



# ***Does Substrate Uniformity Matter?***



***Cerex Advanced Fabrics, Inc***



# Presentation Outline

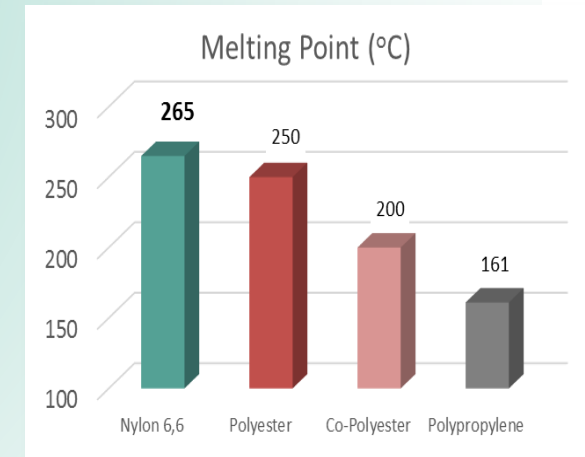
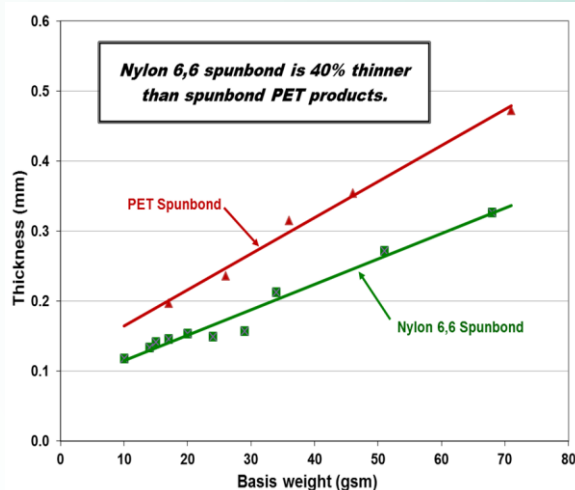
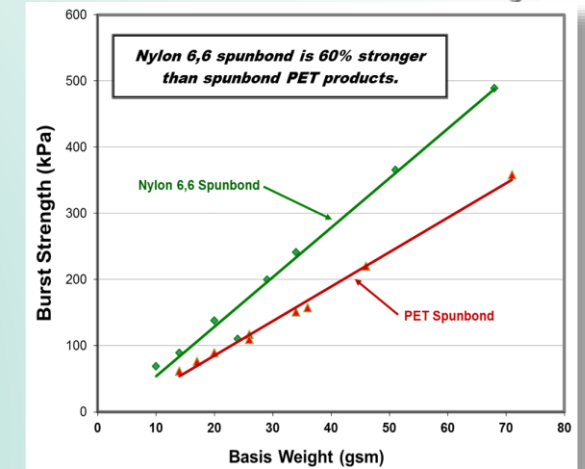
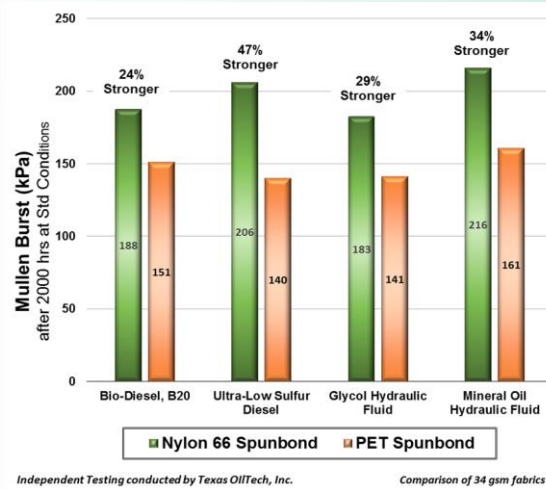
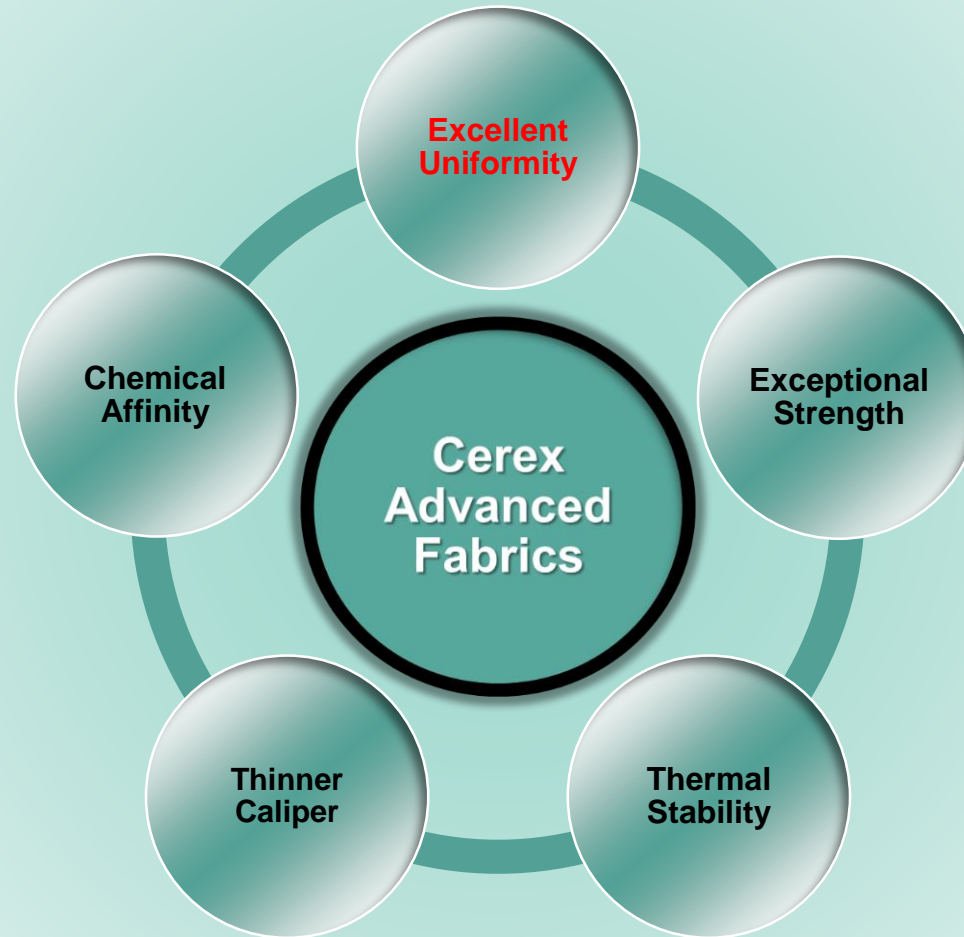


- The Nylon Advantage
- Visual Uniformity Comparison
- Establishing Metrics
  - Physical Properties Comparison
  - Light Intensity Comparison
- Application Benefits
  - Nanofiber Case Study
  - Hydraulic Dynamic Flow Case Study





# The Nylon Advantage®

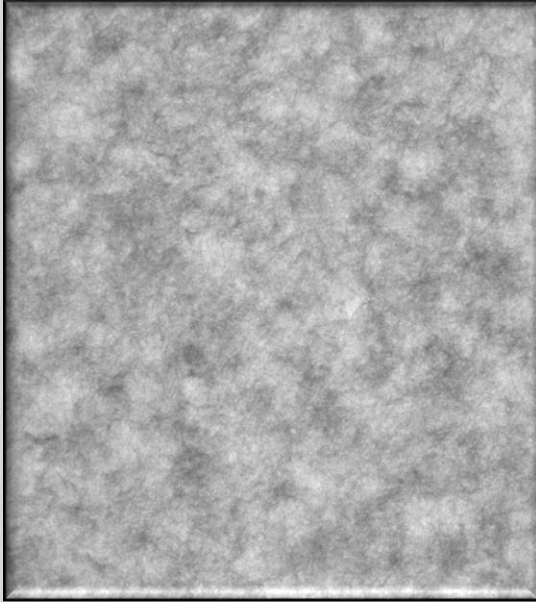


# Visual Comparison

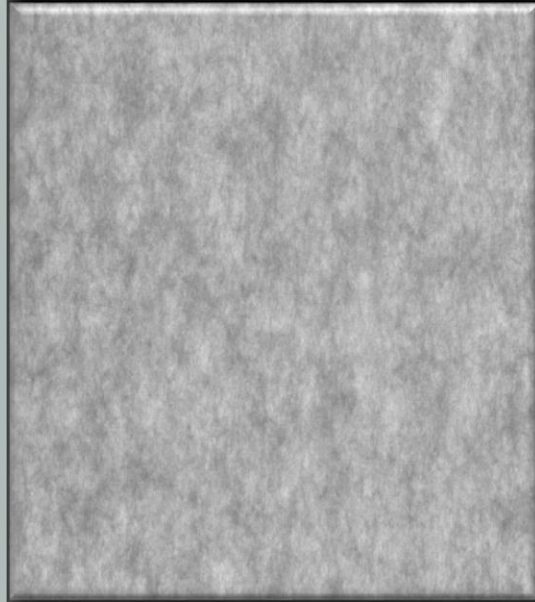
Sample size is 17 cm by 15 cm



20 GSM

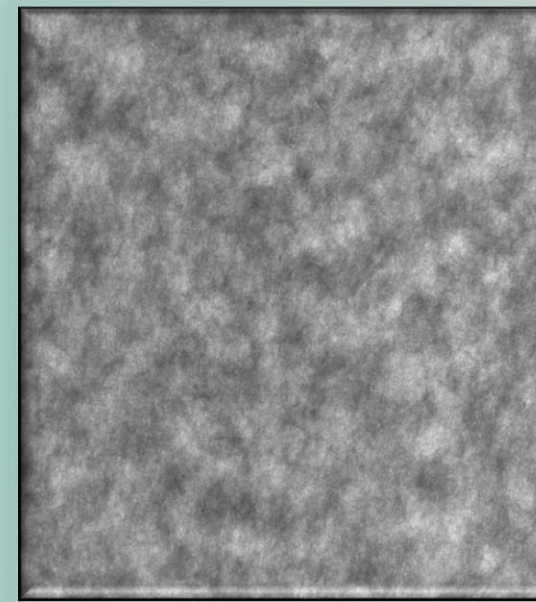


Polyester

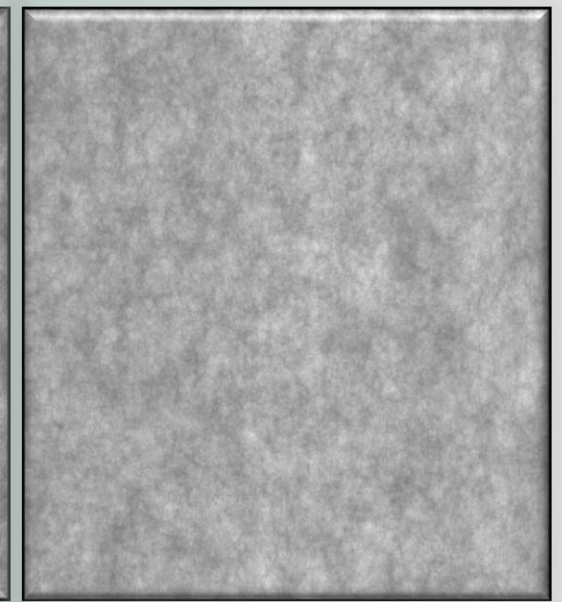


Nylon 6,6

34 GSM



Polyester



Nylon 6,6

- *Most people agree that the visual uniformity of Cerex® brand spunbond nylon is better than polyester*
- *Unfortunately, visual assessments are **subjective** and don't provide quantitative data for comparison*







# Establishing Metrics

- **Physical Properties Variation**

- Basis Weight
- Caliper (Thickness)
- Air Permeability



- **Light Intensity Variation**

- On Line Camera



# Sampling Plan and Test Methods



- Six (6) 64-72” PET SB wide rolls commercially purchased
- Five (5) 60” wide Cerex® rolls selected
- Basis Weights ranged between 20 and 51 gsm
- 10 Full Width MD Samples every 10m
- 5-7 CD Samples taken every 30 cm
- 50-70 Samples per roll – Multiple tests per sample

ASTM Test Methods

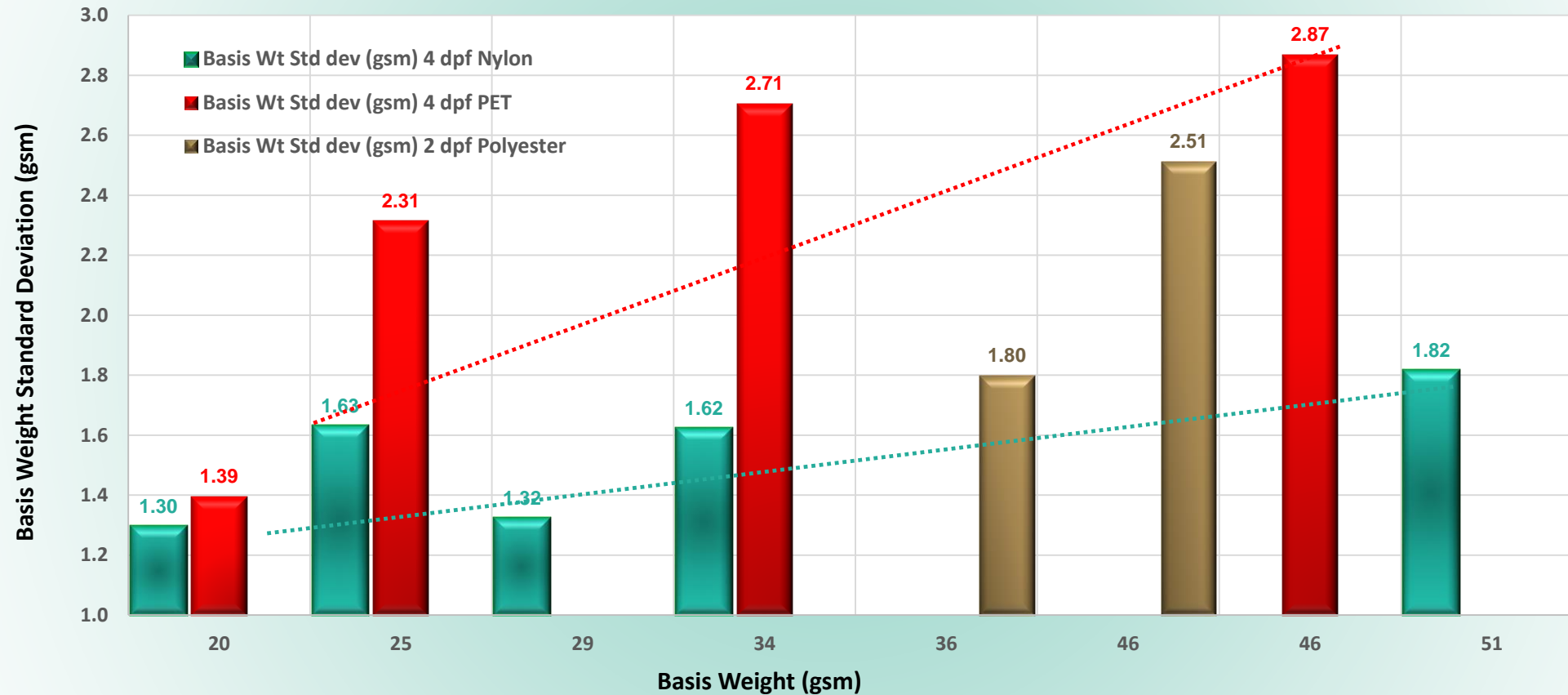
Basis Weight	Thickness	Air Perm
D3776	D1777	D737



# Basis Weight Variability



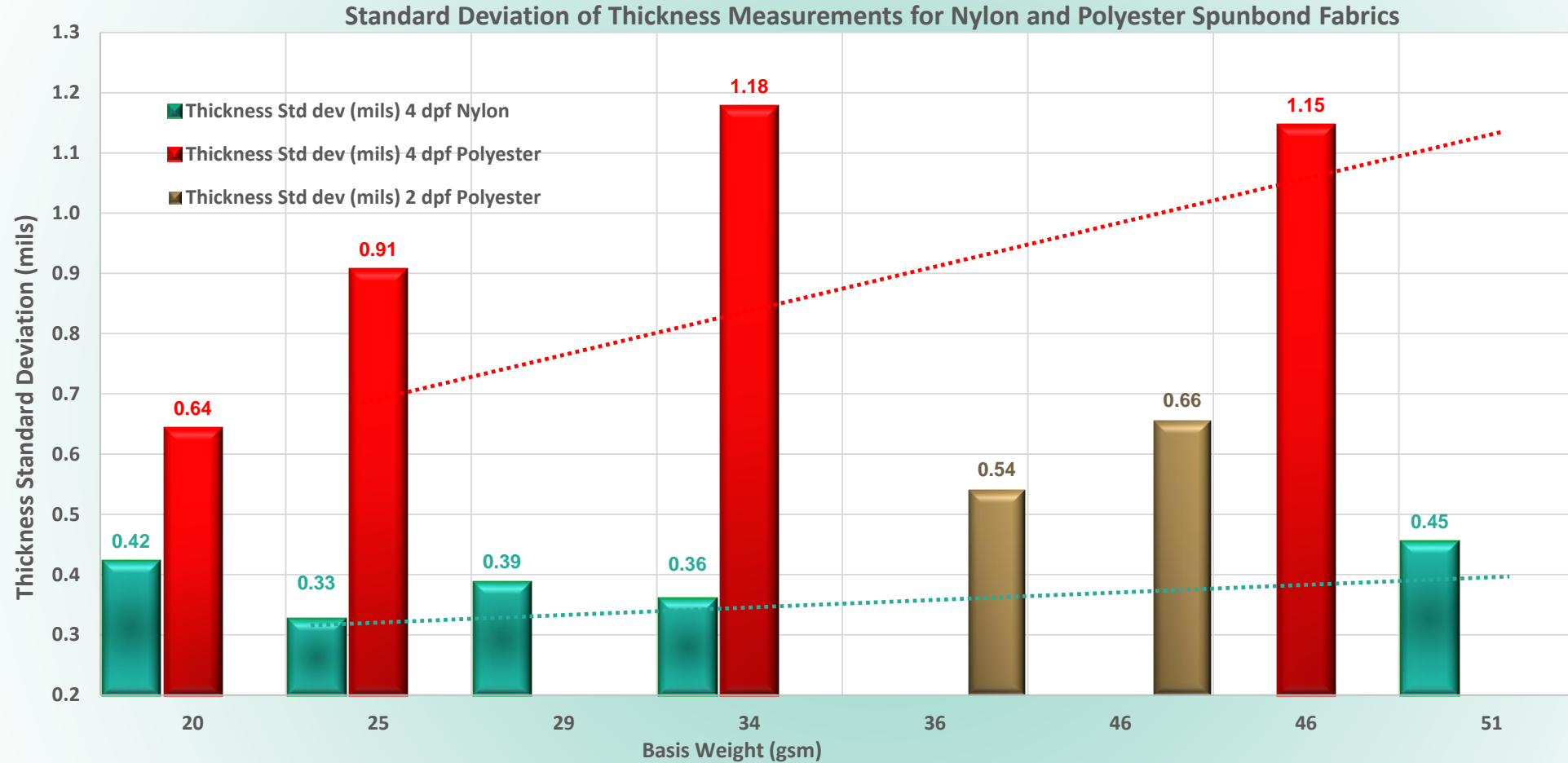
Standard Deviation of Basis Weight Measurements for Nylon and Polyester Spunbond Fabrics



- ***More uniform Basis Weight leads to more uniform strength properties***



# Thickness Variability



- **Thickness uniformity is critical for membrane casting applications**
- **Thinner composite structures allow:**
  - **More surface area (more pleats) or**
  - **Lower pressure drop (more space for fluid to flow)**

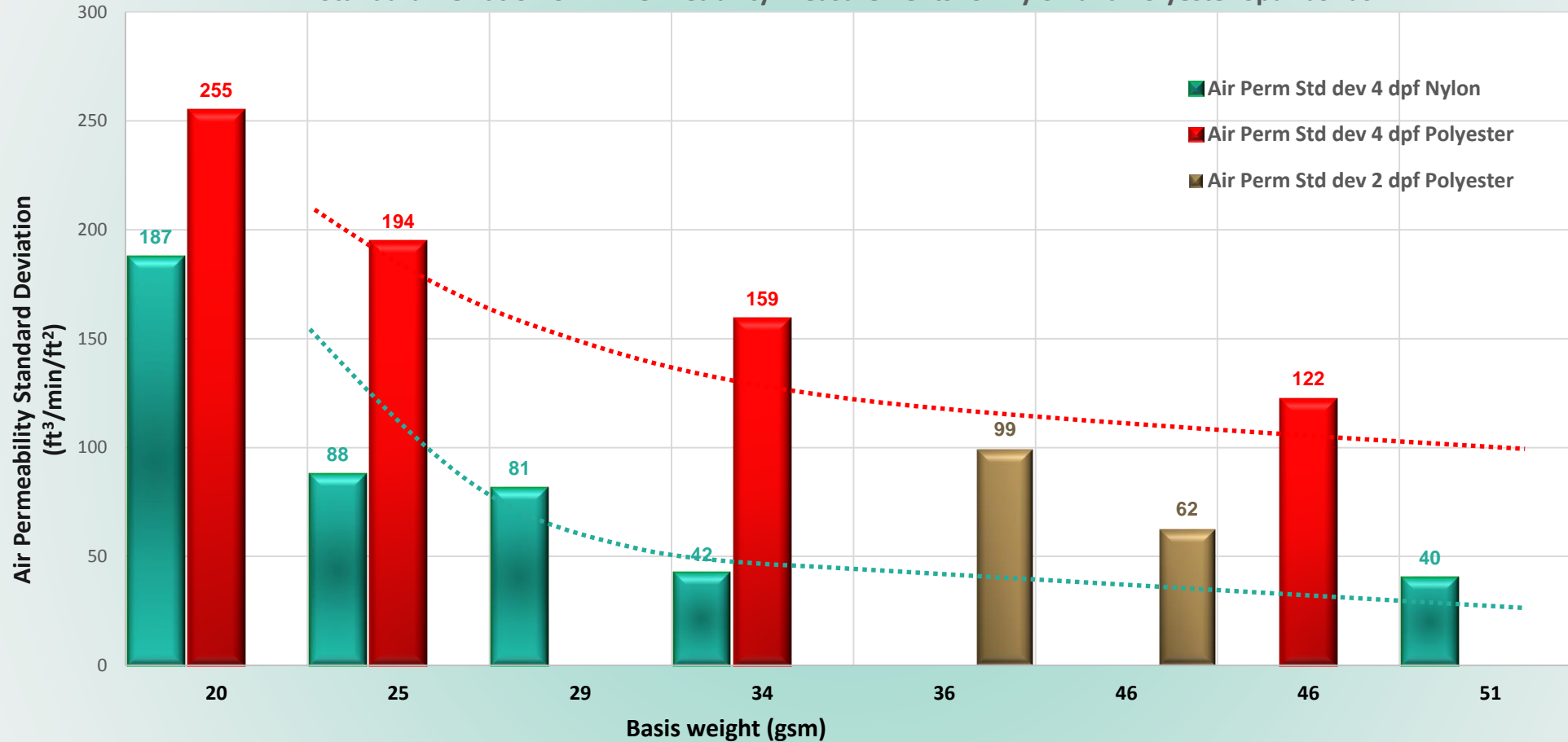




# Air Permeability Variability



Standard Deviation of Air Permeability Measurements for Nylon and Polyester Spunbonds



- ***Air permeability uniformity of nylon fabrics indicates consistency of web formation***



# On-Line Camera Inspection system



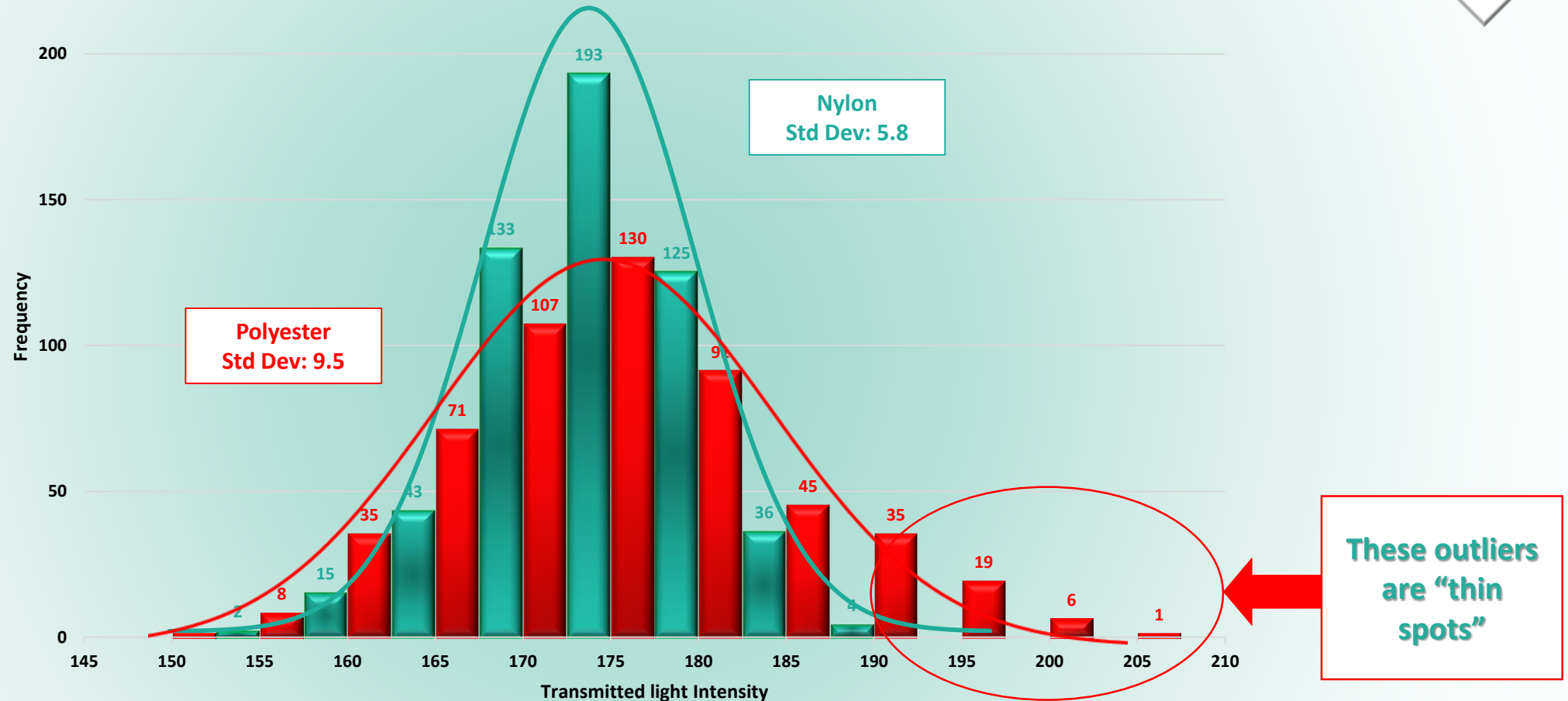
**On-line camera system provides grey scale output of transmitted light showing thick and thin spots on fabrics**



# Optical Representation of Fabrics



Histogram of transmitted light intensity for 20 gsm spunbond fabrics

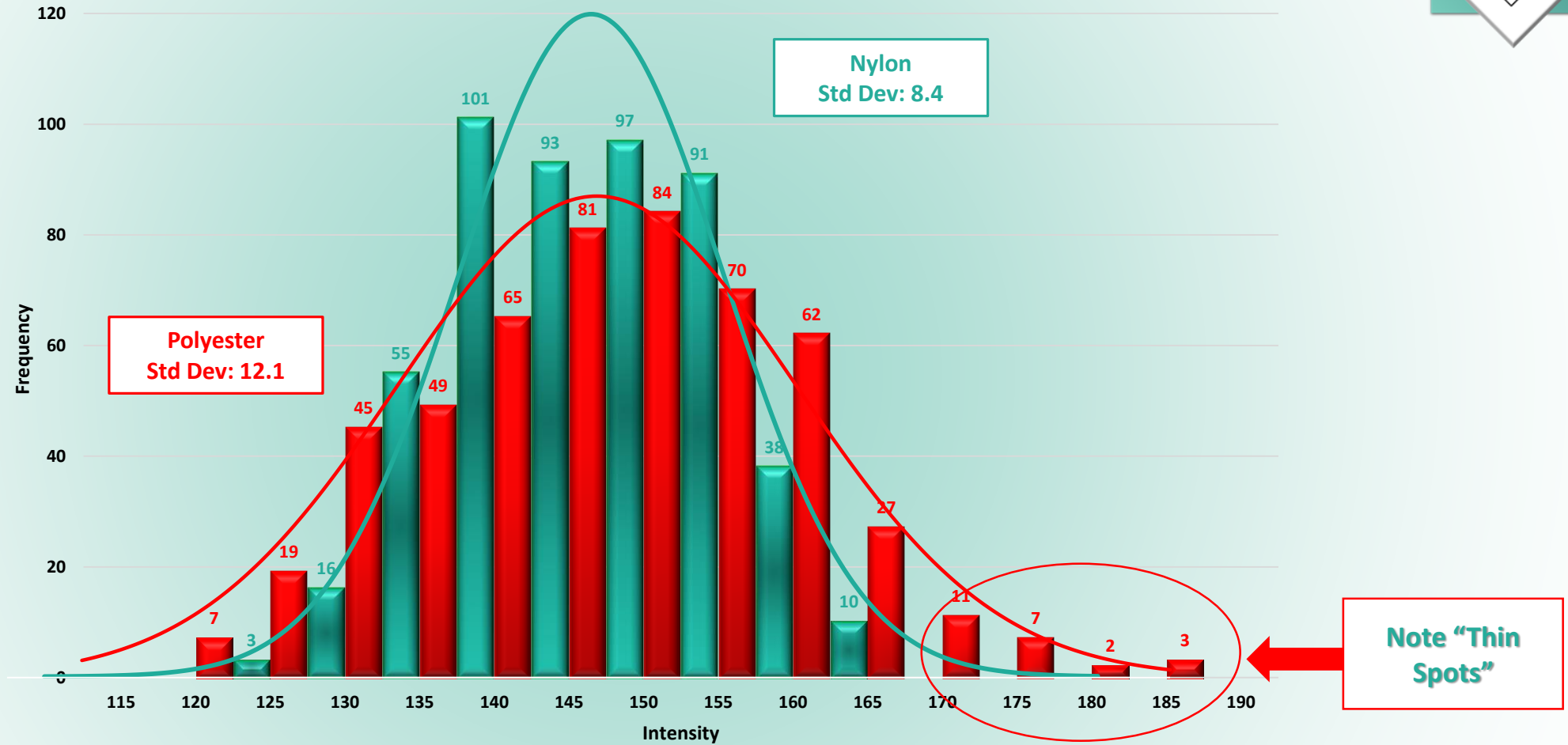




# Optical Representation of Fabrics



Histogram of transmitted light intensity for 34 gsm spunbond fabrics



***Transmitted light intensity data corroborates the physical property data***

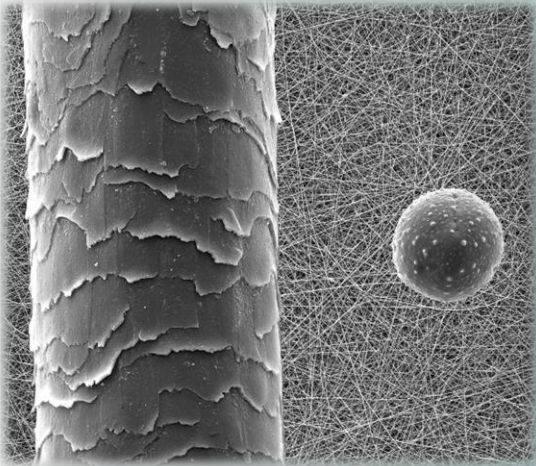


# Case Study – Nanofiber Application

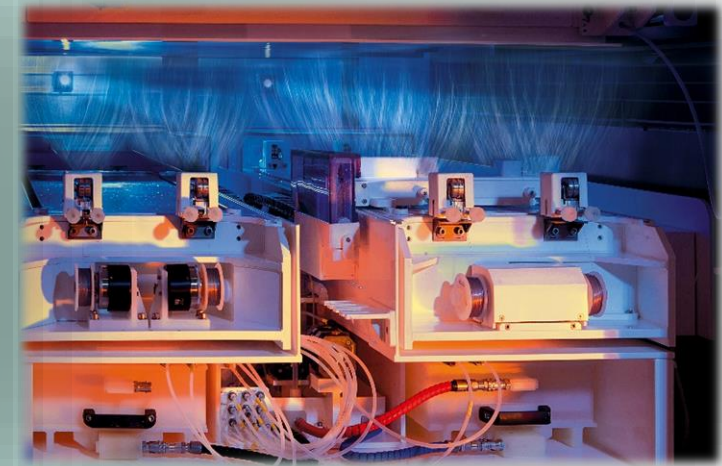
## Same Process Conditions



TSI 8130 @32 lpm (0.3  $\mu$  particle)



<u>% Penetration</u>	34 gsm <u>Cerex®</u>	46 gsm <u>Polyester</u>
Average	8.4%	6.3%
Std Dev	1.2%	2.4%
Max % Pen (@ 3 Std Dev)	12.0%	13.5%



***Nanofiber E –Spin on two different substrates at the same equipment settings (Line Speed, Voltage, etc)***

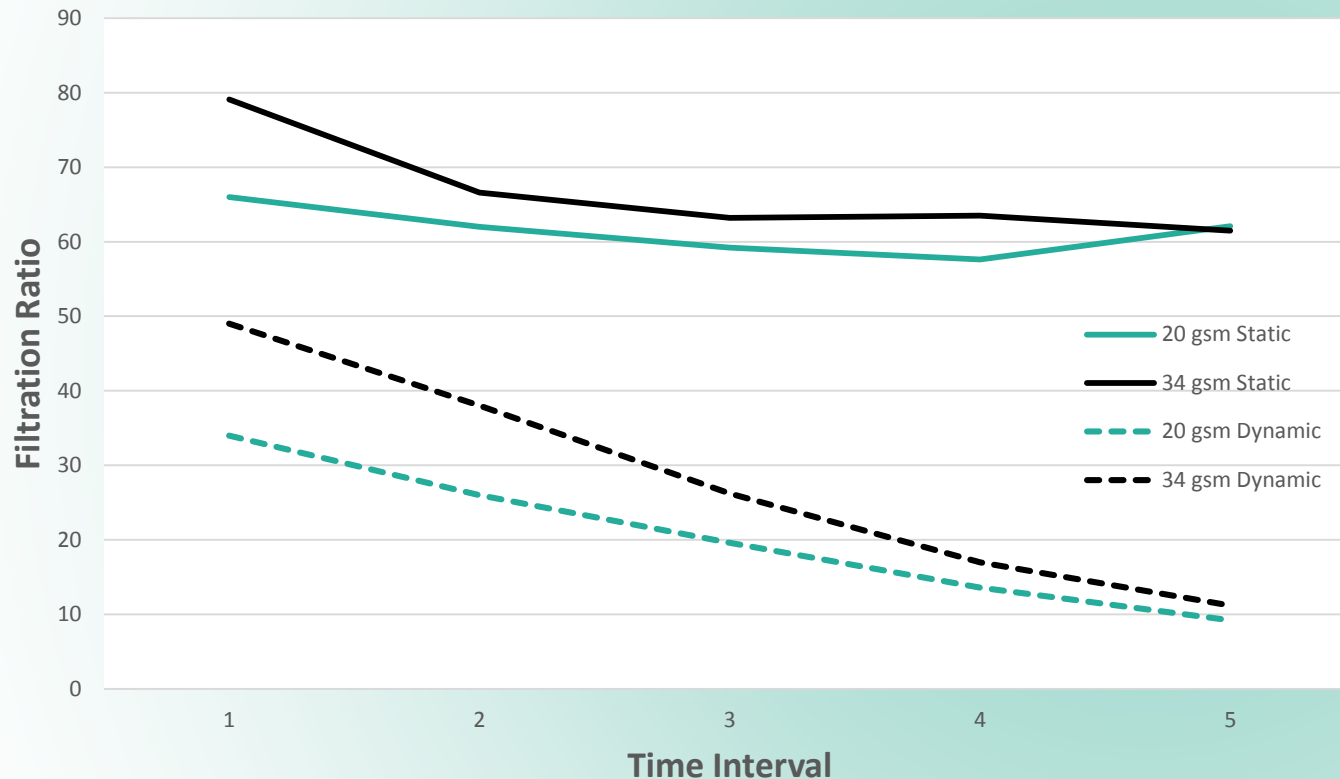
- Cerex BW 25% less than PET SB***
- TSI % Pen variability range twice as large for PET (14.4%) vs Cerex (7.2%)***



# Case Study - Hydraulic Dynamic Flow Cerex® @ 20 gsm & 34 gsm



6 Micron Filtration Ratio



- **ISO 16889 (Static) vs ISO 23369 (Dynamic)**
- **Flat Sheet Composite Testing**
  - Epoxy coated wire both sides
  - Cerex substrate both sides
  - 6 micron microglass media
- **Test Conditions**
  - 200 sqcm test area
    - 6 lpm - Static
    - 2.5 to 10 lpm – Dynamic
  - Mil Std 5606 Oil with ISO Medium Test Dust
  - 125 Psid Terminal Pressure
- **Clean Delta P**

	Static	Dynamic
• 20 gsm	1.1 psi	1.7 psi
• 34 gsm	1.2 psi	1.8 psi

- **Dynamic Flow conditions produce lower filtration ratios**
- **34 gsm enhances microglass media to higher filtration ratios in both static and dynamic flow**







# Summary

## Nylon 6,6 Compared to Polyester

	<u>Nylon</u>	<u>Polyester</u>
• Visually More Consistent	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• Lower Variability of Physical Properties	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• Lower Basis Weight Variability		
• Lower Thickness Variability		
• Lower Air Permeability Variability		
• Lower Variability of Transmitted Light	<input checked="" type="checkbox"/>	<input type="checkbox"/>





# Benefits for Filtration Applications

## The greater uniformity of Cerex® spunbond nylon fabrics ....

- ✓ **Increases the consistency in nanofiber, meltblown and membrane casting media formation resulting in better filter performance**
- ✓ **Reduces downstream fiber migration, contaminate shedding and channeling in “real world” dynamic flow conditions**
- ✓ **Provides better media protection during pleating and helps prevent burst failures from high pressure system pulsations**
- ✓ **Combined with nylon’s greater strength, temperature and chemical resistance allows advanced filter media to out-perform the competition.**



# *Thank You*



*Please visit us at booth #422 during the  
upcoming INDA Filtration Show in Chicago or  
contact us for additional information*



*The Nylon Advantage®*  
**[www.cerex.com](http://www.cerex.com)**





# *Questions*



# ***Thank You***



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***The Nylon Advantage®***

***Webpage***

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