Bi-component Fiber and Nonwoven for Hygiene Application; Market and Technology Trend in Asia

ANFA Nonwovens Conference 2019

8th November, 2019

JNC Corporation

Taku Kojima

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  - Acquisition Distribution Layer (ADL)
  - Backsheet
  - Others

Company Profile of JNC Corporation

Founded	1906
Established	2011
Paid-in capital	31.15 billion JPY
Number of Employees	3,362
Web site	www.jnc-corp.co.jp/english

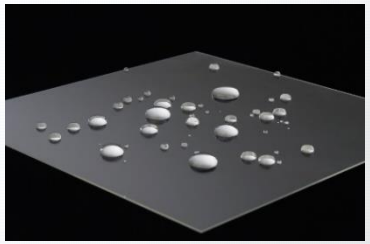
Business Portfolio

Performance Products

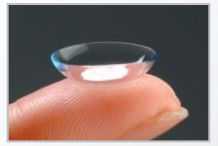
Consumer Goods

Fibers & Fabrics

Microfabricated Products



Basic Chemicals

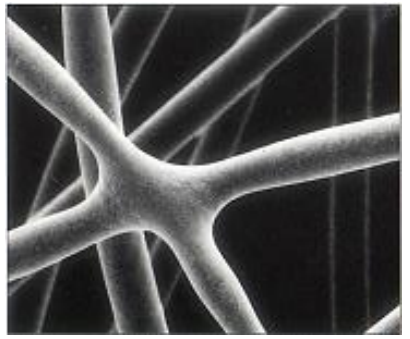


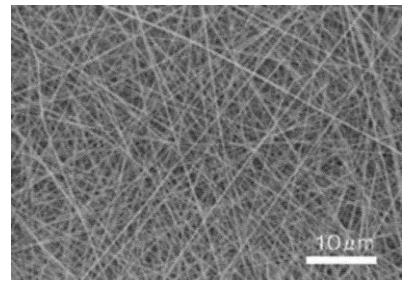
Energy and Environment

Life Chemicals

Fibers and Fabrics Division / Products

- **ES Fiber***: Bi-component thermo-bondable fiber
- **EsSoft** : Air-through nonwoven fabric
- **ELFino** : Melt-blown nonwoven fabric
  Fiber diameter : 0.7 ~ 10 micron
- **Elfa** : Electro-spun nano fiber
  Fiber diameter : <1 micron





*** ES Fiber is distributed by ES FiberVisions, a joint venture between FiberVisions and JNC Corporation.**

ES FiberVisions* / Bicomponent Fiber Business Locations

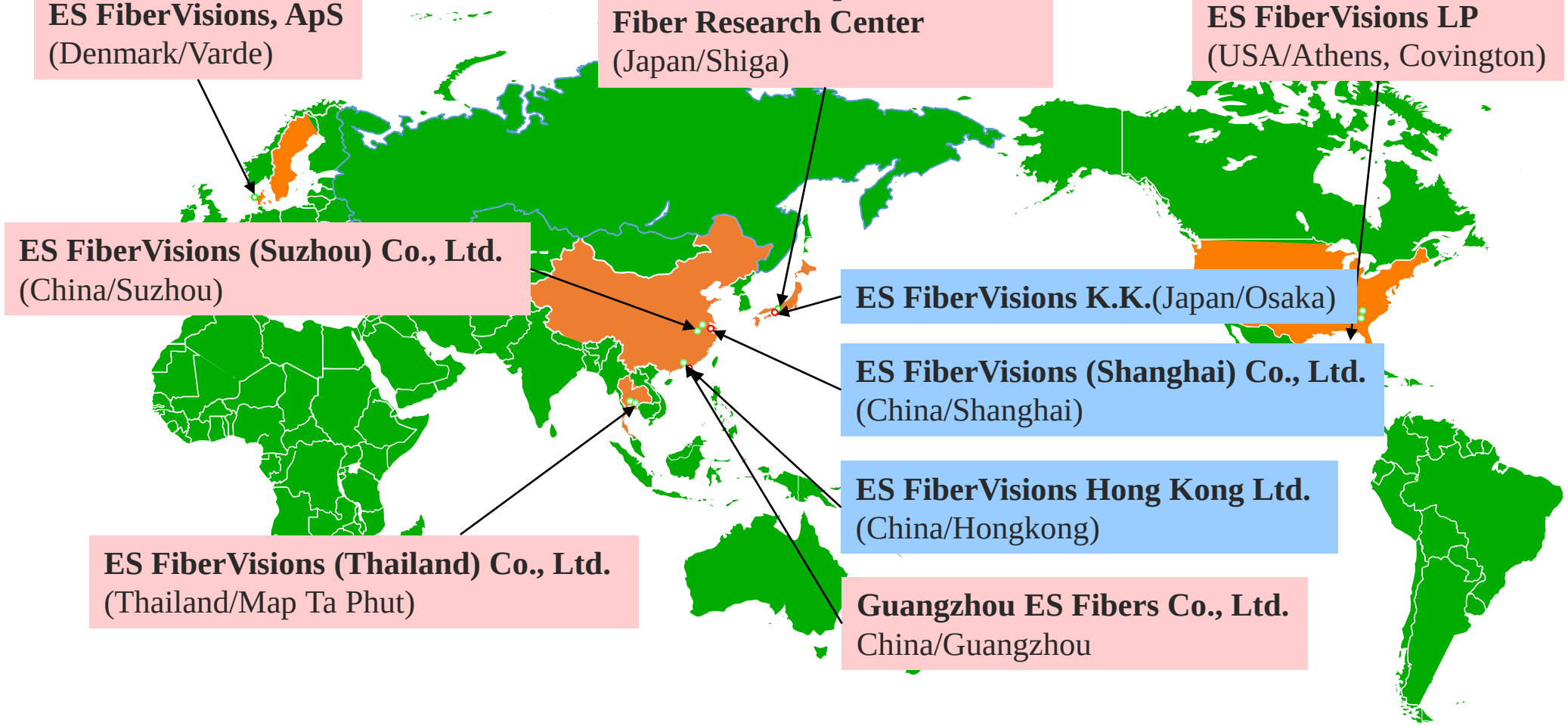
Fiber Factory

Office

ES FiberVisions, ApS
(Denmark/Varde)

JNC Fibers Corporation
Fiber Research Center
(Japan/Shiga)

ES FiberVisions LP
(USA/Athens, Covington)



ES FiberVisions (Suzhou) Co., Ltd.
(China/Suzhou)

ES FiberVisions K.K.(Japan/Osaka)

ES FiberVisions (Shanghai) Co., Ltd.
(China/Shanghai)

ES FiberVisions Hong Kong Ltd.
(China/Hongkong)

ES FiberVisions (Thailand) Co., Ltd.
(Thailand/Map Ta Phut)

Guangzhou ES Fibers Co., Ltd.
China/Guangzhou

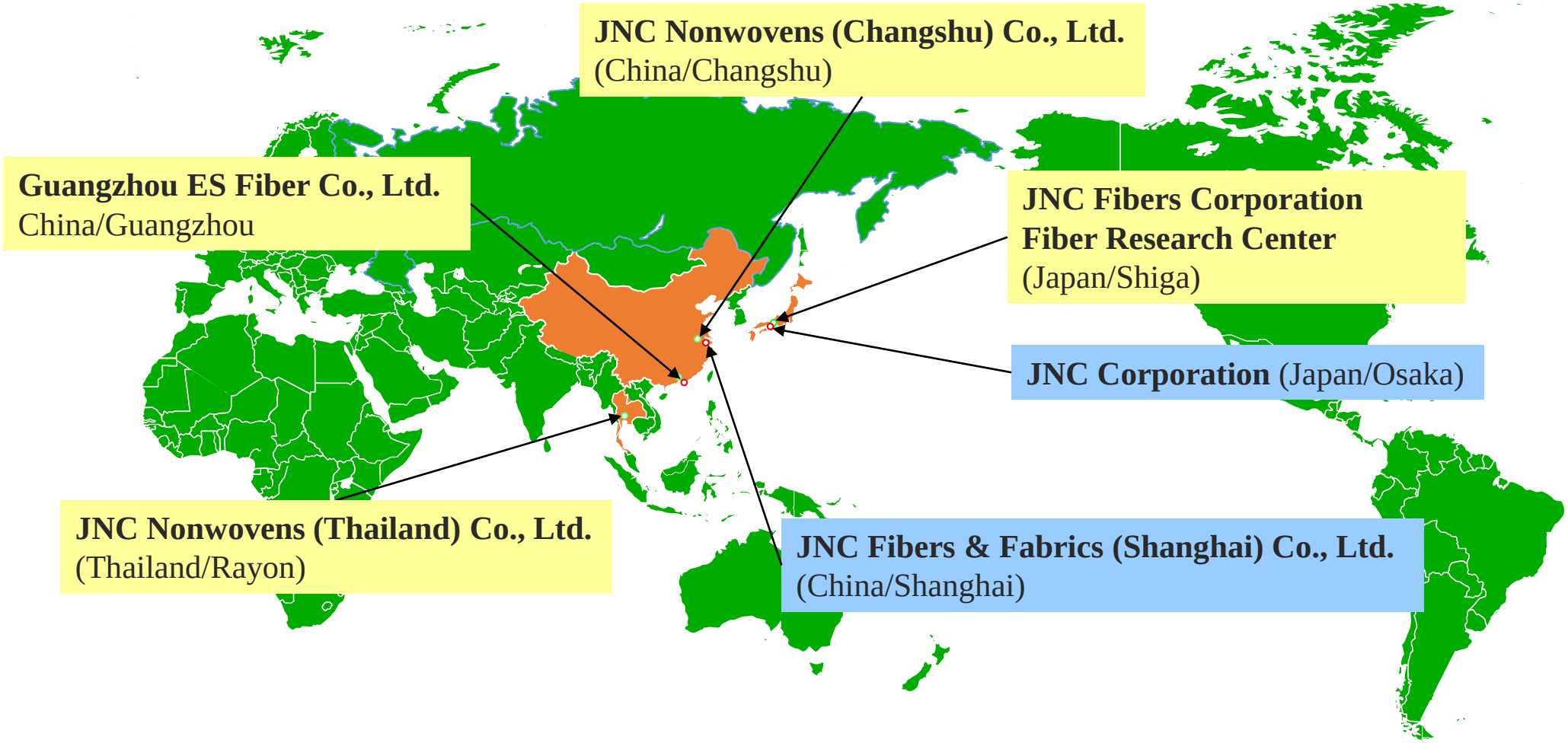
ES FIBERVISIONS

*** ES FiberVisions is a joint venture between FiberVisions and JNC Corporation**

JNC Corporation / Nonwoven Business Locations

Air-through Nonwoven Factory

Office



JNC Nonwovens (Changshu) Co., Ltd.
(China/Changshu)

Guangzhou ES Fiber Co., Ltd.
China/Guangzhou

JNC Fibers Corporation
Fiber Research Center
(Japan/Shiga)

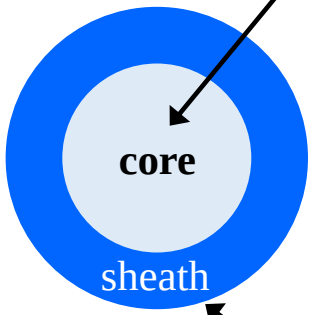
JNC Corporation (Japan/Osaka)

JNC Nonwovens (Thailand) Co., Ltd.
(Thailand/Rayon)

JNC Fibers & Fabrics (Shanghai) Co., Ltd.
(China/Shanghai)

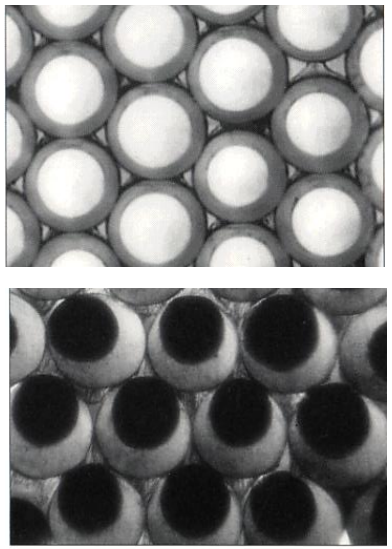
What is ES Fiber?

ES Fiber is a bi-component thermo-bondable fiber, made of two thermo-plastic polymers with different melting point. Difference of melting points between the sheath component and the core component gives thermo-bondability to the fiber.

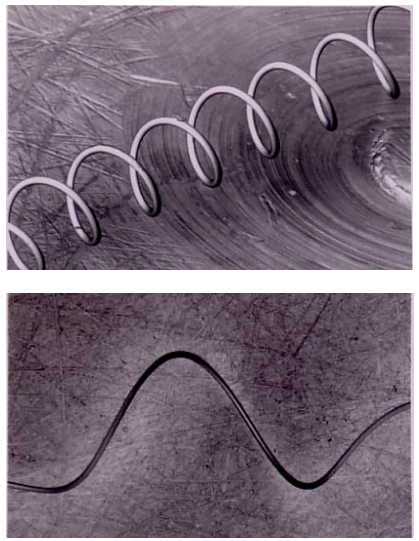


High melting point
（Homo-PP, PET etc.）
（30~70%）

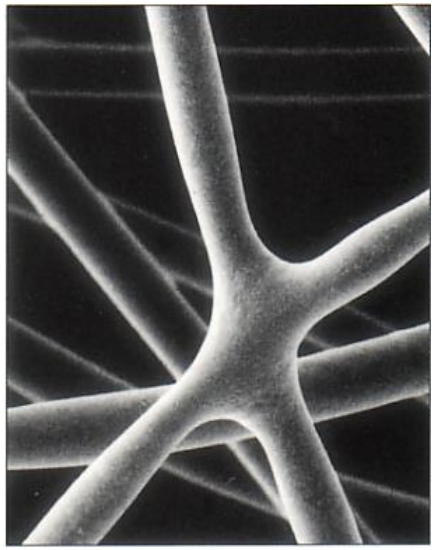
Low melting point
（PE, Co-PP etc.）
（70~30%）



Cross-section



3D-Crimp Fiber

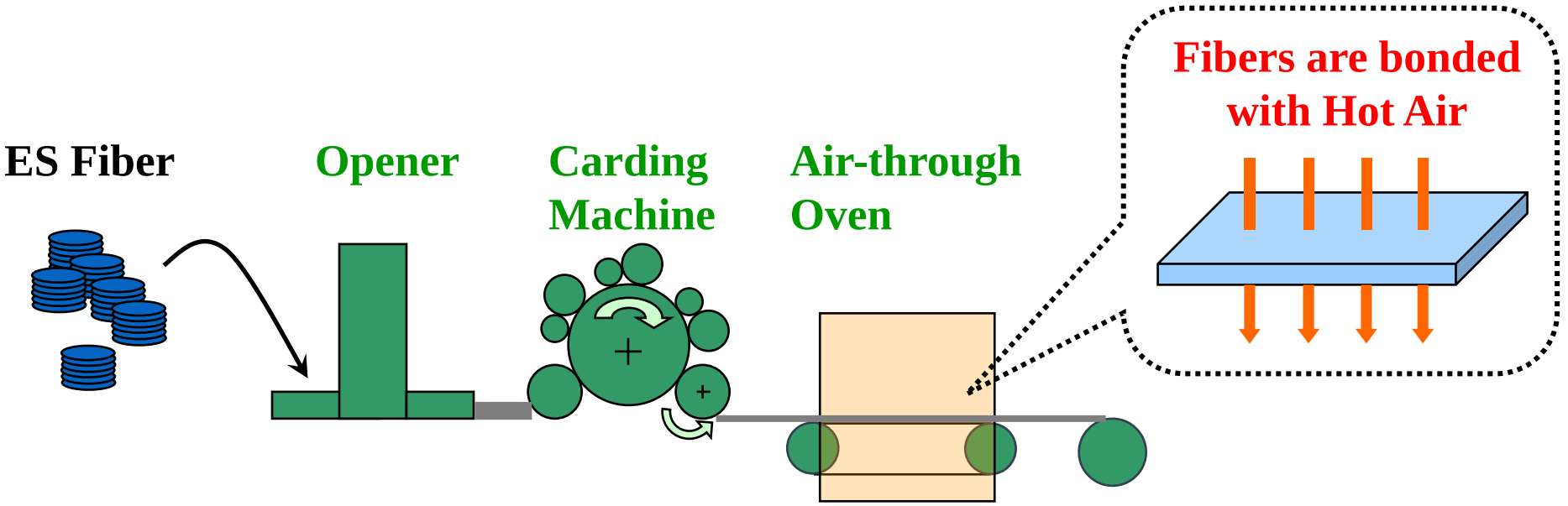


Bonding Point

ES FIBERVISIONS

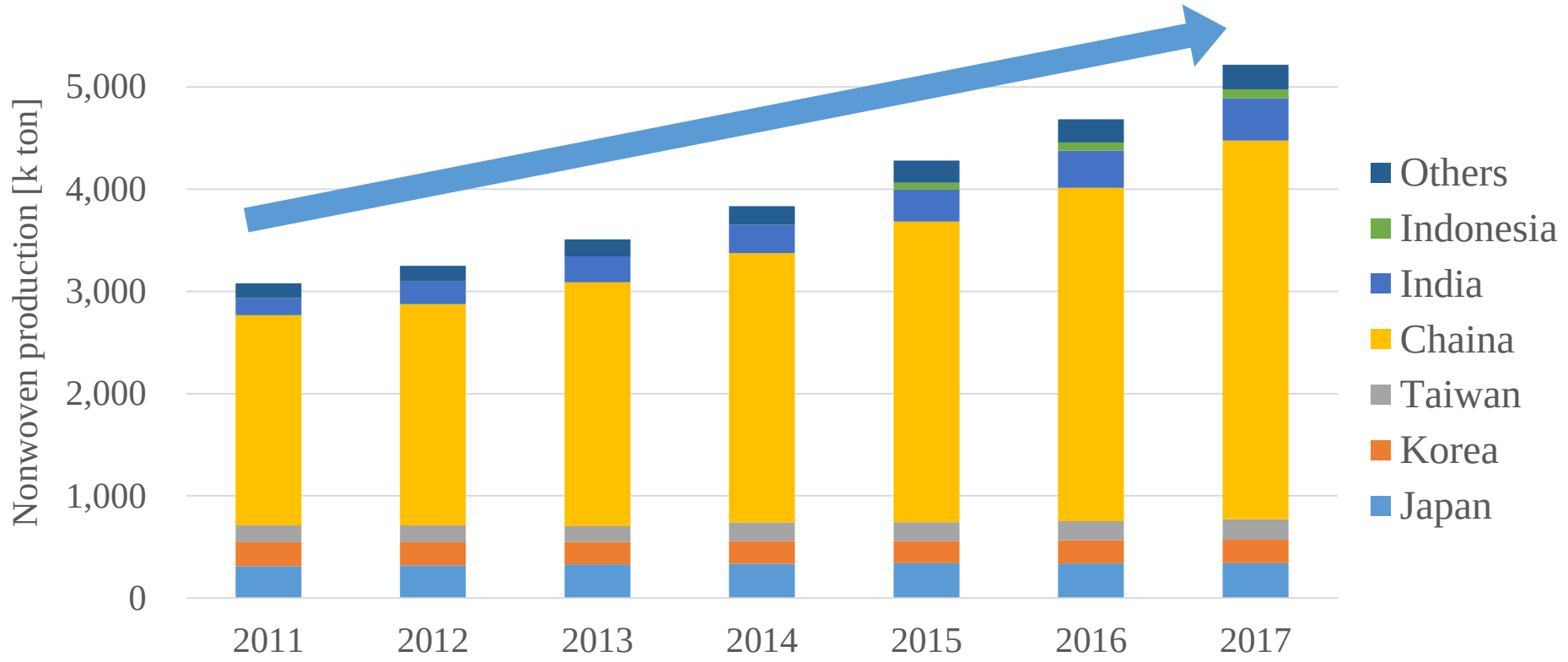
EsSoft

EsSoft is Airthrough nonwoven fabric, formed by ES fibers with hot-air treatment without adhesive. EsSoft has excellent softness, high bulkiness and excellent absorbency, and is also safe as it is made without adhesives.



Contents

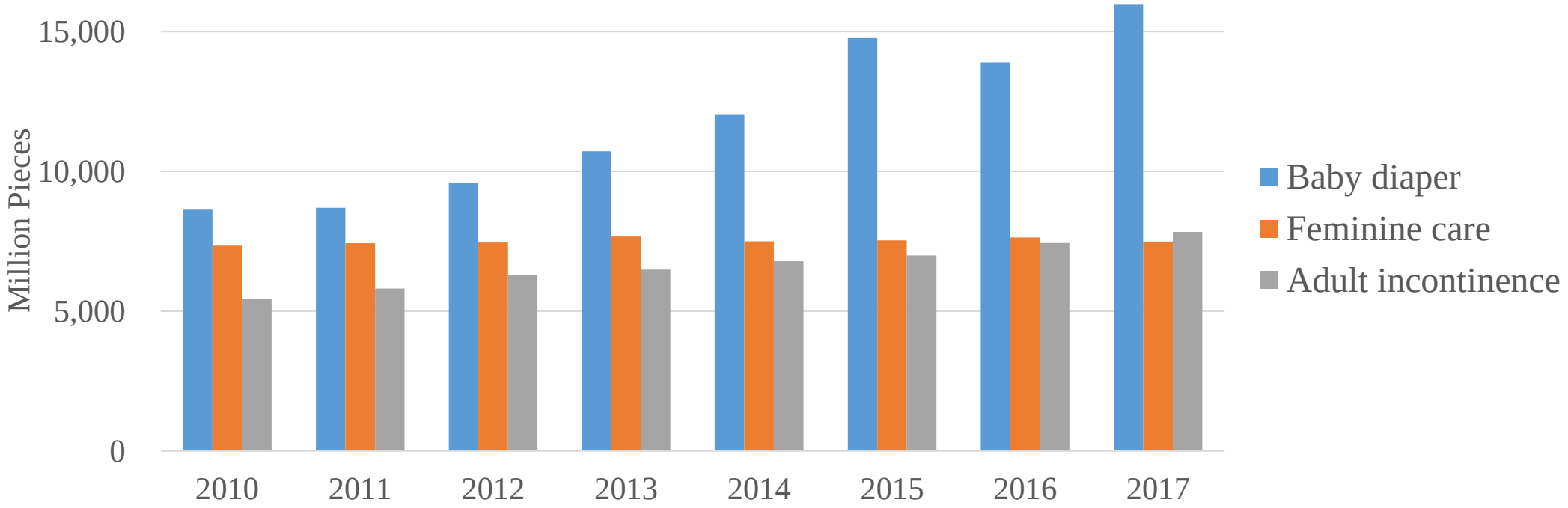
Production Volume of Nonwovens in Asia



✓ China is driving growth of nonwoven production volume in Asia.

Source: METI, KNIC, TNFIA, CNTA, BCH, ANNA

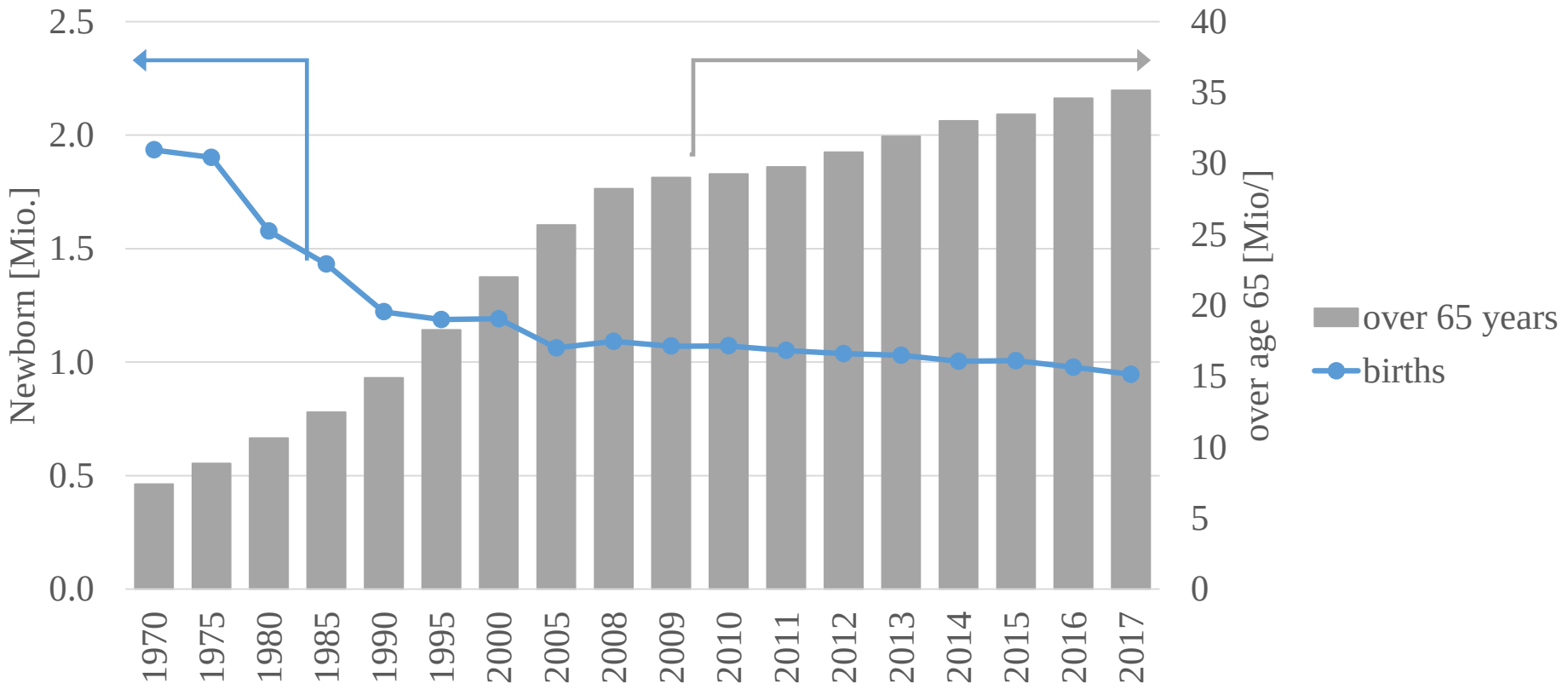
Production Volume of Hygiene Products in Japan



- ✓ Baby diaper is rapidly growing due to strong inbound demand by China.
- ✓ Adult continence grows steadily. Feminine care is almost constant.

Source: Japan Hygiene Products Industry Association database, Ministry of Internal Affairs and Communications database

Population of over Age 65 and newborn in Japan



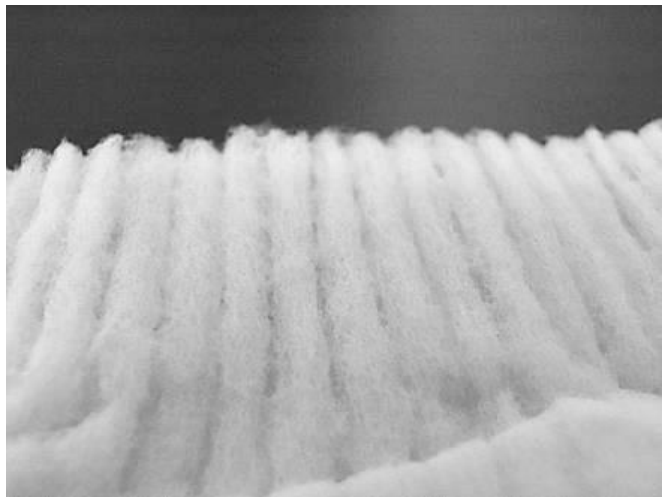
- ✓ Expanding of adult continence and nursing care products is expected due to ageing society.

Source: Japan Hygiene Products Industry Association database, Ministry of Internal Affairs and Communications database

Market Trend of Nonwovens for Hygiene Application in Asia

- **Japan**

- Airthrough nonwoven is mainly used for topsheet and backsheet due to dryness softness, and surface smoothness.
- 3D textured topsheet became standard for premium products.
- Additional functions such as “skin friendly”, “stretchable” and “organic” are key words for differentiation.



Market Trend of Nonwovens for Hygiene Application in Asia

● China

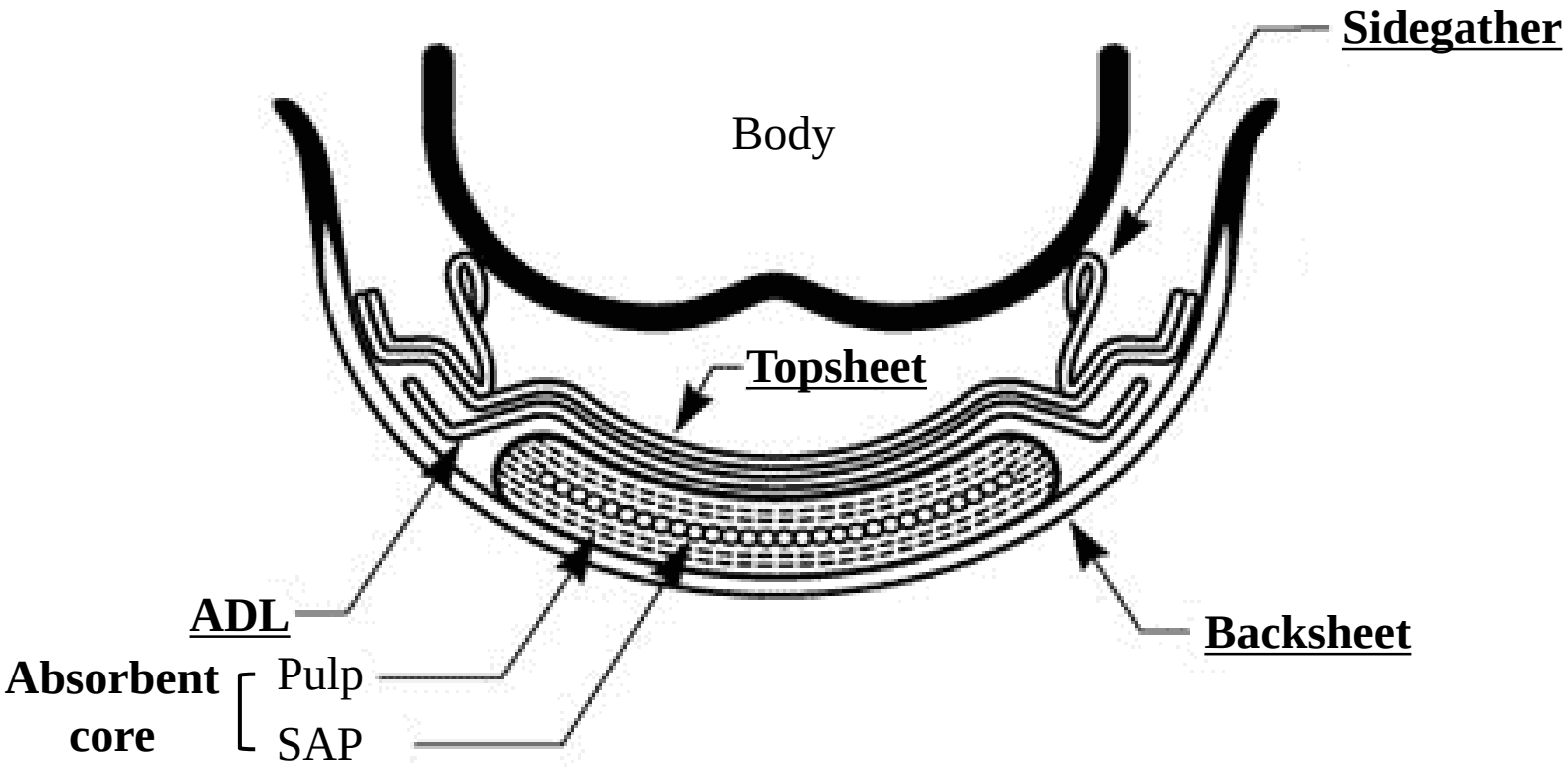
- Premium diapers made in Japan has been showing good sales but overall sales are slow from the second half of 2018.
- Air-through nonwoven topsheet became standard not only by the global brands but also by the local brands.
- Aperture or 3D textured nonwovens have introduced into the market and growing fast.
- The sales channel rapidly shifted from retailer to E-Commerce. It made easier for start-ups to enter the market, meanwhile this trend lowered market pricing.

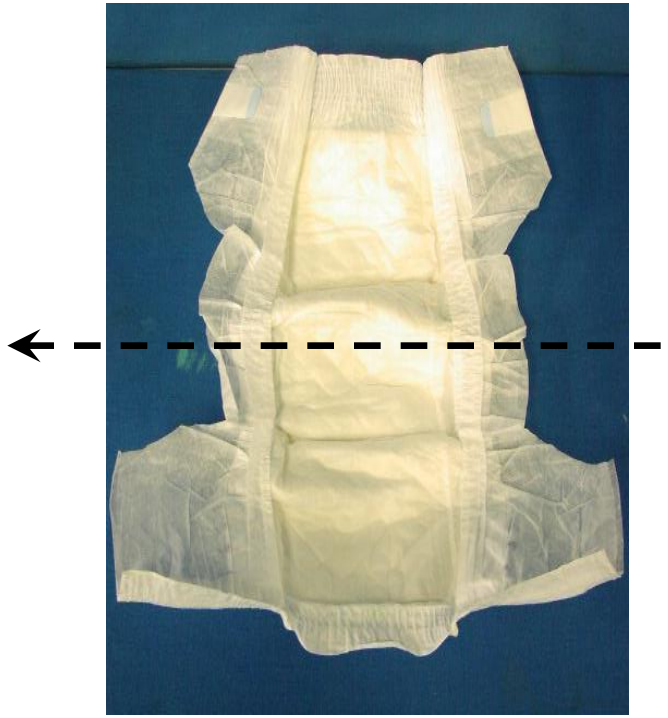
● ASEAN

- Air-through nonwoven topsheet is becoming mainstream.
- Products are designed to match requirement by region or country.

Contents

Structure of Baby Diaper

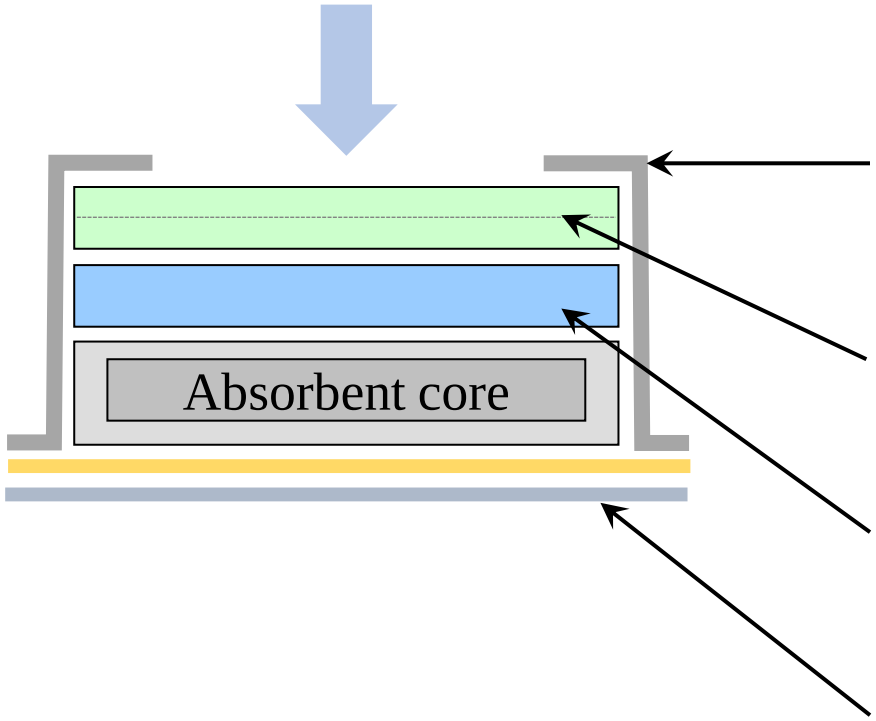




ADL : Acquisition Diffusion Layer
SAP : Supper Absorbent Polymer

Source: Japan Hygiene Products Industry Association

Required Properties for Nonwovens in Baby Diaper



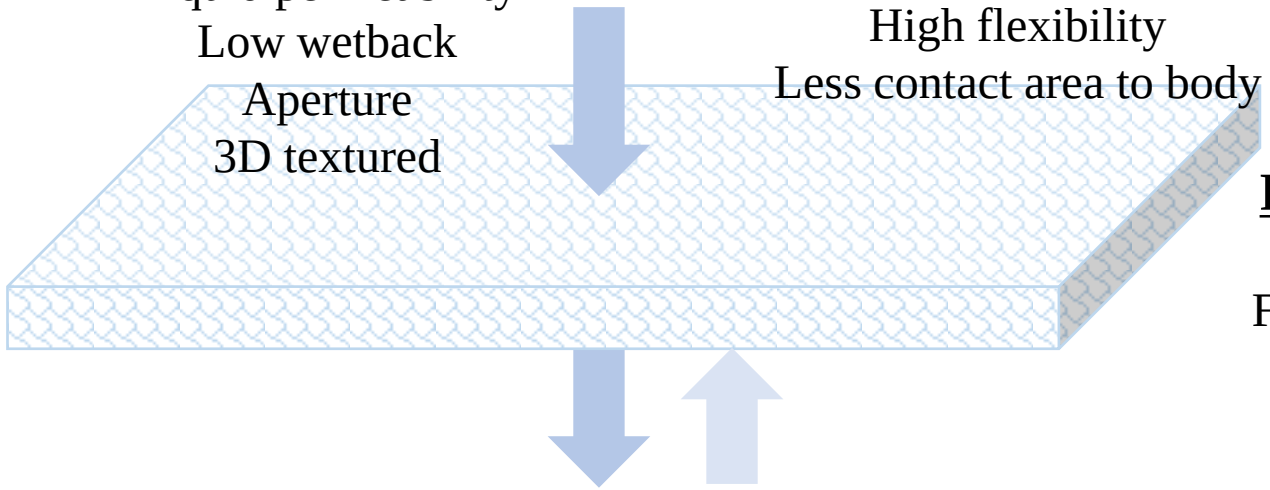
Component	Required properties
Sidegather	Tear strength Hydrophobic Touch feeling / Softness, smoothness
Topsheet	Liquid permeability / Hydrophilic Touch feeling / Softness, smoothness Surface dryness
ADL Acquisition Diffusion Layer	Liquid permeability / Hydrophilic Liquid distribution Bulkiness
Backsheet	Tear strength Touch feeling / Softness, smoothness Hydrophobic

Topsheet

Soft and smooth touch feeling
High loft
Softness
High flexibility
Less contact area to body

Surface dryness
Liquid permeability
Low wetback
Aperture
3D textured

Design
Aperture
3D textured



Fitting properties
Stretch
Followability to body

How to balance the required properties?

Fiber
Composition
Fineness
Finish

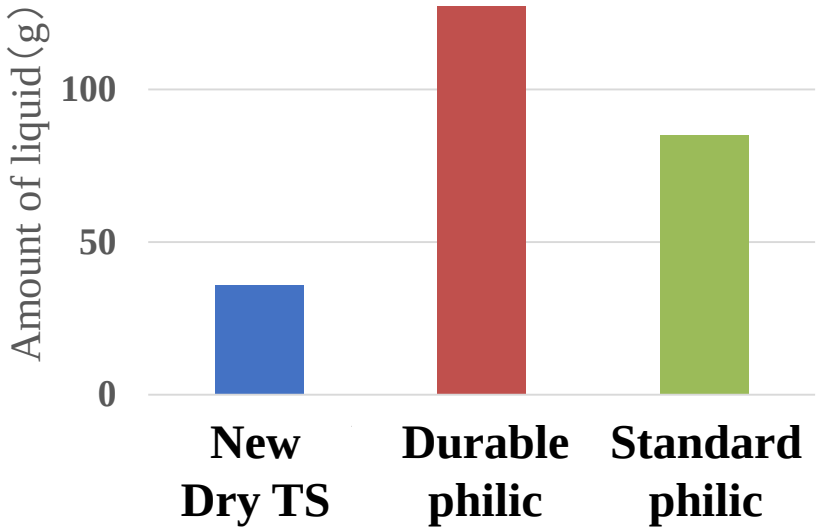
×

Nonwoven
Multi-layered
Post processing

Skin Friendly, Dryness and Mild Acidic Nonwoven for Topsheet

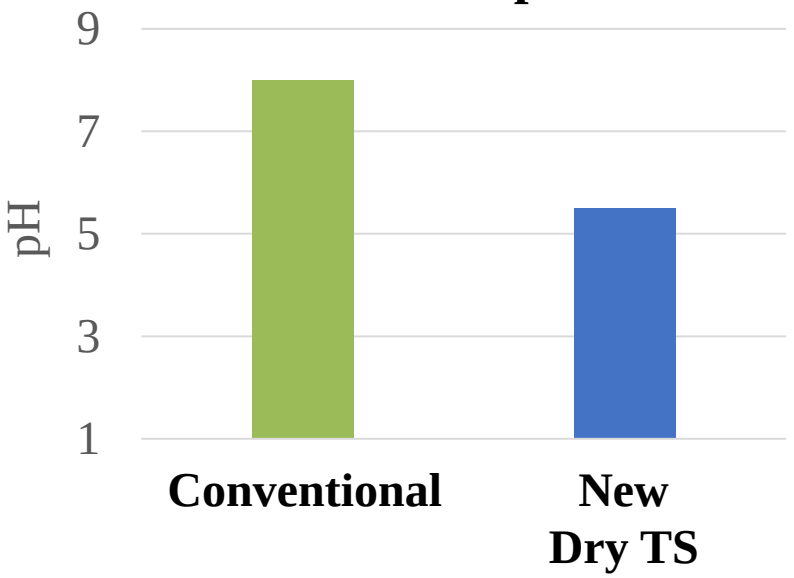
- ✓ Surface dryness by reducing liquid retention of nonwoven
- ✓ pH control to 5.0 ~ 5.5 which close to baby skin
- ➔ Prevent diaper rash

Liquid retention test*



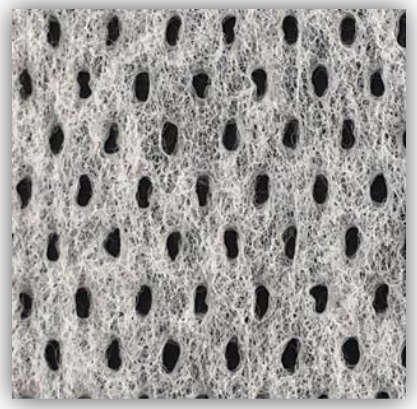
*JNC method

Nonwoven pH**

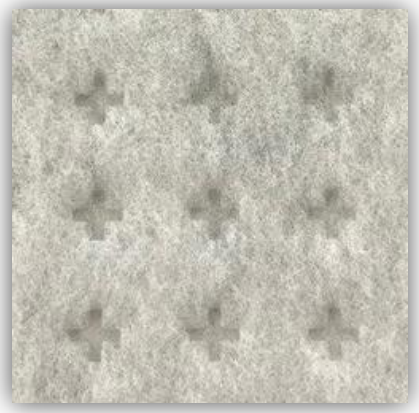


**GB method

Aperture and 3D Textured Nonwoven for Topsheet

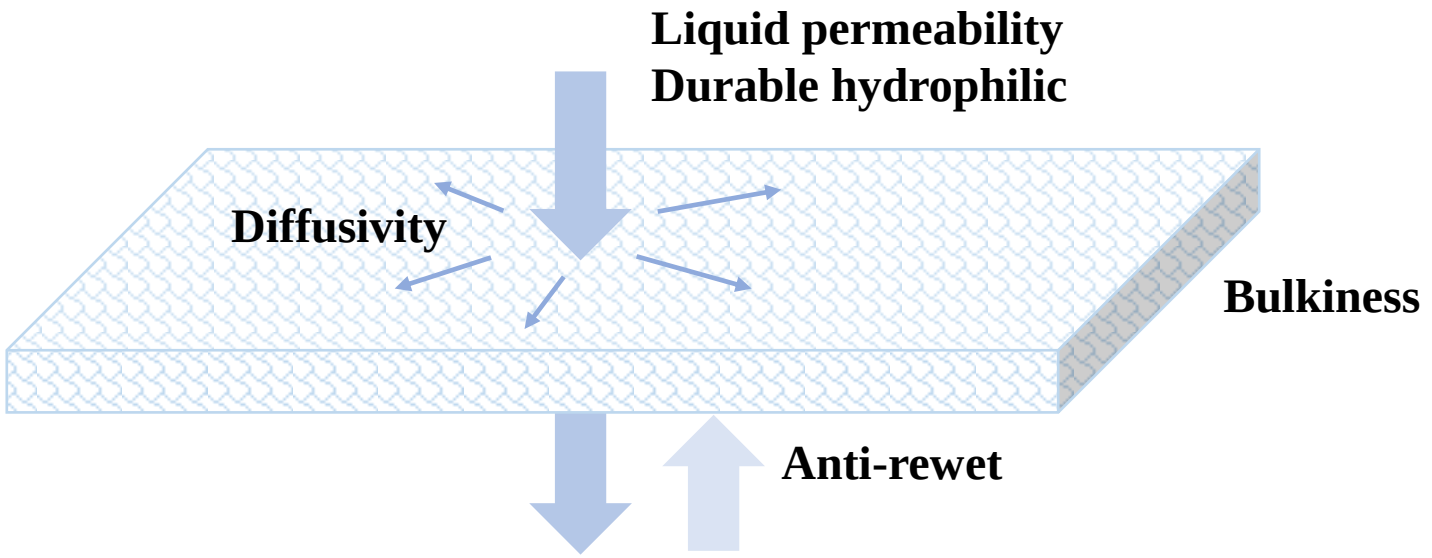




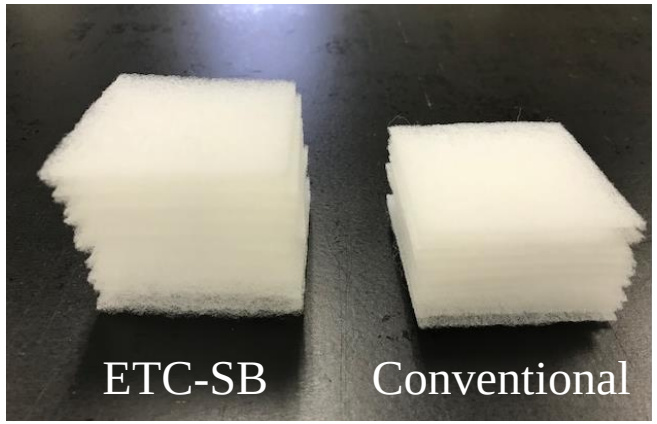


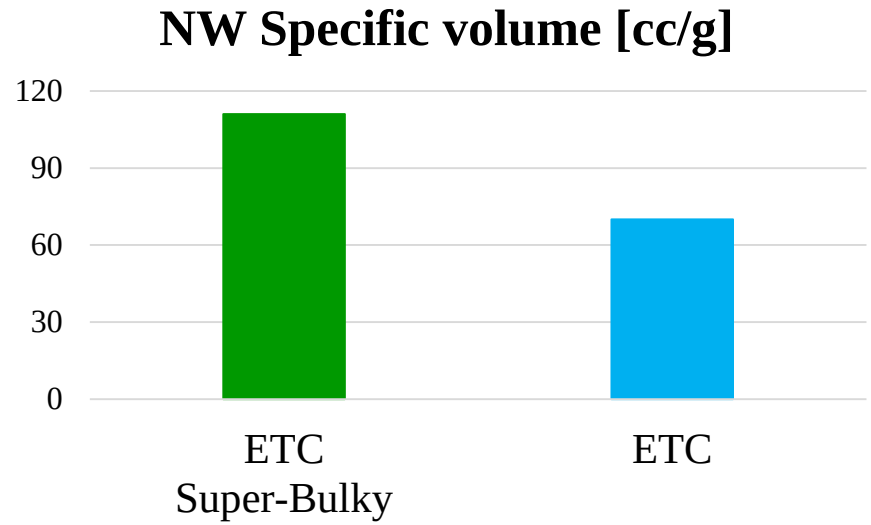

- ✓ Liquid permeability
- ✓ Trapping loose stool
- ✓ Air permeability
- ✓ Cushioning
- ✓ Good appearance

ADL



Superbulk Nonwovens for ADL





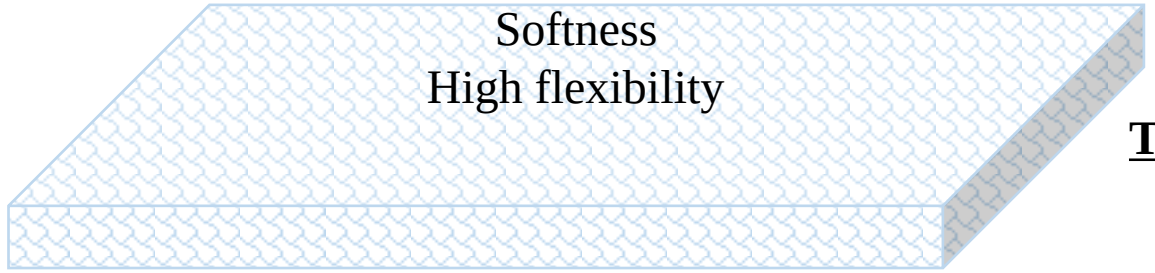
Backsheet

Soft and smooth touch feeling

High loft

Softness

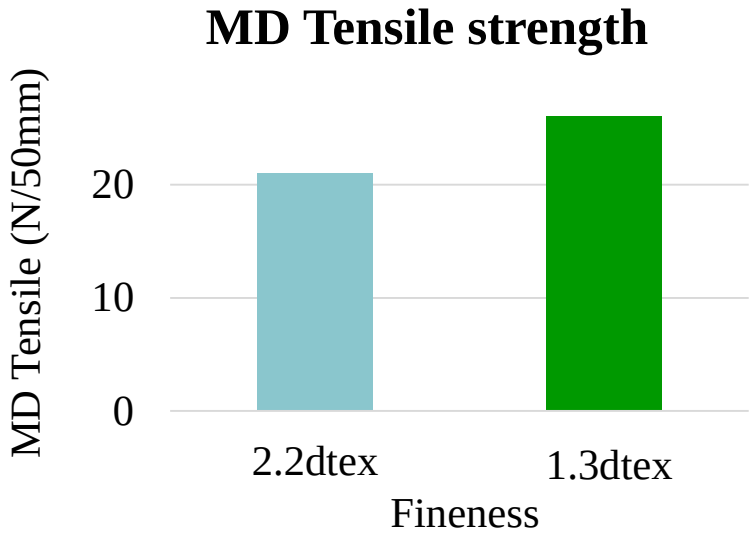
High flexibility



Tear strength

Ultra Smooth touch feeling Nonwovens for backsheet

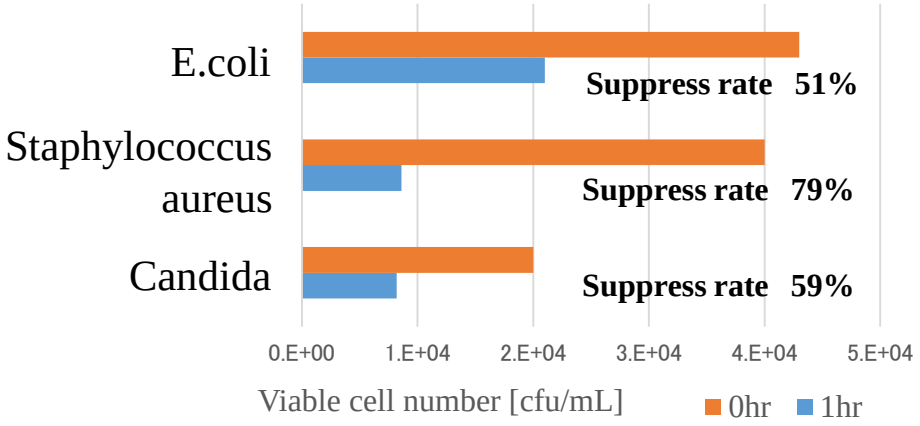
- ✓ 1.3dtex PE/PET fiber gives ultra smooth touch feeling
- ✓ High tear strength



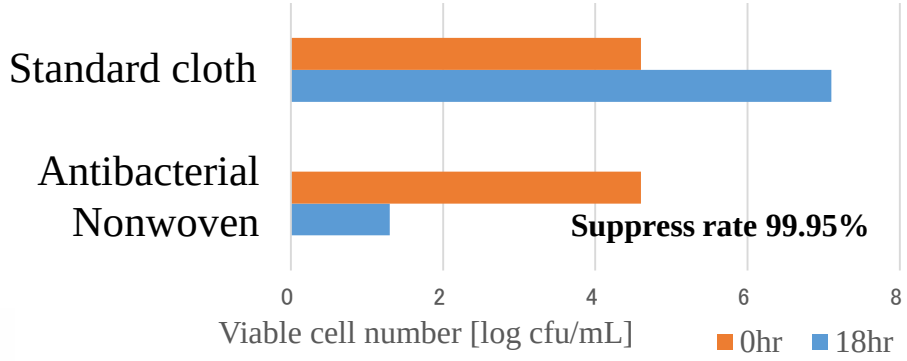
Antibacterial Nonwoven

☐ Antibacterial effect

■ GB test 15979-2002



■ JIS L 1902-2015 / Staphylococcus aureus



☐ Deodorant effect

	Gas reduction rate 24hr	
Anmonia	18%	Excrement, Pet, Sweat, Cigarette
Acetic acid	**60%**	Excrement, Body odors, Old age odor
Hydrogen sulfide	**26%**	Excrement, Cigarette, Garbage
Trimethylamine	5%	Excrement, Cigarette, Pet, Garbage

∗ Tetrapack, detector tube method

- ✓ **High antibacterial properties >5**
- ✓ **Effective to mold and ferment**
- ✓ **Long life**
- ✓ **High safety**

Thank you for your attention.