

Wool & Nonwovens

Friday 6th October 2006



AUSTRALIAN WOOL
TEXTILE TRAINING CENTRE



australian wool
innovation
• limited



What is meant by “Nonwoven”

- Nonwovens are textiles formed from fibres or filaments without going through a yarn stage.
- Knits are not woven but they aren't nonwoven
- Nonwovens could be called non-spun except that the fibre manufacturing process is also called “spinning”
- Nonwoven fabrics are produced without knitting or weaving

Nonwoven Processes

- Web forming
- Bonding
- Finishing
- Coloration

Web Formation - Carding

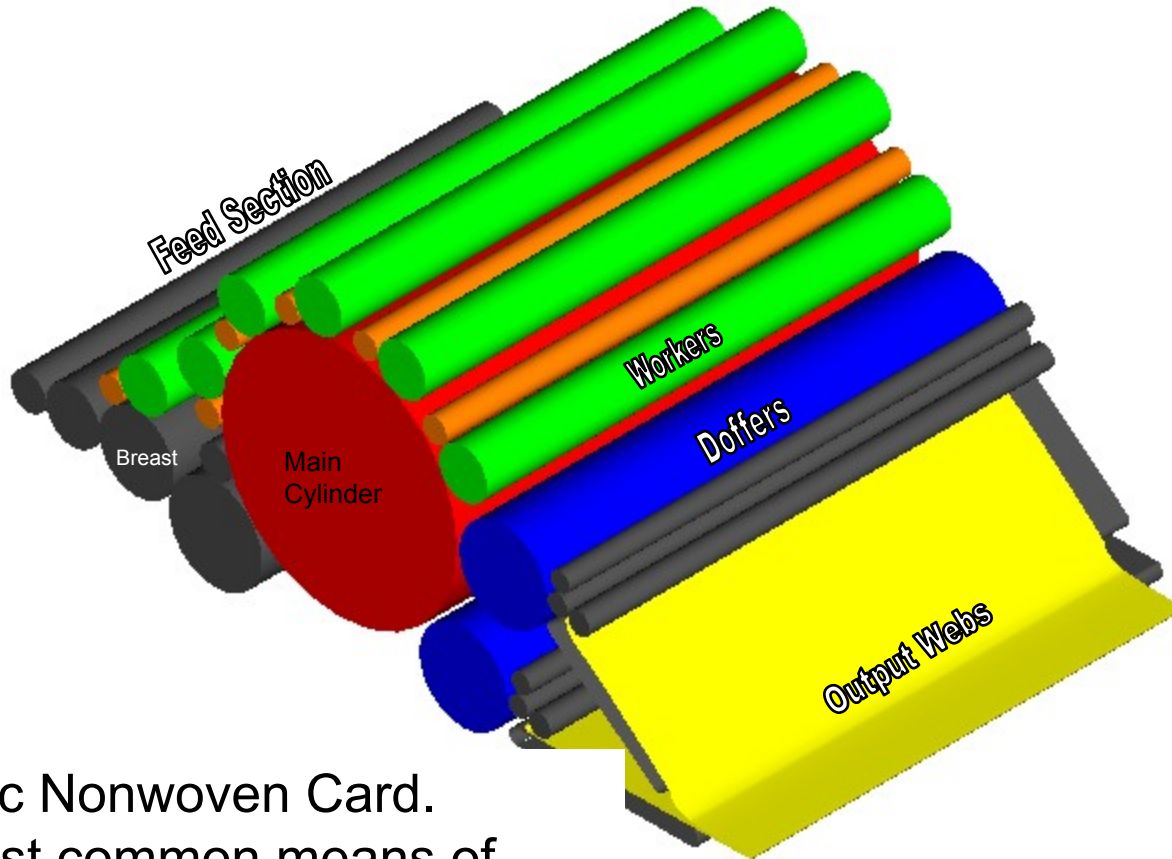
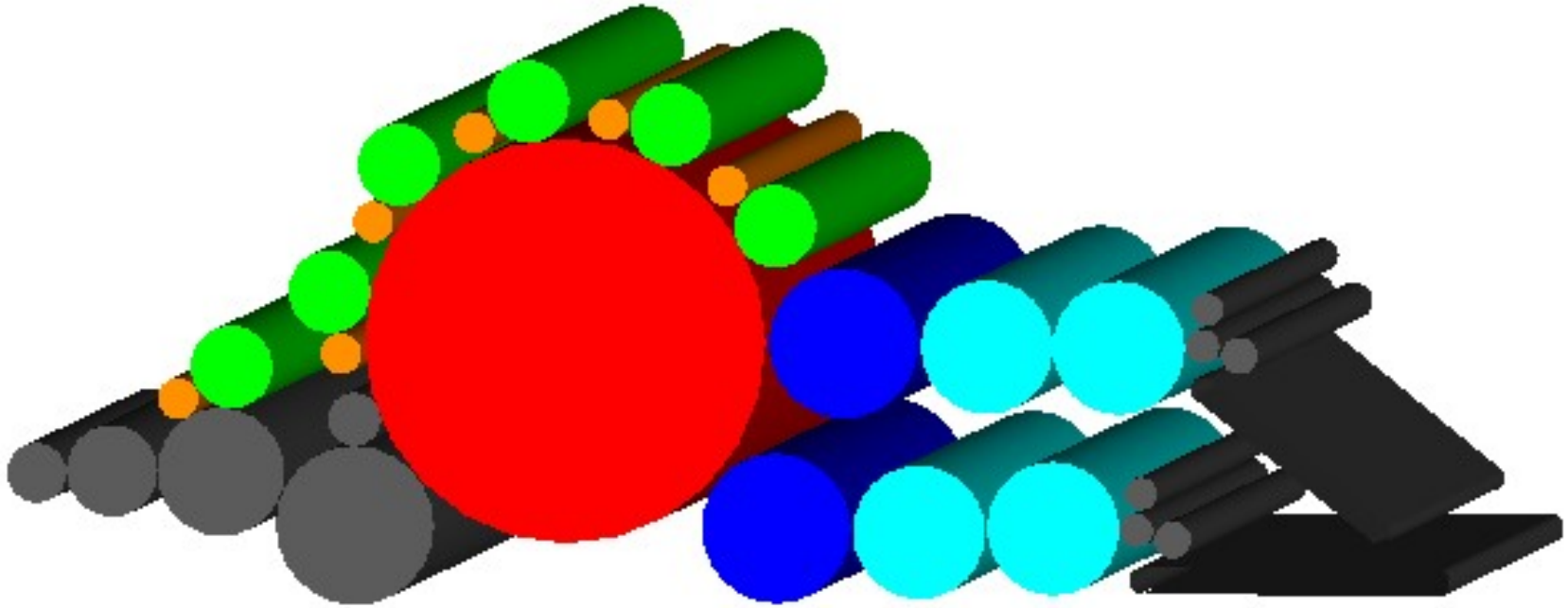


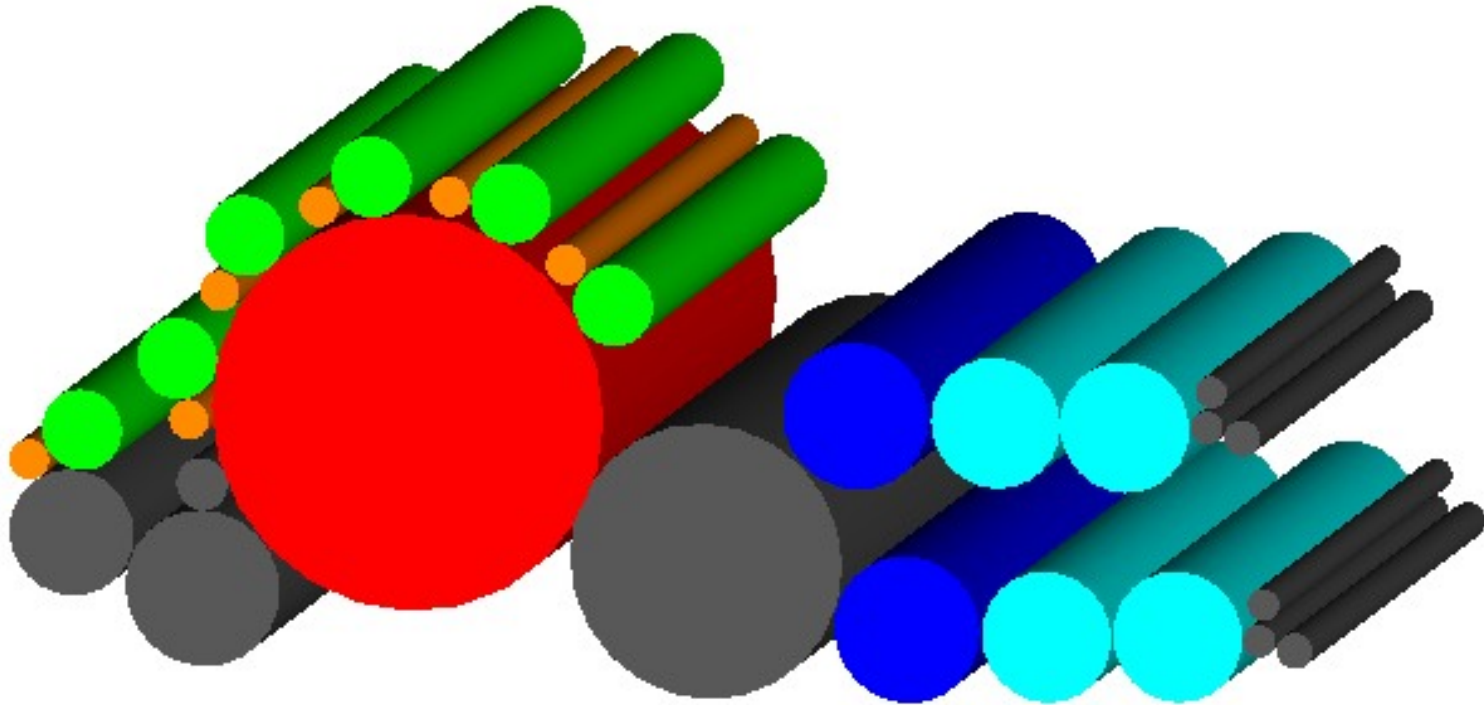
Figure 1. Basic Nonwoven Card.
This is the most common means of web formation.

Web Formation - Carding



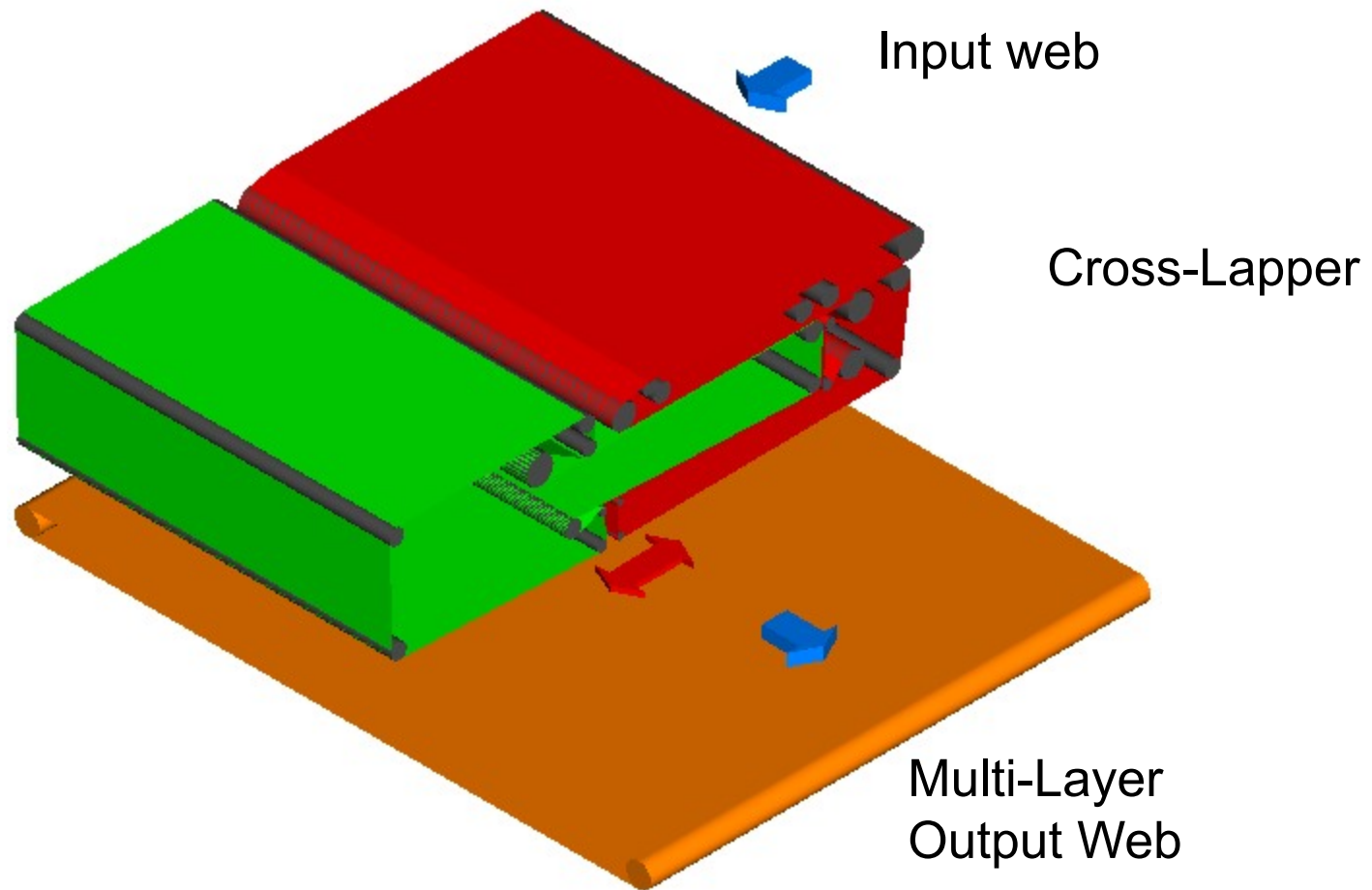
Schematic diagram of a typical nonwoven card with condenser rollers, (eg Thibeau, Spinnbau, FOR)

Web Formation - Carding

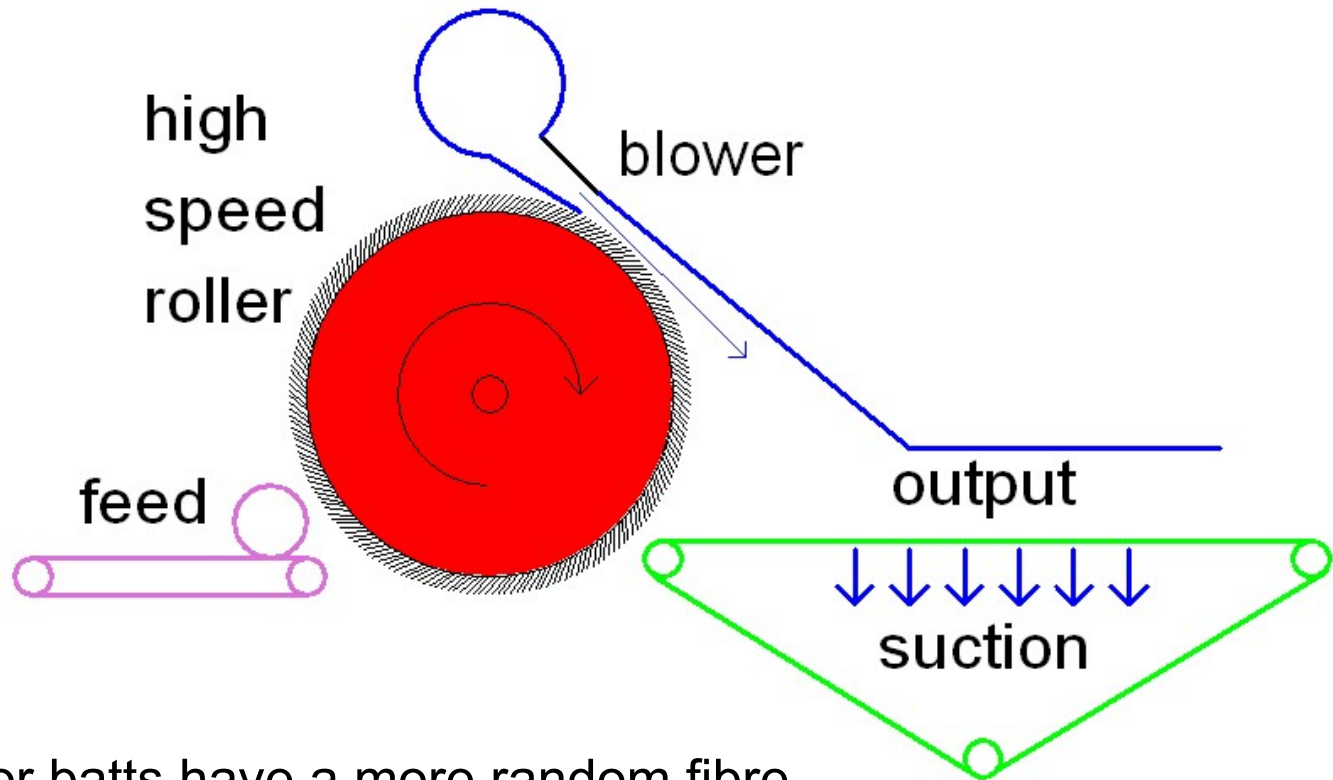


A Random Card, has extra counter-rotating roller between cylinder and doffers.

Web Formation – Cross-Lapping



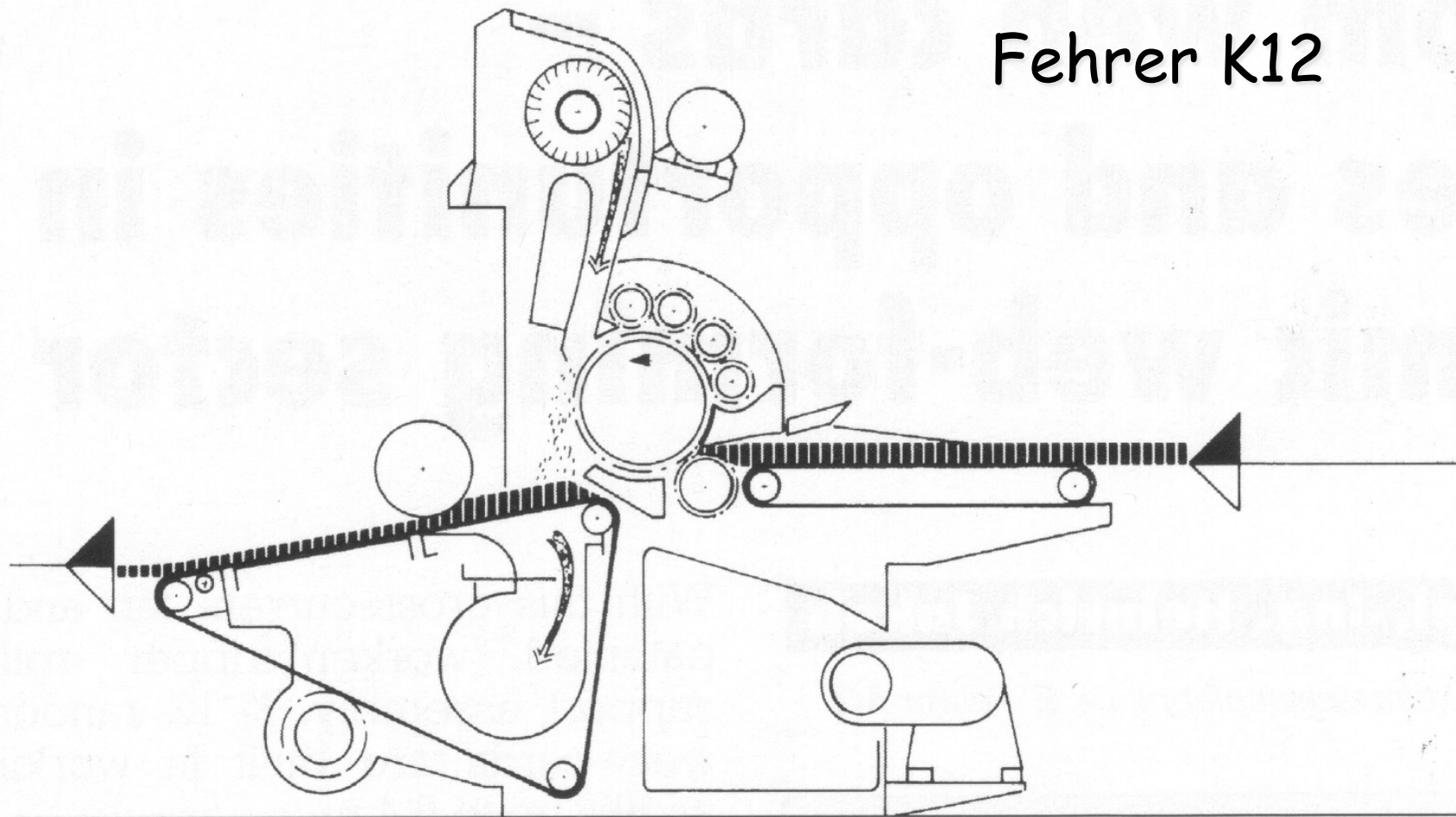
Web Formation – Air-Lay



Air-laid webs or batts have a more random fibre orientation distribution. They usually have high bulk as they have fibres oriented in the vertical direction.

Web Formation – Air-Lay

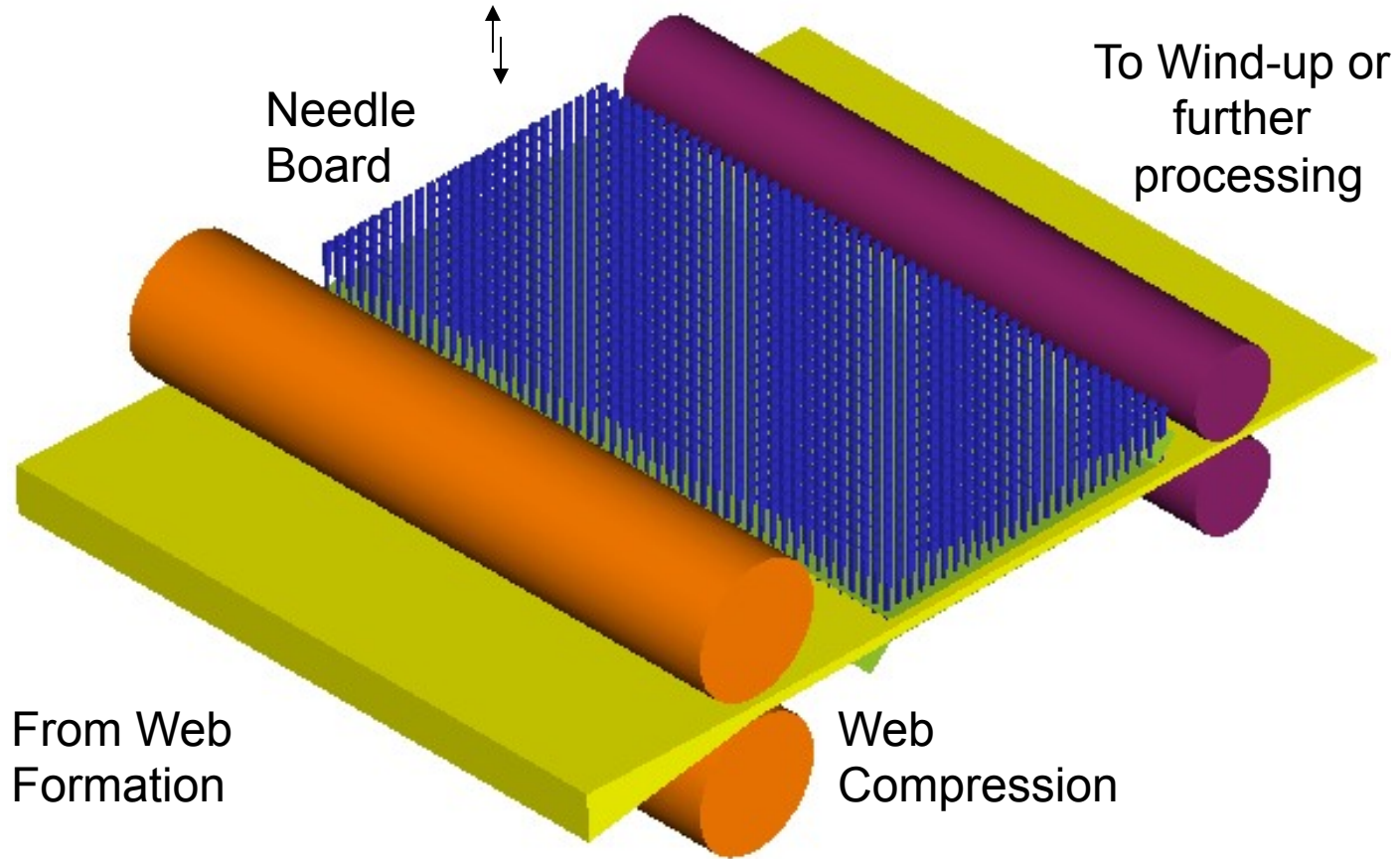
Fehrer K12



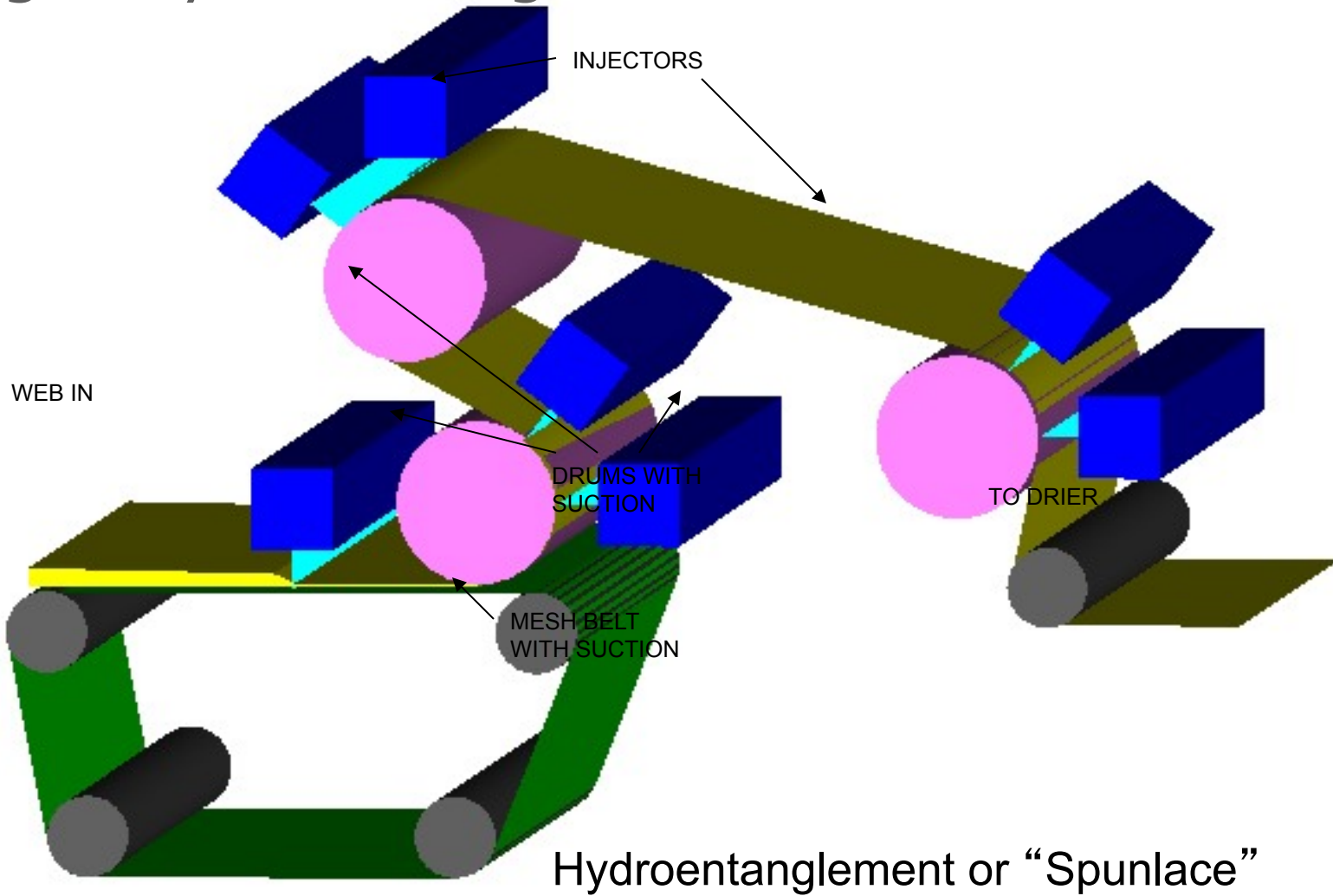
Bonding Mechanisms suited to Wool

- Needle Punch
- Hydroentanglement
- Stitch Bonding
 - yarns sewn into fabric
- Thermal Bonding
 - fibres glued with low temperature melting component of bicomponent fibres included in blend.
- Scrims: pre-woven or welded nets into which fibre webs are entangled to give extra strength and resilience.

Bonding – Needle Punch



Bonding – Hydroentanglement



Spunlace

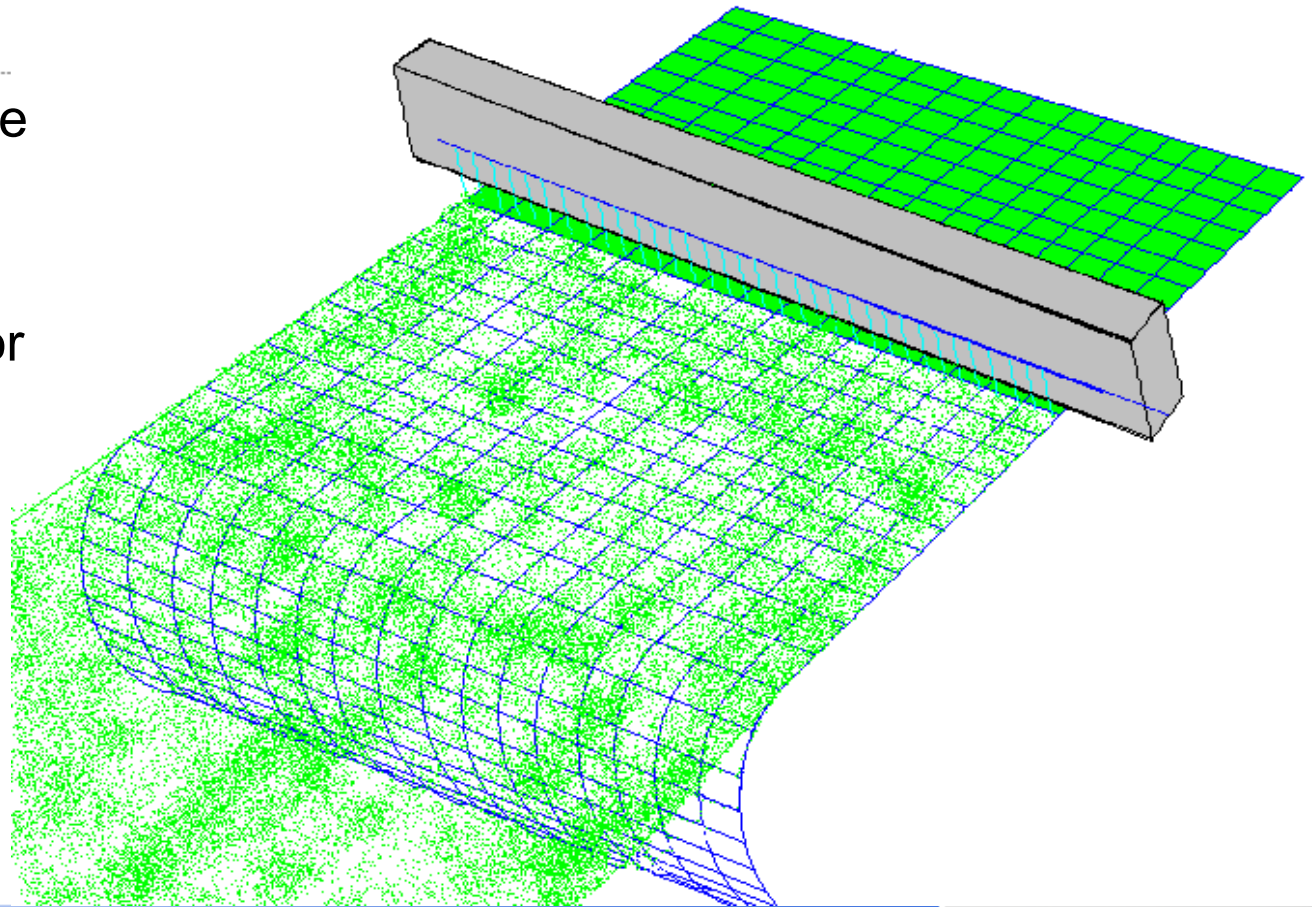
- High Specific Energy
- No reciprocating parts
- Very high speed possible
- High power consumption
- 4m wide line $\sim 1.2\text{MW}$
- but high production rate means a few cents/kg operating costs

Common Spunlace products are:

- Wipes, towels, tissues
- Filters
- Protective apparel
- Surgical gowns and covers
- Synthetic leather
- Sanitary products
- Home furnishings
- Interlinings (some wool)

Spunlace + scrims

- scrim to provide strength:
- lower entanglement for bulk and softness with good recovery
- Pre-stressed or shrinkable

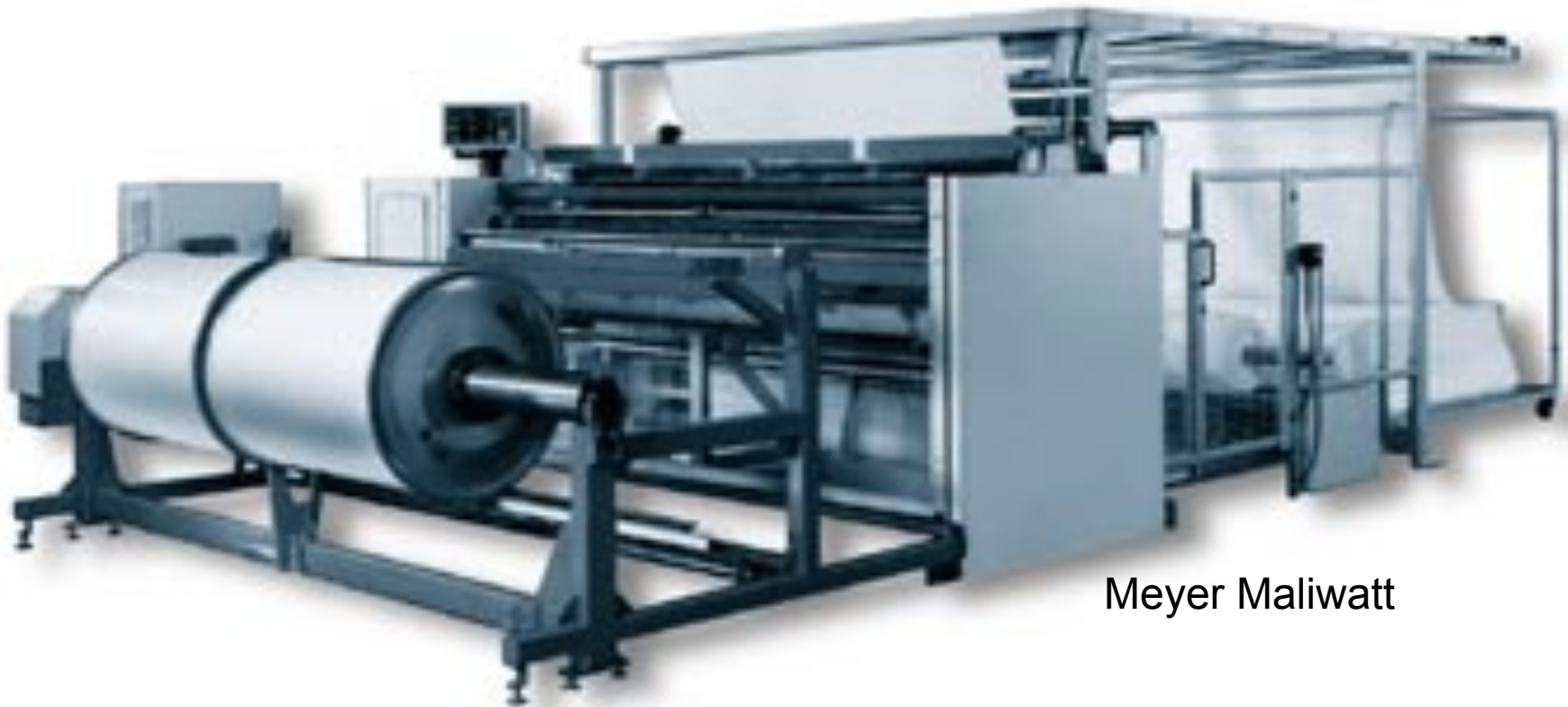


Spunlace Wool Fabrics

- scrim provides strength
- Trade off with drape and flexibility



Stitch Bonding



Meyer Maliwatt

Stitch Bonding

– yarns sewn into fabric. Like scrims, provide strength with flexibility

Stitch Bonding

- Rows of threads are sewn into the fabric
- Provides strength with flexibility, somewhat like a woven
- Threads hidden in felt
- Lower weight limits 200-300gsm
- Threadless Stitch bonding:
- The needles capture groups of fibres from the web itself and form stitches with them


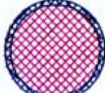

















Thermal Bonding

materials

- Bicomponent fibres
- Intimate blend of fusible and conventional fibres
- Low melt powder
- Low melt film

Bicomponent cross sections

- Core sheath
- Side by side
- Island in the sea
- Pie segment

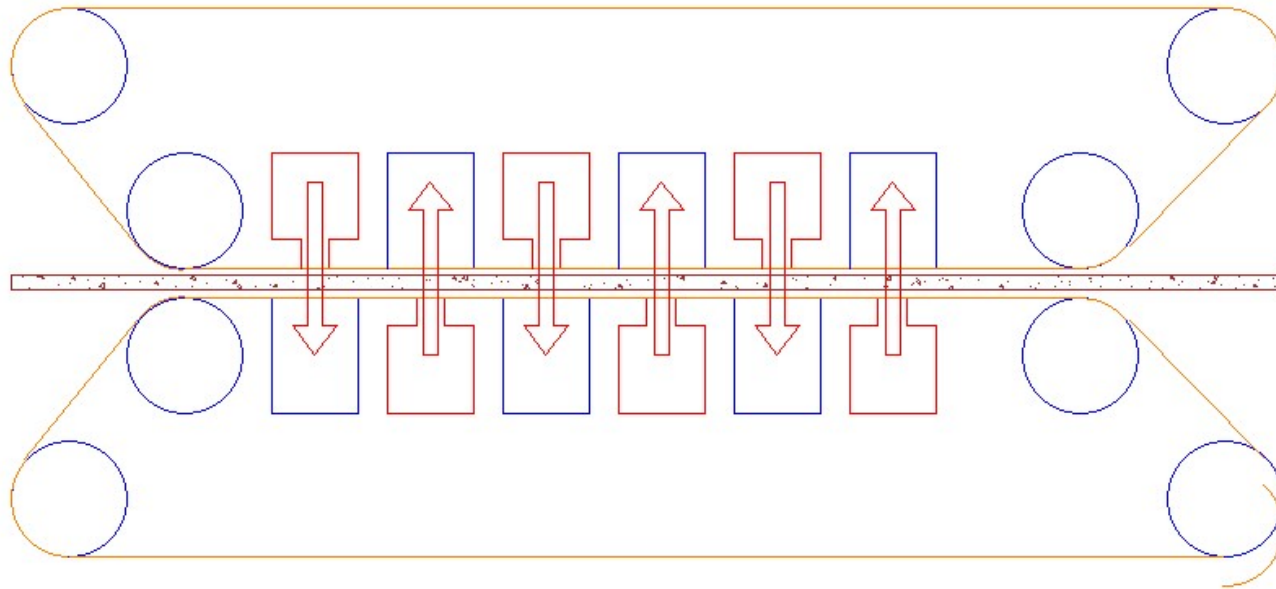
FAMILY	BICOMPONENT FIBERS				
	VARIANTS				
CORE & SHEATH	 50/50	 20/80	 ECCENTRIC	 TRILOBAL	 CONDUCTIVE
SIDE BY SIDE	 50/50	 20/80	 MIXED VISCOSITY	 ABA	 MIXED VISCOSITIES
TIPPED	 TRILOBAL	 CROSS			
MICRO-DENIER	 SEGMENTED PIE	 ISLANDS-IN-A-SEA			 STRIPED
MIXED FIBERS	 COLORS	 DENIERS, COMPONENTS, CROSS-SECTIONS			 BICOMPONENT/HOMOFILAMENT

Through air bonding

- Heated air is passed through the web to be bonded
 - Bonding is achieved by convection
 - Air flow in both directions or single direction
 - Dwell time inside oven
 - Fabric density
 - Maximum bonding is on surface

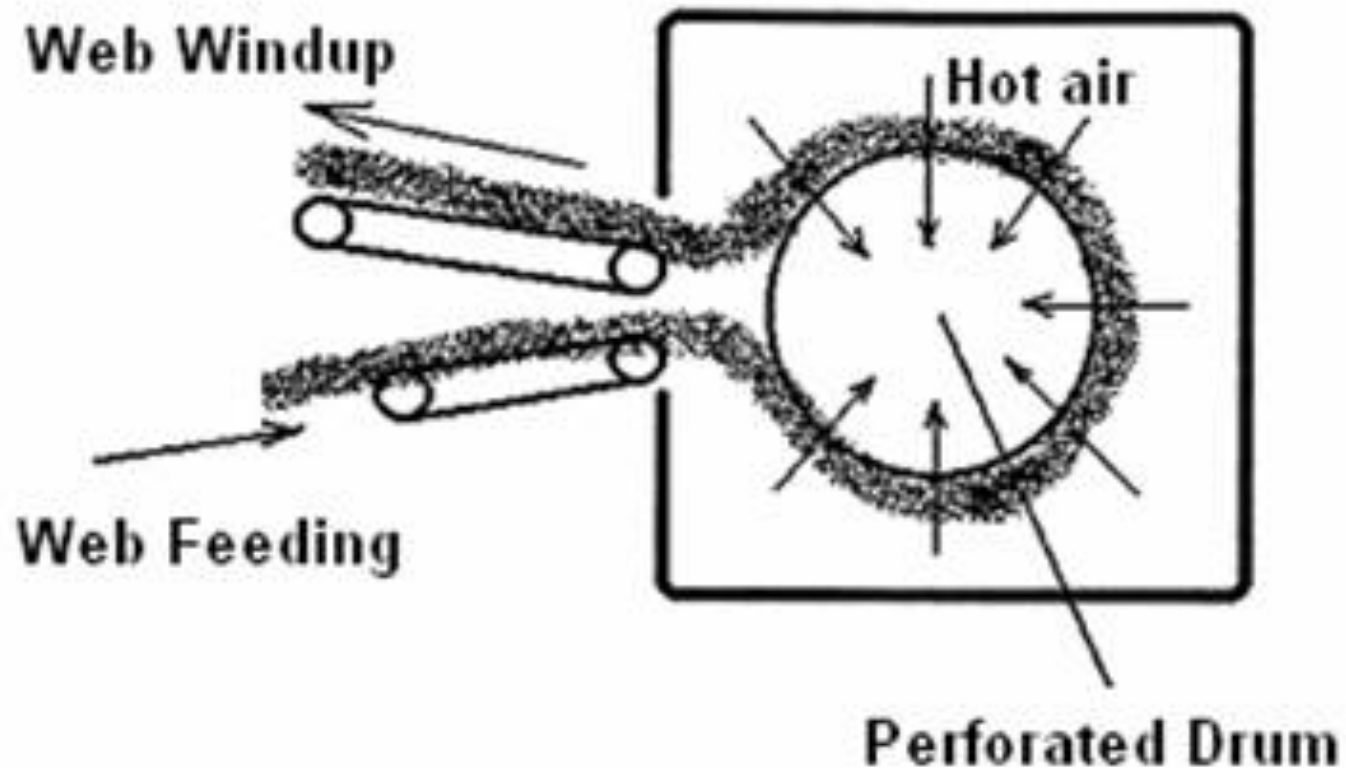
Through air bonding

- Flat bed



Through air bonding

- Perforated drum



Through air bonding

