

# New Forming Fabric Developments & Technology

제지 기술 발전에 따른 신형 와이어의 개발

**Kyung Jun Kim**

김 경 준

**Albany International Korea**

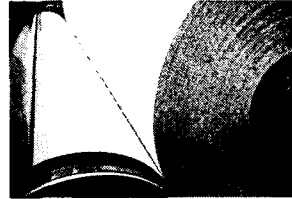
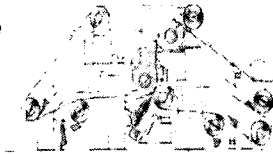
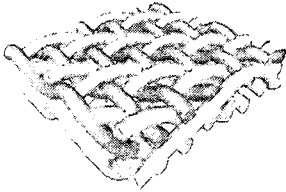
알바니 인터내셔널 코리아



제31회 펄프 · 종이기술 국제세미나



# New Forming Fabric Developments & Technology



2005년 6월 24일  
제31회 펄프 종이기술 국제세미나  
알바니 인터내셔널 코리아 김경준

**ALBANY**  
INTERNATIONAL

**INLINE**

## Contents

### 와이어의 기본 요구 품질 - 탈수/보류/이송

Forming Fabric Basic Demands

- Drainage / Fiber Support / Transport

### 와이어의 종류 - 1중직/2중직/3중직

Forming Fabric Type & Weave Pattern

- Single / Double / Triple Layer

### 신제품 New Product

- SSB (Sheet Support Binder)

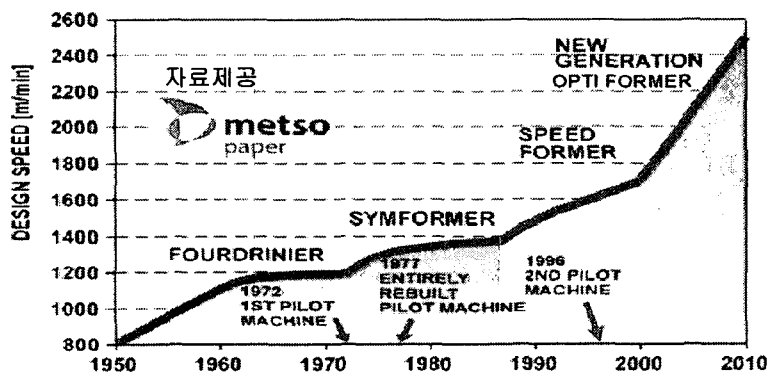
- InLine (WBTL-Warp Bound Triple)

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## Paper Making Technical Trend

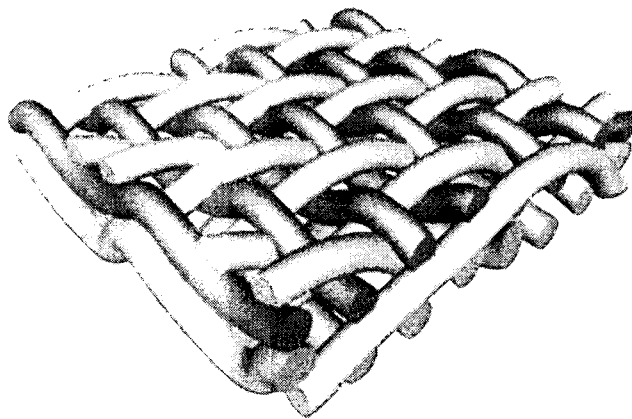
- 생산성 향상 Increase Productivity
  - 초지기의 대형화 / 고속화
- 품질 개선 Improve Paper Quality
  - Rebuild Machine
- 원가 절감 Cost Reduction
  - Pulp, Energy, Chemical.. . . .

## Paper Machine Design Speed Development / Generation



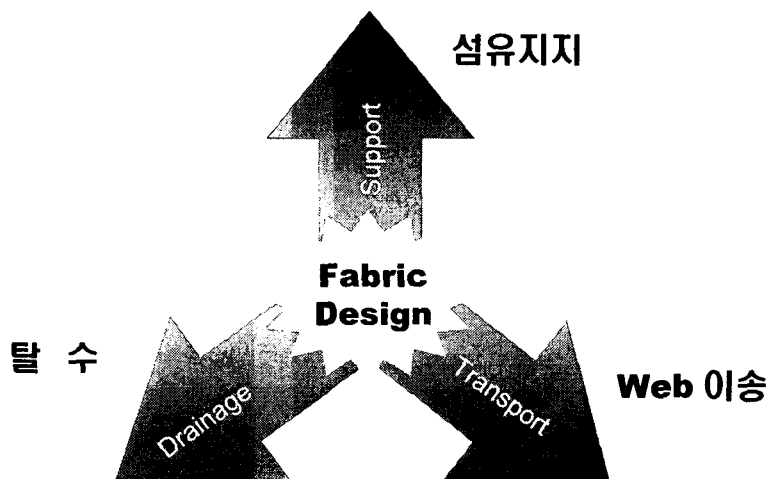
지난 10년간 매년 평균 4%씩 생산량이 증가  
초지기의 속도는 매년 약 30m/min 증가 되었으며  
초지기의 폭은 20년전 대비 2배 증가

# Forming Fabric Basic Demands



ALOW  
AUTOMATIC

## Forming Fabric Design Concept



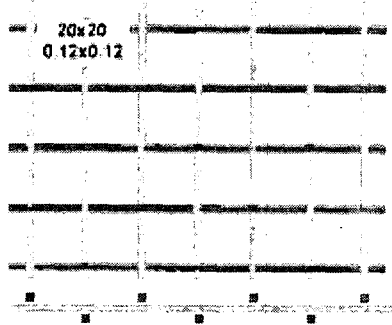
ALOW  
AUTOMATIC

## Maximize Drainage

탈수량 / 탈수 속도

**Removing Large volumes of Water  
In a very short span of time**

농도 1% 내외의 지료를 와이어를 이용해서 탈수  
초기 탈수량 조절이 품질 및 작업성에 큰 영향을 줌



**Max.  
Drainage !!!**

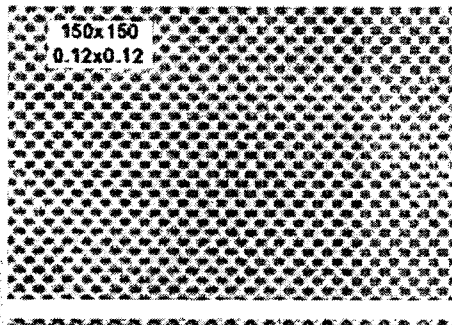
**Fiber Support  
Transport ??**

## Maximize Fiber Support

섬유지지 / 기계적 보류 / 품질

**Fiber Support enhance Sheet Characteristics  
- Formation, Smoothness, Printability .. ..**

최적의 보류, 섬유 분산을 통하여 고품질의 제품 생산



**Drainage & Transport ??**

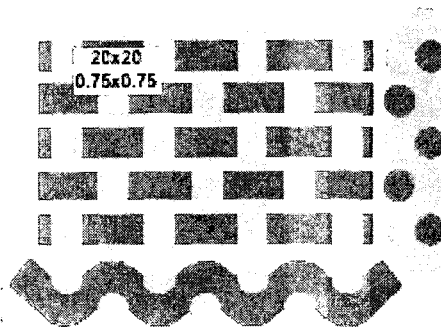
# Maximize Transport

Web 이송 / Tension / 구조적 안정성

**Ability of transfer the sheet to the press part**

**- Stability, Stiffness, Wear Resistance .. ..**

Head Box에서 분출된 자료를 탈수시켜 Web을 형성 Press Part로 이송

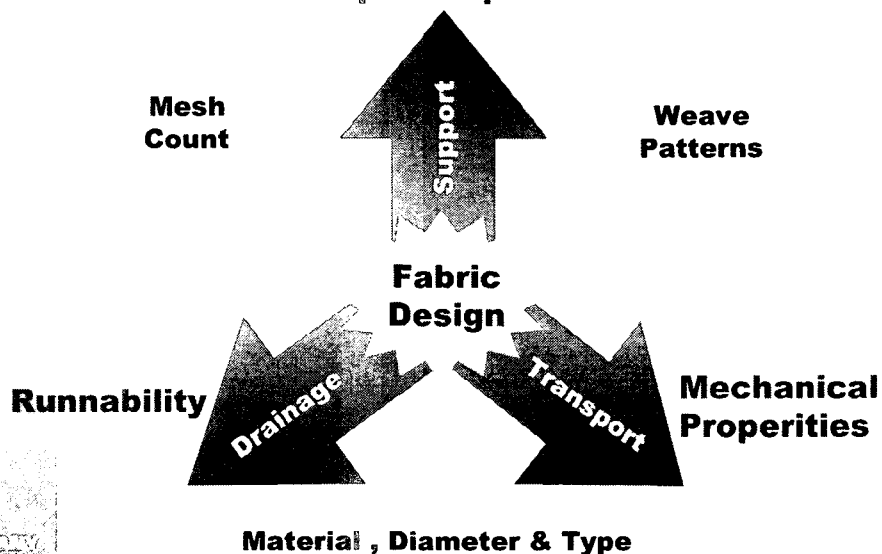


**Sheet  
Profile  
Guiding  
Drive  
Tension !!!**

**Drainage & Sheet Support ??**

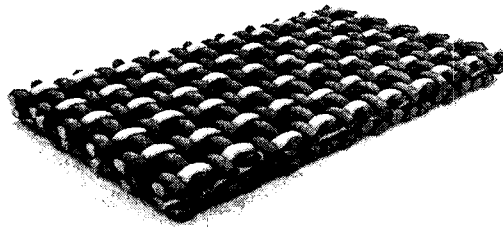
## Forming Fabric Design Concept

Paper Properties



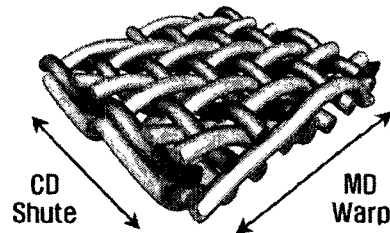
# Albany Forming Fabric Type & Weave Pattern

와이어의 종류 - 1중직/2중직/3중직



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A. J. WEAVER

## Forming Fabric Type



(1) Single layer, 1중직

(2) Double layer, 2중직

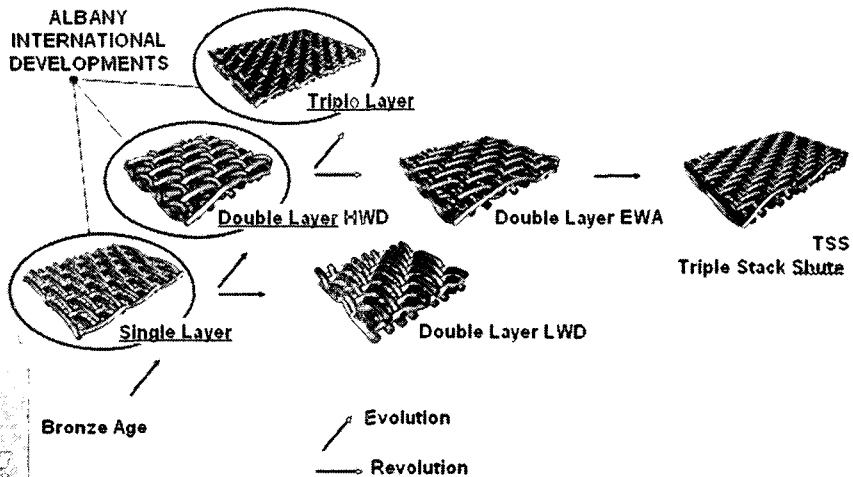
(3) Two and half layer, 2.5중직

(4) Triple layer, 3중직

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A. J. WEAVER

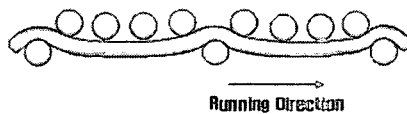


## Forming Fabric Style Development General

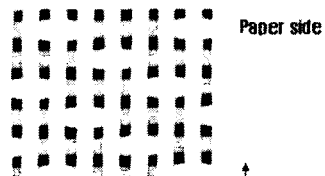
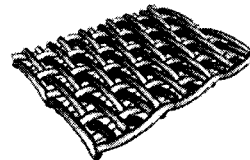


## Forming Fabric Styles Single Layers, 1중직

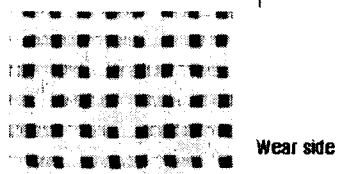
- Characteristics
  - Low warp density
  - 1 warp and 1 shute layer
  - No top or bottom side



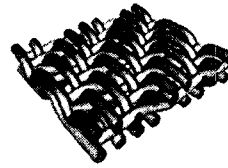
- Properties
  - Dewatering : Very high
  - Fibre support : 50 (0-100)



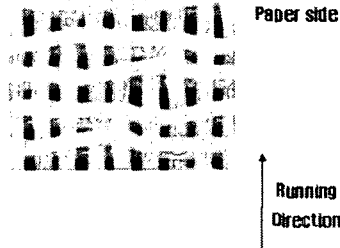
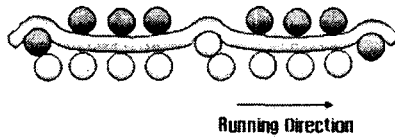
Running Direction



## Forming Fabric Styles Double Layers, 2중직 LWD (Low Warp Density)



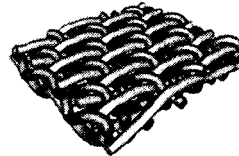
- Characteristics
  - Low warp density
  - 1 warp and 2 shute layers



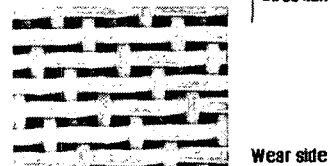
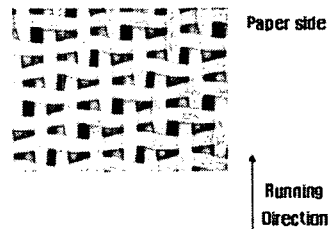
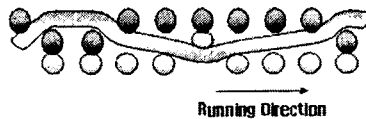
- Properties
  - Dewatering : High
  - Elbre support : 50 (0-100)

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## Forming Fabric Styles Double Layers, 2중직 HWD (High Warp Density)



- Characteristics
  - High warp density
  - 1 warp and 2 shute layers



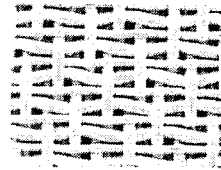
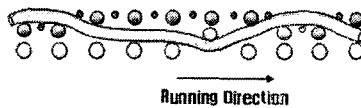
- Properties
  - Dewatering : Average
  - Elbre support : 70 (0-100)

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## Forming Fabric Styles Double Layers, 2.5중직 EWA (Extra Weft Added)

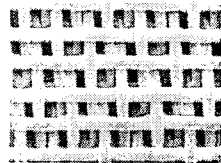


- Characteristics
  - High warp density
  - 1 warp and 2 shuttle layers
  - Additional filler yarn



Paper side

Running Direction

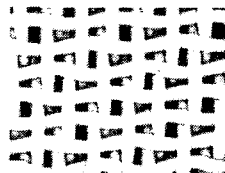


Wear side

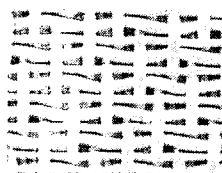
- Properties
  - Dewatering : Above average
  - Fibre support : 85 (0-100)

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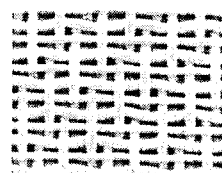
## Forming Fabric Styles Comparison different HWD designs



Double Layer HWD  
2중직



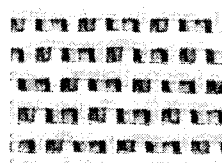
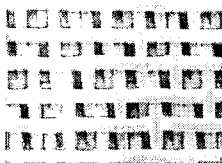
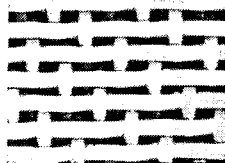
Double Layer EWA  
2.5중직



Double Layer TW  
2.5중직

Paper side

Running Direction



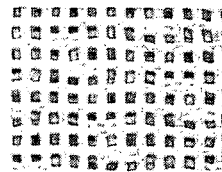
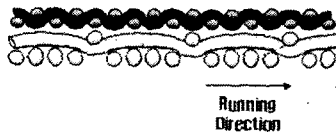
Wear side

ALBANY  
APPROX

## Forming Fabric Styles Triple Layers – conventional 일반 3중직

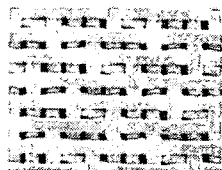


- Characteristics
  - "open" warp density
  - 2 warp and 2 shute layers
  - Binder yarn



Paper side

Running Direction

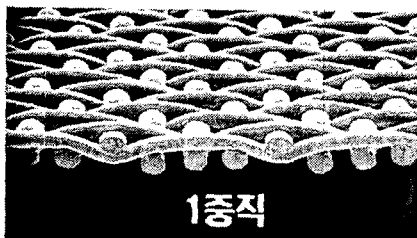


Wear side

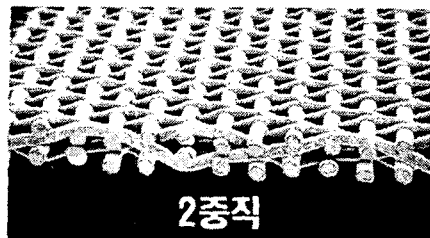
- Properties
  - Dewatering : High
  - Elong support : 95 (0-100)

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AFRICA

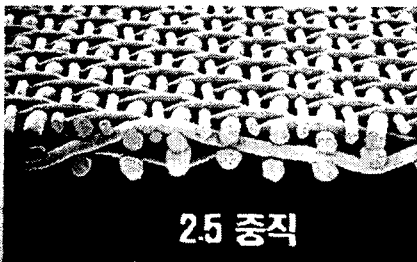
## Forming Fabrics



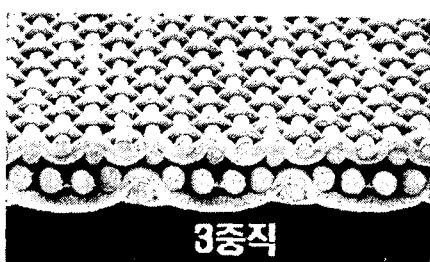
1중직



2중직



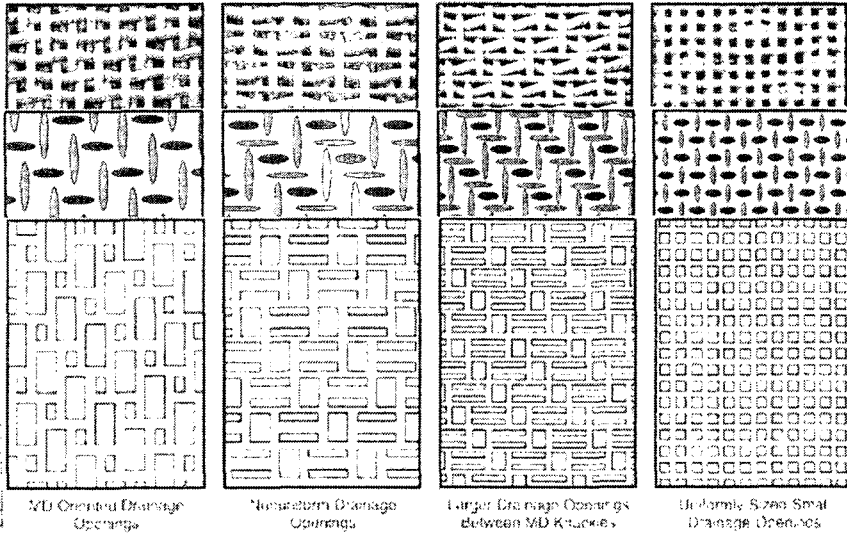
2.5 중직



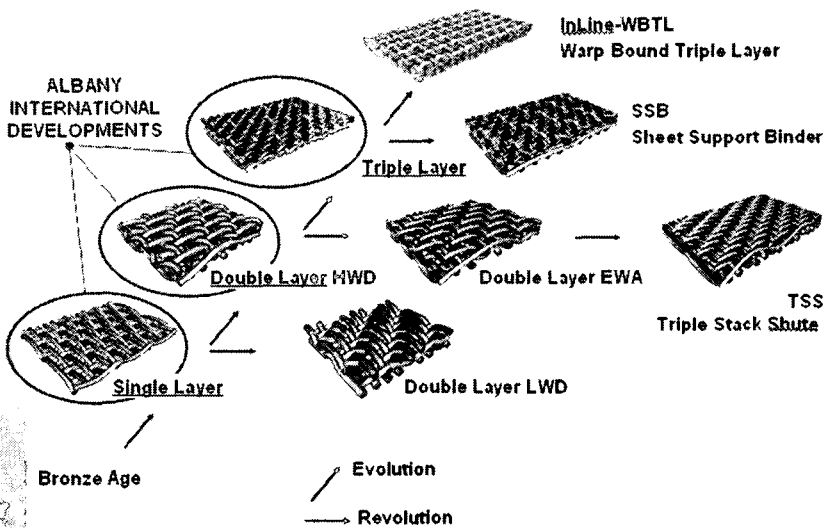
3중직

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AFRICA

## Drainage Opening -Uniformity



## Forming Fabric Style Development General



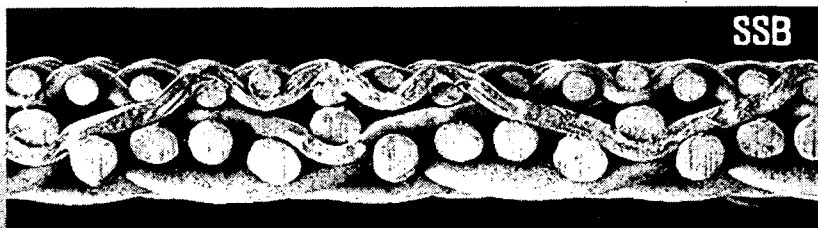
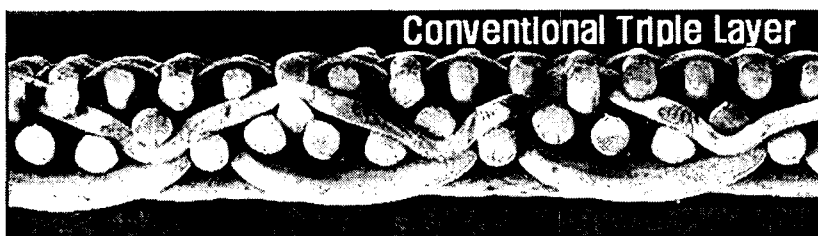


# SSB

*Sheet Support Binding Triple*

## Advanced Triple Layer Forming Fabric

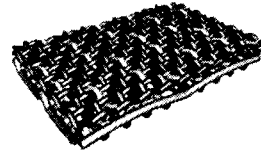
### Triple Layer vs SSB



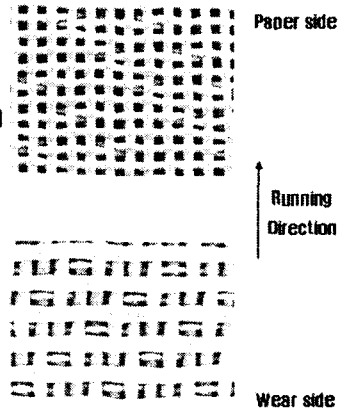
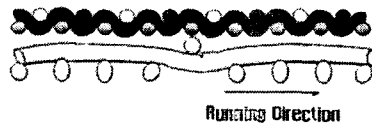
CMD, Binding Yarn

ALBANY  
VALUE CONCEPT

# Forming Fabric Styles Triple Layers SSB (Sheet Support Binder)



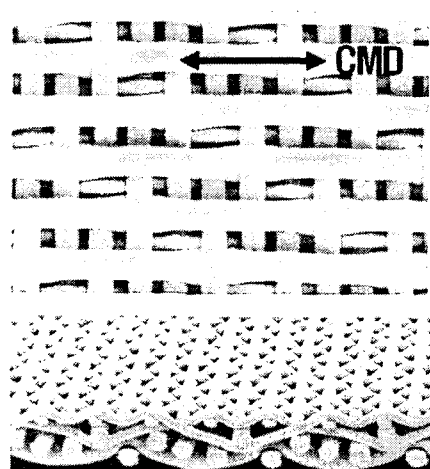
- Characteristics
  - "open" warp density
  - 2 warp and 2 shuttle layers
  - Mutual support/binder yarn



- Properties
  - Dewatering : Very high
  - Fibre support : 100 (0-100)

## SSB Structure

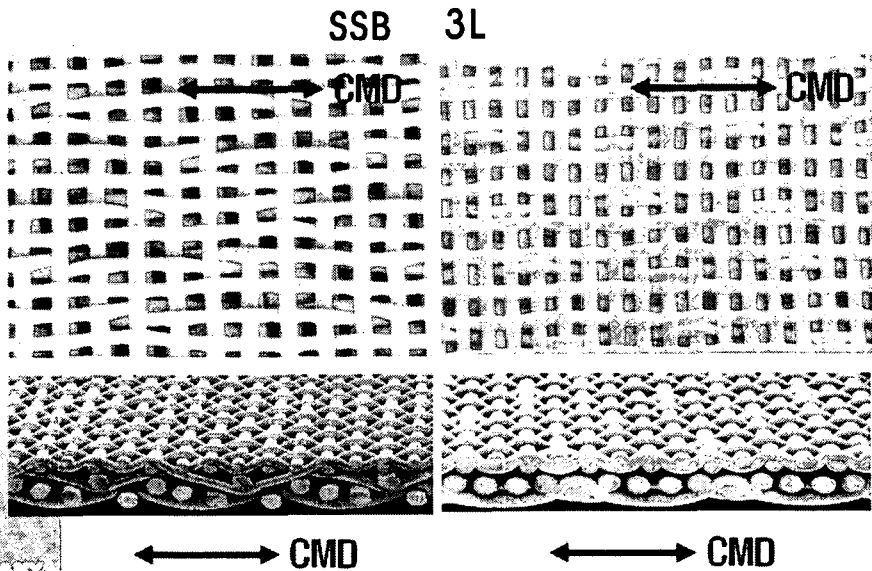
종이면 기계면



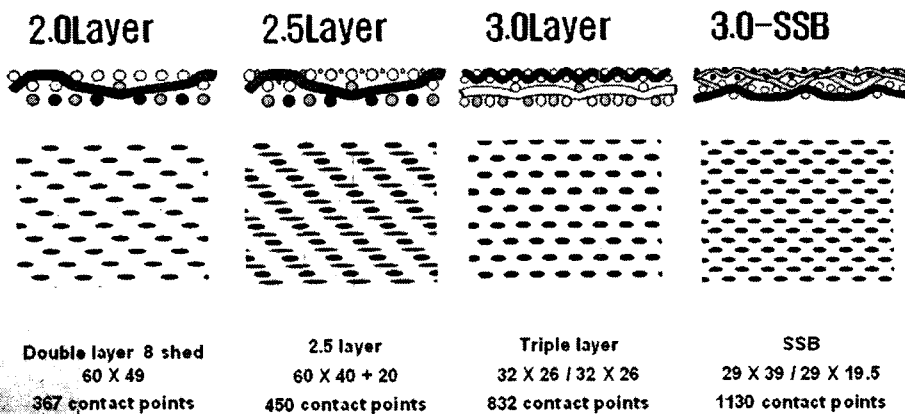
MD

CMD

## SSB vs Triple Layer



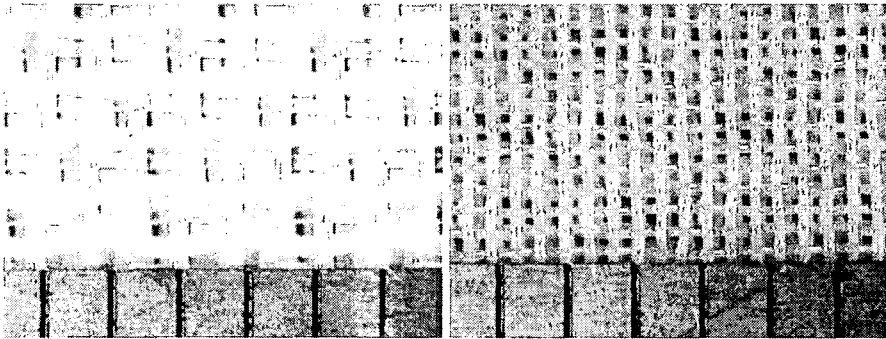
## Sheet Contact Point(SCP) – 2.5L vs 3.0L





## SCP – Sheet Contact Point

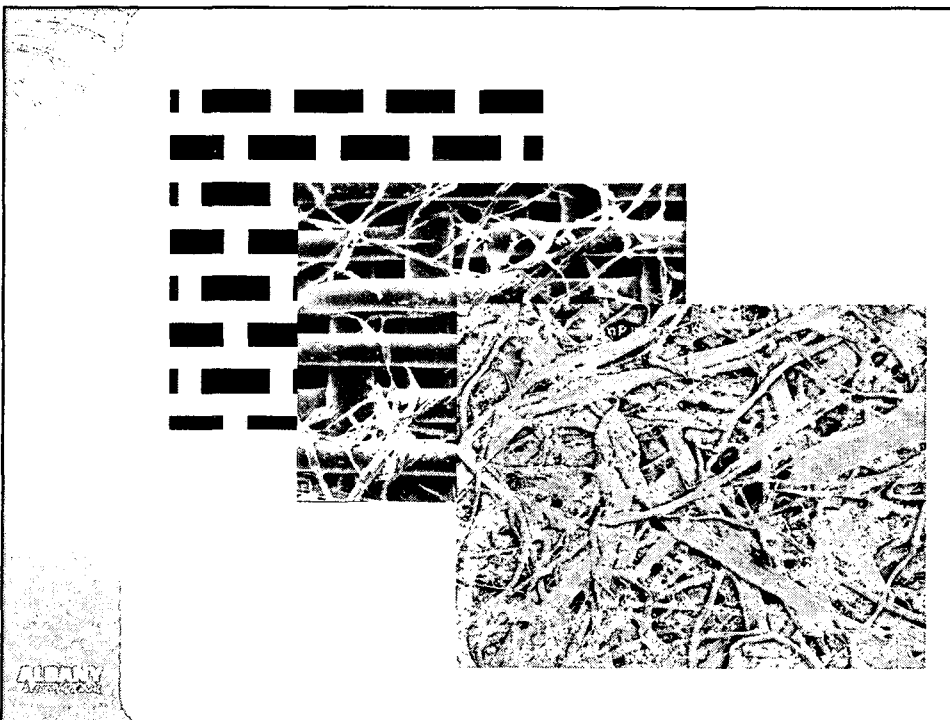
Fiber Support - Mesh x Counts



2.5 Layer

3.0 Layer

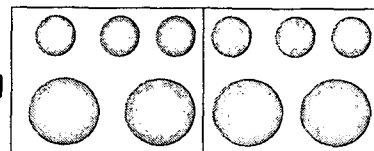
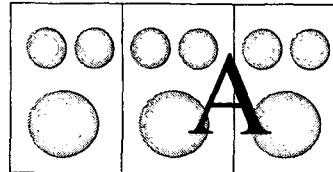
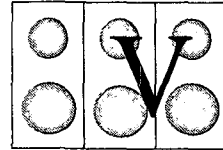
ACI 308



ACI 308

## AI SSB's: Shute ratio

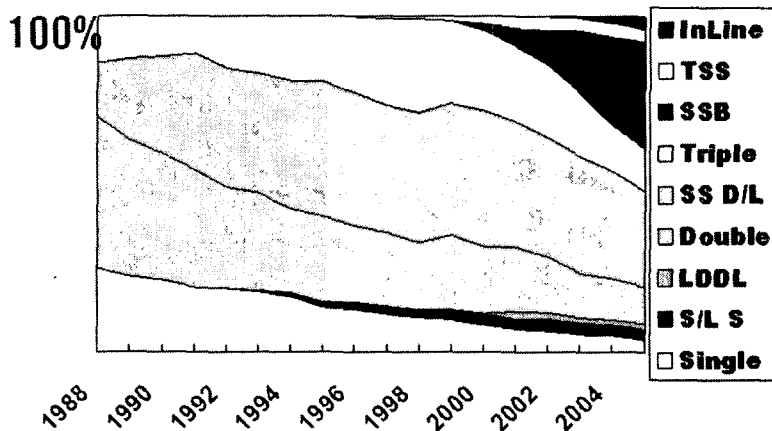
- 1/1 shute ratio: 332
  - Low water carry (void volume and caliper)
- 2/1 shute ratio: 574, 340
  - Very high fiber support (contact points)
- 3/2 shute ratio: 432
  - Very high life time capacity (number of shutes machine side)



Shute(CD Yarn) Ratio

## Global Product mix

1988 to 1Q 2005 (annualized)



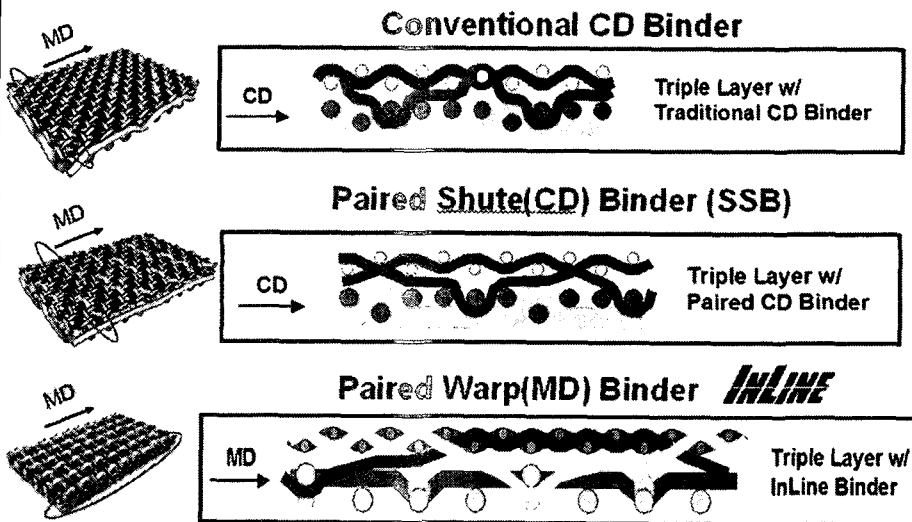


# INLINE

WBTL  
Warp Bound Triple Layer

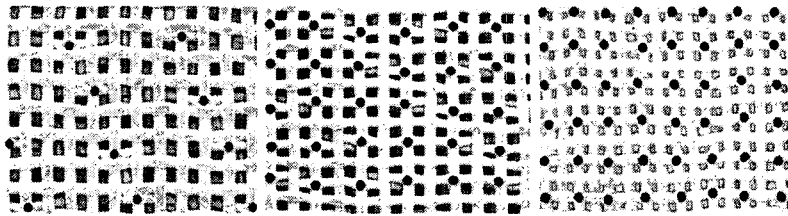
## The New Standard in Forming Fabric Technology

### Triple Layer Binding Technologies



# Triple Layer Binding Technologies

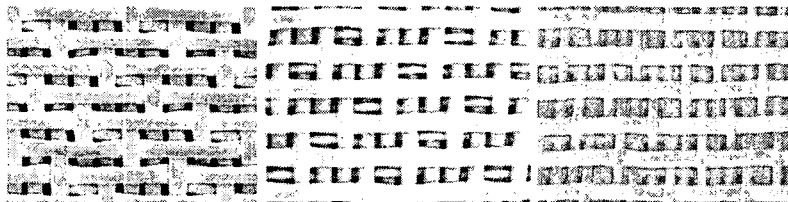
Paper side



Triple layer

SSB

**INLINE**



Machine side

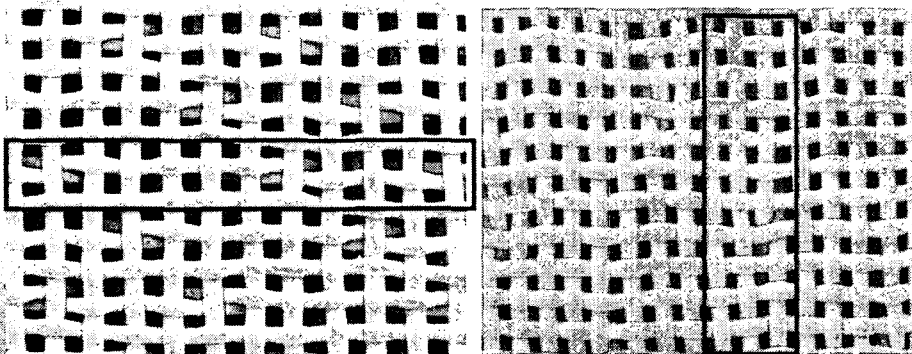
←→ CMD

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# Triple Layer Binding Technologies

SSB

**INLINE**

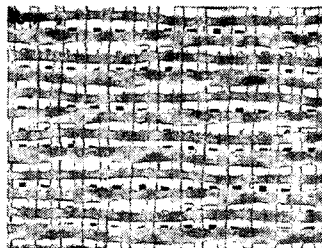
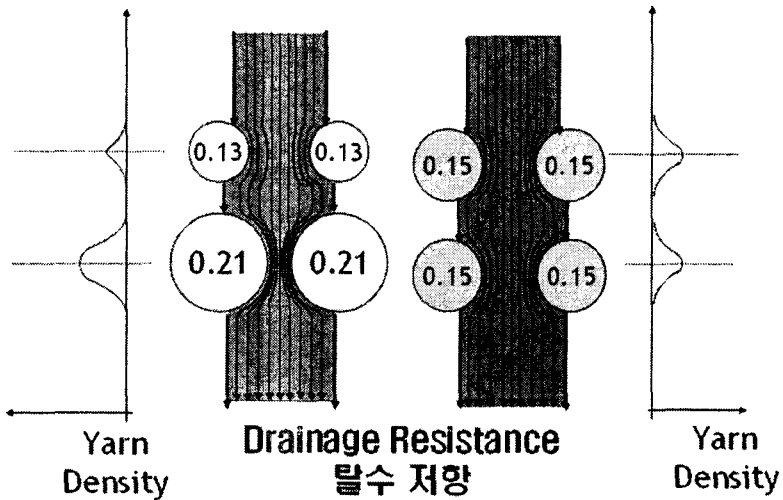


←→ CMD

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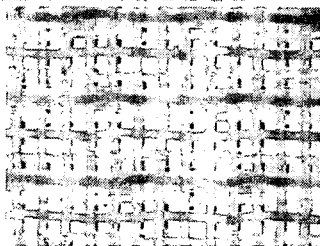
# Stacking & Flow

Warp (MD) Diameters  
"Straight Through Drainage"

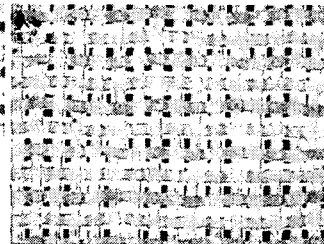


← SSB 2/1, MD stacked

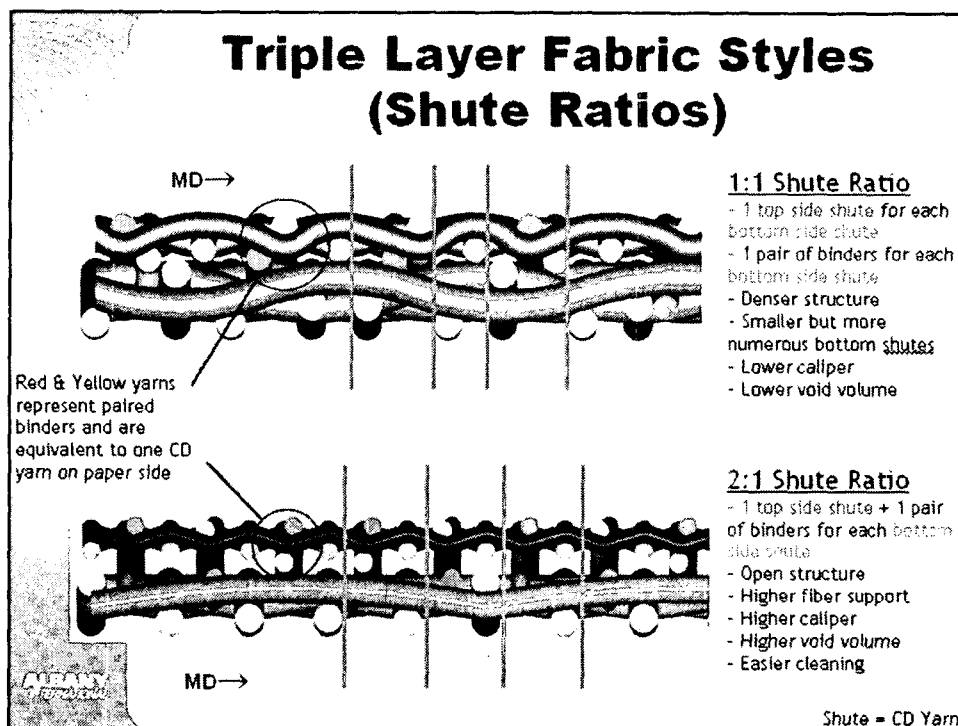
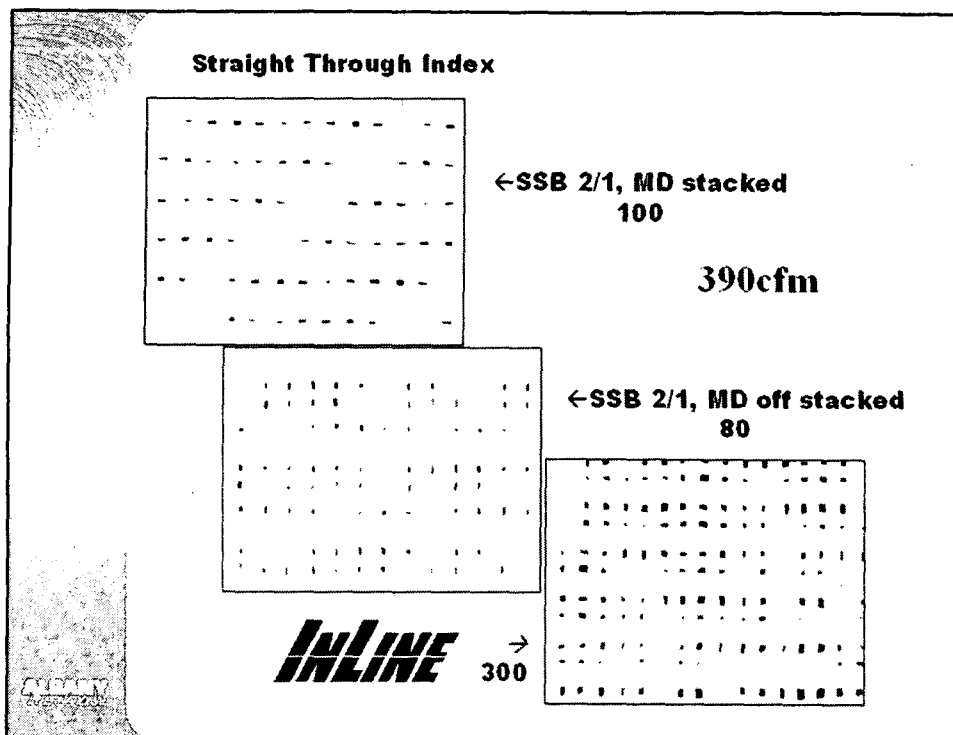
390cfm



← SSB 2/1, MD off stacked



**INLINE** →



## **INLINE** Concepts

### **PRINTLINE** Q588

- 2:1 Shute Ratio
- 0.15 / 0.25, 0.30 or 0.35 mm

### **DRYLINE** Q590

- 2:1 Shute Ratio w/ WS Packing Yarn
- 0.15 / 0.25 (0.13) mm

### **THINLINE** Q592

- 1:1 Shute Ratio
- 0.15 / 0.20 mm

## **INLINE** Concepts

### **PRINTLINE** Q588

- Good drainage capacity
- Excellent structural stability
- Superior life potential

### **DRYLINE** Q590

- Controlled drainage
- Highest sheet support
- Low drag load

### **THINLINE** Q592

- Thinnest/lowest void volume for couch solids

## **INLINE** Product range

### **1/1 Shute Ratio Q592 ThinLine**

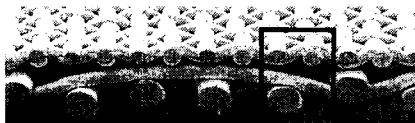


- Feature : Thin fabric, lower void volume
- Benefit : Less water carry, higher dryness
- Basic Specification
  - Machine side diameter : 0.20 mm
  - Contact points : 918 ~ 1,050 points/Cm
  - Caliper : 0.64 mm
  - Air perm range : 320 ~ 450 cfm
- Benefit: Less water carry, higher dryness

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## **INLINE** Product range

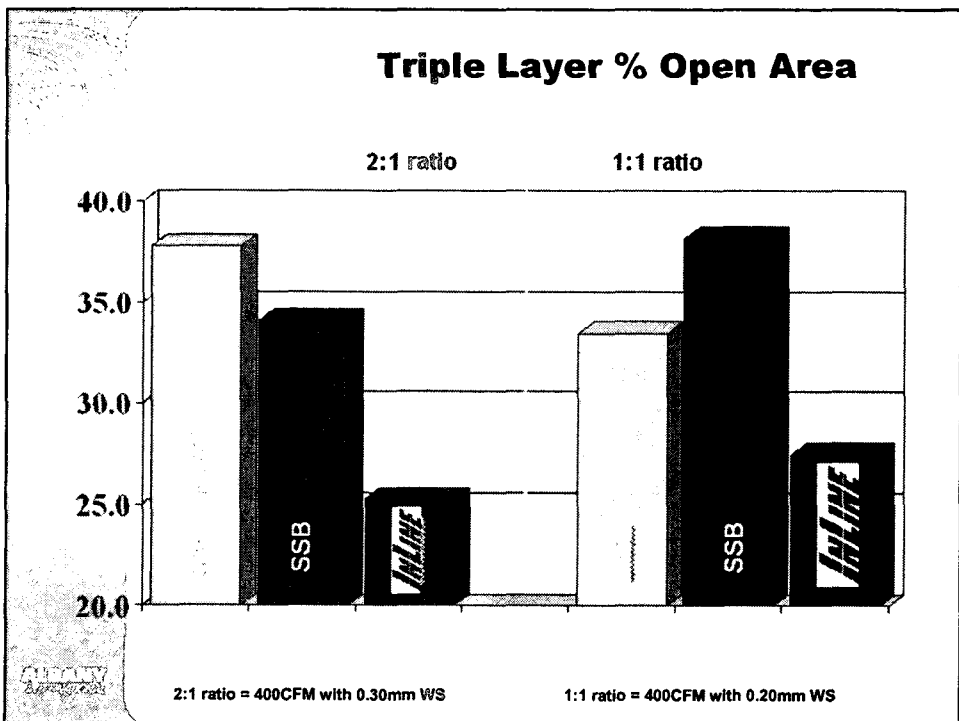
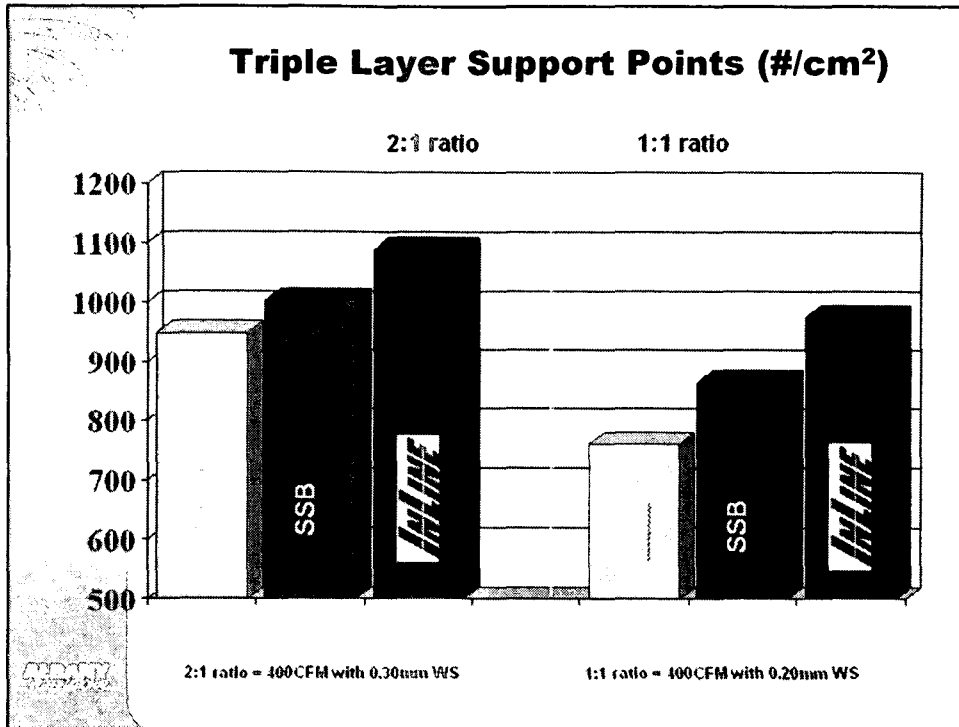
### **1/1 Shute Ratio Q592 ThinLine**

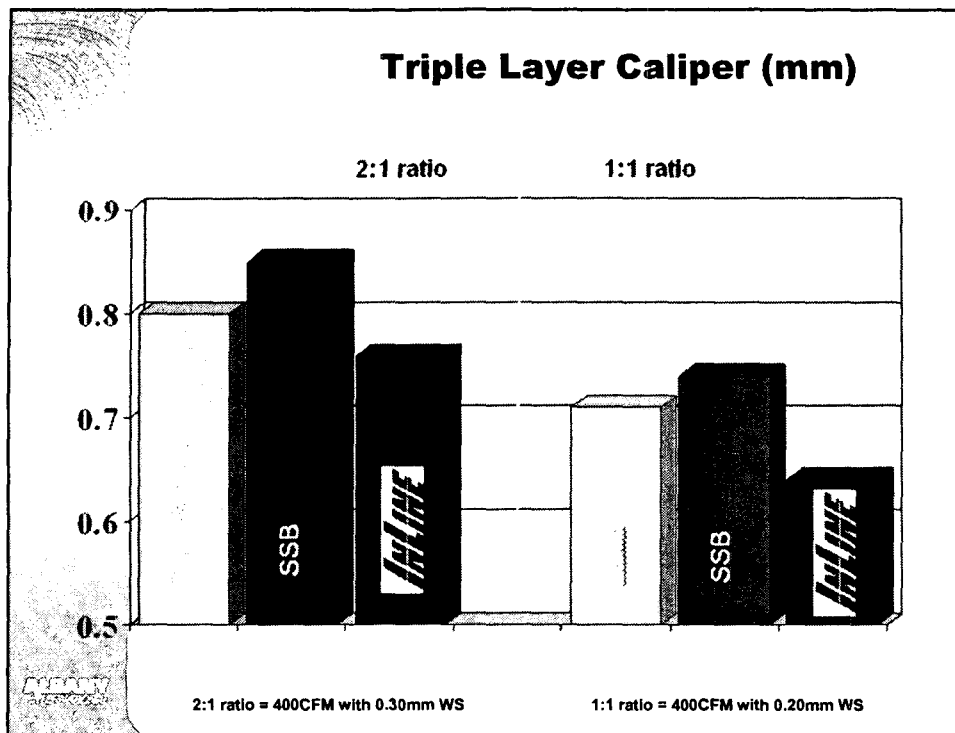


- Feature : Very high number of contact points  
Thicker bottom Shute diameters
- Basic Specification
  - Machine side diameter : 0.25 / 0.30 / 0.35 mm
  - Contact points : 975 ~ 1,190 points/Cm
  - Caliper : 0.73 ~ 0.83 mm
  - Air perm range : 345 ~ 465 cfm
- Benefit : Higher retention, better formation  
and less wire marking, easier cleaning, higher life

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## **INLINE** *Orders Global : March 2005*

- **Orders**

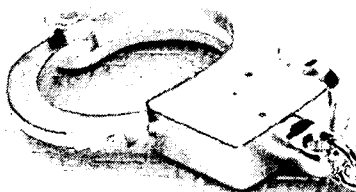
- 220 (47316 m<sup>2</sup>)
- 93 US, 38 Canadian, 28 Finland, 13 Norway, 10 France, 8 Korea, 4 New Zealand, 3 Australia, 3 Indonesia, 3 China, 2 UK, 2 Sweden, 3 South Africa, 2 Malaysia, 3 Mexico, 2 Israel, 1 Italy, 1 Slovakia, 1 Brazil,
- Fourdriniers, hybrids & gap formers
- News, LWC, SC, Fine, Coated Free, Sack, Linerboard

- **Installations**

- 86 Total
- 66 Positions

- **Reorders**

- 67
- 32 Positions

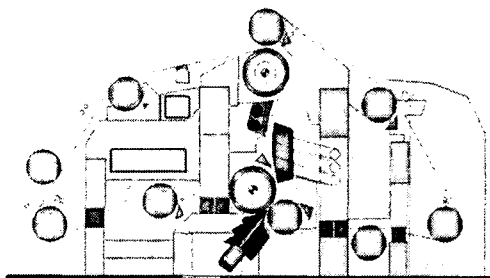


# Break Free.

## **INLINE**

*Are you shackled to out-of-date  
forming fabric technology?*

**USA**  
**Speedformer HS**  
**1,400m/min Newprint**  
**Q588 Conveying**



- Retention Improvement
- Retention aid reduction
- Higher Couch Solids

## **INLINE**

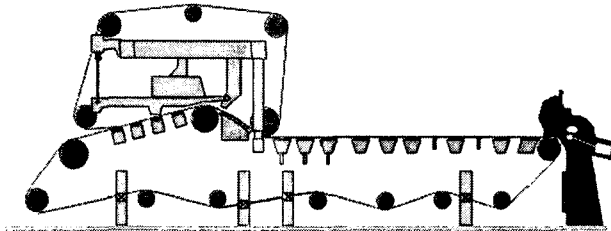
**ARMY**



**ALBANY**  
OFFICIAL



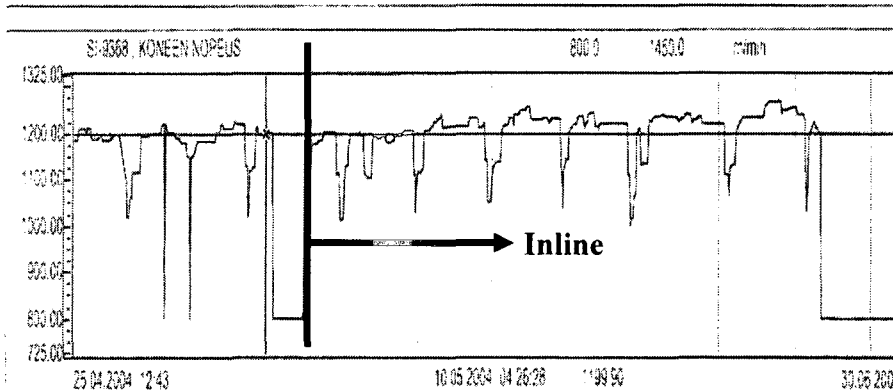
**Finland  
Symformer FR  
1,300 m/mn Copy paper  
Q588 on bottom**



- +40 m/mn machine speed increase  
(speed record at 1,321 m/mn)
- -17% less power consumption
- No fiber carry back
- Better profile

**INLINE**

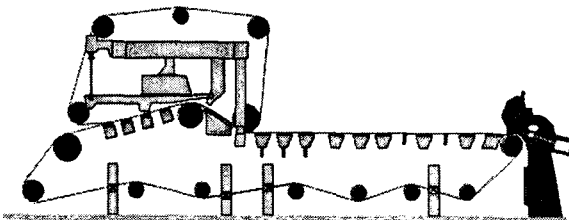
**Finland  
Symformer FR  
1,300 m/mn Copy paper  
Q588 on bottom**



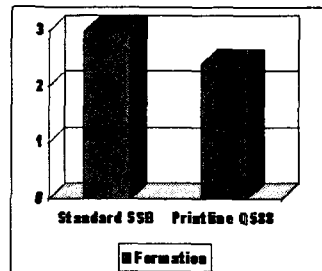
**INLINE**

**INLINE**

**Norway  
Hybrid Former  
1,300 m/mn Newsprint  
Q588 on bottom versus SSB**



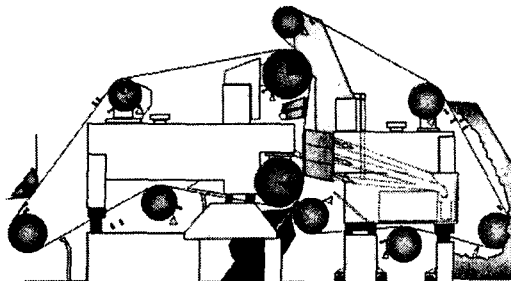
- Improved paper profile
- No fiber carry back, clean run
- Less power consumption
- Better formation
- Better opacity, lower porosity



**ALBERT**  
AUTOMATIC

**Norway  
Speed former HS  
1,300 m/mn Newsprint  
Q588 on bottom versus Q13**

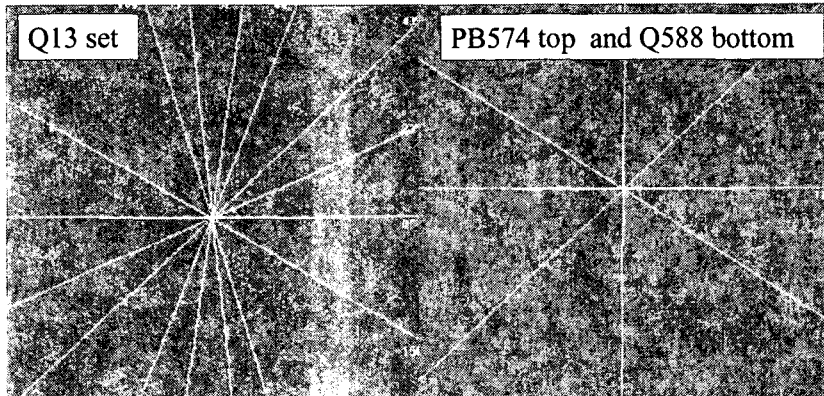
- Good formation
- Better runnability
- Less marking



**ALBERT**  
AUTOMATIC

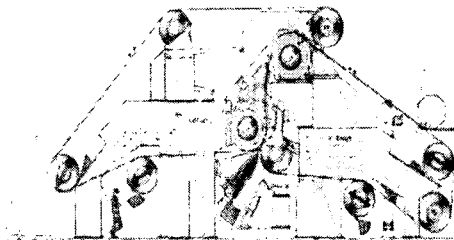
**INLINE**

**Norway**  
**Speed former HS**  
**1,300 m/mn Newsprint**  
**Q588 on bottom versus Q13**



**INLINE**

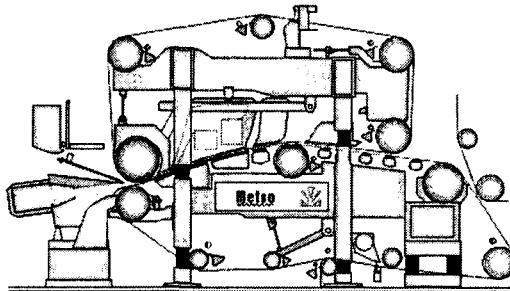
**China**  
**Optiformer LB**  
**1,260 m/mn LWC / Newsprint**  
**Q588 Top and Q592 bottom versus Q13**



- Lower Retention Aids(Higher retention)
- Better formation
- Higher Couch Solids (1.2% higher than 2.0L)
- Good profile

**INLINE**

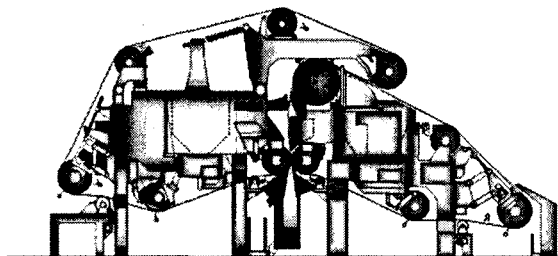
**USA**  
**Speed former HHS-MB**  
**1,220 m/mn Copy paper**  
**Q588 on bottom versus 8 shed DL**



- Life time record
- Better retention
- Better formation
- Higher couch solids

**INLINE**

**USA**  
**Bel Baie III**  
**1,000 m/mn Newsprint**  
**Q592 on conveying**

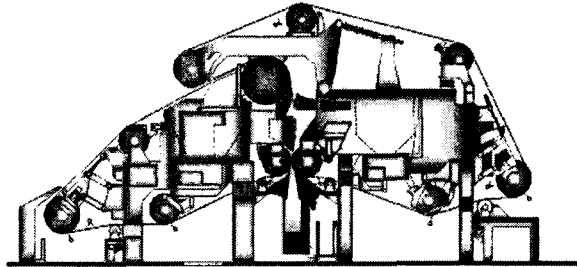


- Better Opacity from 93.8 to 94.2%
- + 2% Higher couch solids (15 to 17%)

**INLINE**



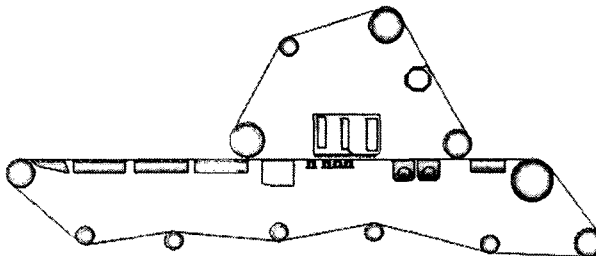
**USA**  
**Bel Baie III**  
**1,375 m/mn Newsprint**  
**Q588 on conveying**



- Reduced breaks
- Improved formation

**INLINE**

**USA**  
**Symformer MB/ top**  
**1,050 m/mn Newsprint**  
**Q588 versus competition SSB**



- Reduce the number of breaks  
 from 1.22 hrs per day to 1.15 hrs / day
- Daily production increases by 7 tons a day

**INLINE**

## **INLINE**

- High Sheet Contact Point
  - Higher OPR, Good Paper Surface
  - Improve Formation
- Low Caliper
  - Good Drainage
  - [High Drainage Eff. at the Vacuum Box]
  - Less Rewetting
- Low Void Volume
  - Less Water Carrying
- ★ MD Drainage Channel

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EVERETT

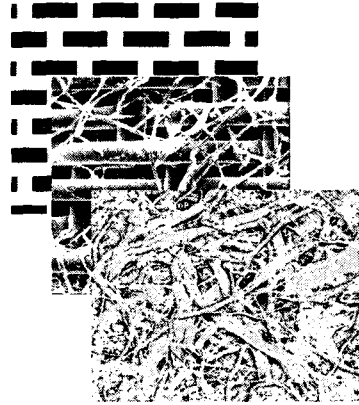
**INLINE**

## **INLINE results**

- Increased 1st pass retention
- Reduction in retention aid usage
- Increased couch solids
- Reduced draws
- Improved drainage
- Good stability
- Excellent structural integrity
- Reduced drive loads
- Clean running

ALBANY  
EVERETT

**INLINE**



## ***Thank You & Question ?***

Albany International Korea  
Forming Technical Application

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