

The State of Nonwoven PPE in the US



Association of the
Nonwoven Fabrics Industry
ADVANCING ENGINEERED MATERIAL SOLUTIONS

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Agenda

- INDA Overview
- North American Production, Capacity and Operating Rates
- COVID Impact on Nonwovens in Personal Protective Equipment
 - Facemasks
 - Medical/Surgical Gowns
 - Wipes
- Sustainability Issues Driving Nonwovens Innovation

INDA

- Started 1968 as International Nonwovens Disposable Association (INDA)
- Supported formation of EDANA 1971
- Added Durables 1970's
- Now INDA, Association of the Nonwoven Fabrics Industry
- 380 Members; Corporations with individual consultants

INDA

Disposables

Hygiene

(Diapers, Inco, Femcare)

Wipes

Filtration

Medical

Others



Durables

Vehicle Construction

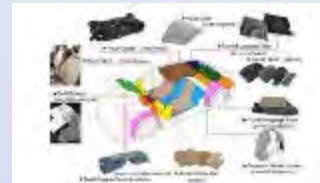
Building Construction

Geosynthetics

Home & Office Furniture

Apparel

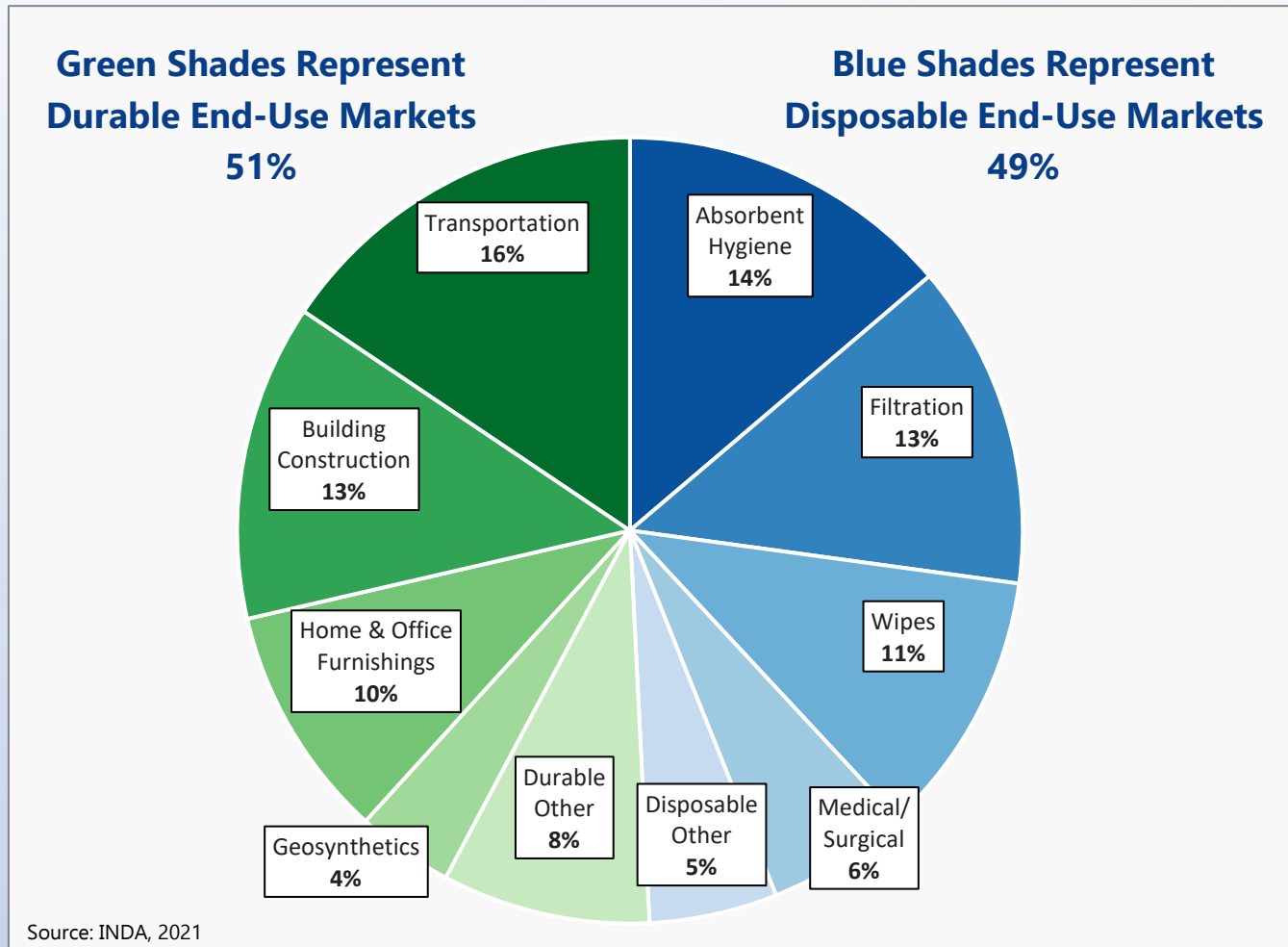
Others



What INDA Does for the Industry

- 1) Advocate for the industry on issues that matter (Plastics, Wipes)
- 2) Gather, analyze and publish relevant industry statistics
- 3) Provide education & training on nonwovens
- 4) Facilitate face-to-face interaction by organizing industry events
- 5) Stimulate innovation through Conference content
- 6) Recognize excellence in service and technical achievement
- 7) Harmonize and manage product/testing standards

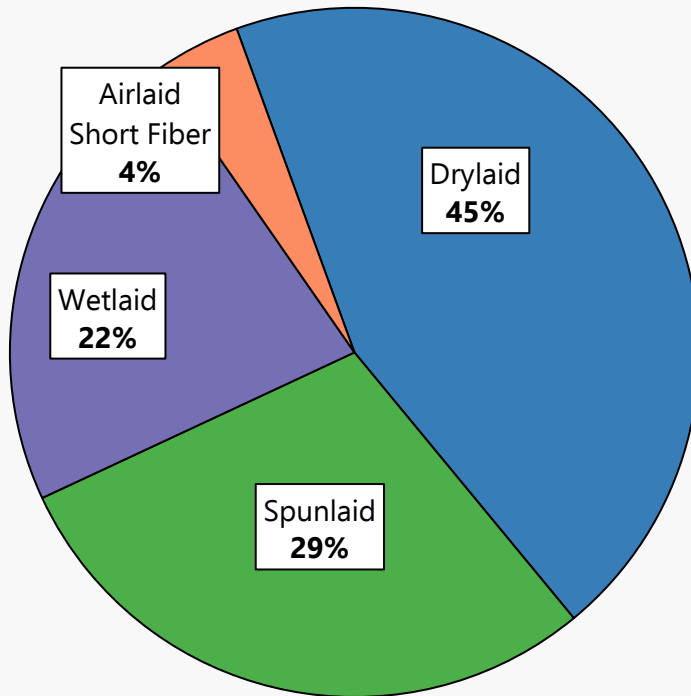
North America Production Share by End-Use Market 2020, Tonnes



Capacity by Process / Capacity by Region

Capacity by Process

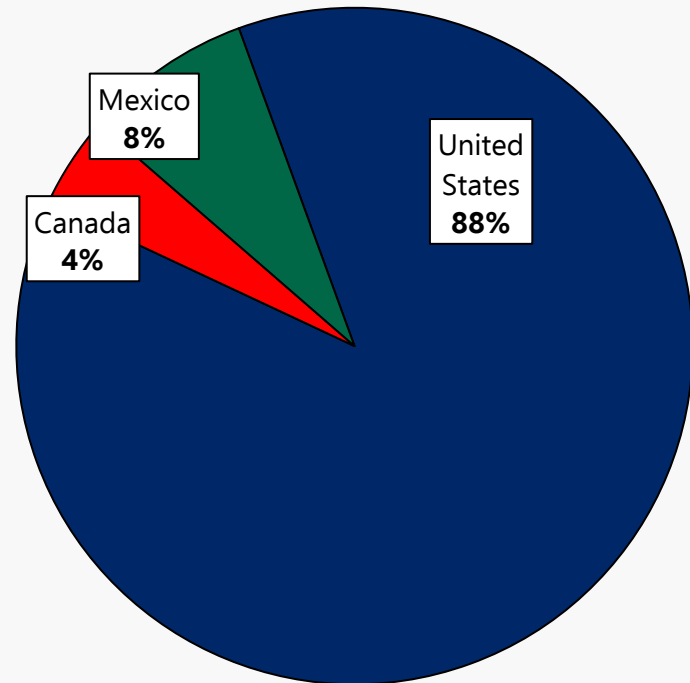
2020, Tonnes



Source: INDA, 2021

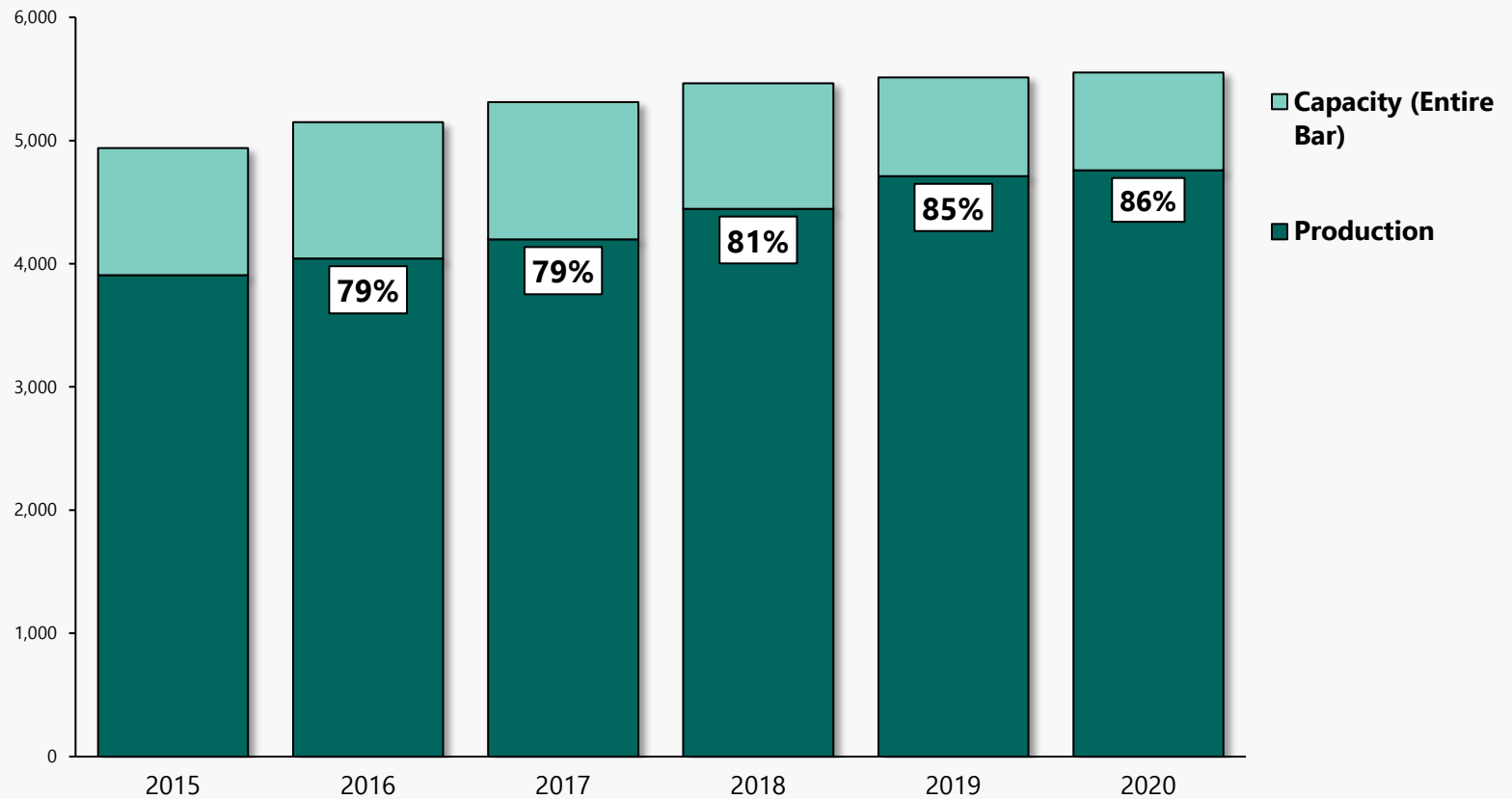
Capacity by Region

2020, Tonnes



Source: INDA, 2021

North American Capacity, Production and Operating Rate 2015 – 2020 in Thousand of Tonnes

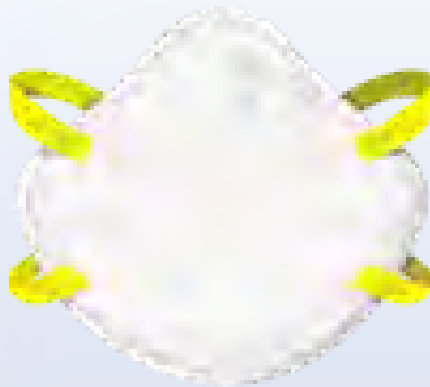


Source: INDA, 2021

COVID-19 Impact on Nonwovens in Personal Protection Equipment

- Facemasks and Respirators
- Medical/Surgical Gowns
- Wipes:
 - Disinfectant Surface Wipes
 - Anti-Bacterial Skin Wipes
 - Flushable Wipes

Facemask Types



Respirators	Medical Face Masks	Barrier Face Coverings	Cloth Gaitors
<p>Personal protective equipment (PPE) designed to protect the wearer from inhalation of hazardous atmospheres</p> <p>“N95”</p>	<p>Designed to protect the wearer's face from patients' fluids and those around the wearer from his exhale</p>	<p>Have the primary purpose of providing source control on exhale but also provide a degree of inhalation protection for the wearers</p>	<p>Little to no protection for anyone</p>

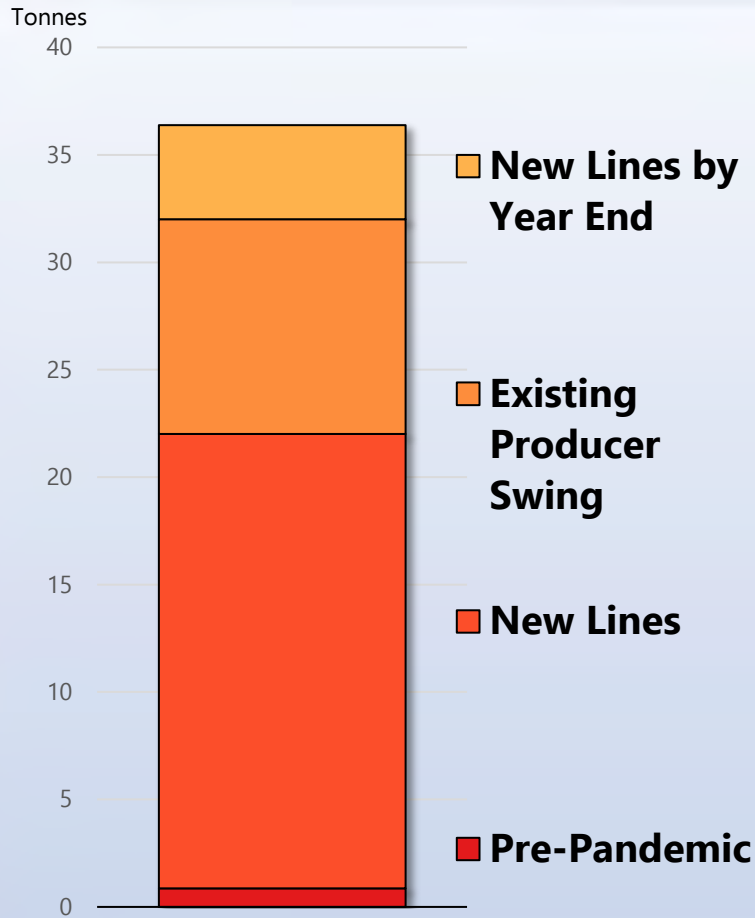
Facemasks

Pre-Covid-19:

- 80% of Medical Masks & Respirators came from Asia
 - No inventories
 - No second sources
 - Low costs
- Embargoed in January
 - No inventories
 - Very low MB production base in US
 - Mad scramble!

United States Capacity

Meltblown Material for Barrier Face Coverings



Fine-Fiber Meltblown

Current Fine Fiber Meltblown Availability Monthly Equivalents

N95 Respirator	1.78 billion
Nonwoven Pleated Face Mask	5.33 billion

Micron Size Comparisons

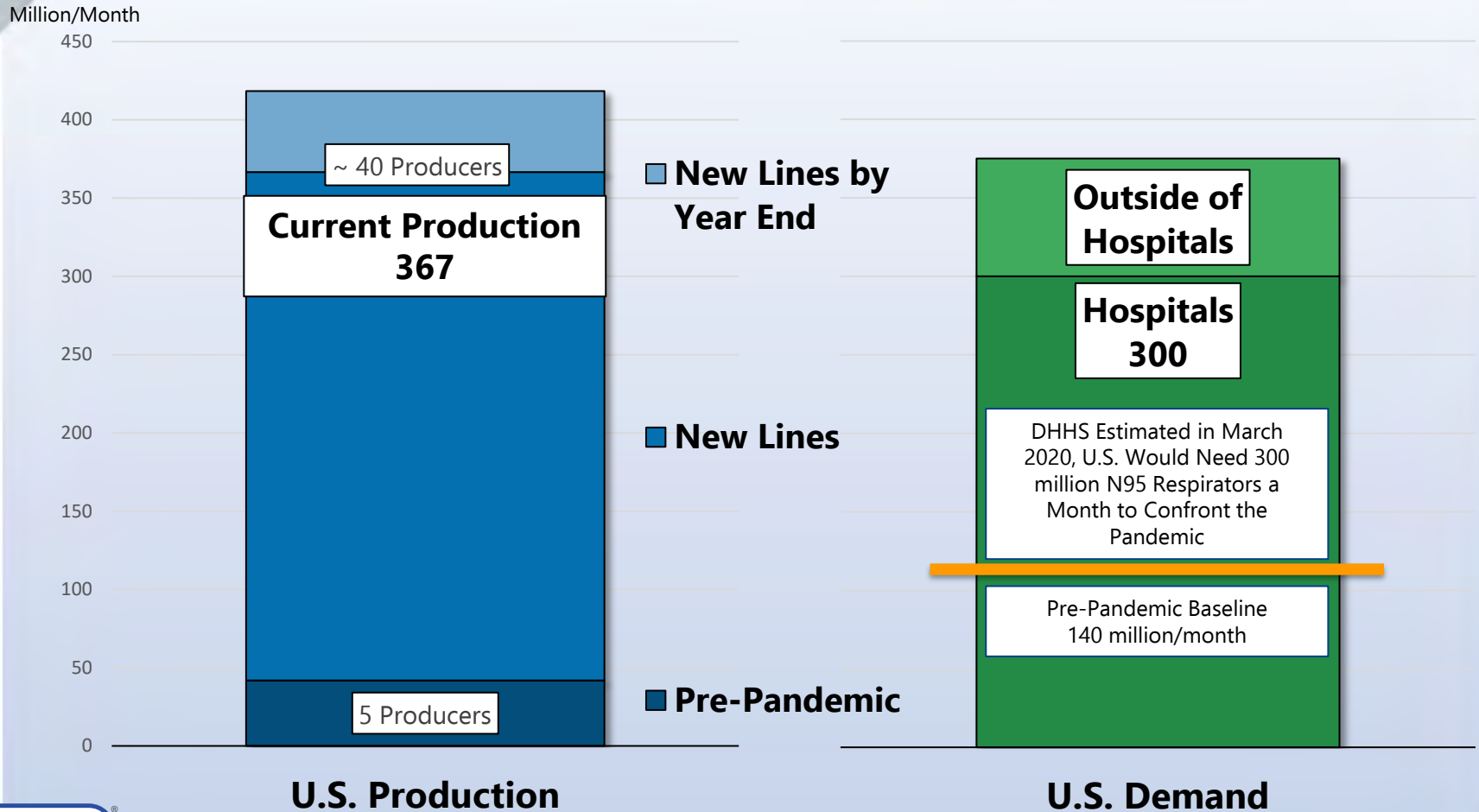
Fine Fiber Meltblown	1 Micron
Pollen	30 Microns
Lower Visibility Limit	40 Microns
Grain of Table Salt	100 Microns



Source: INDA Estimates, 2021

U.S. Production & “Peak” Demand

N95 Respirators for Healthcare Community



Source: DHHS (N95 Demand) and INDA Estimates, 2021

U.S. Production & Potential Demand

Pleated Nonwoven Face Masks

Million/Month

1400

1200

1000

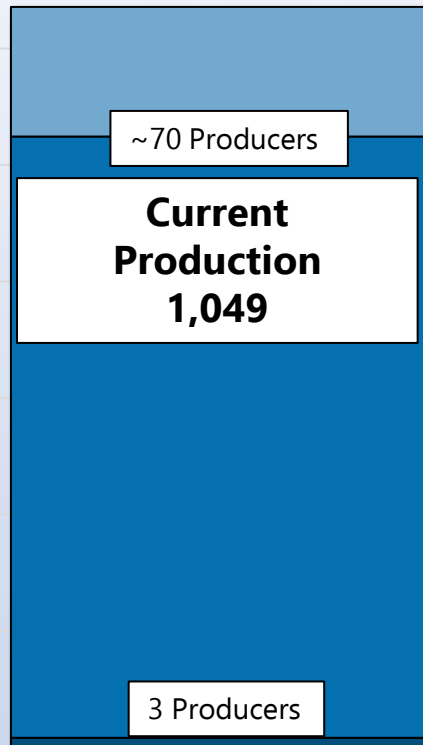
800

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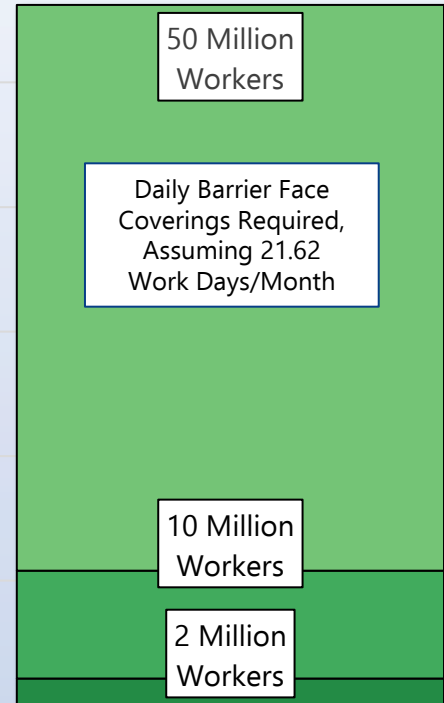


■ New Lines by Year End

■ New Lines

■ Pre-Pandemic

U.S. Pleated Nonwoven Face Mask Production



U.S. Workforce



Source: U.S. Bureau of Labor Statistics (U.S. Workforce) and INDA Estimates, 2021

New ASTM Performance Standard (ASTM F-3502)

Sub-micron particulate filtration efficiency

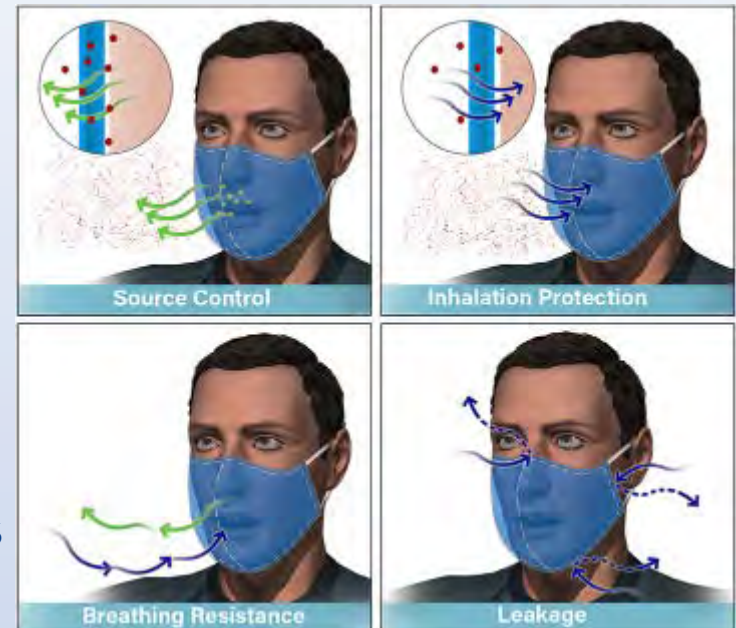
- Establishes % particles blocked by product
- Higher values are better

Airflow resistance (inhalation)

- Measures resistance to air passing through product
- Lower values are better

Applies to single use and reusable products

- Reusable products are evaluated before and after maximum number of cycles for manufacturer specified laundering/cleaning procedures



An Opportunity for Taiwan PPE Providers:

- Automated cut-and-sew medical gown operations in the US
- Currently hand-labor in lower wage countries
- US domestic manufacturing preferred in government contracts

Sustainability Issues Driving Nonwoven Developments

Consumers of Wipes and Absorbent Hygiene:

- **More connected and very Good at getting product information**
- **Want truth, facts, trust**
 - What chemicals and why there
 - What is in a product, what is not
 - More natural inputs
 - Non-toxic, simple solutions

Nonwoven Wipes Substrates

- Desire for “non-plastic” Baby Wipe
 - PHA
 - PLA
 - Viscose (EU SUP Issue)
 - Lyocell
- Rise of bio-based polymers
 - Polypropylene
 - Polyester
 - Polyethylene
- Flax, Hemp, Cotton



Conclusion

- North American Nonwovens market is strong with operating rates now supporting new investments
- COVID-19 drove growth in US Meltblown and facemask capacity
- Automated cut-and-sew for Medical gowns a potential opportunity
- Sustainability issues are driving nonwoven developments in substrates, chemistries and packaging; and government concerns about plastics
- Nonwovens Industry continues to develop material solutions to key challenges in modern society

Thank You!



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