CURRENT AND FUTURE TRENDS: THE NORTH AMERICAN NONWOVENS INDUSTRY

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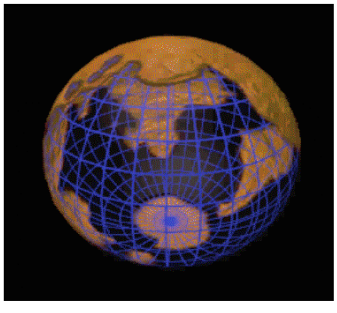
Author will discuss the current and future trends of the North American Nonwovens industry.

INDA

CURRENT AND FUTURE TRENDS

THE NORTH AMERICAN NONWOVENS INDUSTRY



T. R. WIRTZ - PRESIDENT
INDA - Association of the Nonwoven Fabrics Industry

NONWOVENS SYMPOSIUM

Today's Agenda

I. Forming Methods

II. Major Markets

III. Top Manufacturers

IV. Future Trends

Charting the Path Forward

INDA's MISSION

To promote the growth and profitability of the Nonwoven Fabrics Industry

Staff	19 people
Annual Budget	$4 Million
Members (1Aug00)	255

Charting the Path Forward

INDA - Primary Activities

EDUCATIONAL SERVICES

Meetings & Conferences
- IDEA Show
- Filtration Show
- Nonwovens Basics Course
- Highloft Conference
- Needlepunch Conference

Communication Programs
- Industry Statistics
- Technical Journal
- International Directory
- Quarterly Newsletter
- Internet Programs

INDUSTRY ADVOCACY

Marketing Programs
- Nonwovens Promo Video
- Fabric Sampler
- Nonwovens Handbook
- Wipers Brochure
- Healthcare Waste Reduction

Government Affairs
- Regulatory Issues
- Legislative Issues
- International Trade Issues

Technical Support
- Standard Test Method Development
- Technical Conference

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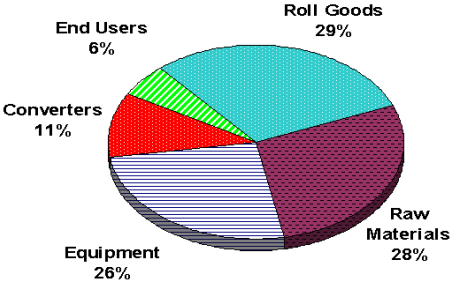
INDA Membership



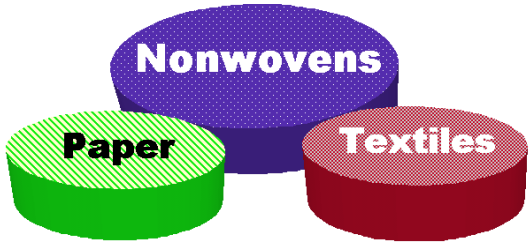
. . . INDA membership is diverse and . . .
. . . A good cross-section of the Nonwovens Industry . . .

Charting the Path Forward

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:663-667 (2001)
National Cotton Council, Memphis TN

Nonwoven Materials

Engineered Fabrics of the Future



. . . Nonwovens fill the performance vs. cost gap . . .

. . . Between paper and textiles . . .

Nonwoven - Primary Forming Technologies

Process	Fibre/Filament	Web Structure Produced
Carding	30 - 65 mm	Oriented in MD, Crosslaid, Randomised Multilayer by means of multiple units
Wetlaid	3 - 25 mm	Randomised distribution, very uniform formation, medium density structure, multilayer capabilities by multiple flow, boxes or by multichannel flowbox
Short Fibre	3 - 15 mm	Randomised distribution, uniform distribution, low to very Airlaid low density structure, multilayer capability by means of multiple forming heads
Staple Fiber	30 - 50 mm	Directional or randomised. Multilayer capability by means Airlaid of multiple units.
Spunlaid	Continuous Filaments	Filamentary structure. Randomised. Multilayer capability by multiple units.
Melt Blown	Short Fibres length	Randomised structure. 3D structure

Products That Use Nonwovens

AGRICULTURE
- Crop Covers
- Turf protection products
- Nursery overwintering
- Weed control fabrics
- Root bags
- Containers
- Capillary matting

AUTOMOTIVE
- Trunk applications
- Floor covers
- Sideliners
- Front and back liners
- Wheelhouse covers
- Rear shelf trim panel covers
- Seat applications
- Headliner
- Cover slip sheets
- Foam reinforcements
- Oil, Air & other filters
- Door trim panel carpets
- Door trim panel padding
- Vinyl, landau cover backings

HOME FURNISHINGS
- Furniture construction sheeting
- Insulators, arms and back
- Cushion ticking
- Dust covers
- Decking
- Skirt linings
- Pull strips
- Bedding construction sheeting
- Quilt backing
- Dust covers
- Flanging
- Spring wrap
- Insulators
- Quilt backings
- Blankets
- Wallcovering backings
- Acoustical wallcoverings
- Upholstery backings
- Pillows, pillowcases
- Window treatments
- Drapery components
- Carpet backings, carpets and pads
- Mattress pad components

INDUSTRIAL/MILITARY
- Coated fabrics
- Filters
- Semiconductor polishing pads
- Wipers
- Clean room apparel
- HVAC filters
- Military clothing
- Abrasives
- Cable insulation
- Reinforced plastics
- Tapes
- Protective clothing, lab coats
- Sorbents
- Lubricating pads
- Flame barriers
- Packaging
- Conveyor belts
- Display felts
- Papermaker felts
- Noise absorbent felts

Products That Use Nonwovens.....continued

SCHOOL, OFFICE
- Bookcovers
- Mailing envelopes, labels
- Floppy disk liners
- Towels
- Pen nibs

CLOTHING
- Interlinings
- Clothing and glove insulation
- Bra and shoulder padding
- Handbag components
- Shoe components

GEOTEXTILES
- Asphalt overlay
- Road and railroad beds underlay
- Soil stabilization
- Drainage
- Dam and Stream embankments
- Golf and tennis courts
- Artificial turf
- Sedimentation & erosion control
- Pond liners

HEALTHCARE
- Surgical: caps, gowns, masks, shoe covers
- Sponges, dressings, wipes
- Orthopedic padding
- Bandages, tapes
- Dental bibs
- Drapes, wraps, packs
- Sterile packaging
- Bed linen, underpads
- Transdermal drug delivery
- Contamination control gowns
- Electrodes
- Examination gowns
- Filters for IV solutions, blood oxygenators & kidney dialyzers

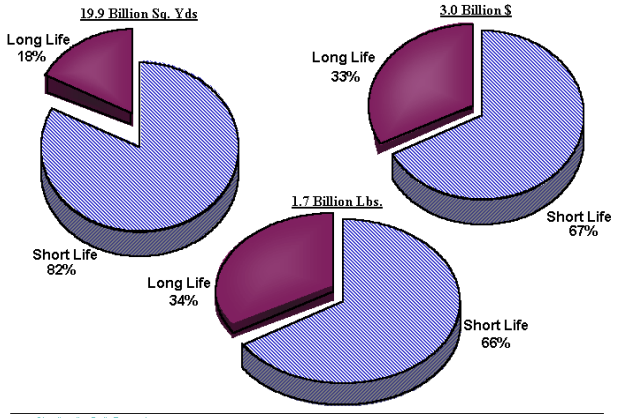
HOUSEHOLD
- Wipes, wet, dry, polishing
- Filters
- Aprons
- Scouring pads
- Fabric softener sheets
- Dust cloths, mops
- Placemats, napkins
- Ironing board pads
- Washcloths
- Tablecloths

LEISURE, TRAVEL
- Sleeping bags
- Tarpaulins, tents
- Artificial leather, luggage
- Airline headrests, pillow cases

PERSONAL CARE
- Vacuum cleaner bags
- Diapers
- Sanitary napkins, tampons
- Tea, coffee bags
- Training pants
- Incontinence products
- Dry and wet wipes
- Cosmetic applicators, removers
- Lens tissue
- Hand warmers
- Buff pads

CONSTRUCTION
- Insulation
- Roofing and tile underlayment
- Acoustical ceilings
- Housewrap
- Pipe wrap

1999 Nonwoven Markets - North America



Nonwoven Volume - 1999 Short-Life Market

(Millions of Sq. Yds.)

Hygiene/Absorbent	10,200
Wipes	2,200
Medical/Surgical	1,600
Filtration (Liquids & Gases)	1,400
Other Short-Life	1,100
TOTAL SHORT-LIFE	**16,500**

Source: INDA estimates

Nonwoven Volume - 1999 Long-Life Market

(Millions of Sq. Yds.)

Upholstery, Bed/Table Linen	1,320
Civil Engineering	390
Building Applications	360
Interlinings	320
Floor Cover	300
Other Long-Life (Shoe, Garments, etc.)	800
TOTAL LONG-LIFE	**3,500**

Source: INDA estimates

Charting the Path Forward

Nonwoven Market - 1999 Company Ranking

(Sales in North America - in millions of $US)

Company	Sales Volume
1) DuPont	670 - 680
2) Kimberly-Clark	630 - 640
3) BBA Nonwovens	505 - 515
4) PGI Nonwovens	415 - 425
5) Johns Manville	290 - 300
6) Freudenberg	245 - 255
7) Ahlstrom/Dexter	145 - 155
8) Foss Manufacturing	130 - 140
9) Synthetic Industries	125 - 135
10) BP Fabrics & Fibers	120 - 130

Source: INDA estimates

Charting the Path Forward

Nonwoven Volume - by Forming Technology

(Millions of Sq. Yds.)

Spunbond/Melt Blown	13,000
Carded	3,200
Hydroentangled	1,400
Needlepunch	800
Air Laid	600
Other	1,000
TOTAL	**20,000**

Source: INDA estimates

Charting the Path Forward

Patent Survey - By Company

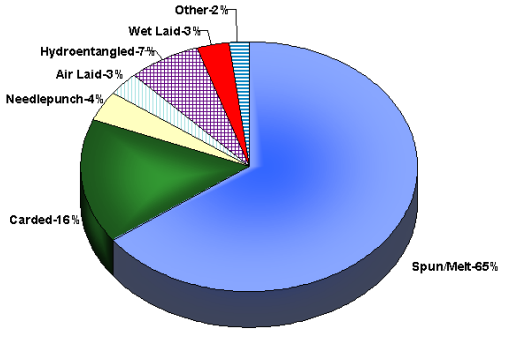
(1995 -> 1st Half 1997)

Company	Sales Volume	% of Total
1) Kimberly-Clark	75	24.7
2) 3M Company	25	8.2
3) DuPont	18	5.9
4) BBA/Fiberweb	18	5.9
5) Proctor & Gamble	18	5.9
6) Freudenberg	13	4.3
7) Hercules	13	4.3
8) Asahi Chemical	8	2.6
9) Hoechst Celanese	8	2.6
10) Johnson & Johnson	5	1.6
11) PGI	5	1.6
12) Pall Corporation	5	1.6
13) Tonen SK.	5	1.6
14) Veratec	5	1.6
Total	**221**	**72.4**

Charting the Path Forward

1999 Nonwoven Markets - by Technology

(Millions of Sq. Yds.)



Source: INDA estimates

Charting the Path Forward

Patent Survey - By Process

(1995 -> 1st Half 1997)

Nonwoven Process	# of Patents	% of Total
Meltblown	86	28.5
Spunbond	82	26.9
Wetform	37	12.3
Lamination	26	8.5
Spunlace	23	7.7
Dryform	23	7.7
Therobond	12	3.8
Airlaid Pulp	7	2.3
Stitchbond	5	1.5
Needlepunch	3	0.8
Totals	**304**	**100%**

Charting the Path Forward

Nonwoven Production Capacity - by Technology

Technology	Number of Producers	Number of Machines	Est. Capacity (000 tonnes)
Air Laid Pulp	4	8	116
Carded, Calender Bond			
Thermal	6	28	73
Resin	9	29	48
Spunlace	4	17	93
Melt Blown	14	39 - 44	46 - 51
(Monolithic/Composites)			
Needlepunch	250 - 270	400 - 450	230 - 260
Spunbond:			
SBPP only	10	27	183
SBPET	5	12	92
S/M composites	4	13	114
Nylon	1	2	6
Polyethylene	1	2	40
Wet Laid	5	19	87

Growth of Nonwoven Capacity - by Technology

Technology	1999 Lines	1999 M Tonnes
Air Laid Pulp	1	6
Carded, Calender Bond		
Thermal	-	
Resin	-	
Spunlace	1	6-7
Melt Blown	2	1-2
(Monolithic/Composites)		
Needlepunch	10	25-40
Spunbond:		
SBPP only	3	8-9
SBPET	1	10-12
S/M composites	1	6-7
Nylon	-	
Polyethylene	-	
Wet Laid	-	
TOTAL	**19**	**62-83**

Nonwovens Industry

Worldwide Future Trends

- ***Fiber - to - fabric*** (Wet laid, Spunlace, Air Laid, Carded, Needlepunch) -
  - 65% of world market
  - Projected to grow at 3 - 5% P.A.
- ***Polymer - to - fabric*** (Spunbond, Meltblown, Film)
  - 35% of world market
  - Projected to grow at 6 - 8% P.A.
- ***Major markets***(US, Western Europe, Japan) growth slows to 2 - 4% P.A.
- Markets in ***developing countries*** grow rapidly, 8 - 10%+ P.A.
  - Key growth areas of the future - Asia, Latin America, and Eastern Europe.
- There now is ***closer cooperation*** among industry participants and between governments. This will continue.

Worldwide Future Trends - continued

- Many ***mergers and acquisitions*** as nonwovens industry consolidates on worldwide basis.
  - Forward integration
  - Backward integration
  - Acquiring competitors
- ***Barriers to entry*** are falling (NAFTA, Brazil, Argentina, etc.
- ***Distribution channels*** are opening and improving
- Improving long-term ***economic conditions*** in high population regions (mainly pacific rim) means more disposable income.
  - Higher disposable income equates to higher sales of nonwoven materials.
- ***Capital investment*** intensifies.
  - Estimates are that worldwide nonwoven manufacturer's 5-year capital investment programs will exceed US$2 billion.
- Robust growth expected in multi-layered ***composite materials***.

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