheet Side HPN	Felt Cleaning	Oscillating Needle Jet	6"	150 - 250	.06 - .07	0.040"	3" - 4"	Fresh
8	Chemical	Cleaning	Oscillating 45° Jet	3"	40 - 60	Calculate	0.094"	4"	Fresh
9	Tail Cutter	Threading the Sheet	Intermittent Needle Jet	N/A	60 - 80 PSI	1.5 - l/min	0.040"	5" - 6" Distance With 5° angle into Run	Fresh
10	Yankee Coating	Protect Metal Surface	110° Fan & 10° Off Center	6"	50 - 90	3' / sec	0.62"	4" - 7"	Fresh

Transfer Geometry

Observations

Separation angle may need to be re-evaluated.

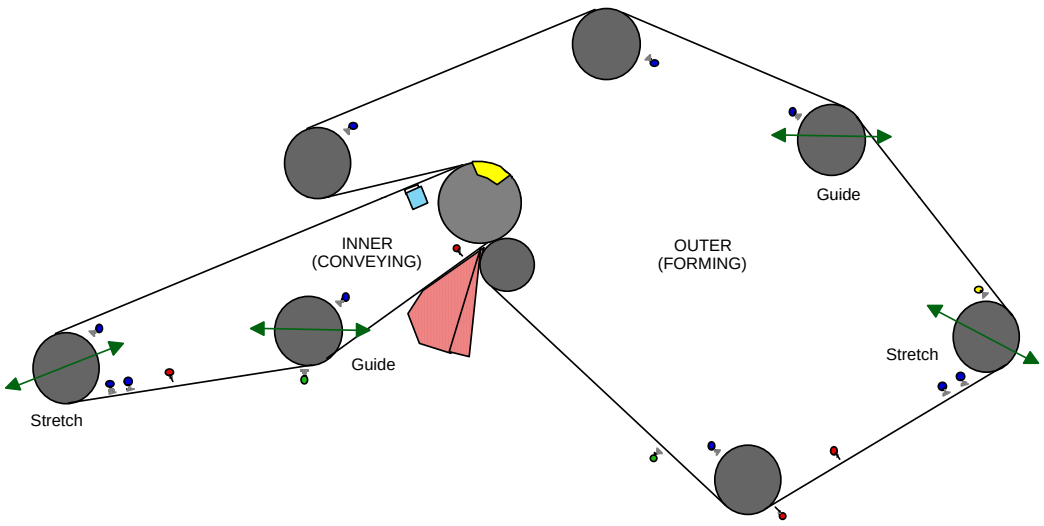


Observations

Bleed thru after transfer, notice carry back on outer fabric above.

Recommended Separation angle 3º-7º

Twin Wire Former



Fabric Requirements

Outer Position:

Fast Drainage

High Fiber Support

High Fabric Stiffness and Stability

Low Fabric Stretch

Easy to Clean

Inner :

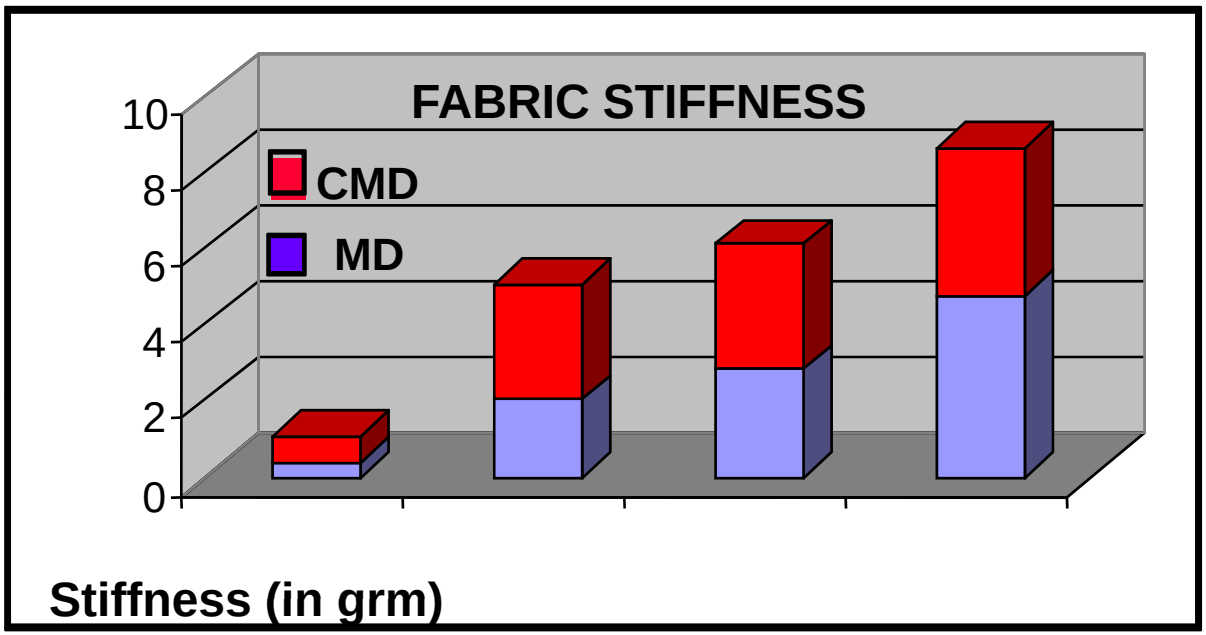
Easy to Clean

Low Fabric Stretch

Good Durability for Life

High Fiber Support (TAD and Suction)

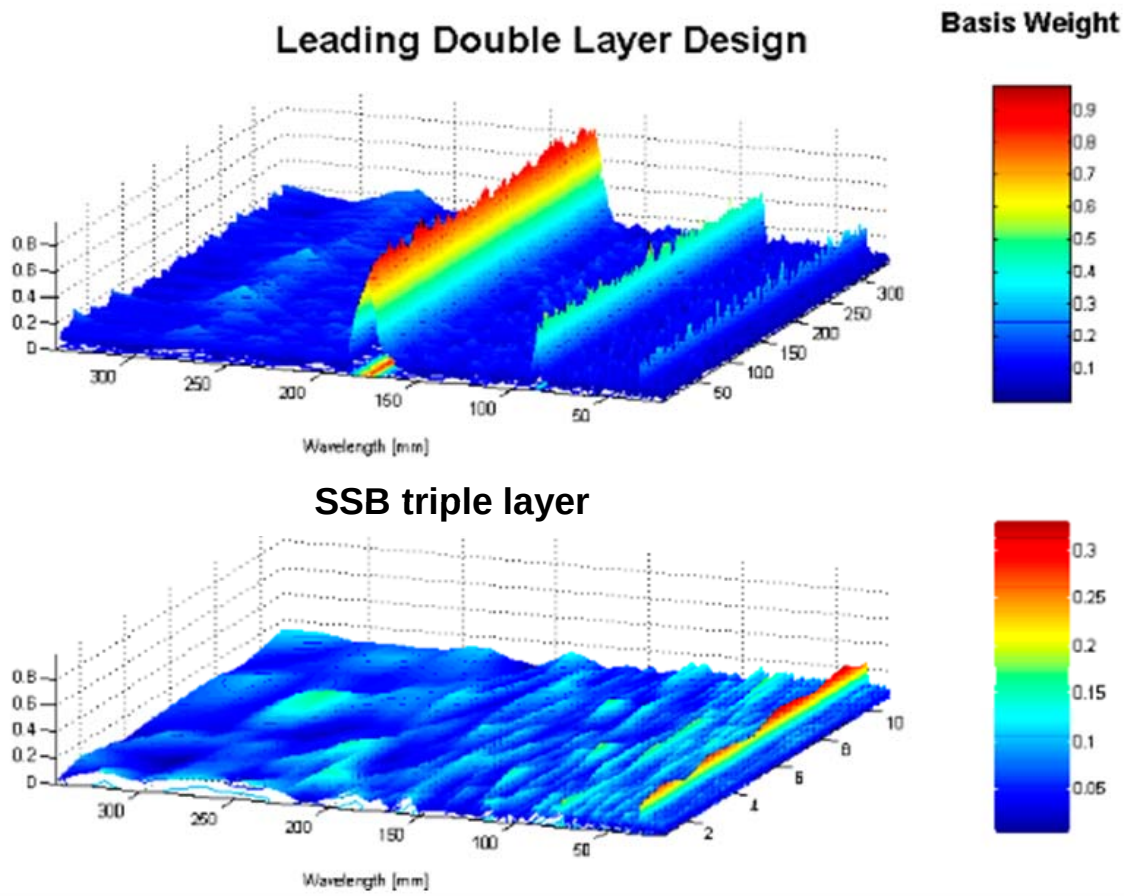
Stiffer fabric means better CD profile!



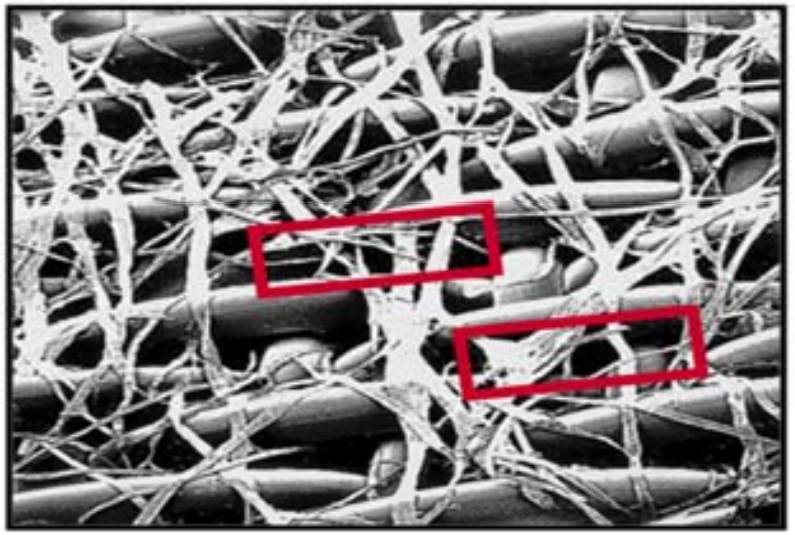
Single Layer | ES Double Layer | Std Triple Layer | SSB Triple Layer

Fabric stiffness has become more important with new ultra dilution head boxes (up to 200 gpm per inch)

Fabric Stiffness = Tissue Uniformity



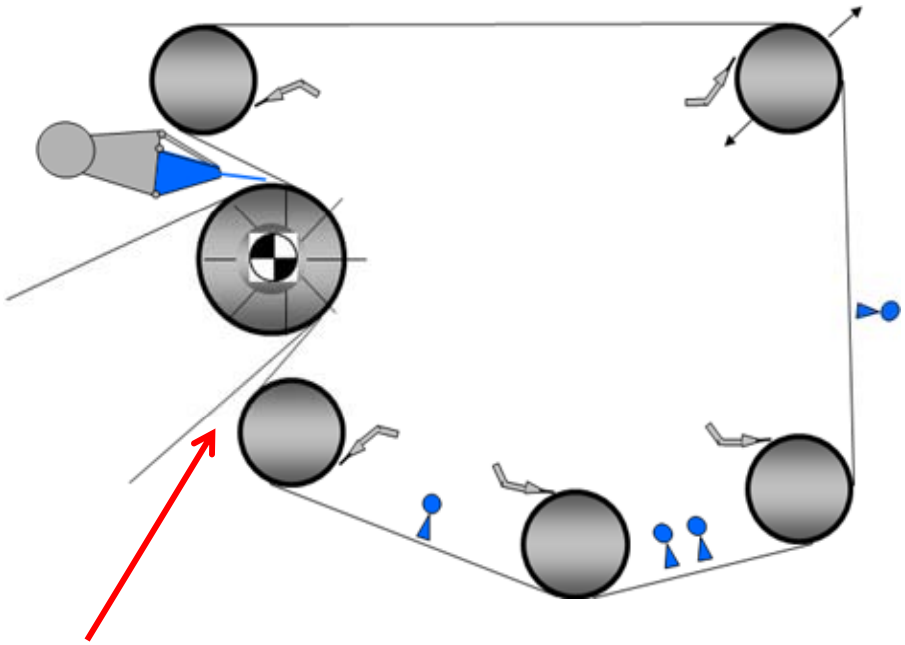
Fabric Design Impact on Tissue Sheet Formation



Same fiber, same fabric....different results...Why?

- Frame **orientation** is different
- CD orientation is critical

Crescent Former



Recommended separation angle 6º- 6½º

Fabric Requirements

Width Stability – Sheet Width Control

High Fabric Stiffness – CD Profile

Fast Drainage – High Speed Operation

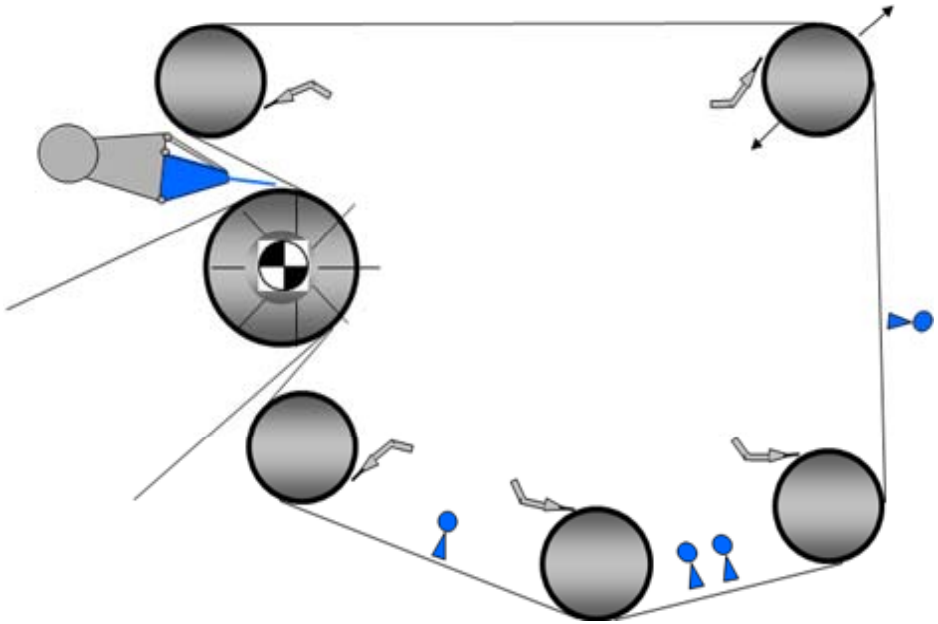
High Fiber Support- Formation and Retention

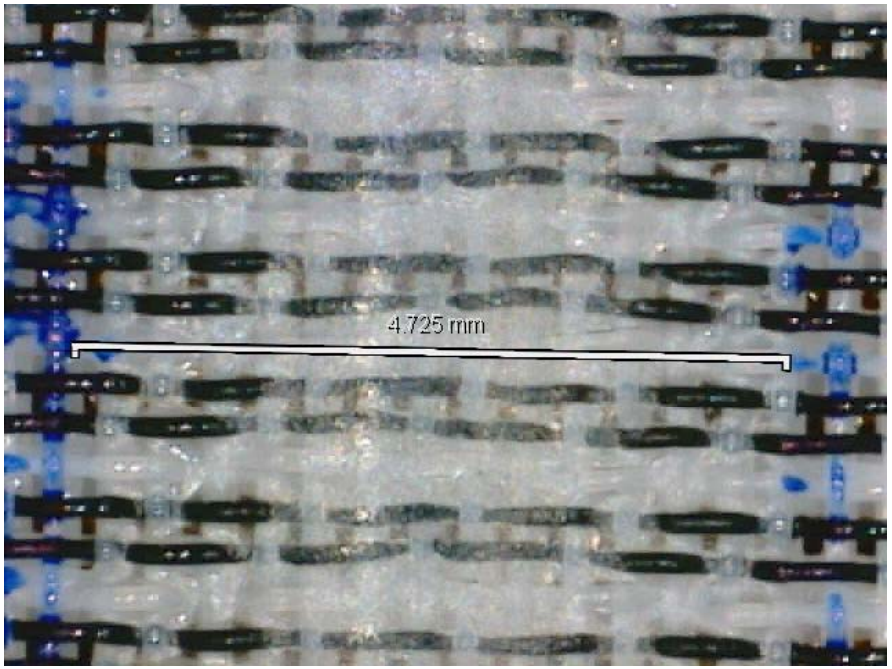
Low Fabric Stretch – High Tension Operation

Easy to Clean – Efficient Showering

Low Water Carry back – Dry Return Run

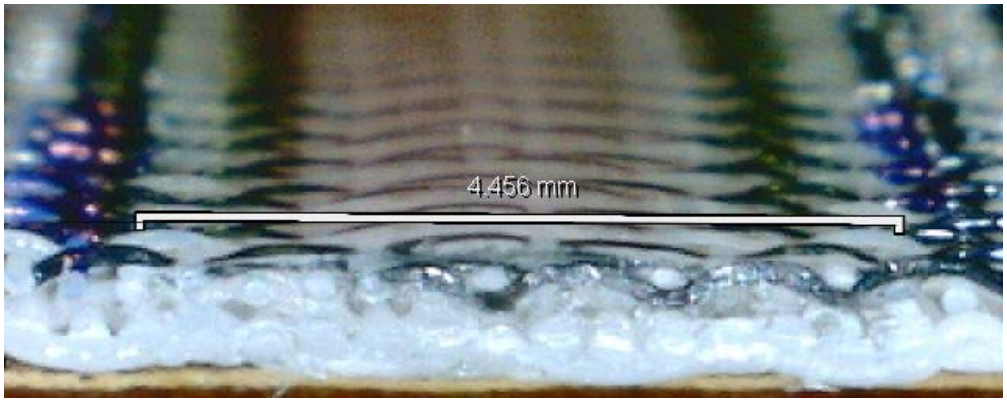
Crescent Former Edge Trim Recommendations





Edge Trim Options

- Trim squirt on Press Felt
- Trim with Wire
  a. Filled edges
  b. Edge beads
  c. No edge discontinuity
  d. 2-Sided trim needs stable width fabric design



Suction Breast Roll Former

Fabric Requirements

Fast Drainage – Very Short Forming Zone

High Fiber Support – Formation and Retention

Low Caliper – Drainage and Showering

Fabric Durability - Life