



COTTON FLOCK: A NATURAL FOR INNOVATION

WHAT IS COTTON FLOCK?

Cotton flock is an innovative, milled form of cotton. Made up of particles 350 microns to 1mm in length, it has been used for decades as a filler and reinforcement fiber in adhesives, epoxy resins, cosmetics, and other applications throughout industrial markets.^{1,2} Now, coform based substrates for wipes, absorbent hygiene, and filtration, can benefit from cotton flock's soft, absorbent, and biodegradable properties.^{3,4}

A NATURAL PARTNERSHIP.

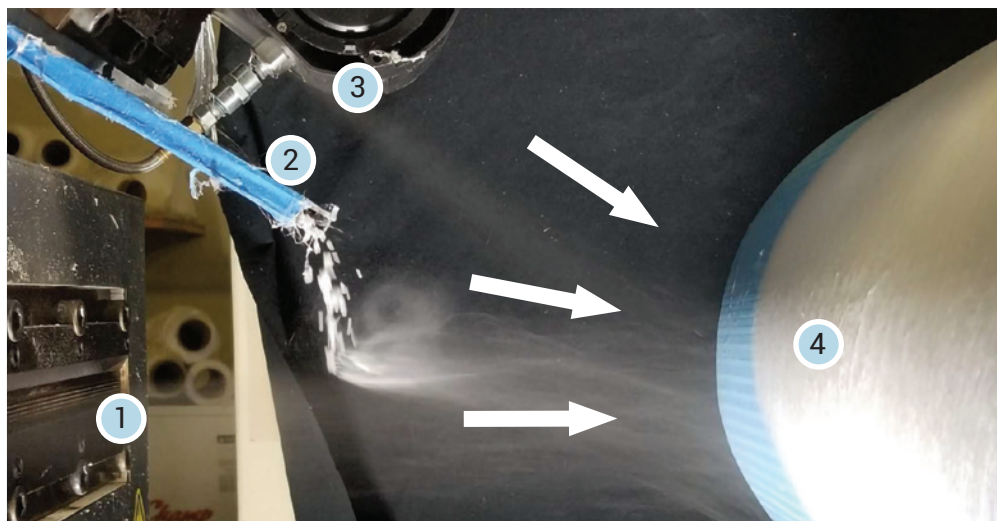
Cotton Incorporated and the Nonwovens Institute at North Carolina State University teamed up to develop and test cotton flock in a lab scale coform project.⁵ As innovation within the nonwovens industry progresses, this technology was identified for its strong potential for new product development incorporating meltblowing technology with micro-sized particles of cotton flock with high surface area. Throughout the course of the trials, polypropylene and cotton flock hybrids were successfully produced with 70-90% cotton content using Biax meltblowing technology. These samples were then tested for basis weight, liquid absorption, and air permeability. Some samples were produced with a pattern to simulate a thermal calender for absorbent wipe applications. Hybrids containing PLA and cotton flock were also produced to show potential for a completely bio-based fabric. Samples of 100% polypropylene and 100% PLA were used as control materials during the trials.

WHAT WE LEARNED.

The results showed that micro-sized cotton particles can be blown into coform substrates. Materials were created with basis weights ranging from 148 to 364 GSM. Across the different trial materials, air permeability ranged from 25 to 83 ft³ / min and absorbency ranged from 183% to over 800%, showing a great degree of flexibility in various applications.

See chart on back for supporting data.

THE SCIENCE BEHIND THE TECHNOLOGY.



BIAX MELTBLOWING TECHNOLOGY KEY:

1. PRIMARY DIE
2. PARTICLE SHAKER
3. SECONDARY DIE
4. COLLECTOR

Biax Fiberfilm Meltblowing Technology:

- Primary Die: 15" width, 0.009" nozzles, 736 polymer holes (4 rows) and 1128 air holes
- Secondary Die: 5" width, 0.02" nozzles, 122 polymer holes (2 rows) and 390 air holes

Raw Materials:

- Cotton Flock: 350 and 650 μm .
- Polypropylene (PP) – Meltflow $\sim 500\text{g}/10\text{min}$ at 230 C

FIBER BLEND	FLOCK SIZE (μm)	BASIS WEIGHT (GSM)	AIR PERMEABILITY (FT ³ /min) <i>ASTM D737</i>	LIQUID ABSORPTION <i>NWSP 010.1</i>
100% PP (Control 1)	N/A	39	42.4	81.1
100% PP (Control 2)	N/A	25	67.2	140.2
100% PP (Control 3)	N/A	18	91.4	124
80% Cotton / 20% PP	350	147.6	24.7	183.4
70% Cotton / 30% PP	350	249.5	27.7	583.8
90% Cotton / 10% PP	350	169.9	83.4	695.8
70% Cotton / 30% PP	650	364.1	32	813.1
85% Cotton / 15% PP	650	232	48.1	786.6
100% PLA (Control 4)	N/A	20	N/A	N/A
90% Cotton / 10% PLA	350	159	N/A	600

To learn more about cotton flock coform innovations, contact us at nonwovens@cottoninc.com.



Cotton Incorporated

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Sources: 1 Cotton fibres and flocks by Goonvean Fibres Ltd. <https://www.goonveanfibres.co.uk/product-cotton.htm>. 2 Cotton Flock Fiber. Claremont Flock. <https://www.claremontflock.com/cotton>. 3 Zambrano, M. et al. (2018). Microfibers generated from the laundering of cotton, rayon and polyester based fabrics and their aquatic biodegradation. Marine Pollution Bulletin 142 (2019) 394–407. 76% in waste water after 250 days with continued degradation projected. 4 Li, L. et al. (2010). Biodegradability study on cotton and polyester fabrics. Journal of Engineered Fibers and Fabrics 5(4). 5 Cotton Incorporated and Nonwovens Institute at NC State University trials on Coform Nonwovens Comprising of Cotton Fibers.