



Building Leadership Excellence



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



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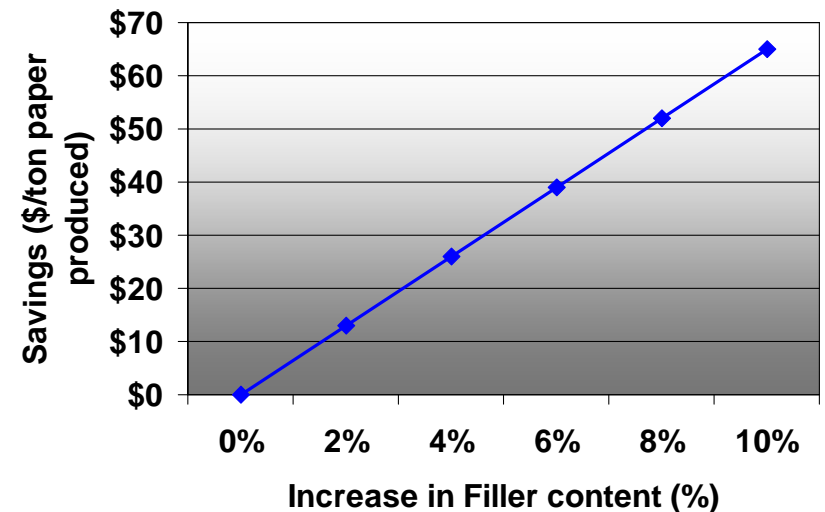
Introduction

- 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

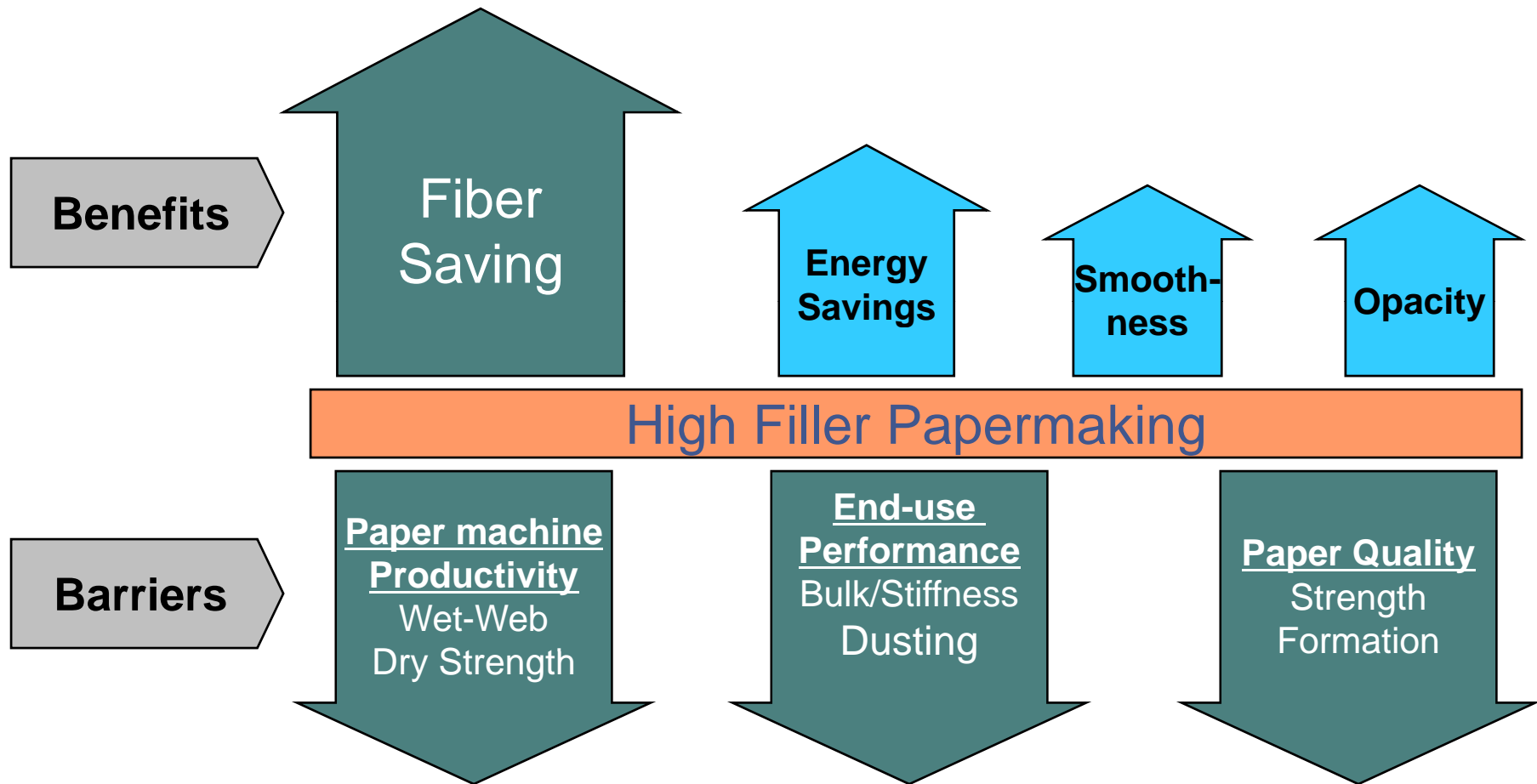
- Opportunity

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



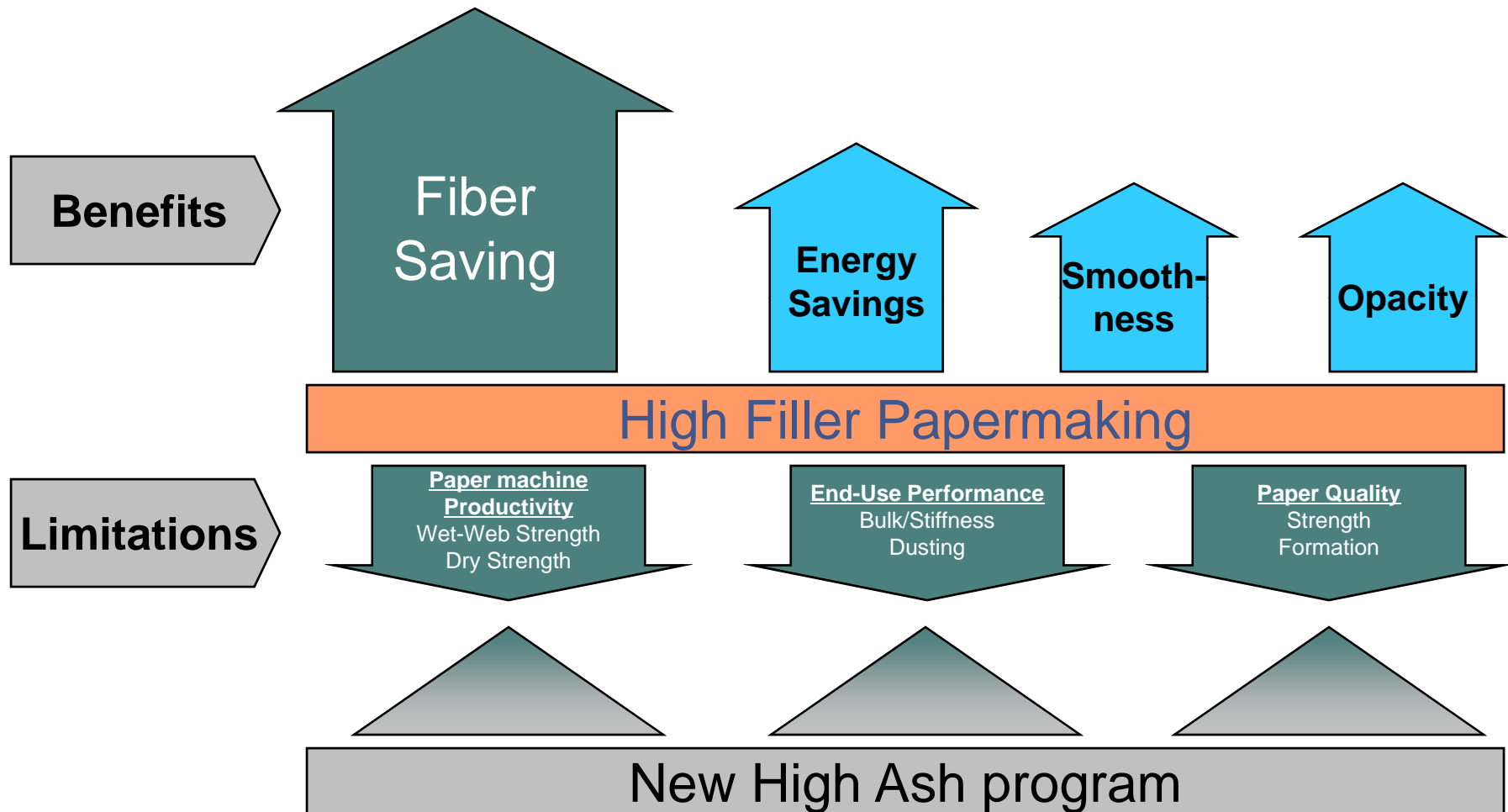
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High Filler Papermaking



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High Filler Papermaking



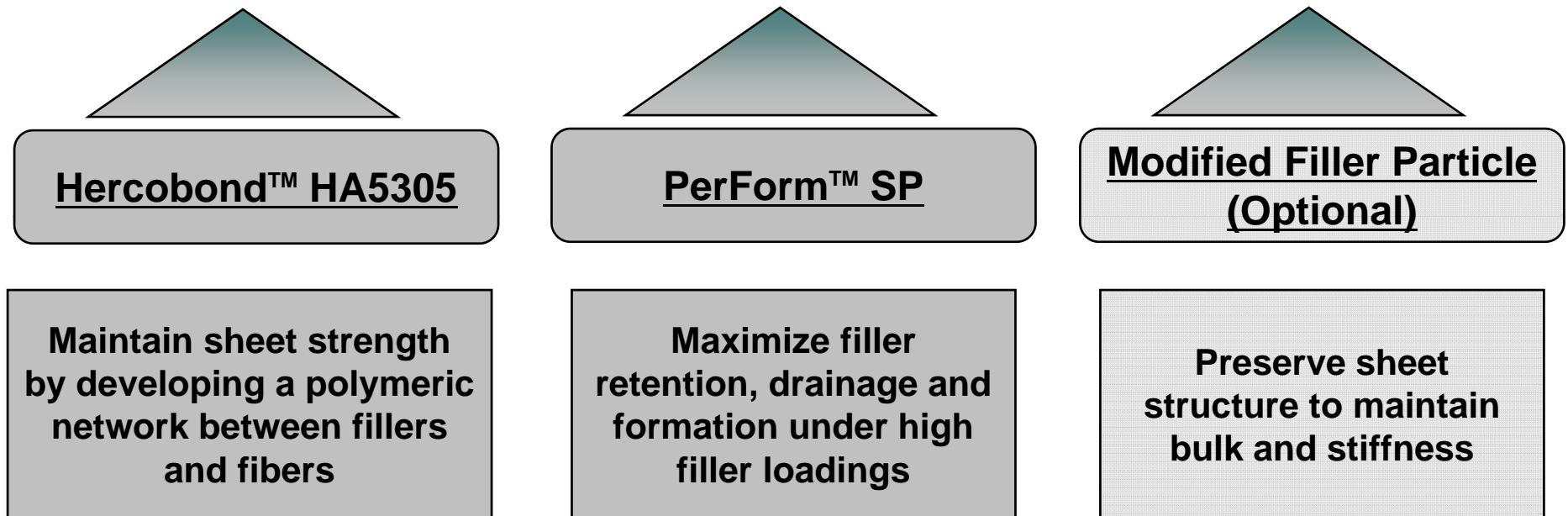
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New High Ash Program - Components



Comprehensive approach to ensure success



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Strength Resin

Properties

Patent-pending synthetic polymer with unique affinity to carbonate (PCC/GCC) filler



Benefits

Coats filler particles to increase bonding with fiber and reduce wire abrasion

Ready-to-use liquid



Simple metering skid minimizing capital cost for implementation

Designed to be compatible with the wet-end chemistry of woodfree paper machines



The strength resin will not quench whitener, therefore maximize brightness gains under high filler

Application

Polymer is added to filler slurry prior to contact with furnish



Maximize contact between filler and polymer for optimal strength polymer orientation



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Advanced Retention Chemistry

Properties

Patented Structured Organic Polymer Technology

Uses an Aluminium source

Ability to increase retention while minimizing the use of flocculants

Benefits

Using industry leading program to maximize filler retention and drainage under high filler loadings

Controllable drainage and linear response

Minimizes overall program costs

Best formation to provide maximum strength



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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

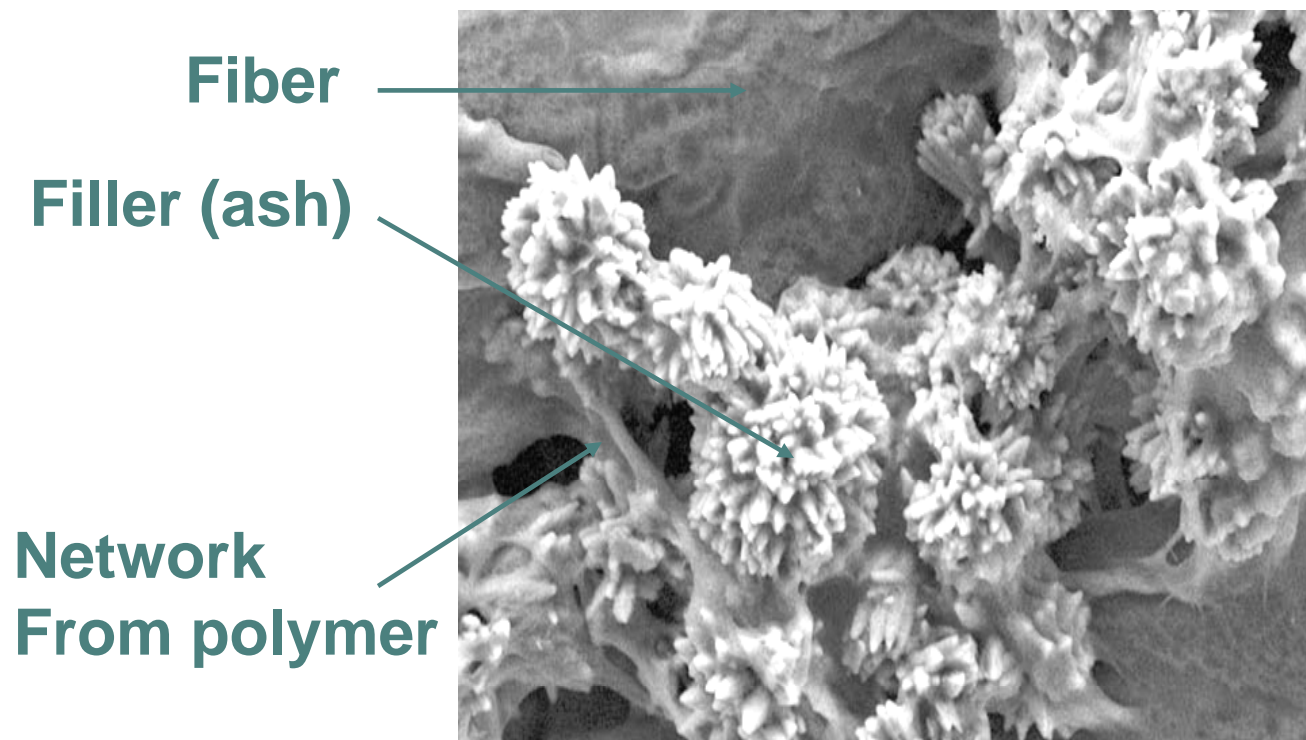
Application

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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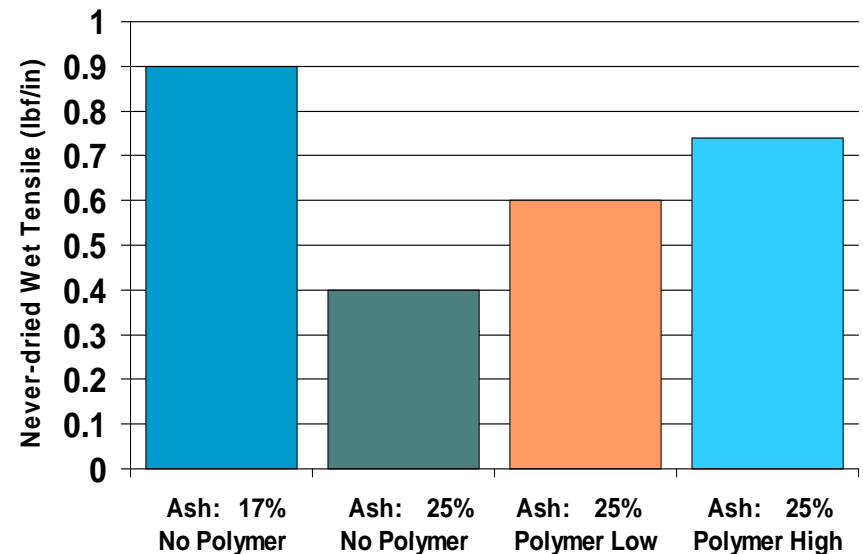
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Wet-web Strength (Never-Dried Strength)

- 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 dosage



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



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Case Study #1

- **Description**

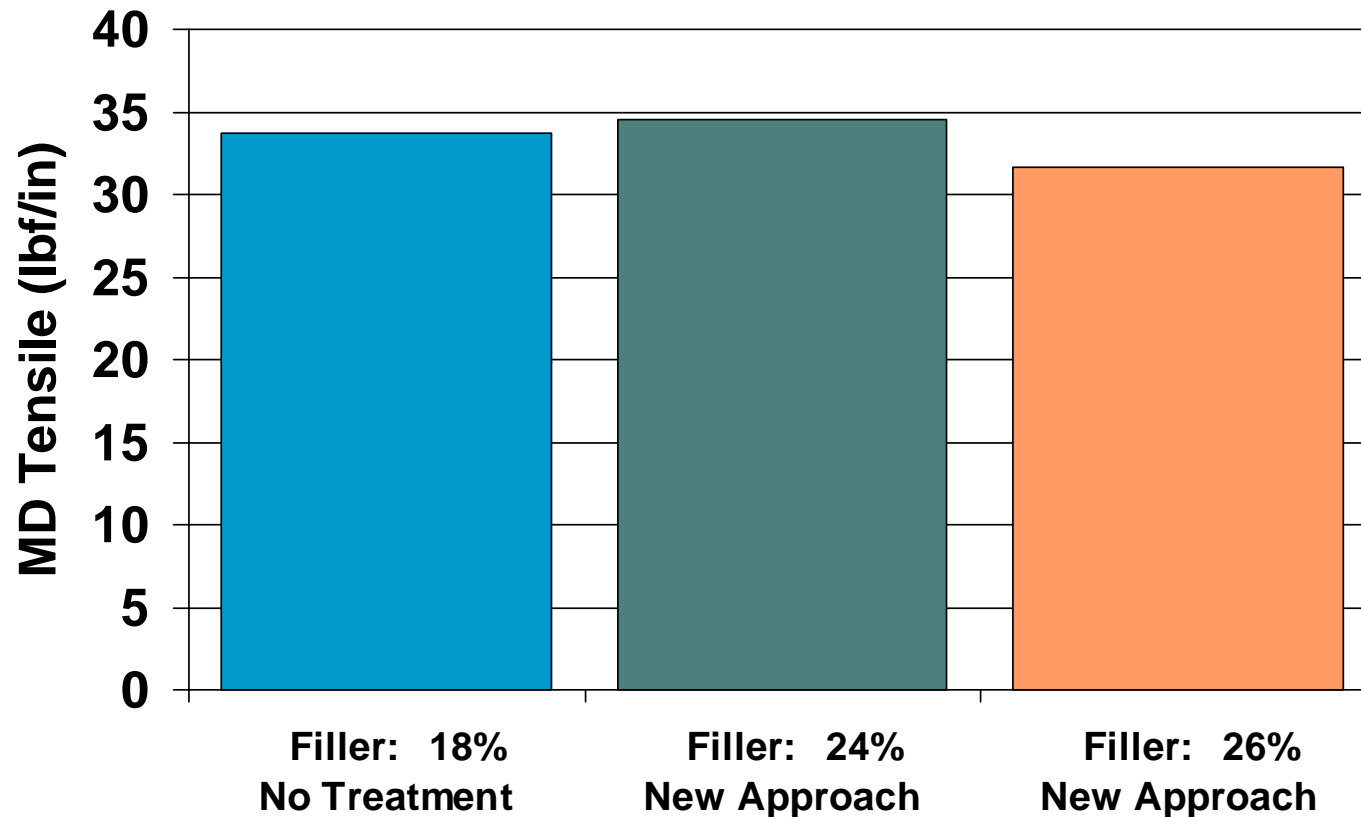
- North-America, 1000 tpd
- Grade: Copy Paper 75 g/m²
- Several trials to increase PCC filler content from 18% to 24% and then to 26% using the modified filler

- **Results**

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



Case Study #1 – Tensile Strength

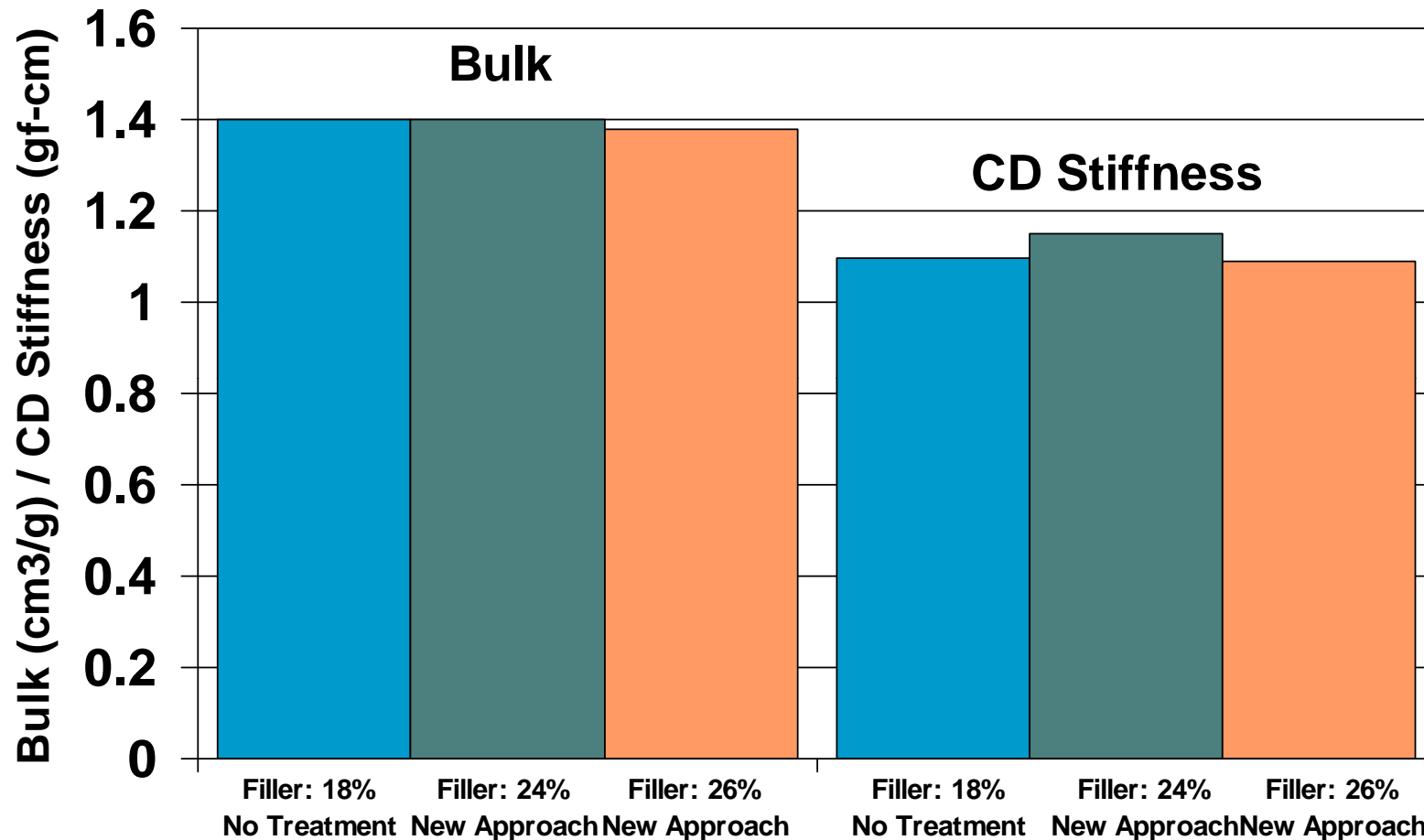


Tensile maintained under high filler loading; MD tensile is important to maintain dry-end paper machine productivity



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Case Study #1 – Bulk and Stiffness



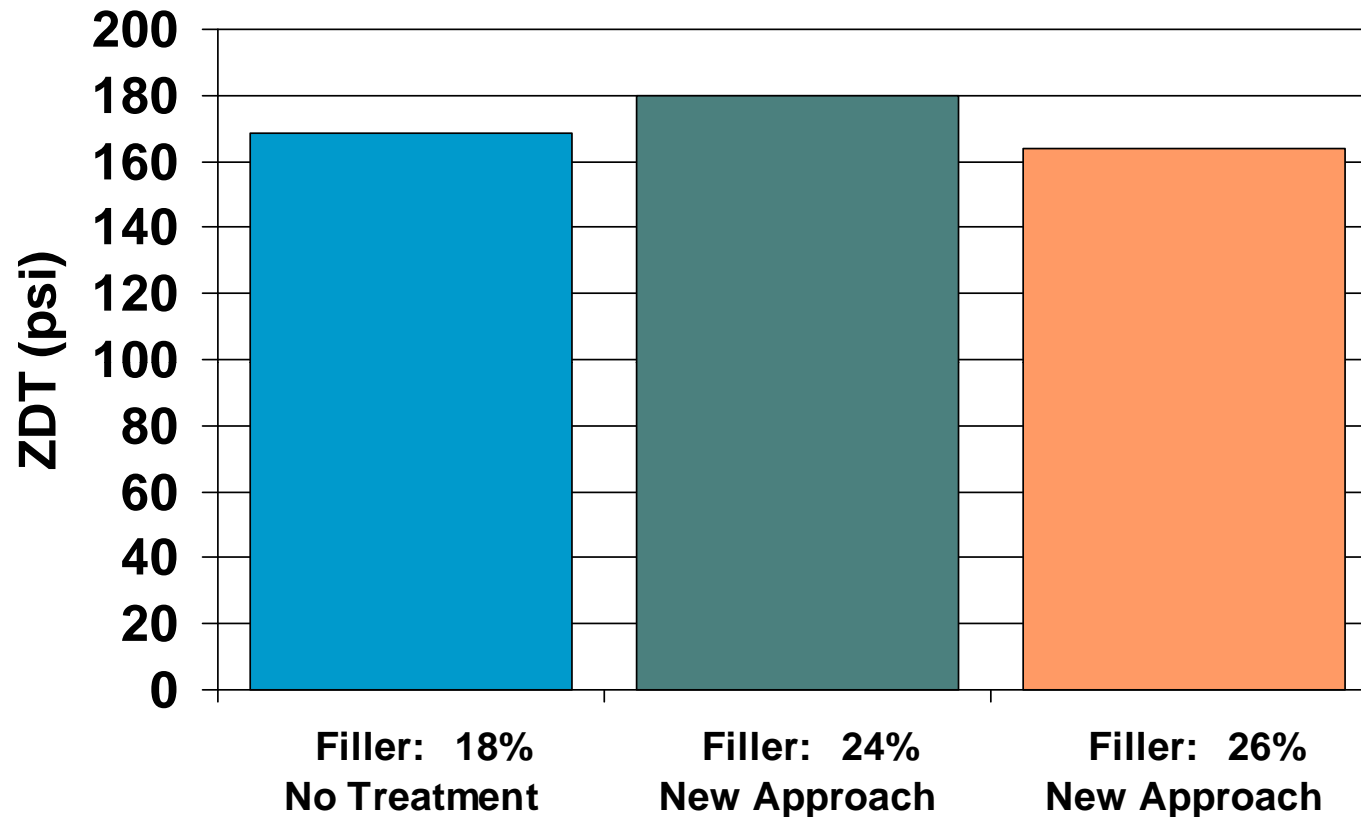
CD Stiffness is critical paper characteristic for copier runability, maintained under high filler loading



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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**



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Case Study #2

- **Description**

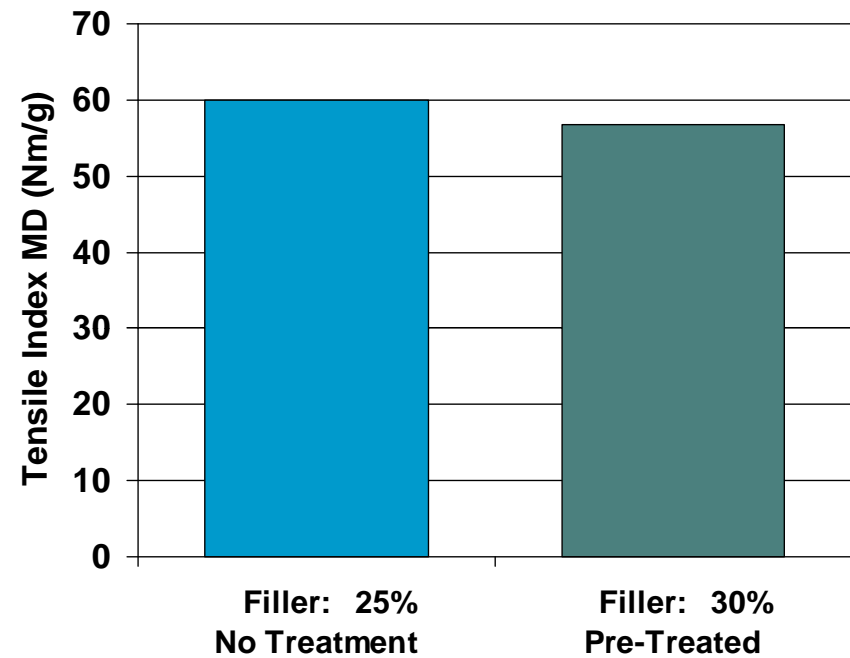
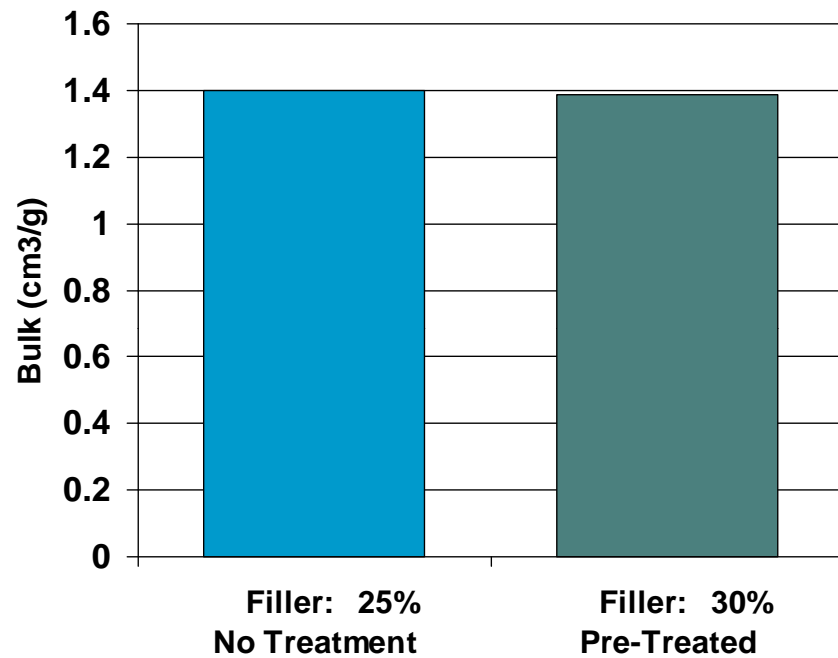
- Asia, 1400 mtpd
- Grade: Copy Paper 80 g/m²
- First trial to increase PCC/GCC filler content from 25% to 30% working with existing fillers.

- **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



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Case Study #3

- **Description**

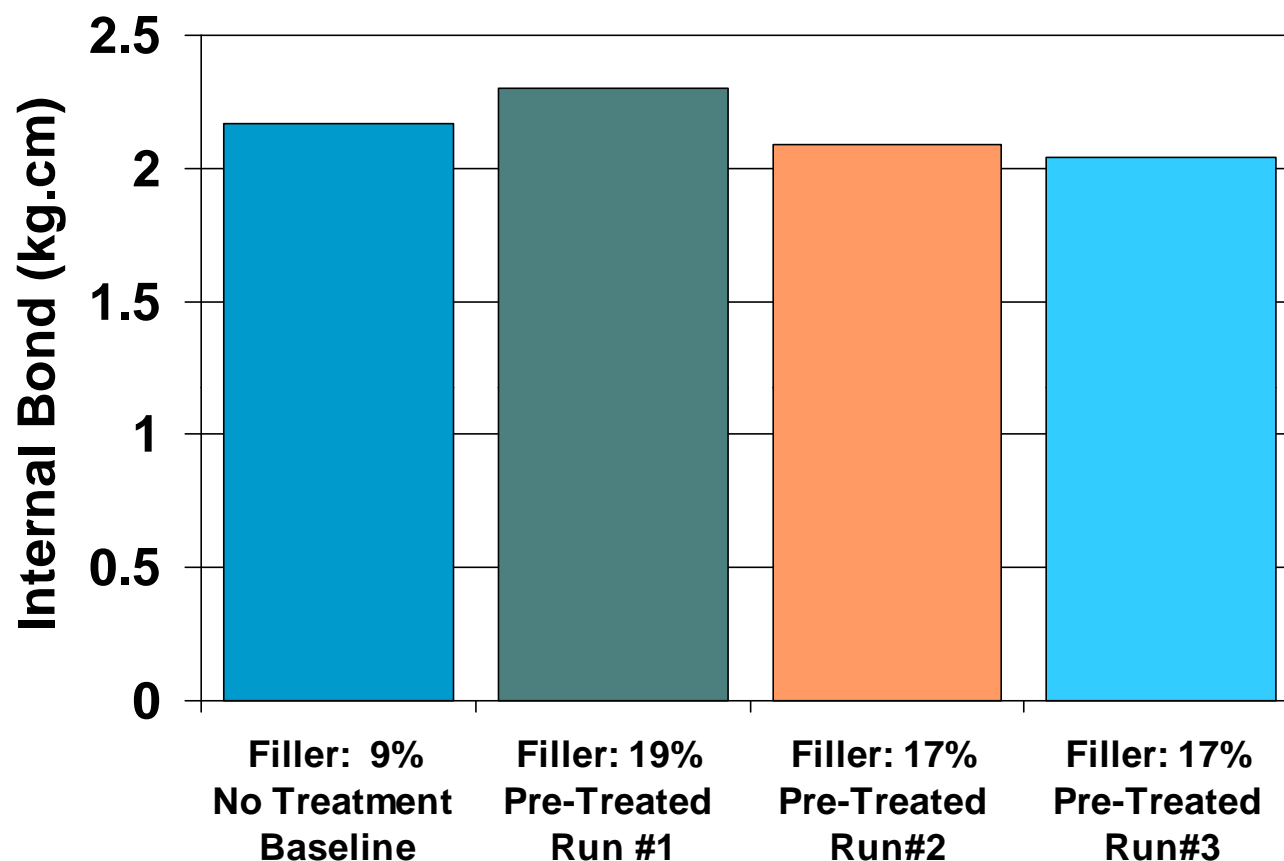
- Asia, 1,400 mtpd
- Grade: Coated basestock 54 g/m²
- Several production runs to increase filler content from 9% to 17% using existing GCC particle
- Use of BCTMP for cost and bulk

- **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



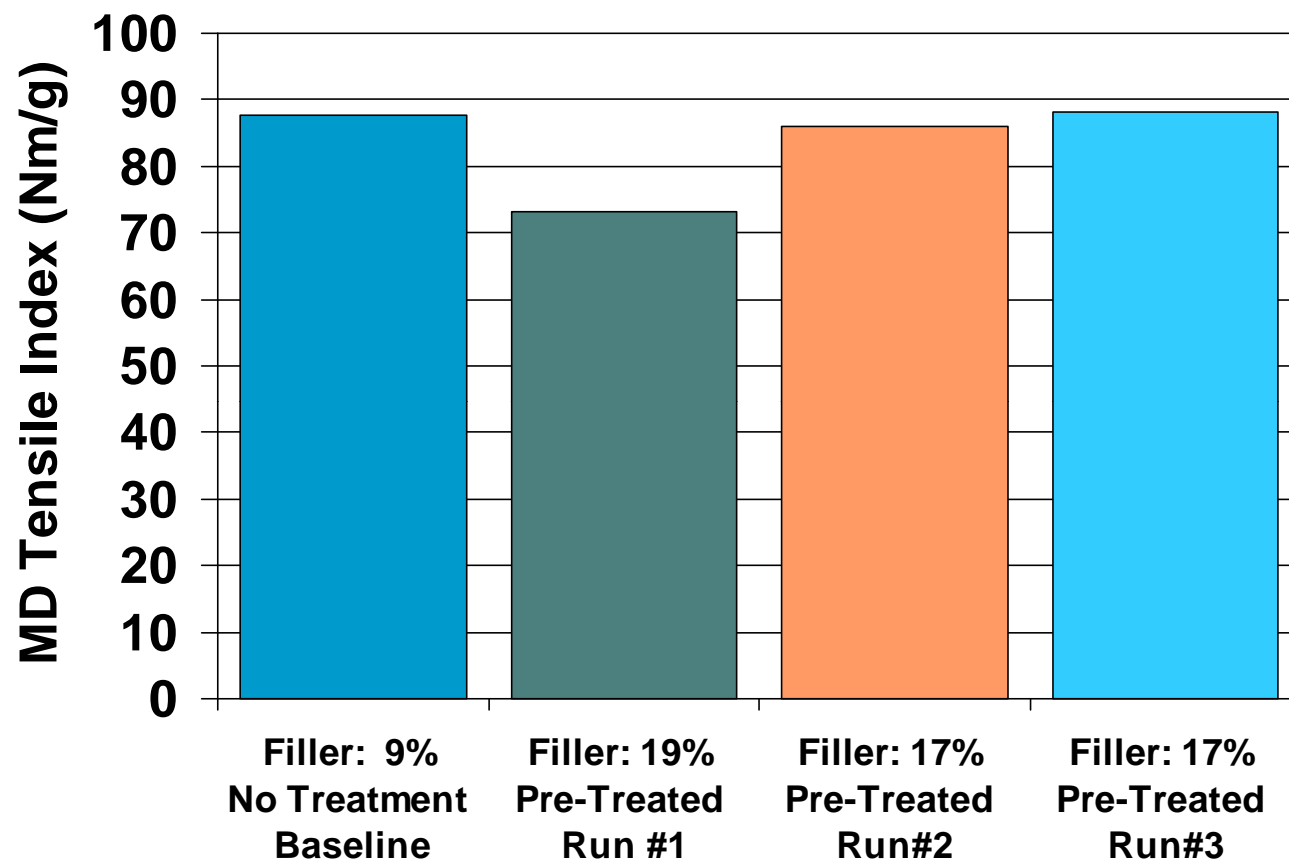
8% filler increase provides significant savings to the mill while maintaining key paper properties



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Case Study #3 – MD Tensile



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



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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



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Thank You

Questions?



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