ASHLAND®

# *OptiFill*[SM]

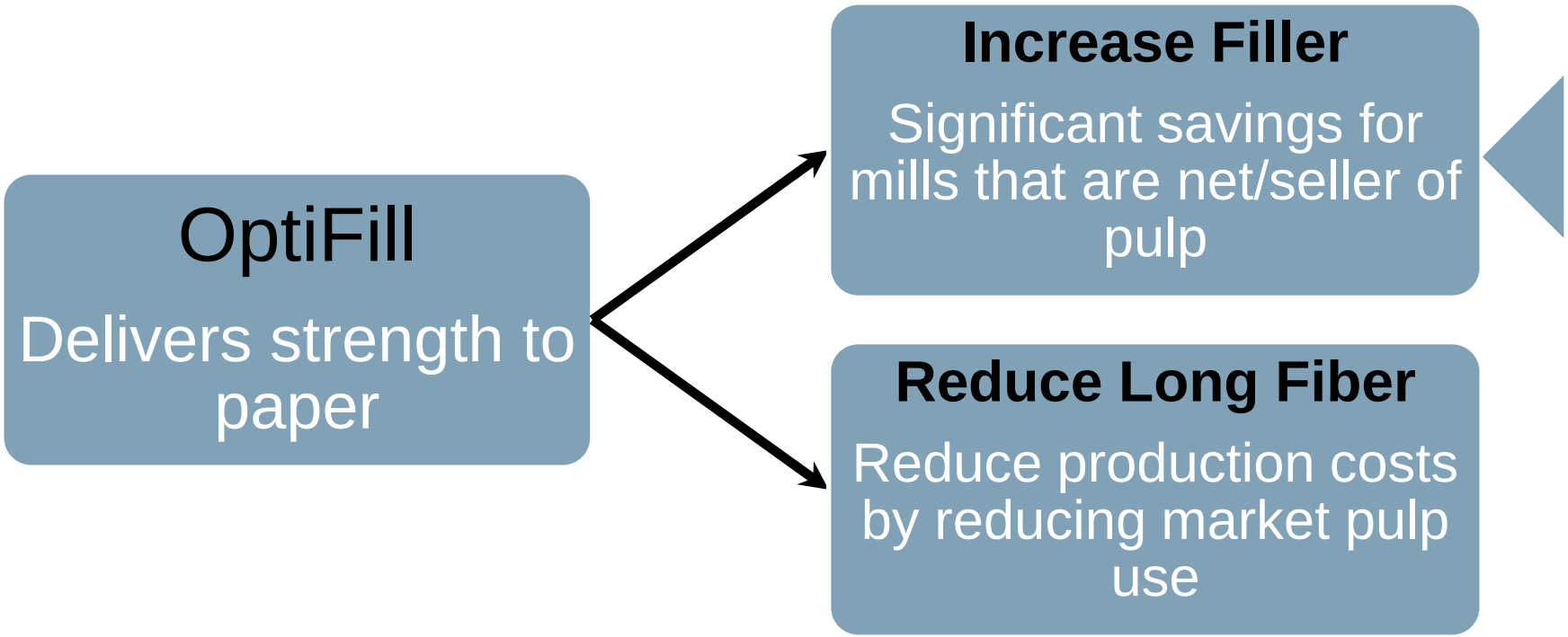
## *Taking Filler Content Above and Beyond*

***A comprehensive approach for lowering costs through fiber substitution for printing and writing operations***

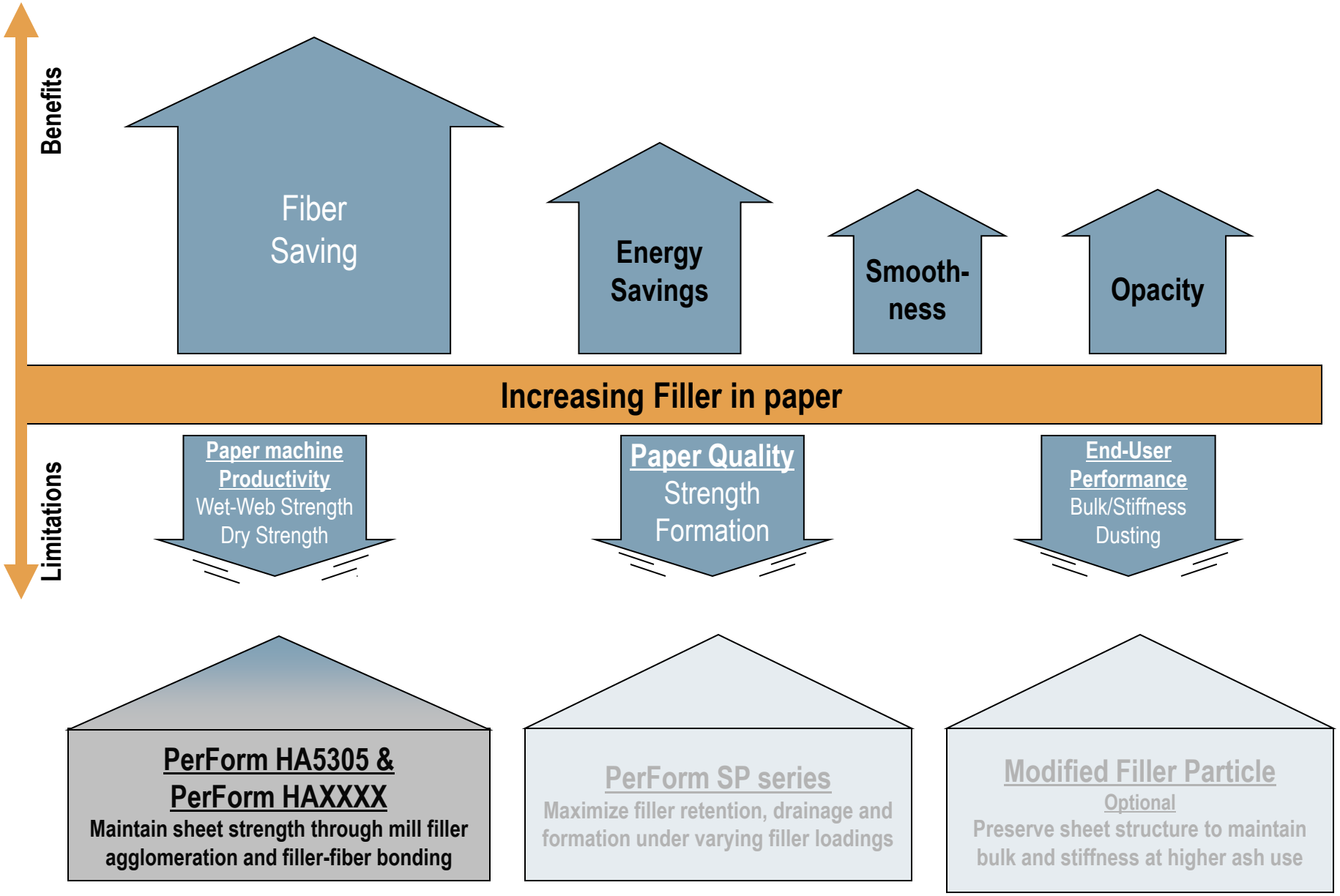
**Ashland Water Technologies**

# *OptiFill Program*

***Optimizing filler and fiber without compromize on quality and productivity***



# OptiFill Program



# *Strength Development – Two Approaches*

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| | Single Approach to maximize runnability | Dual Approach to boost response | |
|---|---|---|---|
| | Filler-Fiber bonding | Filler-Fiber bonding | Filler Aggregation |
| **Product** | PerForm HA5305E | PerForm HA5305E | PerForm HAXXXX |
| **Application** | Filler pre-treatment<br>Added to filler slurry | Thick<br>Stock Addition | Filler pre-treatment<br>Added to filler slurry |
| **Main Action** | Increase internal bond &<br>wet-web strength (paper machine productivity) | | Increase in-plane strength (tensile)<br>Improve filler retention |

**Under validation in EMEA**

# *Hercobond HA5305, strength additive*
# *Function: Filler-Fiber Bonding*
***Patented Technology***

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## Properties

- Proprietary colloidal polymer microstructure – reaction product
- Net anionic, amphoteric polymer system
- 15% actives content
- Ready-to-use liquid
- Single component polymer
- Viscosity 1,500 – 4,000cps
- pH 6.5 – 7.5

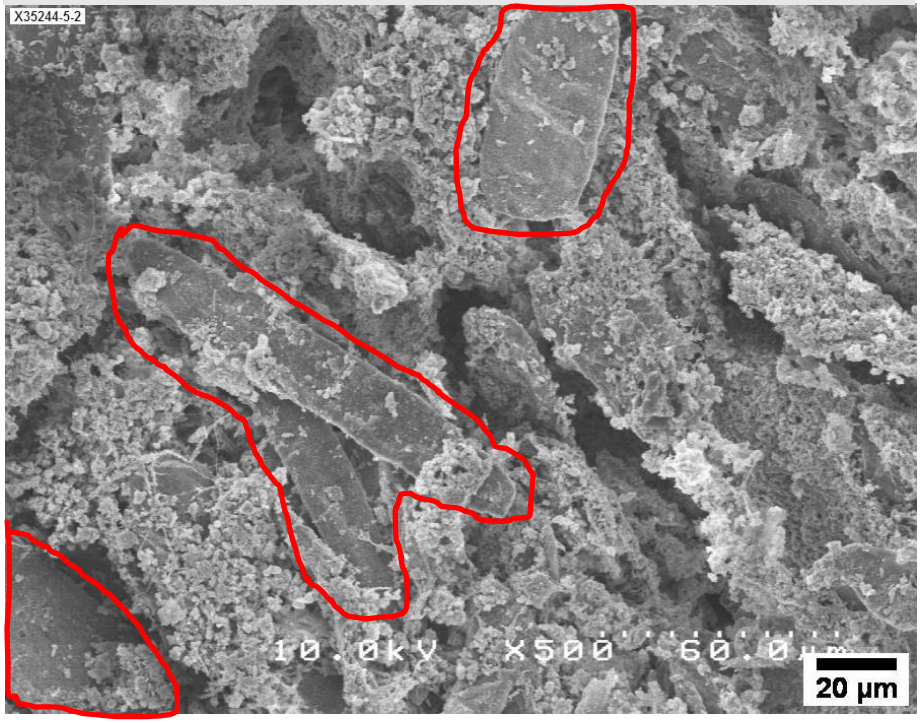
## Benefits

- Fully compatible with PW wet-end
  - Will not quench OBA
- Product is designed to work with PCC and/or GCC; dispersed or undispersed
- Simple to use, simple metering skid
- This polymer has unique afinity to attach to filler surface to reduce filler abrasion
- Increases wet-web to maintain productivity
- Increases internal bond (ZDT)

# *Effect of PerForm HA on binding the fillers to the fibers*
# *SEM of repulped fibers/filler*

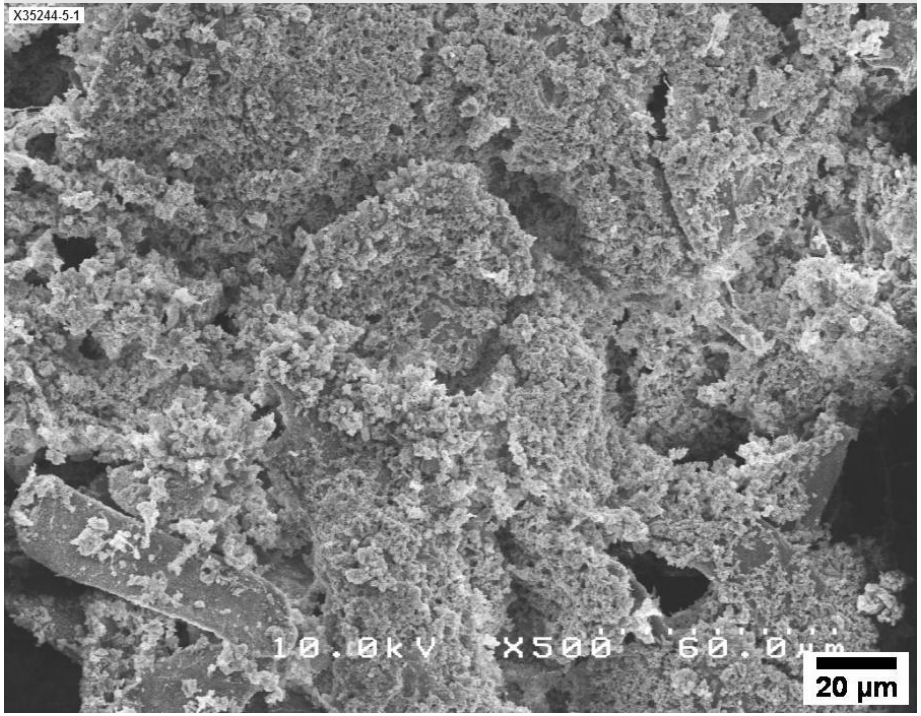
## Untreated, 21%filler

**Less filler linked to fibers**




## Treated with HA, 21% Filler

**Greater surface of fiber covered with filler**



# *PerForm HAXXXX*
# *Function: Mild Filler Aggregation*
*Patented Technology*

## Properties

- Proprietary polymer designed to create structured filler agglomeration
- Net anionic
- Emulsion Polymer, requires make-down
- Viscosity: 100-500 cps
- pH:  6-9
- FDA, BfR compliant

## Benefits

- Medium-size filler agglomerate minimize strength loss
- Stuctured agglomeration provide robust agglomerates to resist shear from papermaking system
- Provides in-plane strength (Tensile)

# UCFS Mill Success Story, Asia
# Increase Filler

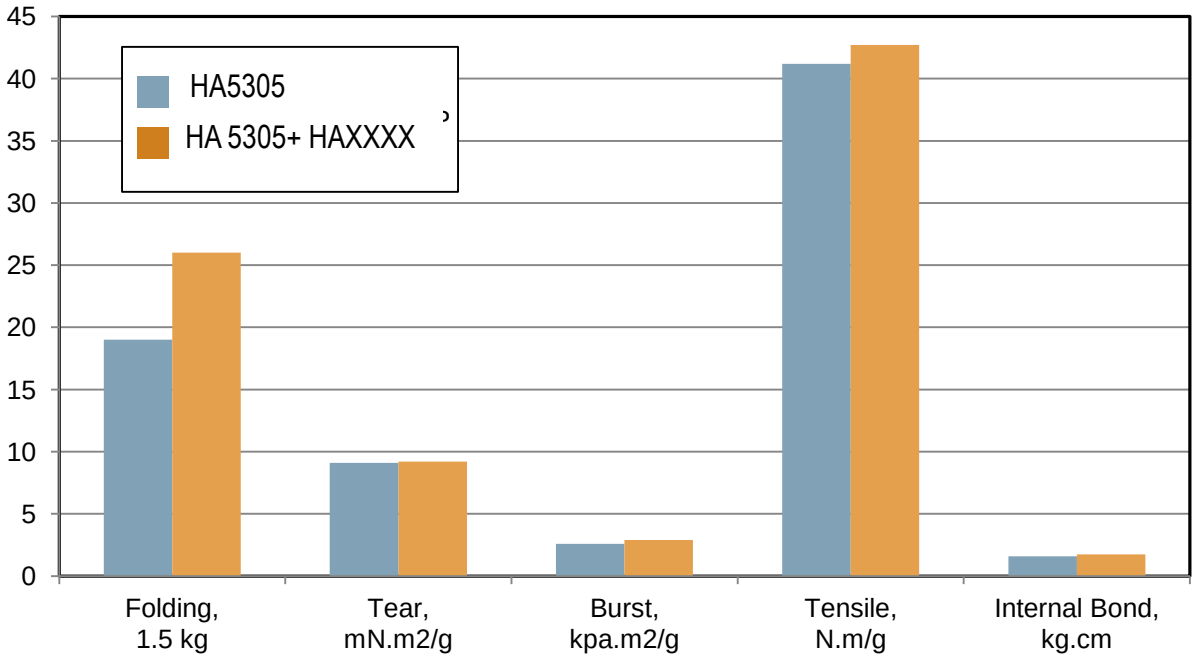
## Mill Goals/Challenges
- Increase filler

## Mill Profile
- Production: 200,000 TPY
- Grade: 75 gsm copy paper
- Retention: PerForm SP7200/CPAM

## Ashland Solution
- Technology:
  - *PerForm HA5305* → *Thick Stock addition*
  - *PerForm HAXXXX* → *Filler pre-treatment*

## Documented Results
- ***5% filler increase***
- ***Paper machine efficiency maintained, no increase in sheet break frequency***
- ***Papermachine productivity unchanged***
- ***All key strength properties maintained or increased***

# *Paper Machine Trial*
## *Results, Paper Quality Improvement*




**PerForm HA5305 & PerForm HAXXXX enabled 5% filler increase while maintaining or increasing strength properties**

# UCFS Mill Success Story, Americas Increase Filler

## Mill Goals/Challenges

- Increase filler

## Mill Profile

- Production: 66,000 TPY
- Grade: 50-80 gsm, copy offset
- Retention: **PerForm SP7200** & APAM

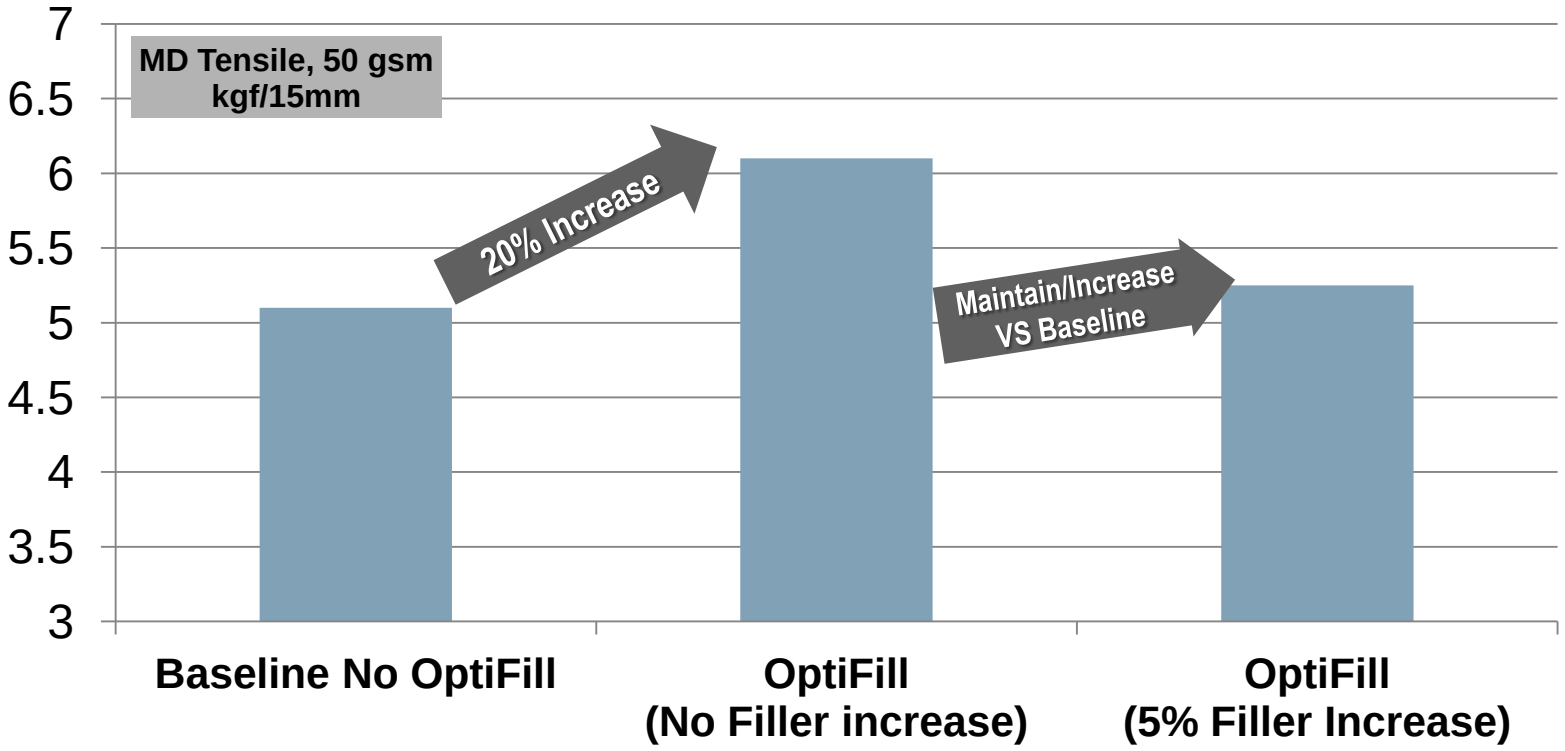
## Ashland Solution

- Technology:
  - ***PerForm HA5305*** → *Thick Stock addition*
  - ***PerForm HAXXXX*** → *Filler pre-treatment*

## Documented Results

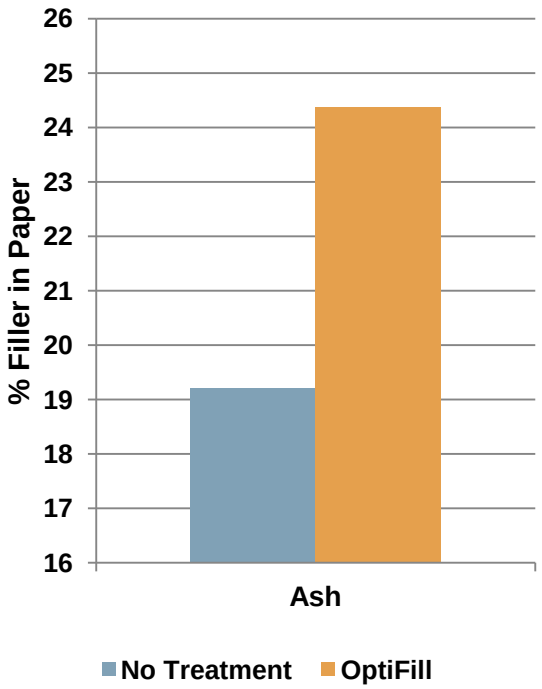
- ***Filler increase from 19% to 24%***
- ***Maintained good papermachine productivity***
- ***End-use results***
  - *Key strength parameters such as tensile, mullen & formation were maintained within specification*
- ***Documented savings***
  - *Excess of $1,000,000 in net savings/year documented*

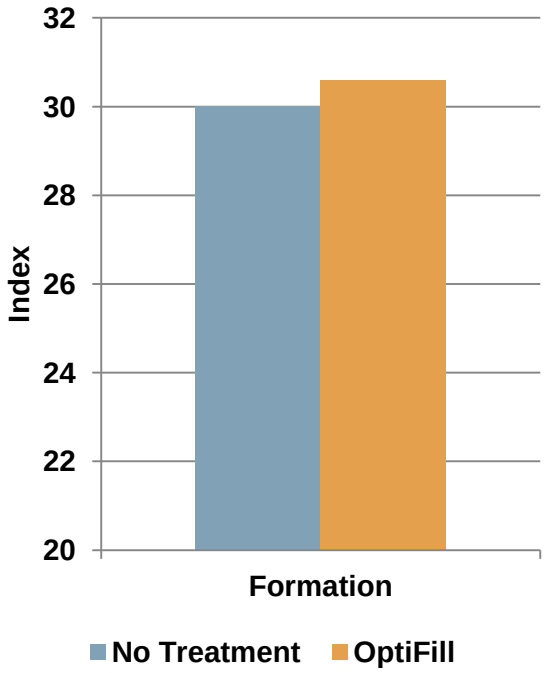
# *UCFS Mill Success Story, Americas*
# *Papermachine results – OptiFill effect on Tensile*

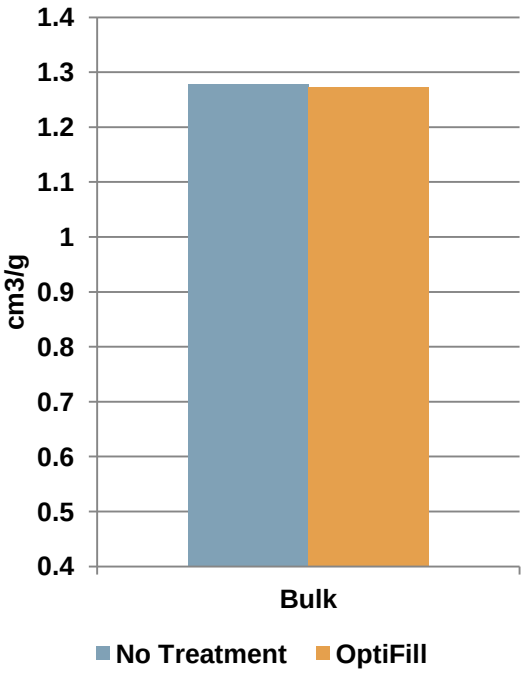



**On a same filler content, OptiFill enabled a 20% increase in Tensile**

# UCFS Mill Success Story, Americas
## Papermachine results – effect on paper quality, 75 gsm

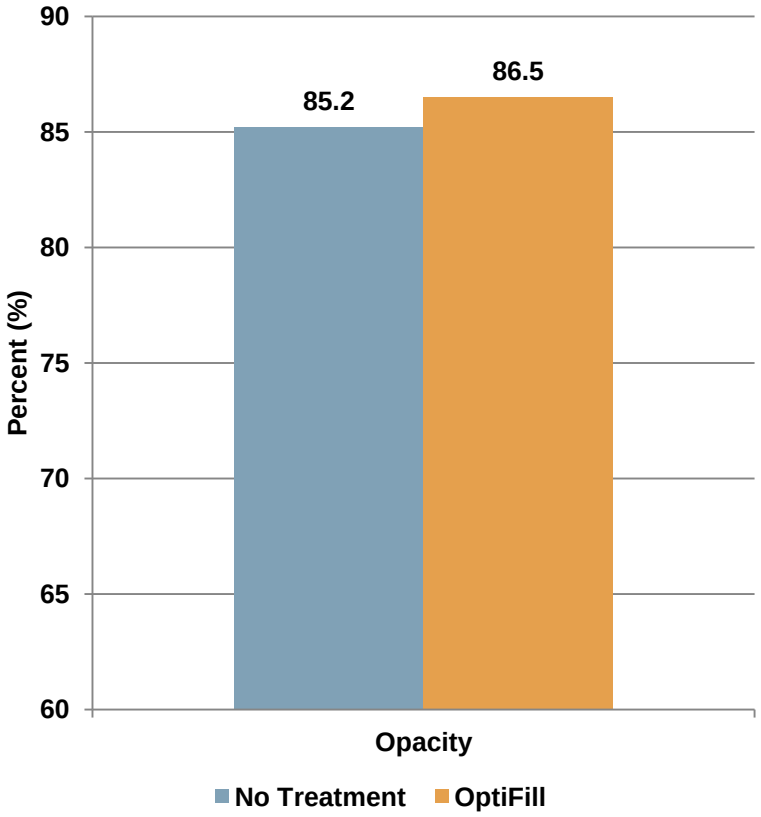


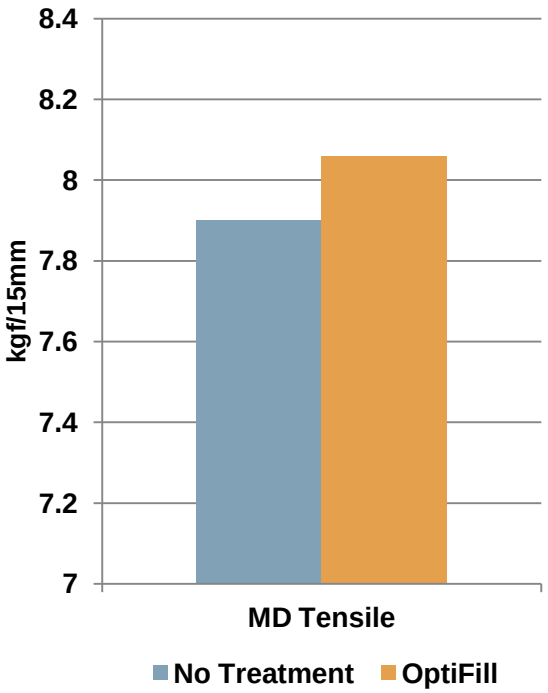

**Sheet formation & bulk were maintained with OptiFill and 5% filler increase**

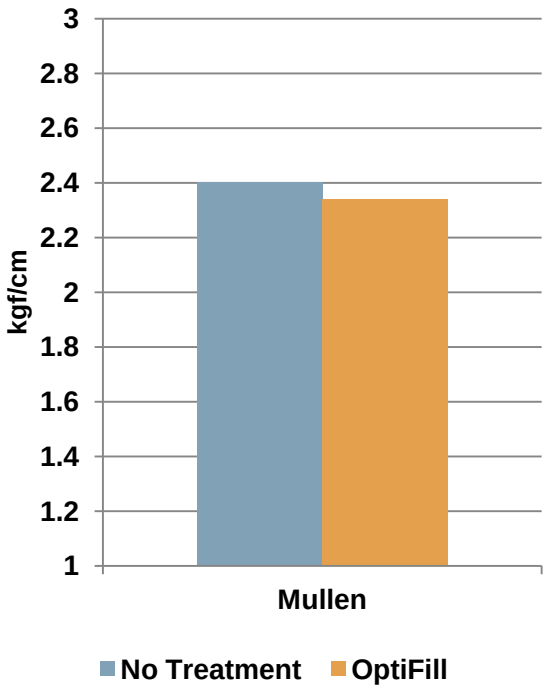
# *UCFS Mill Success Story, Americas*
## *Papermachine results – effect on optical properties, 75 gsm*




**In this case, 5% filler increase generated 1.3 pt gain in opacity**

# UCFS Mill Success Story, Americas
## Papermachine results – effect on paper Strength, 75 gsm




**Key strength parameters maintained with 5% filler increase**

# *UCFS Mill Success Story, Europe Increase Filler*

## *Mill Goals/Challenges*

- Increase filler
- Maintain Runnability

## *Mill Profile*

- Production: 210,000 TPY
- Grade: 80 gsm copy paper
- Retention: PerForm SP7200/CPAM

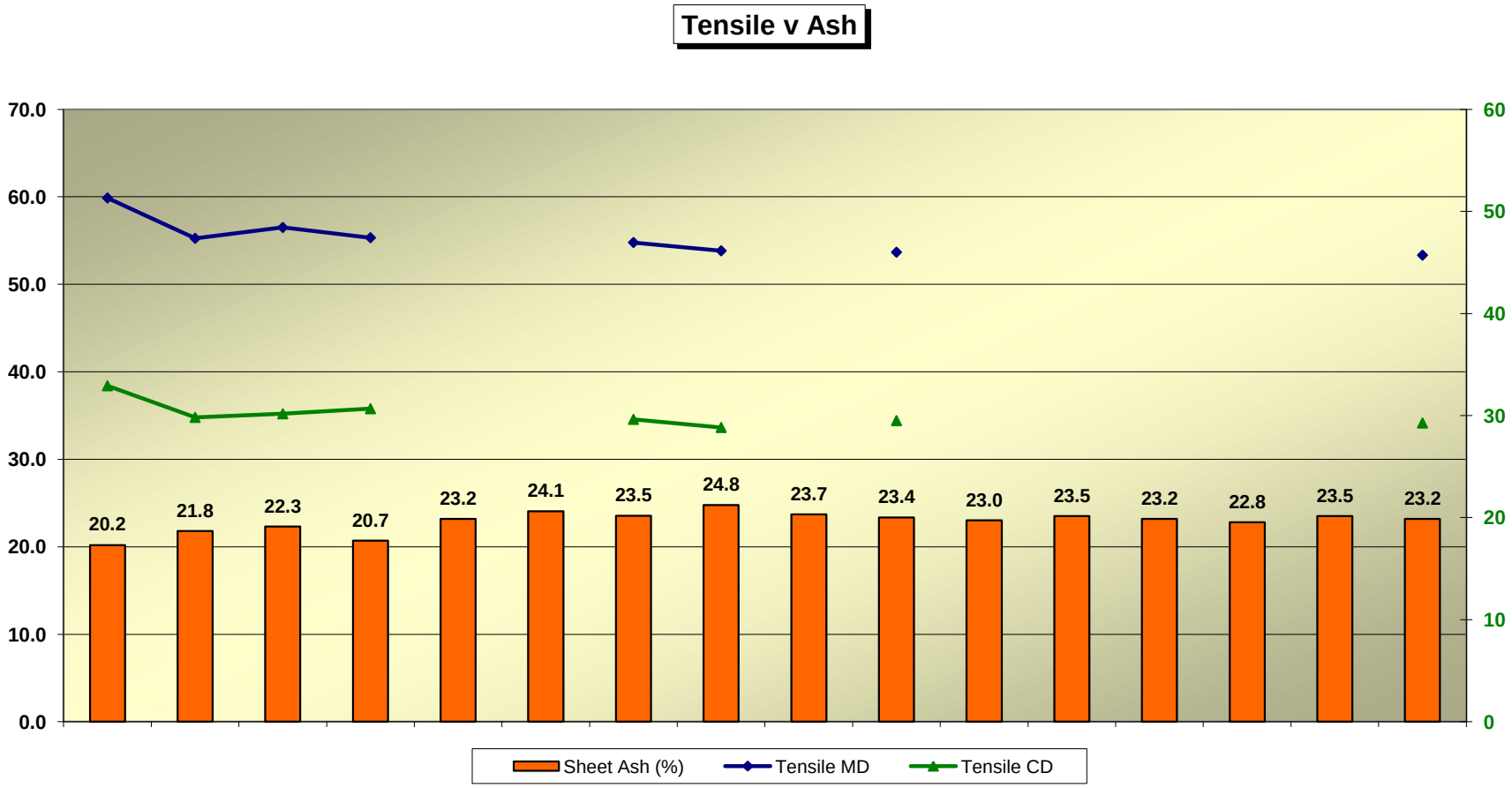
## *Ashland Solution*

- Technology:
  - *Perform HA5305* → *Filler pre-treatment*

## *Documented Results*

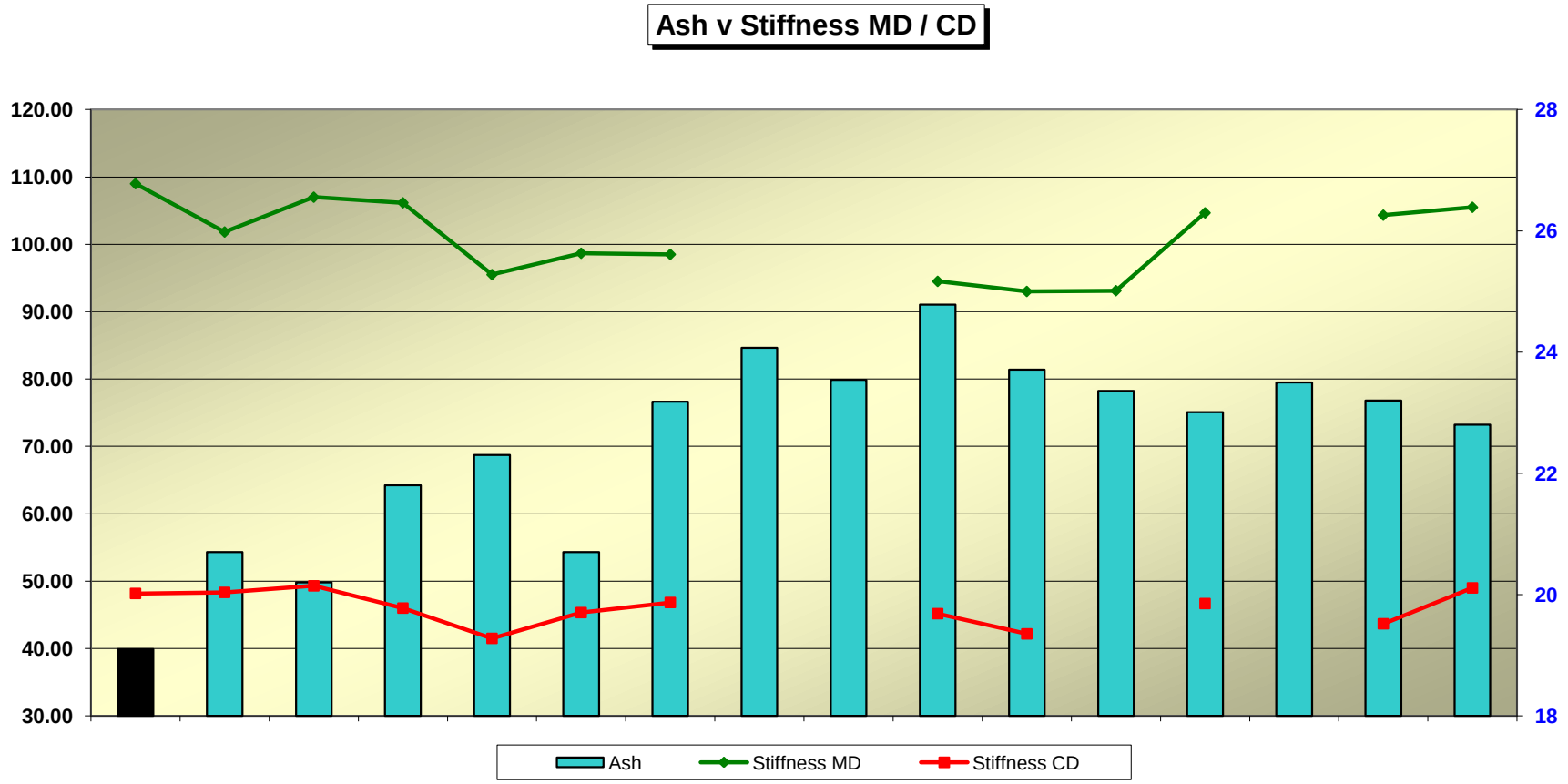
- ***Filler increase +5 points***
- ***Excellent machine runnability***
- ***Good copier dusting performance***
- ***Tensile / Stiffness results within specification***
- ***Significant reduction in steam consumption***

# UCFS Mill Success Story, Europe
# Paper Quality Results; effect on Tensile




**Tensile strength within specification at higher filler content**

# UCFS Mill Success Story, Europe
# Paper Quality Results; effect on Stiffness




**CD Stiffness is critical paper characteristic for copier runnability**

# UCFS Mill Success Story, m-Real Alizay, Europe
# Article published March 2012

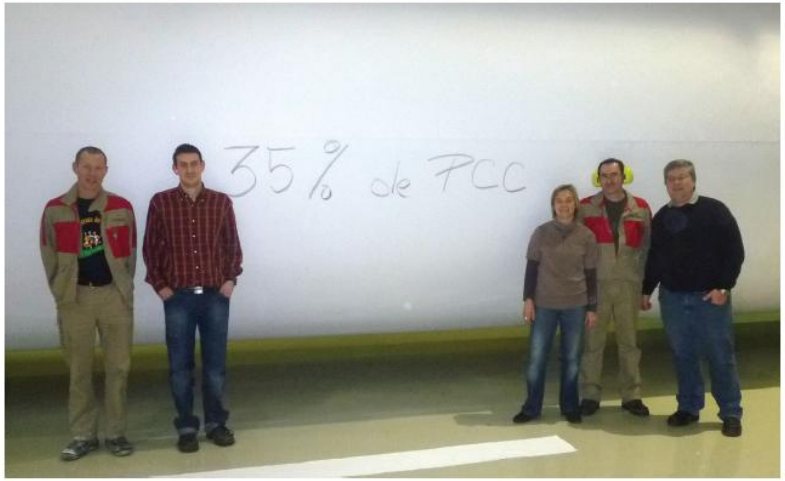
PULP & PAPER INTERNATIONAL PPI

*By GRAEME RODDEN, Executive Editor*

Novel technology developed by Ashland helped a French mill reach 35% filler levels in its copy paper

## A WORLD FIRST

**Alizay mill workers pose with a reel of copy paper made with 35% filler content**



# OptiFill Program – Summary

**Global Commercialization of program**

- **Commercial paper produced in all regions**
  - **Asia, Latin America & Europe**
    - *Extended trials and on-going production*
  - **North America**
    - *Multiple on-going promotions with qualification trials*

**Significant Results Documented**

- **Commercial production (360-1,500 T/day) of Copy, Offset, Coated paper**
- **Filler content of paper produced range from 22% -35% (+3 to 12%)**
  - **Produced with GCC, PCC or combination**
  - **Setting new industry stardards**
- **Demonstrated the ability to maintain paper machine runnability (wet-web strength) while reducing long fiber or increasing filler**
- **Demonstrated significant savings through long fiber replacement**

**Comprehensive and easy to use**

- **Confirmed best practices to achieve optimal results from each program components**
- **Reduced time to implementation: Simplified metering systems**
- **Optional tools that to address machine specific issues such as bulk/stiffness, dusting or strength.**

# EMEA OptiFill Launch Team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