Increasing Filler Without Compromise
A comprehensive approach

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ASHLAND

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RETHINK PAPER:
Lean and Green

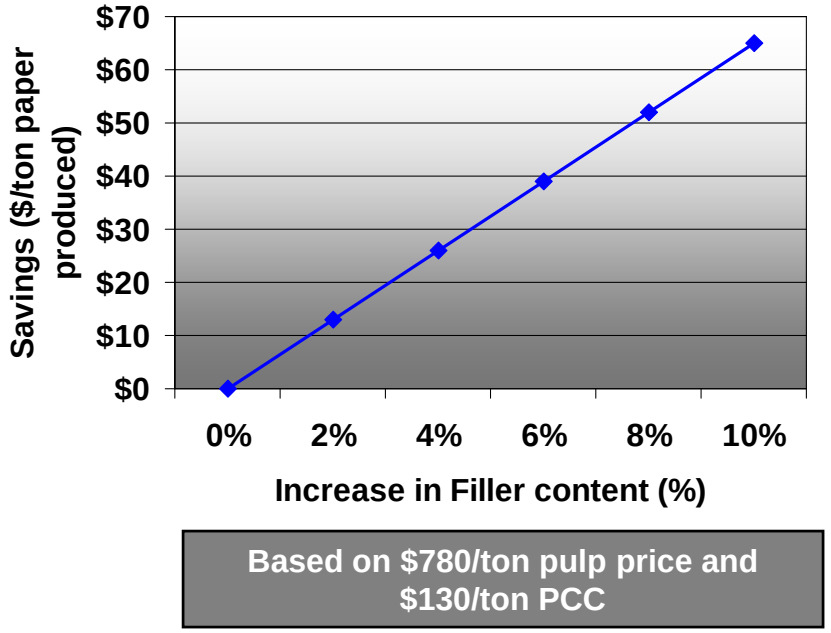
Agenda

- Introduction
- Program Components
- Laboratory work to understand impact of strength resin on Wet-Web Strength
- Case Histories from world-class paper machines
- Summary

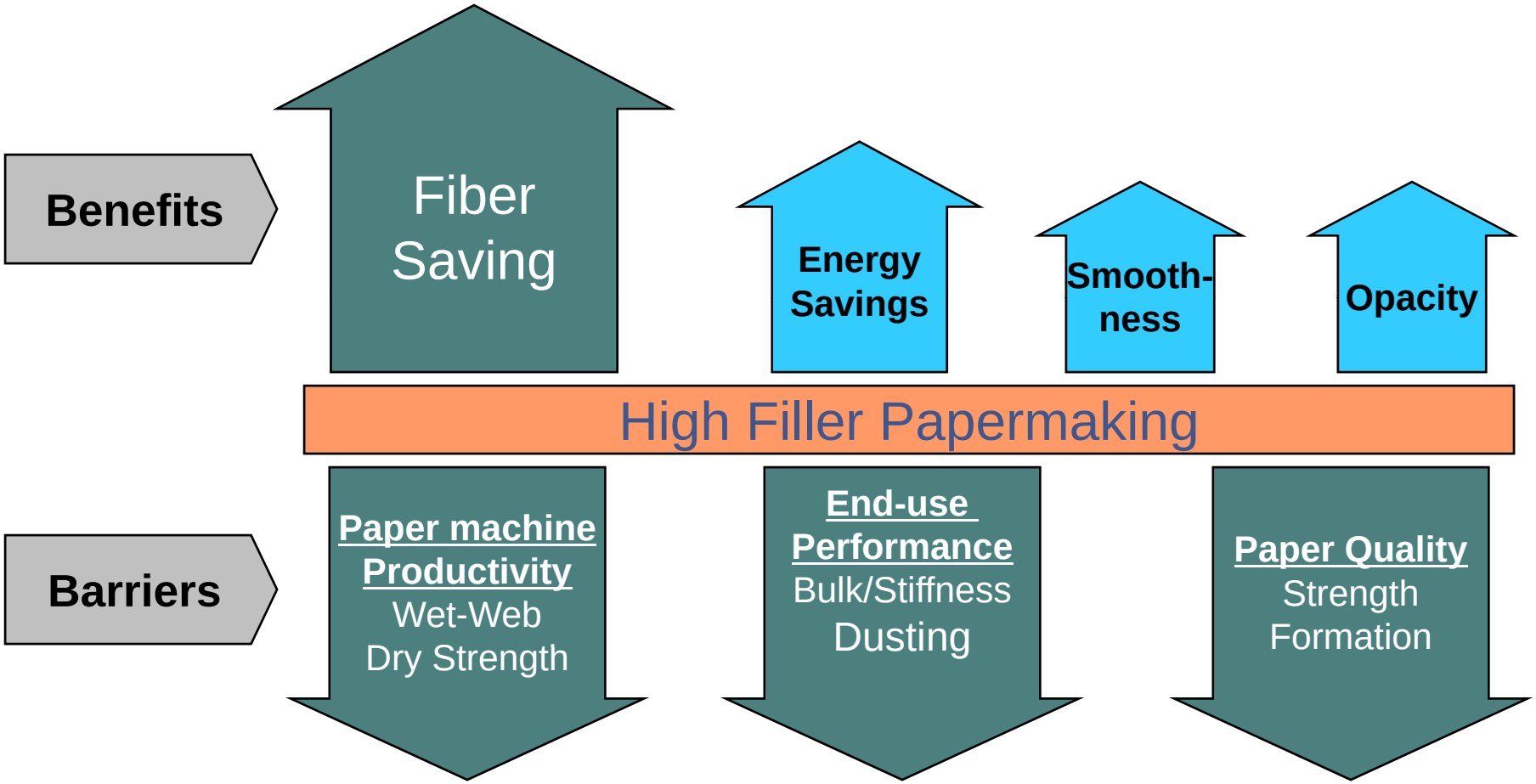
Introduction

- Need
  - To be more competitive in market, Printing and Writing producers are seeking out solutions to make their paper more cost effective without compromising quality

- Opportunity
  - Significantly reduce production costs by substituting expensive fibers with lower cost fillers
    - **Setting a new standard in the industry**



High Filler Papermaking



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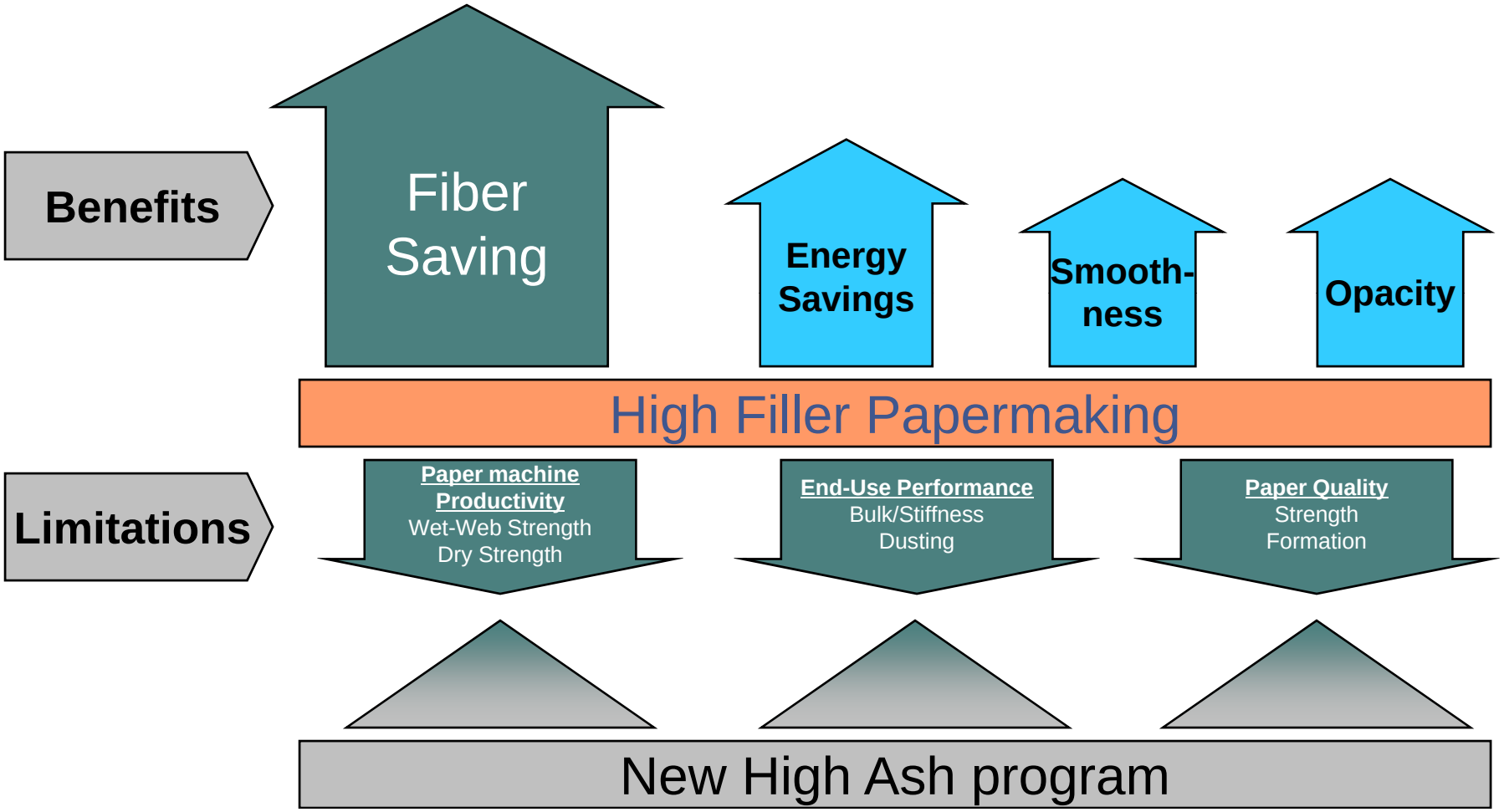

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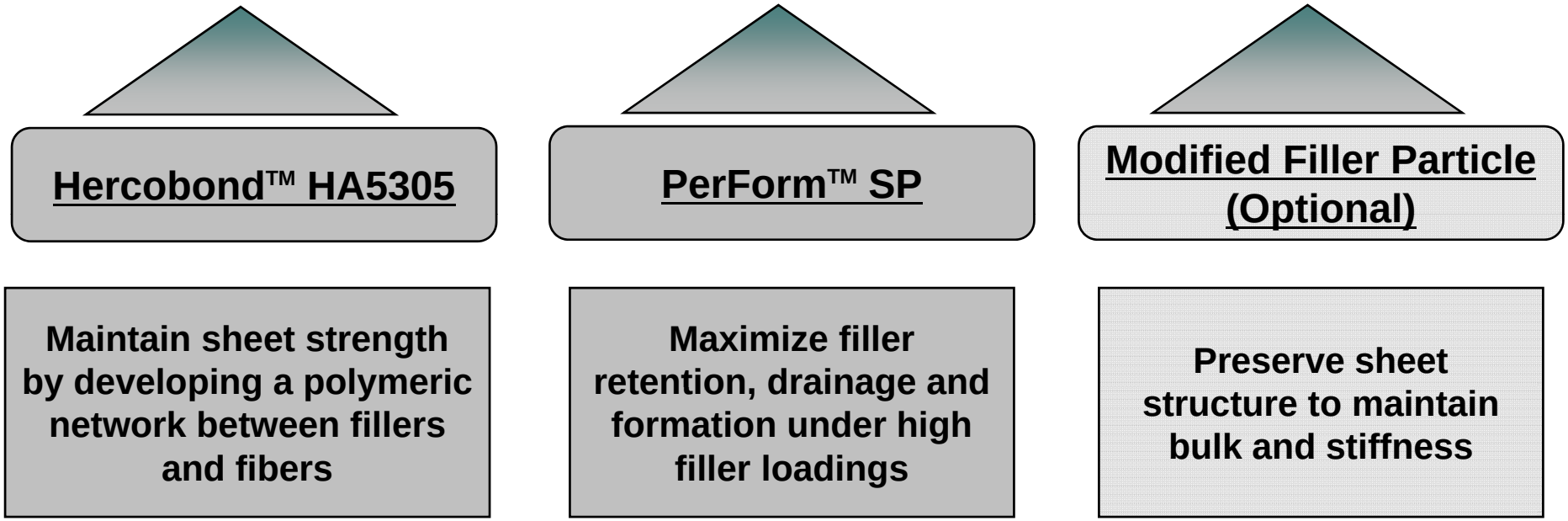
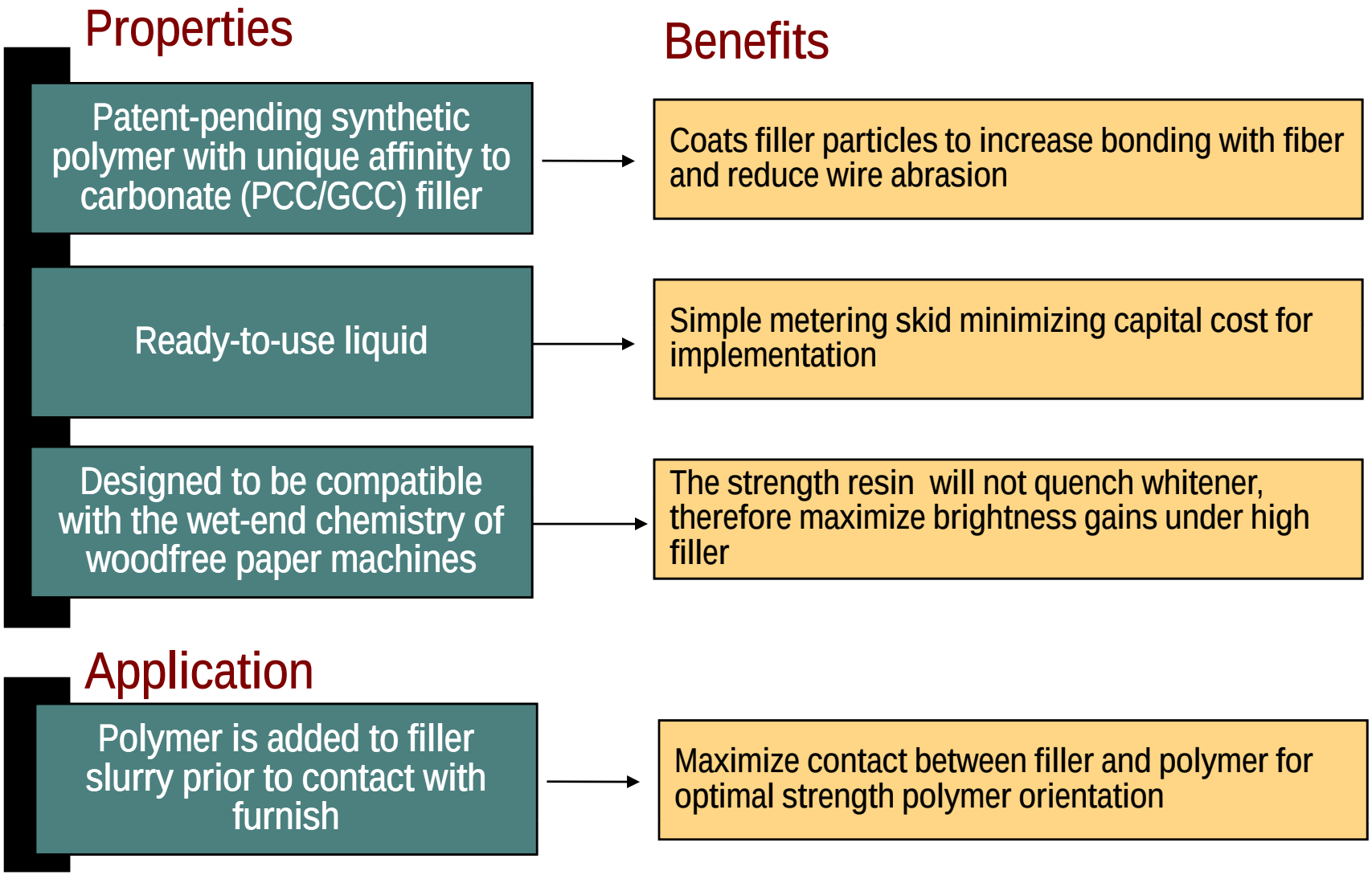
New High Ash Program - Components

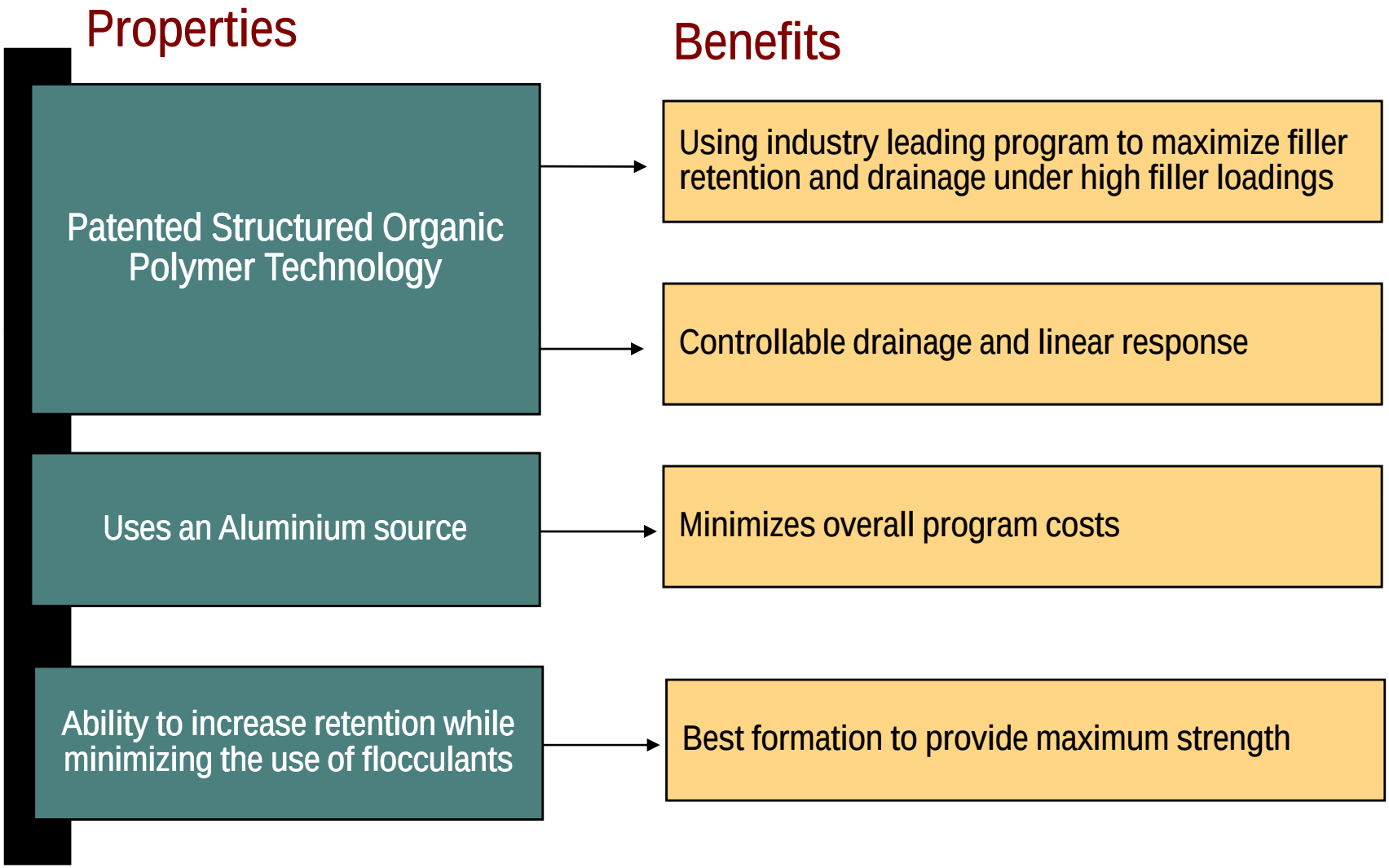


Comprehensive approach to ensure success

Strength Resin



Advanced Retention Chemistry



Modified Filler Particle

Properties

Work with mill's filler supplier to modify filler morphology progressively

→

Benefits

Filler particles can be adapted to the papermaker's needs while gradually increasing filler content minimizing risks to quality

Application

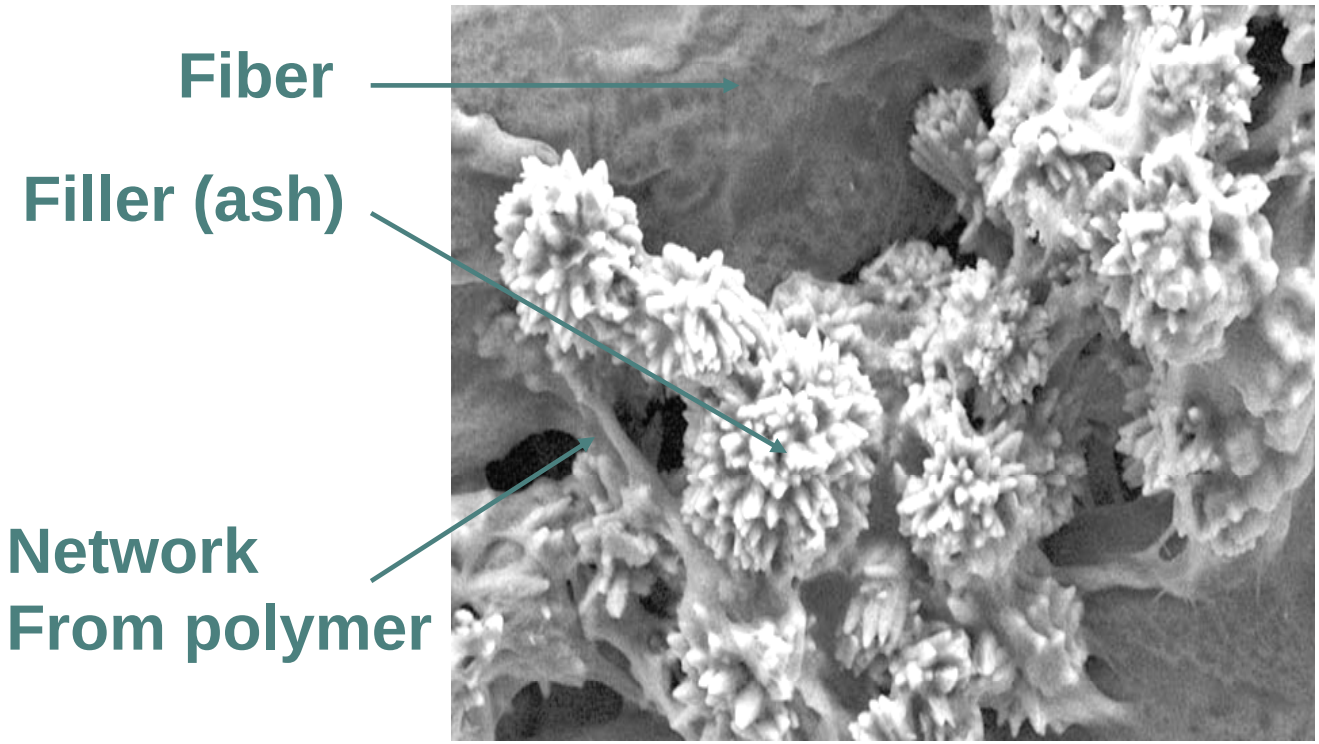
Pre-treated fillers are preferentially added to thick stock or split feed

→

Maximize contact between the treated filler and fibers for optimal strength development

Effect on Paper

Scanning Electron Microscopic view of the surface of treated paper



Once the paper is formed with the program components, a polymeric network is created between fibers and fillers

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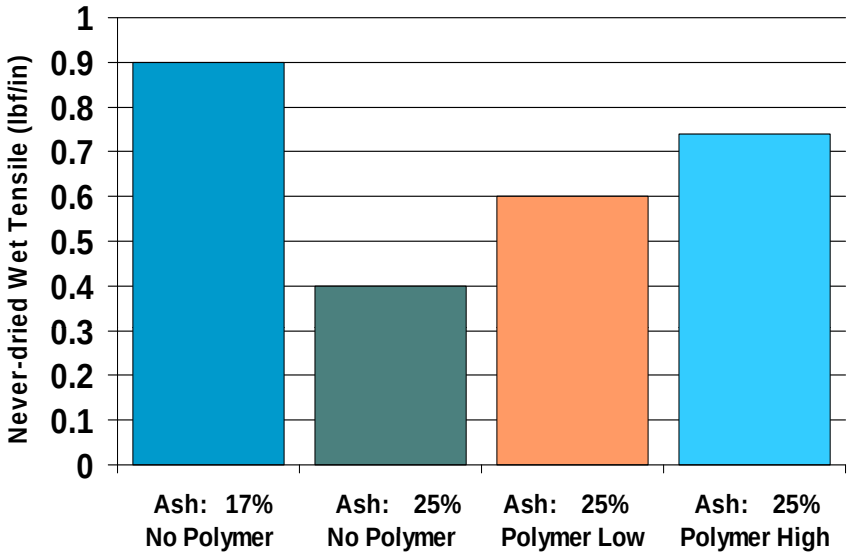
Wet-web Strength (Never-Dried Strength)

- Reduction in wet-web strength can often translate into breaks in the wet-end of the paper machine
- A lab procedure was developed to understand the impact of strength resin
  - Constant press solids
  - Controlled environment
- Results
  - More than 50% of the wet-web tensile was lost with an 8% filler increase.
  - 70% of the loss recovered at the high strength resin dossage



The use of the strength resin can help maintain wet-end productivity at high filler content

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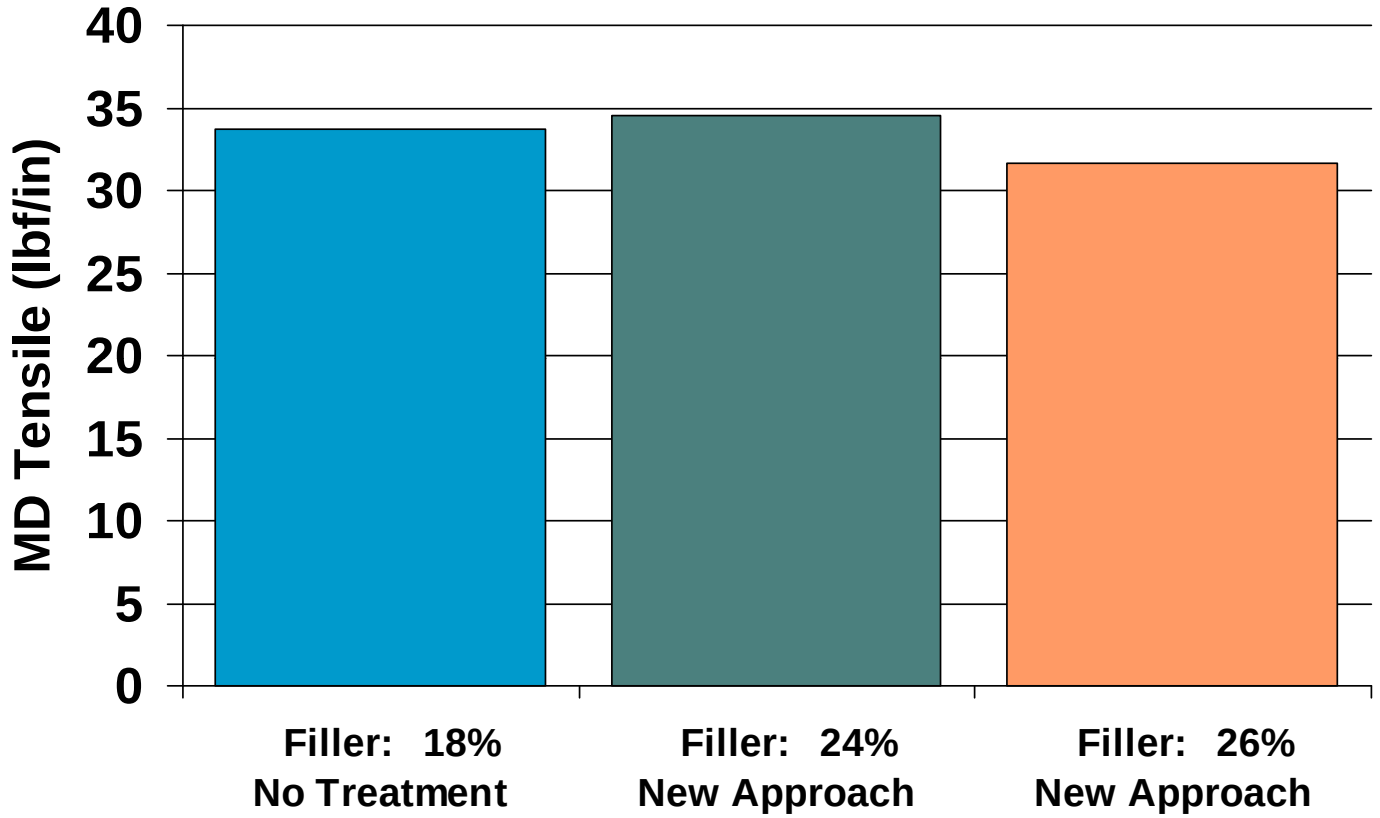
Case Study #1

- **Description**
  - **North-America, 1000 tpd**
  - **Grade: Copy Paper 75 g/m^2**
  - **Several trials to increase PCC filler content from 18% to 24% and then to 26% using the modified filler**

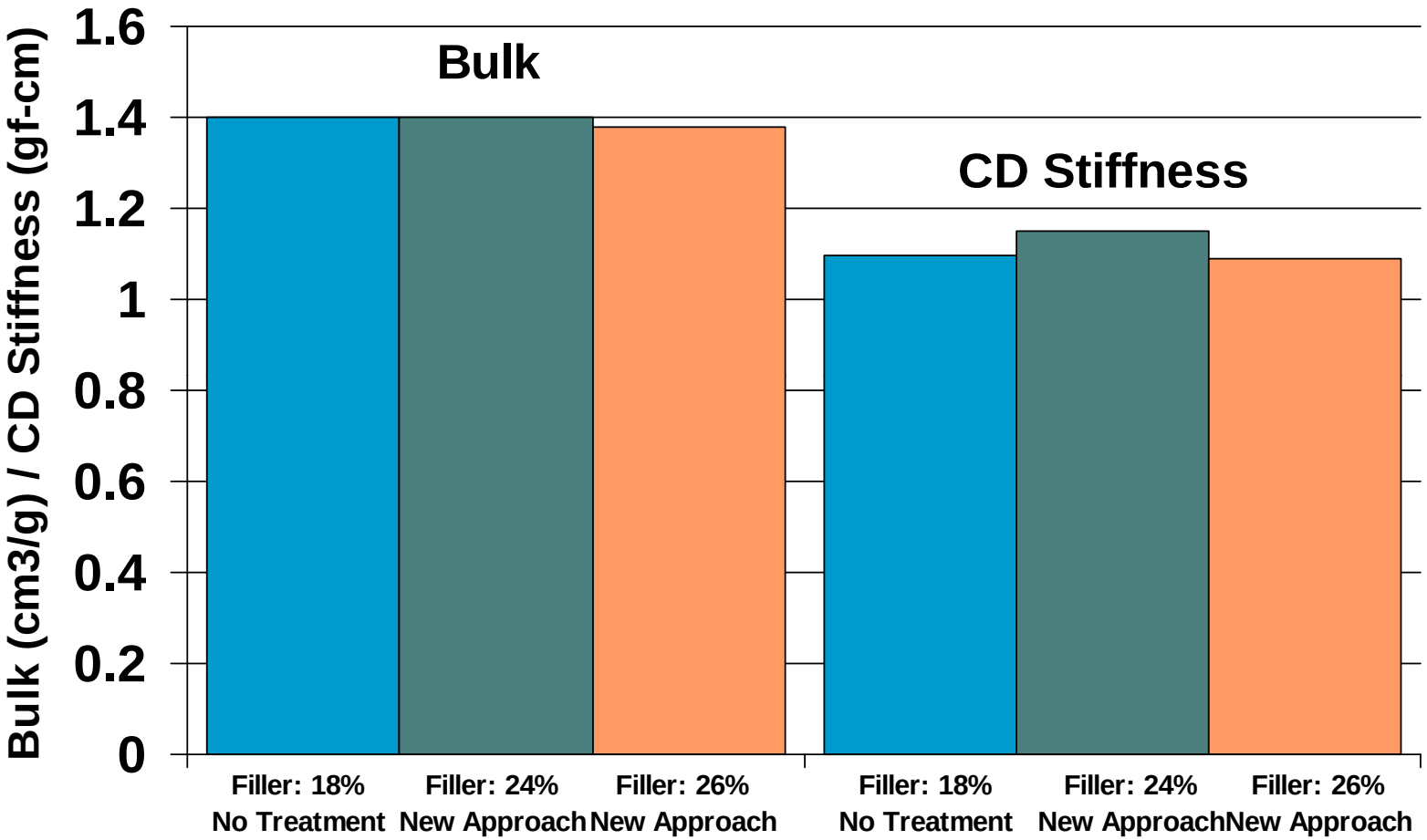
- **Results**
  - **Good machine runability**
  - **Key quality parameters maintained within specification**
  - **Excess of $4 million in net savings/year documented**

Case Study #1 – Tensile Strength



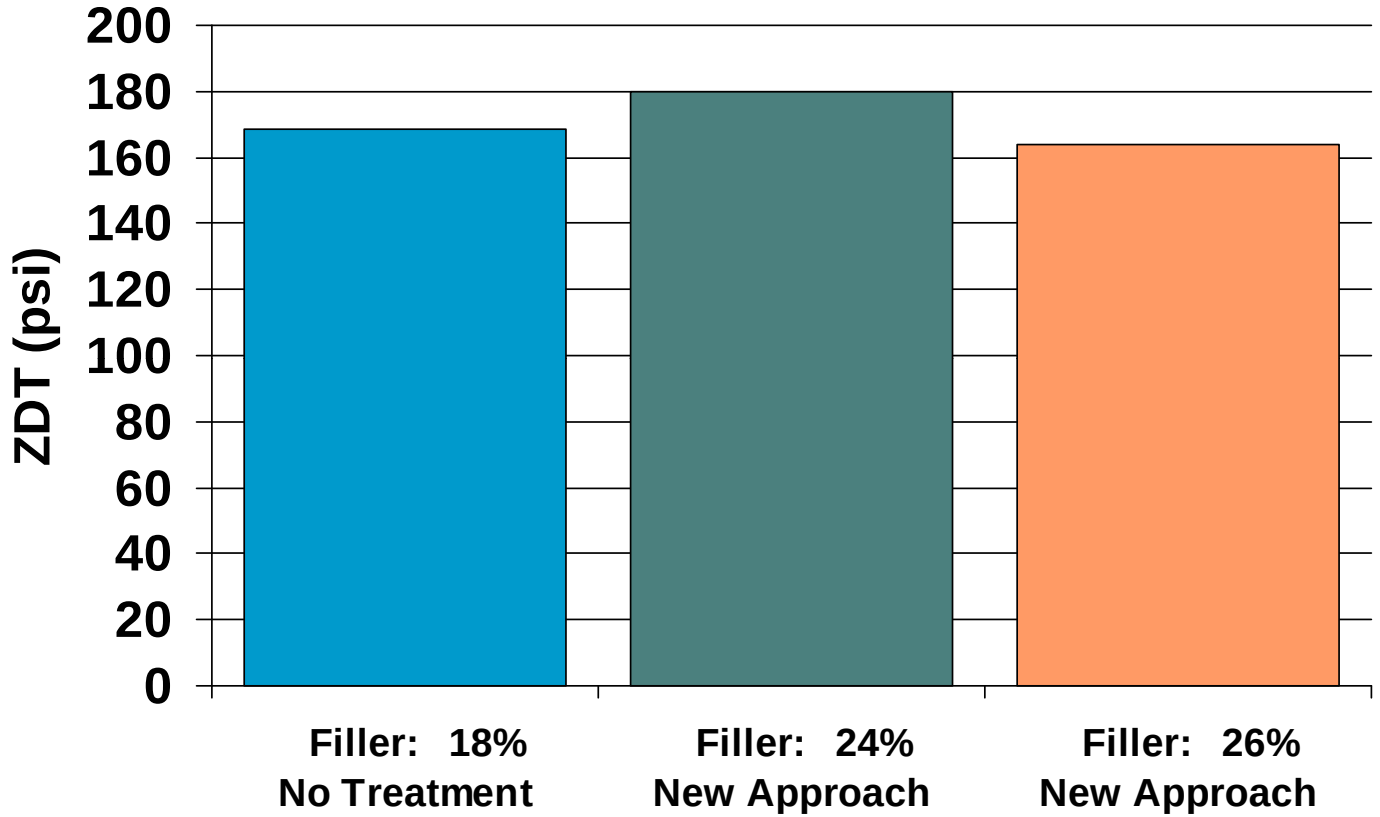
Tensile maintained under high filler loading; MD tensile is important to maintain dry-end paper machine productivity

Case Study #1 – Bulk and Stiffness



CD Stiffness is critical paper characteristic for copier runability, maintained under high filler loading

Case Study #1 - ZDT



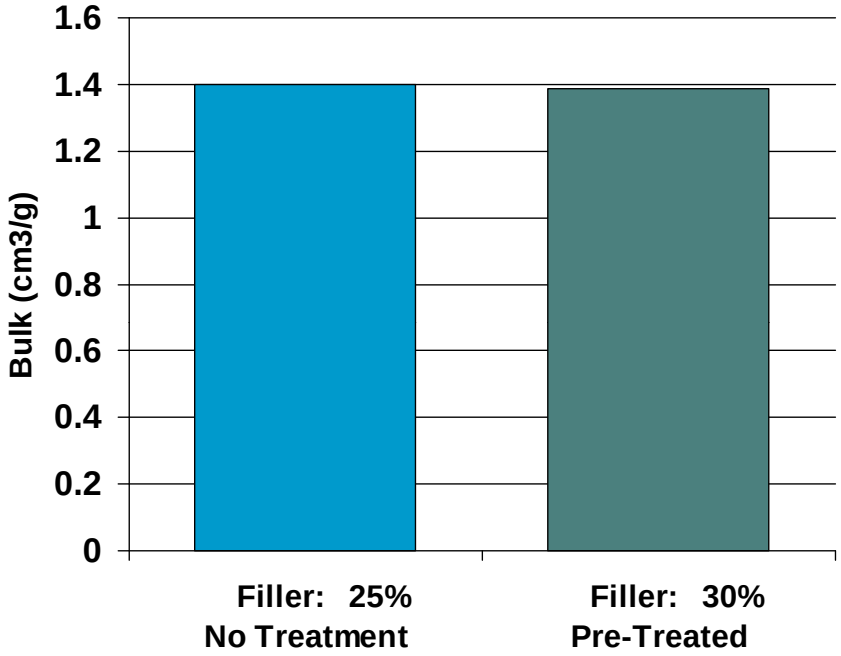
ZDT was used to assess internal and surface strength of paper. This new high ash program enables to maintain this property

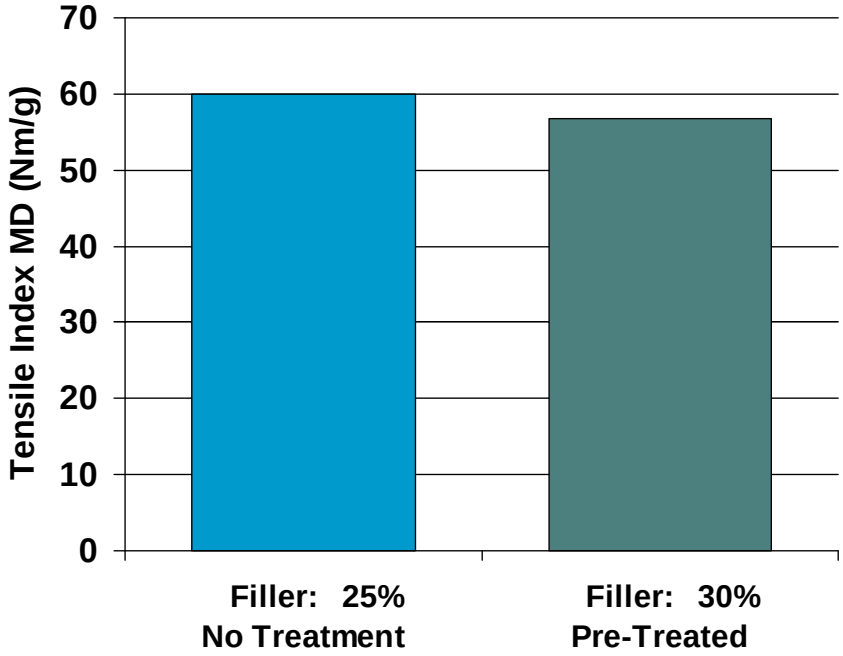
Case Study #2

- **Description**
  - **Asia, 1400 mtpd**
  - **Grade: Copy Paper 80 g/m^2**
  - **First trial to increase PCC/GCC filler content from 25% to 30% working with existing fillers.**

- **Results**
  - **Good machine runability**
  - **Key quality parameters maintained within specifications with 30% filler loading**
    - **Setting new standards for copy paper**
  - **Trials are continuing**

Case Study #2 – Bulk and Tensile





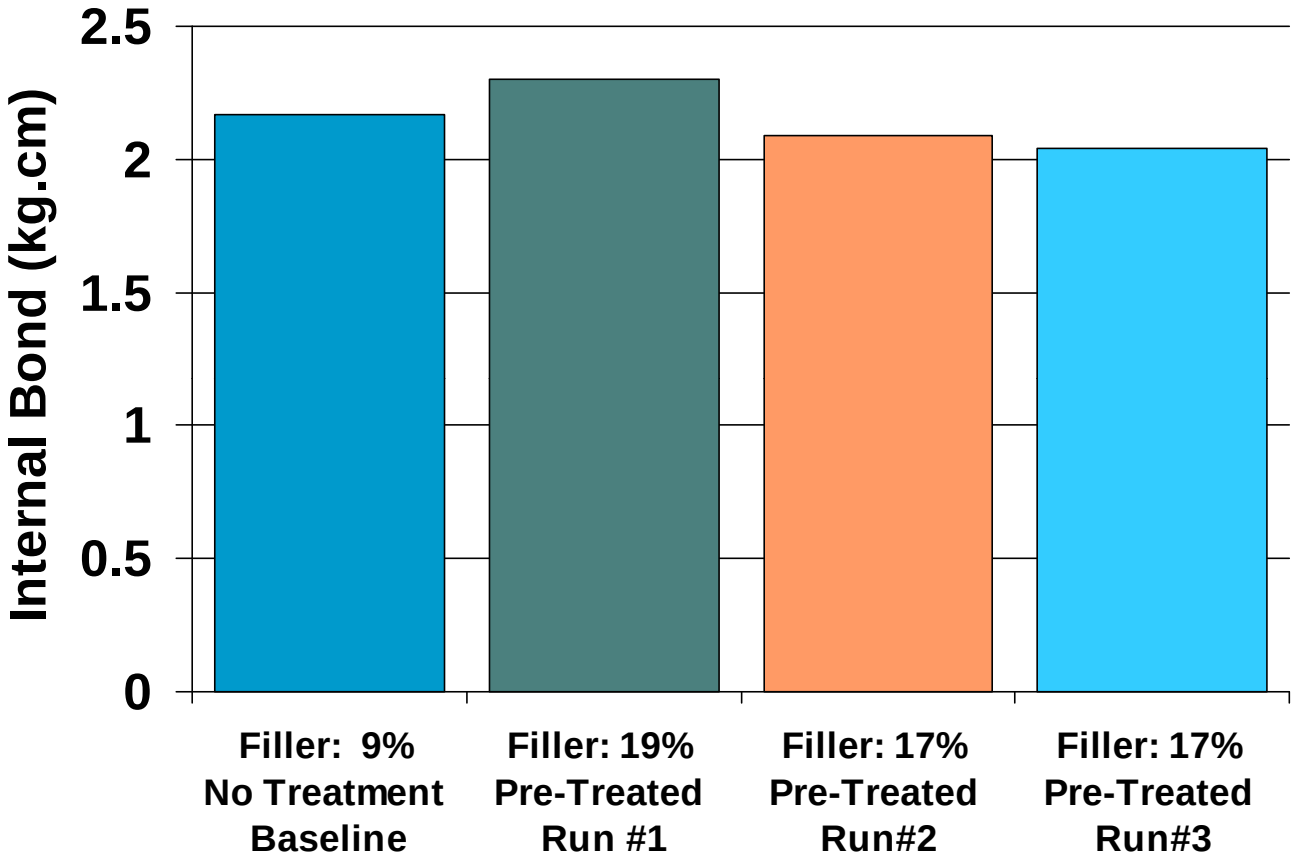
Both bulk and tensile were maintained within specifications

Case Study #3

- **Description**
  - Asia, 1,400 mtpd
  - Grade: Coated basestock 54 g/m^2
  - Several production runs to increase filler content from 9% to 17% using existing GCC particle
  - Use of BCTMP for cost and bulk

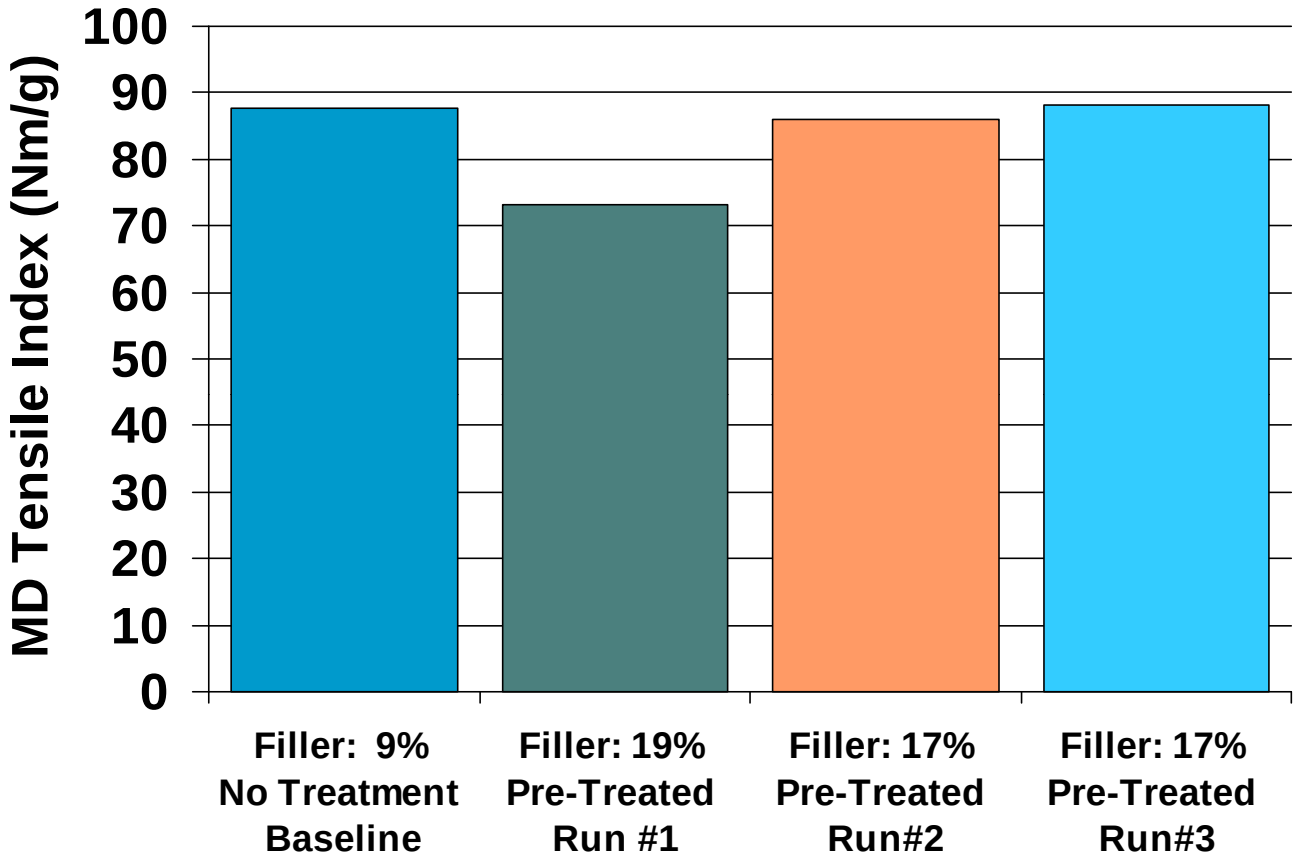
- **Results**
  - Good machine productivity
  - Key strength parameters were maintained within specification for this grade with an 8% filler increase
  - Good repeatability from run to run
  - Application is commercialized

Case Study #3 – Internal Bond



8% filler increase provides significant savings to the mill while maintaining key paper properties

Case Study #3 – MD Tensile



MD Tensile maintained: good paper machine productivity and coater operation were maintained

Summary

Need: Reduce Costs

- Significant savings were identified by replacing fiber by lower cost filler
- Barriers such as strength, stiffness and productivity have limited progress in filler increase

Solution: Comprehensive High Ash program

- Providing papermaker the tools to increase filler without compromising quality or productivity
- Linking Strength, Retention and filler expertise

Promising commercial results

- Demonstrated significant savings
- Continuing validation on world class machines globally

Thank You

Questions?