Nonwoven Materials: Challenges for the Medical and Consumer Products Sector

Bryan D. Haynes, Ph.D.
Director, Global Enterprise Research and Engineering
Global Nonwovens, Kimberly-Clark
Outline

• Review of Innovation enabled by Nonwoven Materials at Kimberly-Clark

• Big 3 Challenges
  – Market Differentiation
  – Raw Material Costs
  – Scale (Prototype to Commercialization)

• Conclusions

• Questions
Kimberly-Clark Innovation

1872  1900  1950  2000
Kimberly-Clark Global Nonwovens

• Vertically integrated and provide the majority of nonwoven needs to our internal customers including Personal Care (Baby Child Care and Adult/Feminine Care), Health Care, KC Professional, and KC International.

• Extensive Patent Estate covering a broad range of processes and materials.

• Vision: Supplier of the Year, Every Year!

• Mission: To innovate, develop, and source advantaged nonwoven solutions.
Business Enabling Innovation via New Materials

- **Spunbond**
- **SBL – Stretch Bonded Laminate**
- **Coform – Meltblown/Pulp Composite**
- **SMS – Spunbond/Meltblown/Spunbond**
1st to Market – Product Enabling Innovation via New Materials

- **PUB** - Point Unbonded
  - Loop for mechanical fastening

- **NBL** - Neck Bonded Laminate
  - Stretch diaper ear

- **SFL** – Spunbond Film Laminate
  - Cloth-like barrier
Technology Evolution + Vision + Risk = Disruptive Technology

Spunbond – Business Enabling

Meltingblown – Business

SMS - Category Enabling.
What Is The Next Big Innovation?

- There are 3 major issues or challenges that need to be addressed to develop and commercialize new materials.
  1. Market Differentiation
  2. Raw Material Costs
  3. Scale-Up
Challenge 1: Market Differentiation

• Over the last decade many process patents have expired and there has been a significant amount of capital invested globally for commodity grade materials.

• If everyone has similar building blocks how can you be different in the market place?
  – Product Design
  – Composites (bringing together multiple materials for new function)
  – Create something totally NEW!!
Challenge 1 Solution: Create Something New!

• The best way to drive market differentiation is to have a proprietary material that provides a consumer need at the right price!
• Creation of a new material may require a new process.
• Invest in process technology.
Challenge 2: Raw Material Cost

• A major percentage of final material cost is due to the cost of raw materials.
  – For example: Polypropylene (PP) price has increased by a factor of ~ 2.5 - 3 since the 1990s.

• Specialty polymers cost more but also provide more consumer benefits.

• How can you decrease raw material costs?
  – Sustainability is key: Reduce, Reuse, Recycle
Challenge 2 Solution: Sustainability

• How can you reduce?
  – Improve functional properties of the materials, stronger, enhanced barrier, etc. This is mass efficiency!
  – Fillers, recycle, etc.

• Make a little go a long way!
  – Nanotechnology (several new emerging technologies)
  – How far can a sugar cube of PP go?
Nanotechnology (Something Small is really BIG!)

How far can a sugar cube of PP go?

- Spunbond Fiber (15 microns) = 4 miles
- Meltblown Fiber (3 microns) = 100 miles
- Nanofiber (300 nanometers) = 10,000 miles

How can we produce these fibers Cost Effectively!!
Challenge 3: Scale – Prototype to Commercial Reality

• Fail Fast, Cheap and Often! Many R&D programs will never make it to commercialization (~10% success rate).
  – “Sometimes when you innovate, you make mistakes. It is best to admit them quickly and get on with improving your other innovations.” Steve Jobs

• A big challenge to develop new materials/processes is to go through the pains of scaling-up.

• “But it ran on the pilot line!” This is a typical and honest response from scientists/engineers when they are scaling up a new process.
Challenge 3 Solutions: Partnerships, Risk Taking, and Dream Big!

- There are more emerging technologies that can benefit from Industry participation – Open Innovation.
- It is not easy! Leadership needs to accept that scaling up may take some time and there could be numerous set-backs before success.
- Do not focus on incremental change. Dream Big and focus on potentially disruptive technologies.
Summary: Big Challenges for Nonwovens

1. Market Differentiation
   – Understanding Consumer Needs and providing differentiated product solutions
   – New materials are the key. Emphasis on process technology. Product – Material – Process (Circle of Life!)

2. Raw Material Cost
   – Reduce, Reuse, Recycle (Sustainability)
   – Make a little go a long way, Mass Efficiency
   – Nanotechnology

3. Commercial Scale-Up
   – More Open Innovation – share the risk burden (Industry partnerships)
   – Be patient, it may take some time to dial in the process
   – Prioritize the Big Ideas, Disruptive Big Bets
Thank You!

Questions??