Spunbond Technology for Durable Nonwovens

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Agenda

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1. Introduction
2. Nonwovens Market
3. Market Requirements for Technical Nonwovens
4. Production Concepts
5. Key Technology Facts
6. Your Benefits

Agenda

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Oerlikon Neumag
Brief Company Introduction

- Founded in 1948
- Market and technology leader for turnkey equipment for BCF yarn and synthetic staple fiber production
- First Supplier for all major nonwoven processes: Spunbond, Meltblown and Airlaid
- Location: Neumünster, Germany
  ≈ 400 employees
- 2012 Merger with Oerlikon Barmag to form Segment Manmade Fiber
- Manmade Fiber Segment of Swiss based Oerlikon with ≈ 2,500 employees and ≈ 900 Mio € turnover

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Nonwovens Market
Global Nonwovens Consumption

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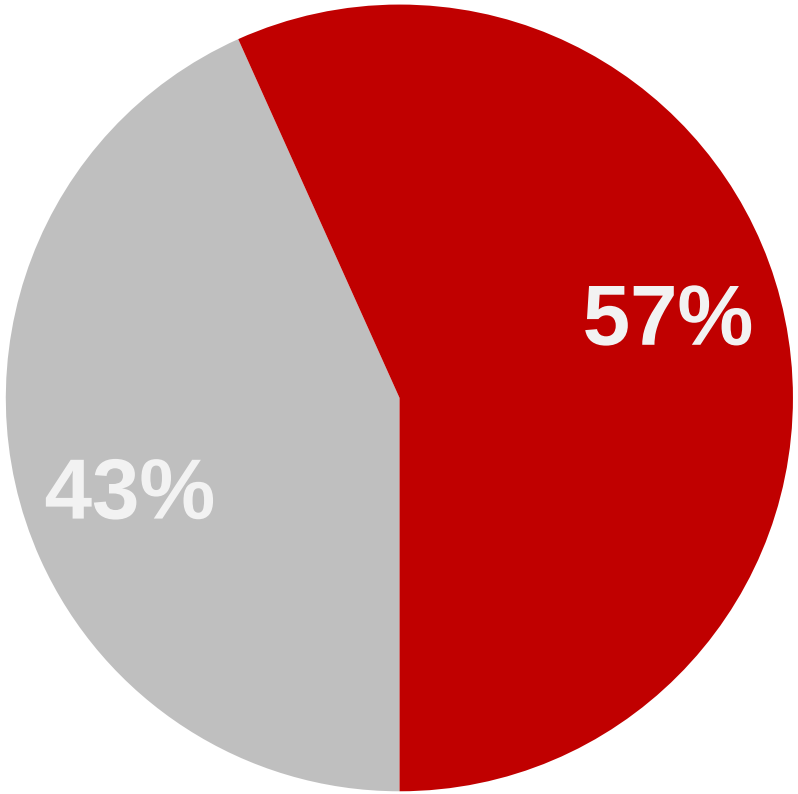
Disposable[1]

- ➔ high volumes of same products,
- ➔ low growth rates,
- ➔ highly competitive

Technical[2]

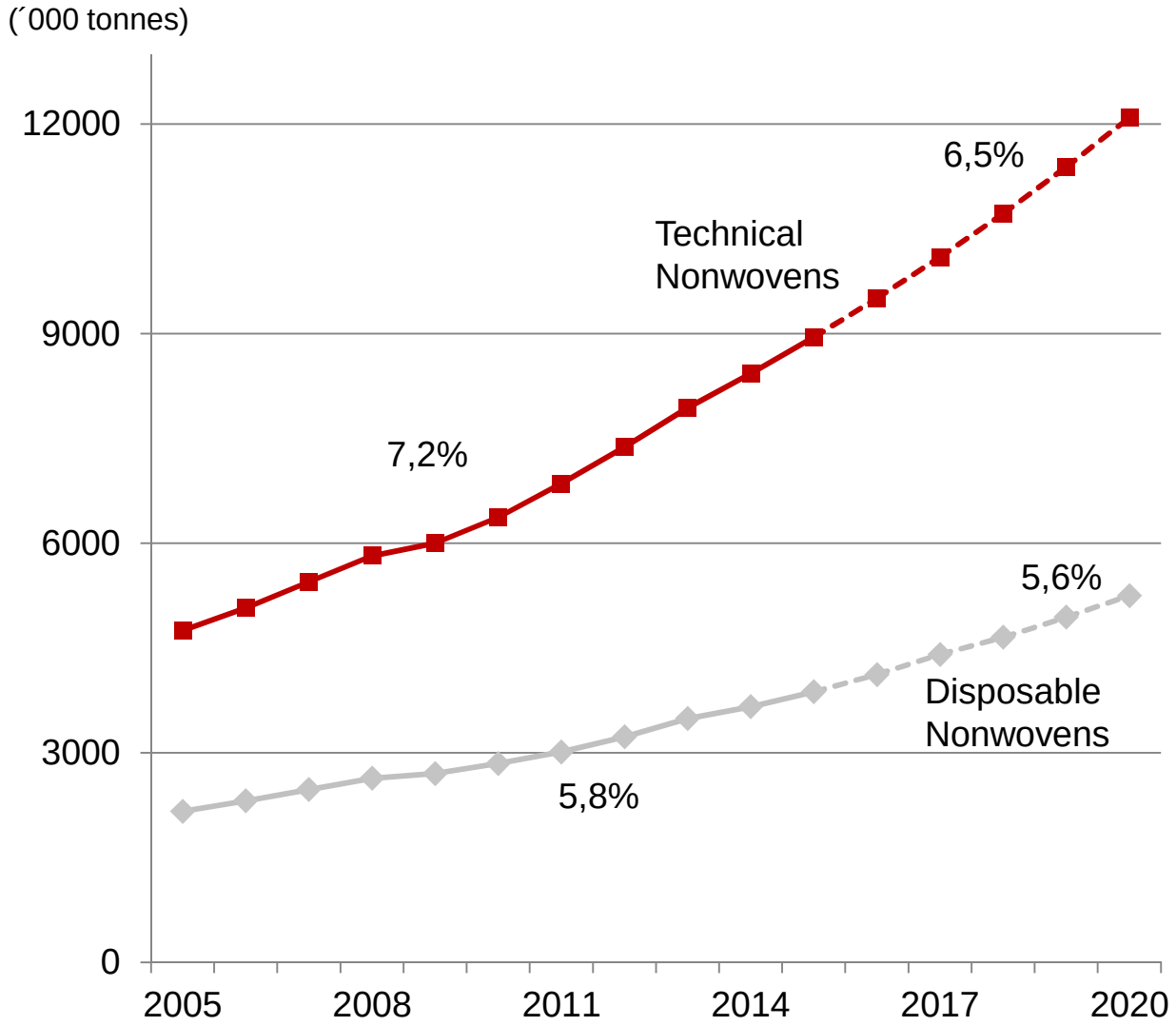
- ➔ higher growth rates,
- ➔ high diversity,
- ➔ high profitability



1) Disposable: Hygiene, Medical, Wipes
2) Technical: Industrial, Filtration

source: SmithersApex

Nonwovens Market
Global Nonwovens Market Development

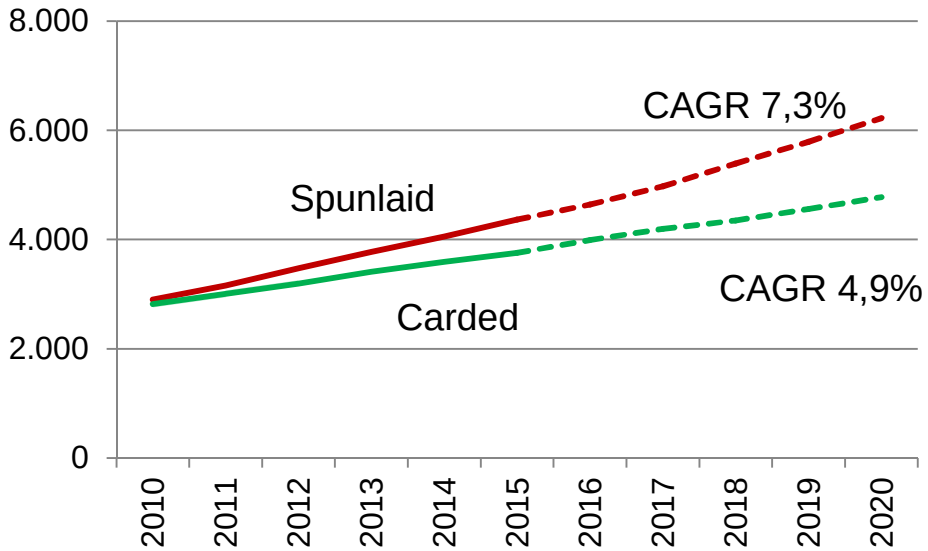


source: SmithersApex (2012/2015)

Nonwovens Market
Global Nonwovens Market Development

General Trend:

From Carding to Spunlaid



- Today nearly 50% of all applied nonwovens are spunlaid
- Spunlaid market growth faster than Carded

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Market requirements for Technical Nonwovens

General Requirements for Production Companies

product qualities to meet the related requirements reflecting established local and export standards

low operational expenses

line flexibility

Sustainable solution
Oerlikon Neumag Technical Spunbond Lines

Oerlikon Neumag Technical Spunbond

- Excellent applications meet high-margin market demands
- Dedicated production lines for the biggest markets in technical nonwovens

High performance nonwoven applications

- Bitumen roofing substrate
- Underlayment roofing membrane
- Geotextile

Typical Product Performance Data for Bitumen Roofing Substrates

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Typical material data from the market

Basis Weight ISO 9073-1	Tensile Strength ISO 9073-3		Elongation ISO 9073-3		Thermal Dimensional Stability DIN 18192	
[g/m²]	MD [N/5 cm]	CD [N/5 cm]	MD [%]	CD [%]	elongation MD [%]	neck-in CD [%]
120	420 – 450	280 – 330	≥ 30	≥ 30	≤ 2	≤ 2
135	473 – 506	315 – 372	≥ 30	≥ 30	≤ 2	≤ 2
150	525 – 563	350 – 420	≥ 30	≥ 30	≤ 2	≤ 2
160	560 – 600	373 – 445	≥ 30	≥ 30	≤ 2	≤ 2
250	875 – 938	583 – 700	≥ 30	≥ 30	≤ 2	≤ 2

Typical product data achievable with Neumag plants.

- Single layer PET spunbond
- Needled, stretched, heat-set and binder impregnated
- Increased profit compared to glass-fiber reinforced substrates

Typical Product Performance Data for Roofing Underlayment Membranes

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Typical material data from the market

Basis Weight ISO 9073-1	Tensile Strength ISO 9073-3		Elongation ISO 9073-3		Nail Shank DIN EN 13859-1	
[g/m²]	MD [N/5 cm]	CD [N/5 cm]	MD [%]	CD [%]	MD [N]	CD [N]
40	77 – 85	59 -65	≥ 40	≥ 40	41	54
55	106 – 117	81 – 90	≥ 40	≥ 40	61	82
70	135 – 149	103 – 114	≥ 40	≥ 40	99	132
80	154 – 171	118 - 130	≥ 40	≥ 40	130	173

Typical product data achievable with Neumag plants.

- Single layer spunbond PP, PET or Bico
- Calendared

Typical Product Performance Data for Reinforcement Nonwoven Geotextiles

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Typical material data from the market

Basis Weight ISO 9073-1	Tensile Strength ISO 10319		Elongation ISO 10319		Puncture Strength (CBR) ISO 12236
[g/m²]	MD [kN/m]	CD [kN/m]	MD [%]	CD [%]	[kN]
80	5,0 – 5,8	4,5 – 5,2	≥ 50	≥ 50	0,5 – 0,7
110	6,8 – 7,9	6,3 – 7,3	≥ 50	≥ 50	1,2 – 1,5
160	9,9 – 11,5	9,4 – 10,9	≥ 50	≥ 50	1,7 – 2,0
270	16,7 – 19,4	16,2 – 18,8	≥ 50	≥ 50	2,9 – 3,1
320	19,8 – 23,0	19,6 – 22,8	≥ 50	≥ 50	3,5 – 4,0

Typical product data achievable with Neumag plants.

- Single layer spunbond
- Needled, stretched, and heat-set

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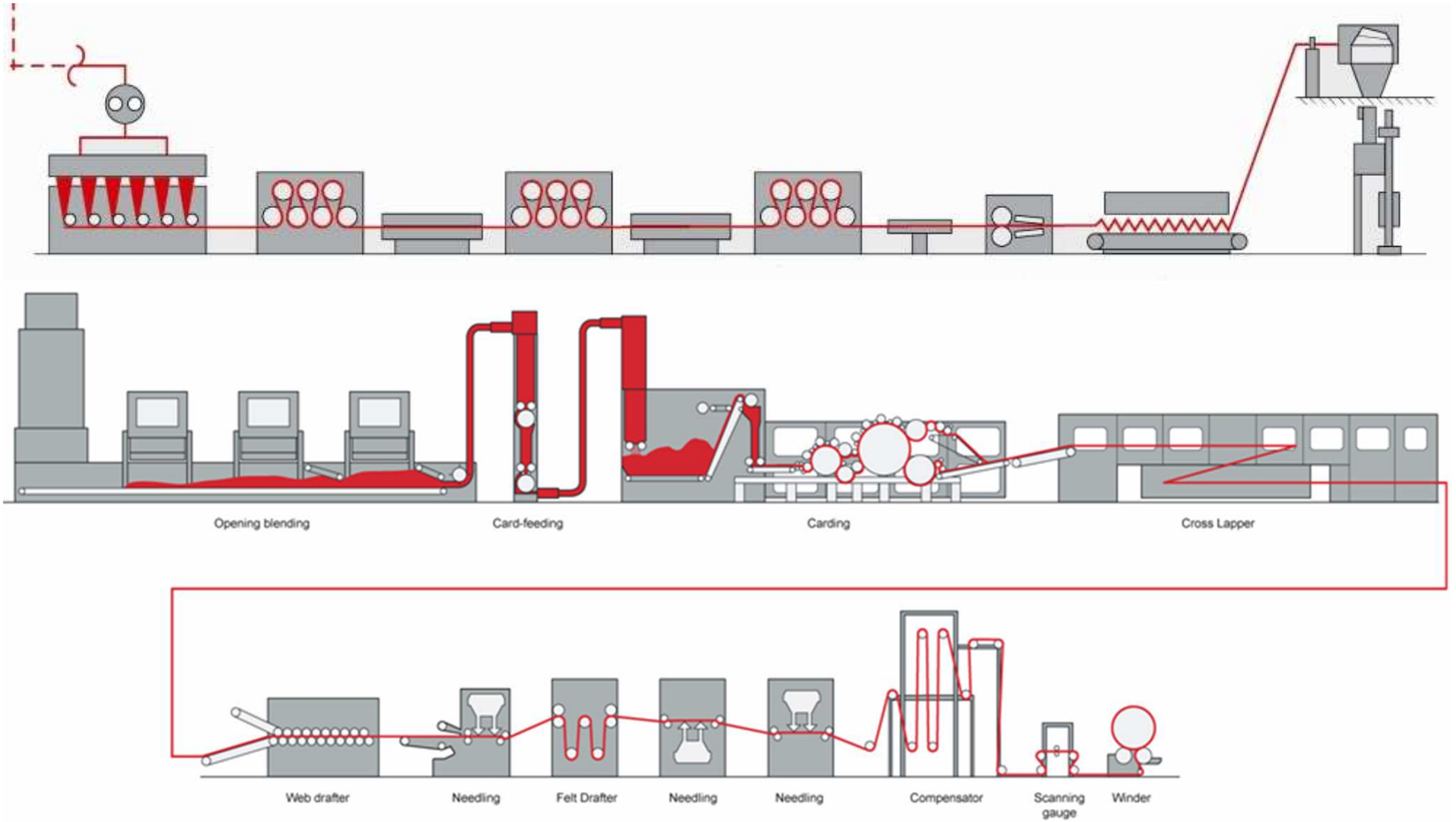
Production concept
In-line production from chips to roll-good

Classical production process

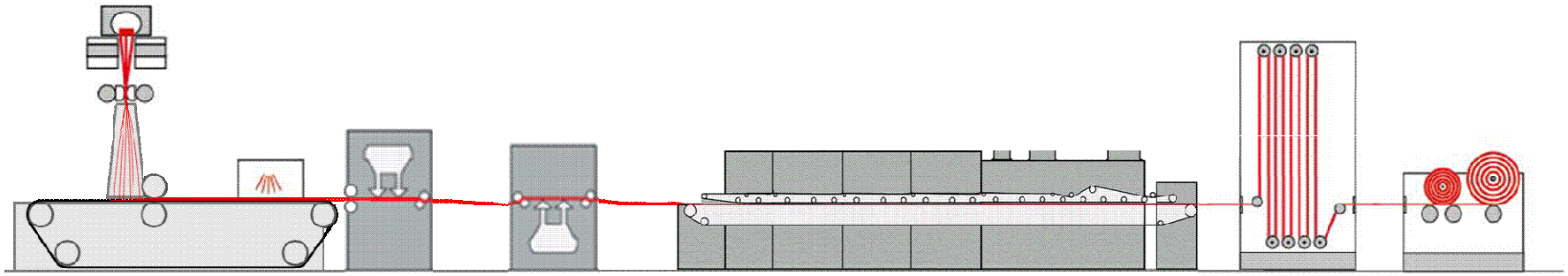
Example: 6m-Geotextile Nonwoven Plant



Production concept
In-line production from chips to roll-good

Single-step in-line production process

Example: 6m-Geotextile Nonwoven Plant



Production concept
In-line production from chips to roll-good

Classical production process versus Single-step in-line production process

Example: 6m-Geotextile Nonwoven Plant

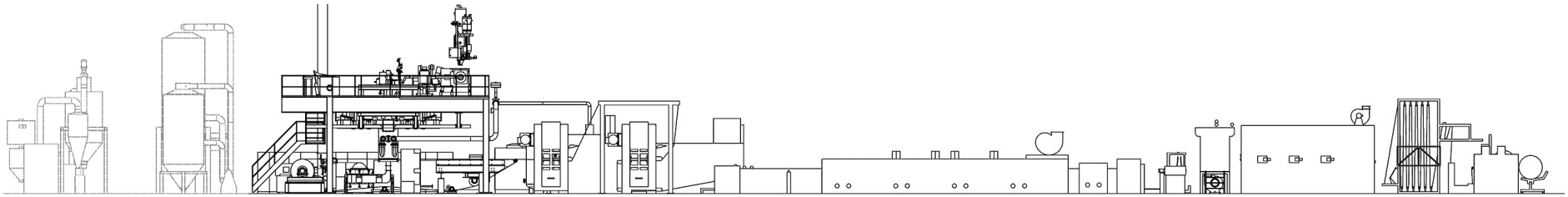
Why to change to Spunbond?	Why to keep Carding?
+ cost efficient production	+ cost efficient production
+ high product performance/quality	+ high product performance/quality
+ maintenance	+ maintenance
+ investment	+ investment
+ space requirement	+ space requirement
+ automation	+ automation
+ …	+ …
➔ 24/7 process	➔ start/stop process
➔ supply change control	➔ raw material flexibility
- uncertain technology	+ familiar technology

Production concept
In-line production from chips to roll-good

Reduced Operation Costs and Improved Yield

Example: Spunbond Bitumen Roofing Substrate Line

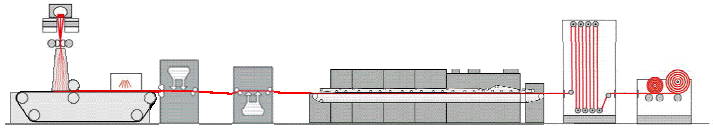
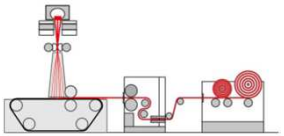
- Improved product performance compared to carded roofing substrates
- In-line fiber spinning and nonwoven forming process: no bale warehouse
- In-line impregnation process: less space required vs. off-line impregnation
- space requirements: 20+15 m x 80+16 m x 12 m (3360 m² hall with 12 m max height)
- Operating man-power savings: single process control system
- Pay back period of plant investment: approx. 2-3 years



Bitumen roofing substrate line concept

Production concept
In-line production from chips to roll-good

High Efficiency Plants for Technical Spunbond

Plant	Line width (trimmed product)	Total annual capacity
Bitumen Roofing Substrate Plant	4.04 m	10,600 tonnes per year
		
PET/PP-Geotextile Plant	5.9 m	11,800 tonnes per year
		
PP/PET or Bico- Roofing Underlayment Plant	3.2 m	6,100 tonnes per year
		

Calculation based on 7,899 hours per year effective production time, trimmed and finished nonwoven-roll good.

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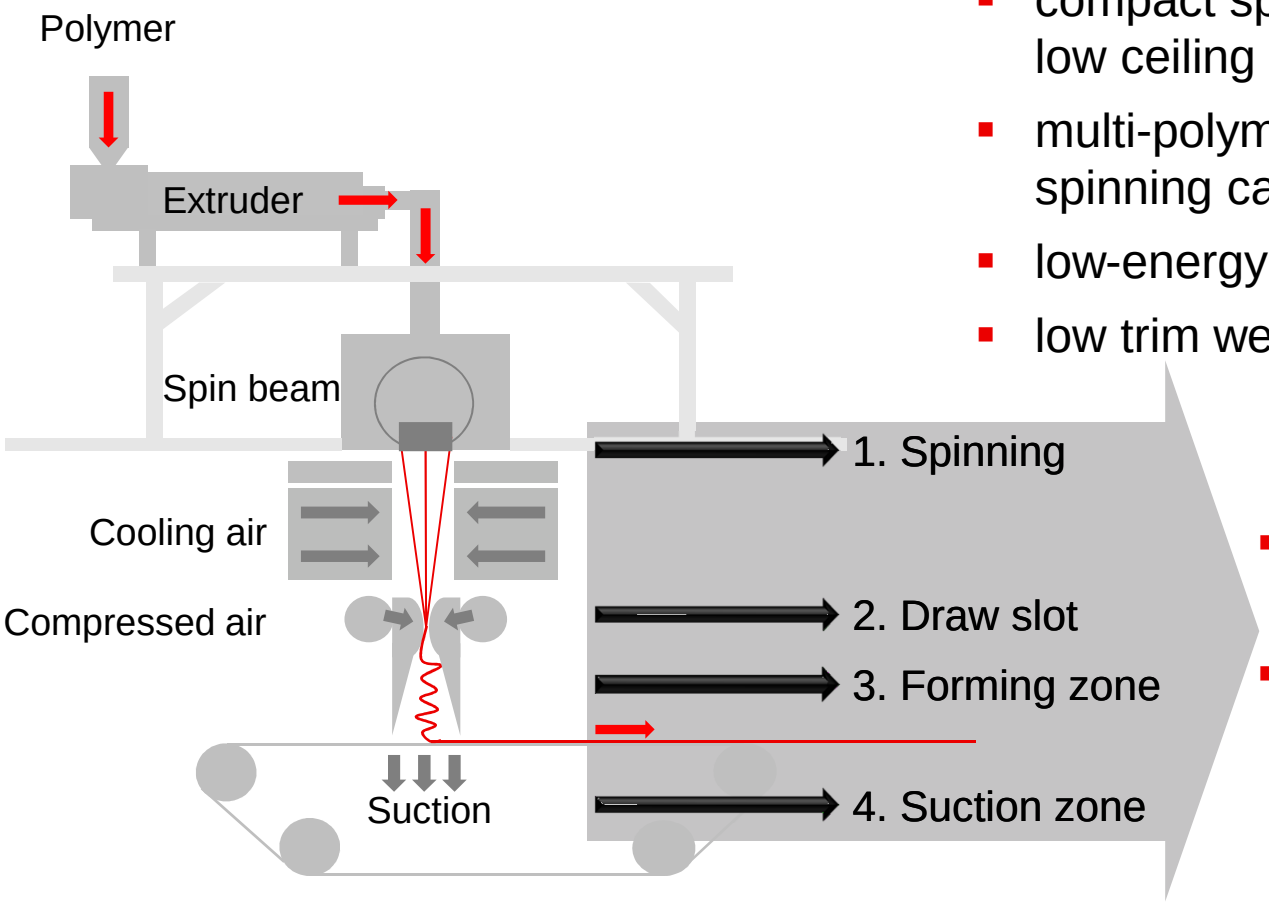
Key Technology Facts
Oerlikon Neumag Spunbond Technology

Neumag Spundbond Process



Technology value propositions

- compact spinning unit:
  low ceiling height
- multi-polymer and fiber
  spinning capability
- low-energy draw-slot technology
- low trim web forming

- **Improved Process and**
- **Improved Nonwoven Characteristics.**

Key Technology Facts
Capability of Spinning Technology

Oerlikon Neumag Spunbond Technology
offers customised solutions for Durable Nonwovens

Flexibility in polymer processing

- Spinning technology is generally suitable for mainly all melt-polymers
  - PET: Standard for High Performance Materials with normal chemical resistance requirements,
  - R-PET: low cost Materials, environmental friendly labeled
  - PLA: “green” Materials from biopolymers, biodegradable
  - PA6 and PA6.6: High-Performance Materials
  - PBT, PPS etc. High-Temperature Materials
  - PP and PE: Standard Material for low cost applications

- PET plants can be upgraded for R-PET

- PP plants can be upgraded for PET and vice versa

Key Technology Facts
Capability of Spinning Technology

Oerlikon Neumag Spunbond Technology
offers customised solutions for Durable Nonwovens

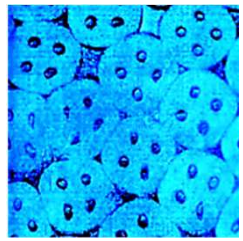
Durable Nonwovens with fiber-integrated functions

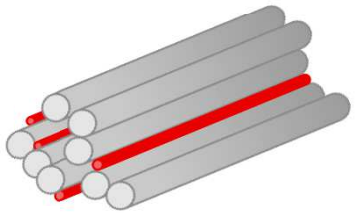
Profiled and hollow fibers with or without self-crimp capability

- Humidity transportation, breathability,
- Liquid transportation,
- Filtration efficiency,
- Sound and heat-insulation,
- High-loft, low density
- etc.

Mixed fiber technology

- One spinneret – two fibers
- Combination of two different polymers in one product, e.g. PET and coPET
- Variability of fiber fineness and profiles



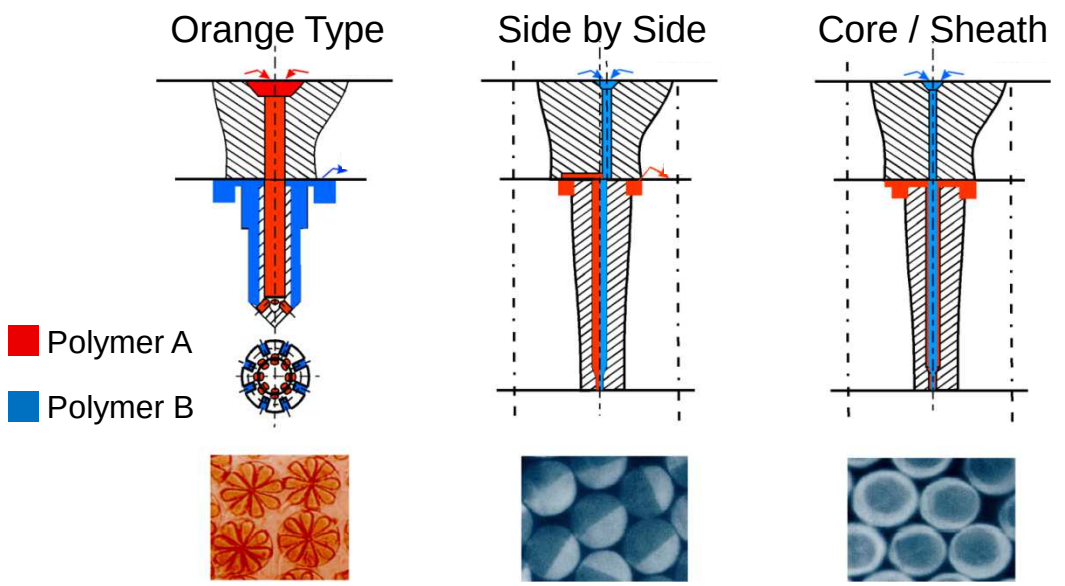


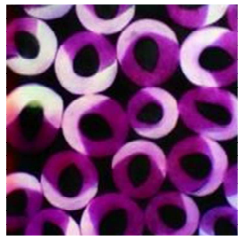
Selection of possible profiled and hollow fibers

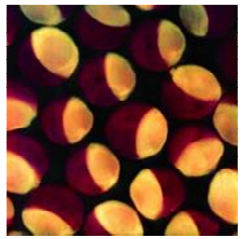
Key Technology Facts
Bicomponent Technology

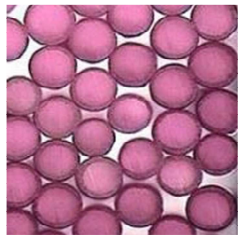
- High variety of cross sections available for advanced characteristics

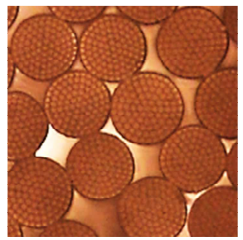
Polymer flow in spinneret for standard bico fibers











Selection of possible bico fiber cross sections

Advantages of bico fibers (examples):

- combination of characteristics in one fiber
- excellent thermobonding with low-melt polymer as sheath component
- 3-D self-crimp fiber
- micro fibers with orange-type or island-in-the-sea

Key Technology Facts
Spunbond Solution Center

- Continuous development of the spunbond process
- Demonstration of process and operation based on customer demands

Capability

- Development of customer products and processes
  - S/M/S Configuration
  - All 3 spinning positions for mono and for bico technology
  - S-Line specialised for technical spunbond nonwoven
  - Bonding: Calender, 2 needle looms
- Evaluation of customers raw materials
- Testing of fibers and nonwoven in own textile laboratory

We welcome you in our lab for your product development and/or raw material evaluation.

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Your Benefits with Oerlikon Neumag Technical Spunbond Lines

In-line production from chips to roll-good

- One-step process eliminates the need of intermediate-product stores
- Full control over the whole value chain

High production capacity

- PET spinning throughput of up to 300 kg/h and meter
- PP spinning throughput of up to 240 kg/h and meter
- Production speed with in-line needlebonding of up to 40 m/min

Low production cost

- Low energy consumption
- High yield
- Few operators for running the line
- pay-back period of plant invest approx. 2 to 4 years

Thank you.


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