

A photograph of a paper mill's machinery, showing large rollers and a stack of paper, with a blue diagonal overlay on the left side of the slide.

Ultis™ Dry² Strength Technology

ADVANCING STRENGTH FOR PAPER AND PACKAGING

Today's Purpose

INTRODUCE Ultis™ Dry² Strength Technology :
Nalco Water's Dry product Dry strength industry-leading
innovation in strength agents

DEMONSTRATE how Ultis™ Dry² Strength
Technology: can improve **your mill's productivity**

SHOWCASE Ultis™ Dry² Strength Technology in
Action: **Case Study**

Motivation for Increasing Dry Strength in Paper



More consistent
Paper
QUALITY

- Allows product to function properly in end use
- Basis weight reduction
 - Maintain strength with less fiber
 - Lower weight packaging – cost savings and environmental benefits
- Allows for lower cost fiber/materials
- Increased machine speed/production through improved dewatering (reduce refining).



REDUCED
TOTAL COST
of Operations

Methods of Increasing Paper Strength

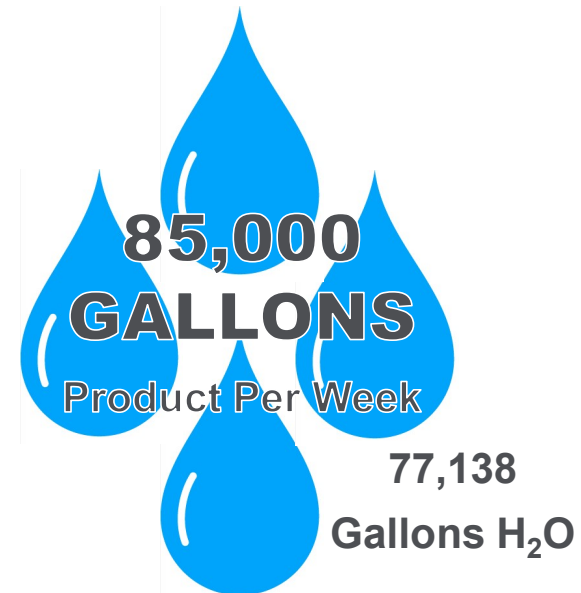
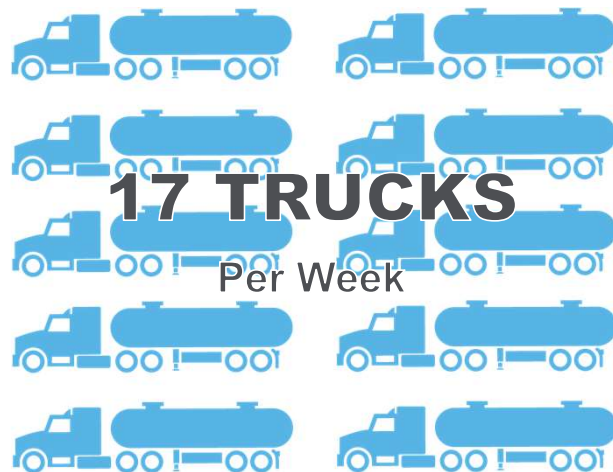
- Mechanical/Operational
 - Increase the weight of the sheet
 - Improve fiber source (recycle vs. virgin)
 - Increase refining of the fibers
 - All come at a cost and may decrease operational efficiency
- Chemical – dry strength aid
 - Water soluble polymers (+ / - /)
 - Adsorb to fiber surface, increase fiber/fiber strength and/or fiber bond area.
 - Examples: starch, modified polyacrylamide

Challenges of applying strength polymers

- Cost-effectively generating strength in recycled board and packing grades
 - Strength agent efficacy
- Low-solids solution polymers
- Short shelf life
 - Shelf life dependent on environmental conditions
- Chemical logistics/management

Example: Recycled Board Producer

- 2,300 tons/day across several paper machines.
- Dosing around 5 lb/ton conventional strength agent (9.25% actives) to achieve strength and productivity targets.



Voice of Customer



Sustainability

- Re-use of raw material
- Water and energy reduction
- Cost optimization

Productivity:






- Increase strength to run faster make more paper.

Grade development

- **Light-weight.** Sell more area with same properties.
- Up-grade.
- Printability.
- Use OCC to match performance of virgin liner.

Strength is the major driver or hurdle to achieving these.

Dry Strength Additive Benefits

Basis Weight Reduction	Increased Production	Energy & Water Conservation	Fiber Substitution	Grade Development
<ul style="list-style-type: none"> ▲ Light-Weighting ▲ <u>Higher strength at lower basis weights</u> 	<ul style="list-style-type: none"> ▲ Increase drainage / dewatering ▲ Less refining ▲ Eliminate Size Press 	<ul style="list-style-type: none"> ▲ Lower steam demand ▲ Less refining energy ▲ Reduced sewer losses 	<ul style="list-style-type: none"> ▲ More OCC ▲ High ash recycle ▲ Strength with recycle fiber 	<ul style="list-style-type: none"> ▲ Consistent strength results ▲ New higher strength grade
				

Dry Strength Additive Benefits

Carbon Footprint	Capital	Quality	Environmental
<ul style="list-style-type: none"> ▲ Lower Freight to ship chemical ▲ Lower Freight to ship boxes ▲ Less Fiber / MSF ▲ Lower energy 	<ul style="list-style-type: none"> ▲ Avoid capital expenditures 	<ul style="list-style-type: none"> ▲ Reduce returns / complaints due to low test ▲ More uniform strength test 	<ul style="list-style-type: none"> ▲ Lower VOC ▲ Lower BOD's ▲ Increase waste recycle



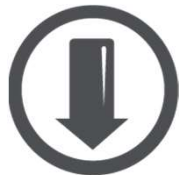
Ultis™ Dry Technology

- A dry powder strength agent developed to address the needs of the recycled board and packaging industry.
 - Unlimited shelf life
 - Improved handling and storage
 - 5 - 10x more concentrated
 - Effective at building strength in board and packaging grades
 - Regulatory compliant
- Significant technical challenge to deliver a dry polymer in the molecular weight range of a paper strength agent.



Ultis™ Dry² Strength Technology

Ultis™ Dry² Strength Technology provides recycled paperboard and packaging manufacturers higher levels of strength in a novel form improving logistics, safety, customer product quality and improved cost of operation.



COSTS

Logistics & Safety

Freight Reduction

\$450K



PRODUCT QUALITY

Basis Weight Optimization

1lb. Weight Reduction

\$1.5M



PRODUCTIVITY

10% Production Increase

\$5.5M



ASSETS

Improved Machine Efficiency
1% improvement

\$700K



ENERGY

Energy & Additive Reduction

\$175K

Yearly savings based on 1000 ton/day Paper Mill Production

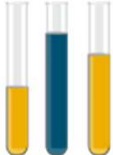
Ultis™ Dry² Strength Technology from Nalco Water: Advancing the Science of Paper Strength

Provides up to **15%** more strength than traditional products

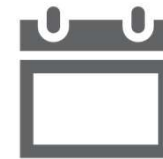


Delivered as a Highly concentrated, solid product



 Polymer-based chemistry

Maintains consistency with a one-year plus shelf life



Overview of Plant Results

CASE STUDY 1

North America
Linerboard & Medium

Situation:

A 100% recycled paperboard mill was producing paper at a heavier weight than target to meet their strength targets.

Solution:

The mill implemented Ultis™ Dry² Strength Technology to meet their strength targets more efficiently.

Results:

INCREASED
production by
24K TONS /year



PRODUCTIVITY

INCREASED
profitability by
\$4.9M /year



PROFITABILITY



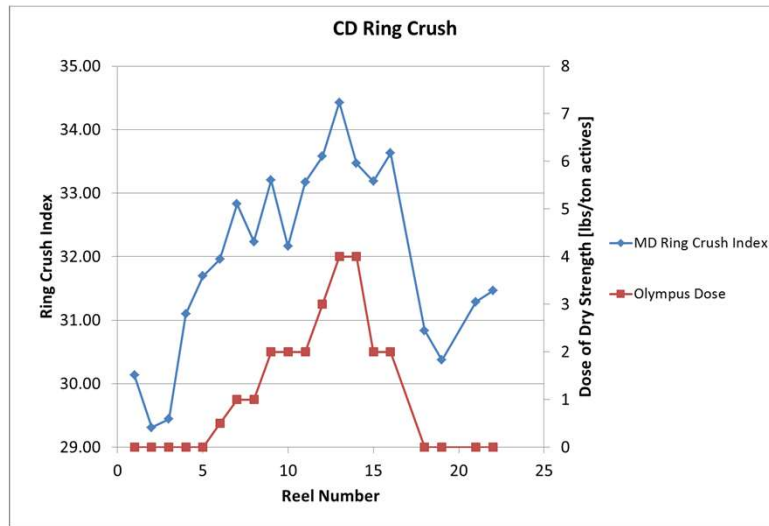
REDUCED
refiner energy by
2.2M kWs
per year,

resulting in
\$140K
COST SAVINGS
per year



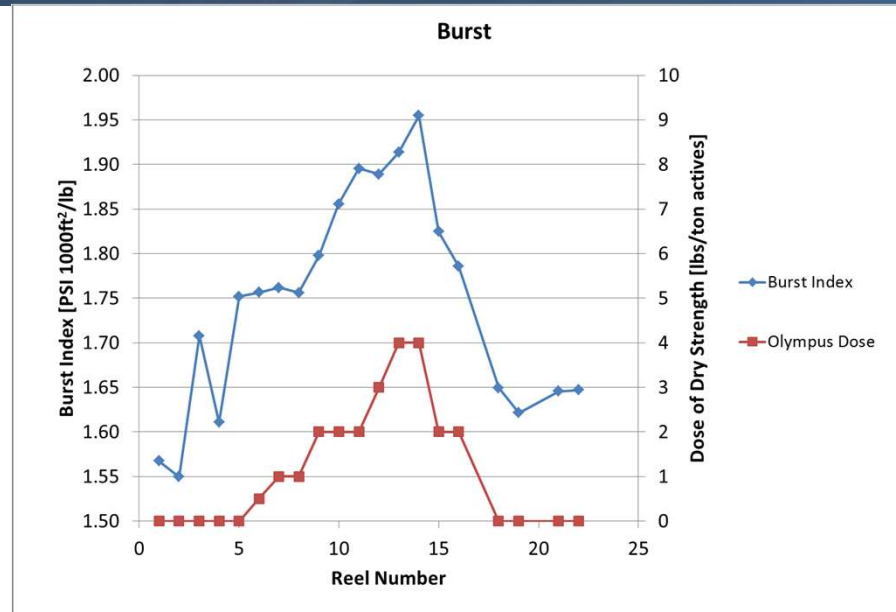
COSTS

Strength Testing: Ring Crush



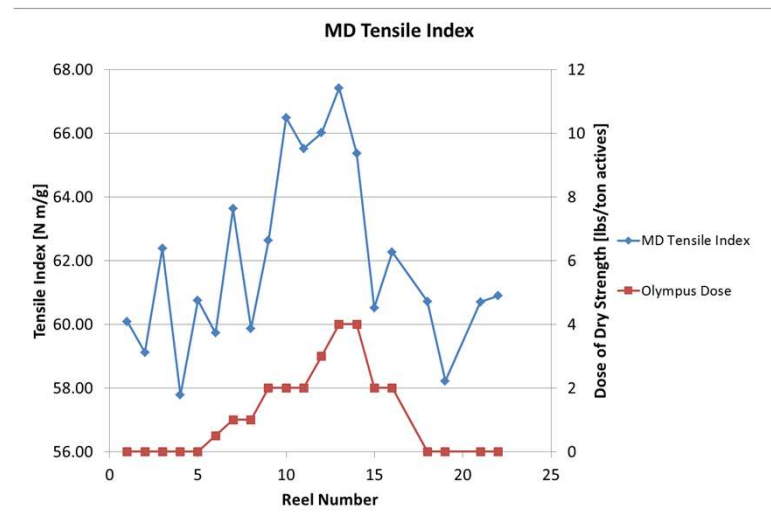
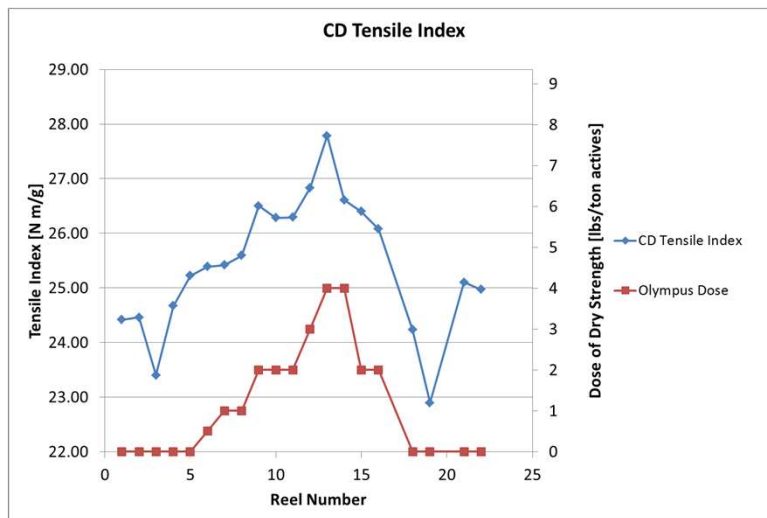
- ▲ Strength increase observed in both MD (13%) and CD (14%) ring crush.
- ▲ Strength decreases after the chemistry is removed from the machine.
- ▲ Short break (caused by equipment – rope break) between reels 18 and 19.
- ▲ Numbers are indexed to basis weight, then multiplied by the BW average.

Strength Testing: Burst



- ▲ 19% increase measured in burst strength.
- ▲ Machine optimized for burst (concora) performance for this grade.

Strength Testing: Tensile Index



- ▲ Increase in both CD (14%) and MD (12%) tensile index observed.
- ▲ Strength decreases after METRIX Ultis is removed from the machine.
- ▲ All values indexed to basis weight.

Overview of Plant Results

Latin America
Linerboard & Medium

Situation:

A 100% recycled paperboard mill desired to improve the productivity and strength quality of their production

Solution:

The mill implemented Ultis™ Dry² Strength Technology to meet their strength targets more efficiently and provided an 81% Return on their investment

Results:

INCREASED
production by
6%



INCREASED
profitability by
\$720K / year

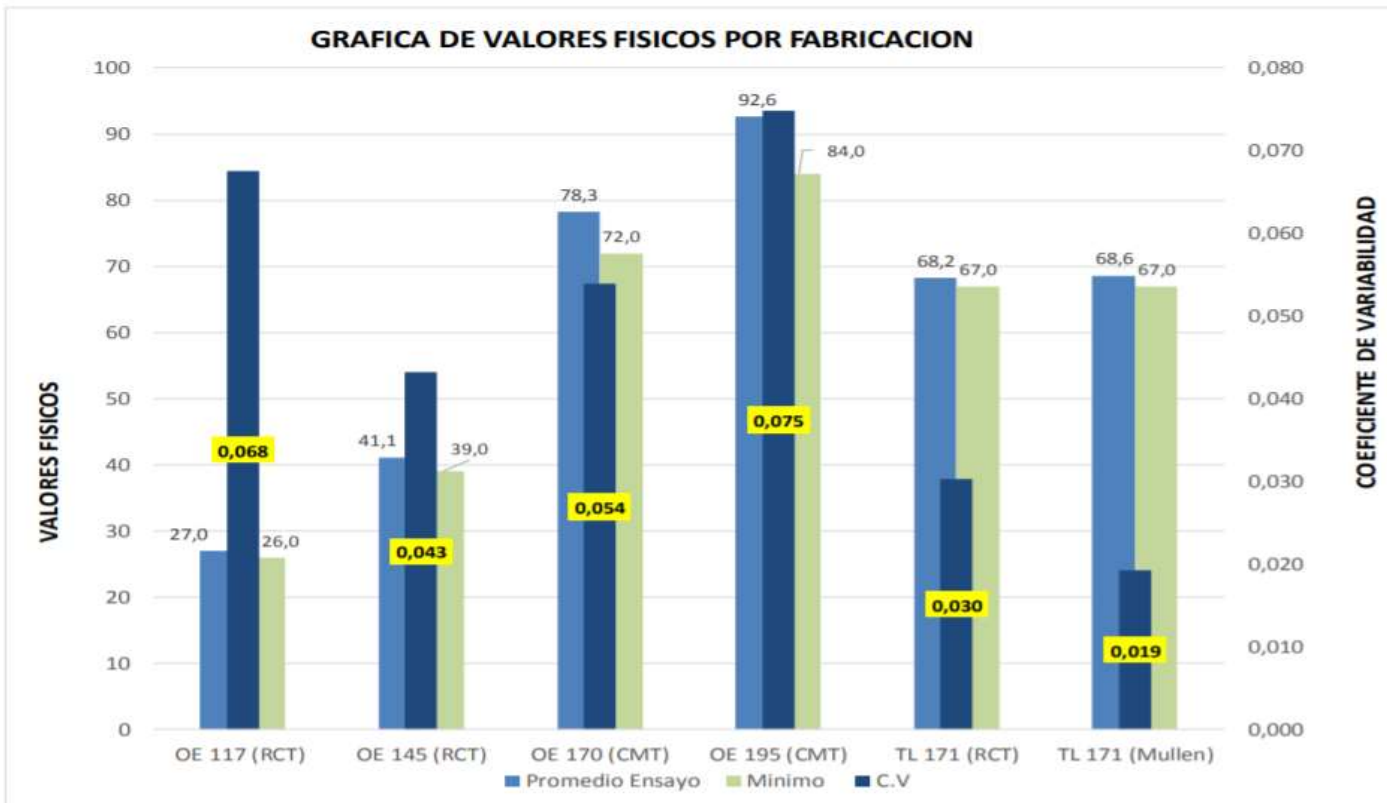


Eliminated **2**
Paper machine
additives

resulting in
\$192K
COST SAVINGS
per year



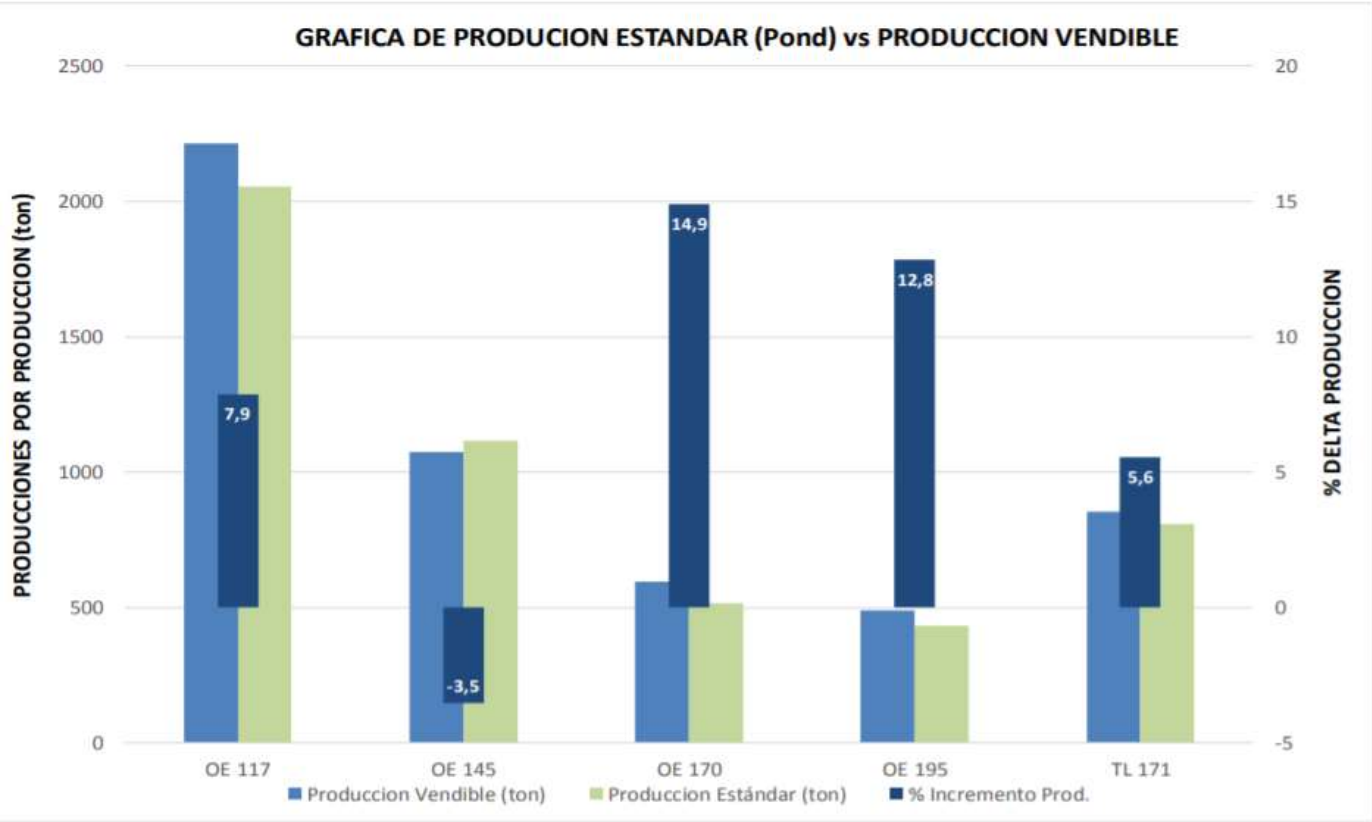
Results - Properties



Ave. 4.8%

Results Production

GRAFICA DE PRODUCCION ESTANDAR (Pond) vs PRODUCCION VENDIBLE



Producción Vendible
Ave. 6.09%



Overview LA Case

Trial Goal: Increased or maintain Ring crush and/or CFC, increasing productivity and decreasing the amount of chemical used.

Competitive Program: GPAM 15 kg/ton, retention aid hmw (+) 1.3 kg/ton, AKD 7 kg/ton

Nalco Program: 63888 (Ultis) 1.9 kg/ton machine chest pump, 61067 0.3 kg/ton before screen, AKD 5.0 kg/ton pre-fan-pump.

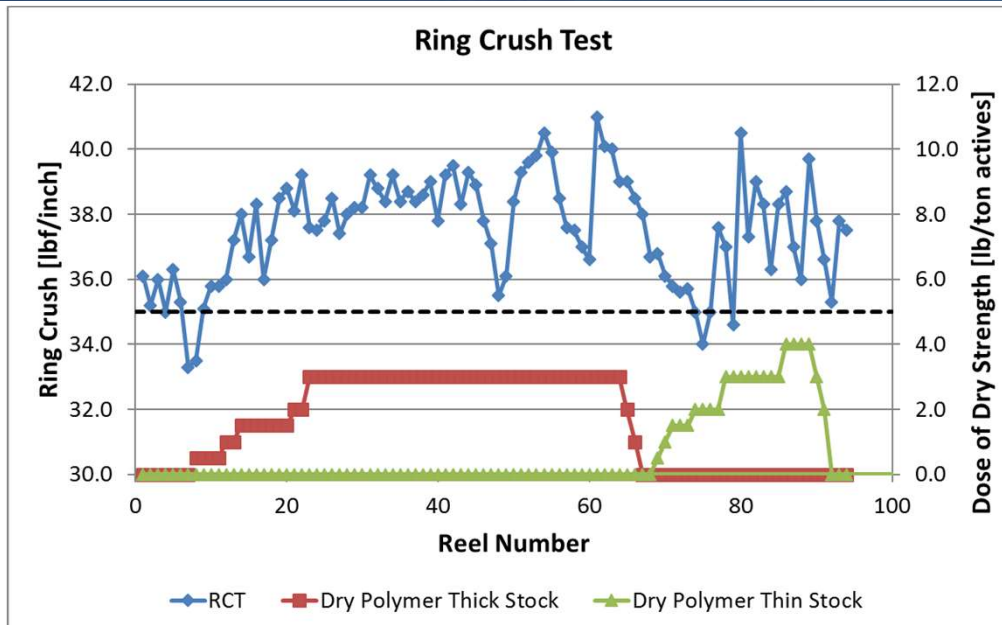
Results: RC and CFC maintain the same values, productivity increased from 4.1 to 4.3 ton/hr, basis weight decrease from 160 g/m² to 157 g/m², chemical dosage decreased.

Key Learning: Getting the best strength values, the 63888 was change from before the screen to the machine chest pump.

eSaving\$ Mill saved \$292,452 Usd/year producing 3 days per week high basis weight liner.

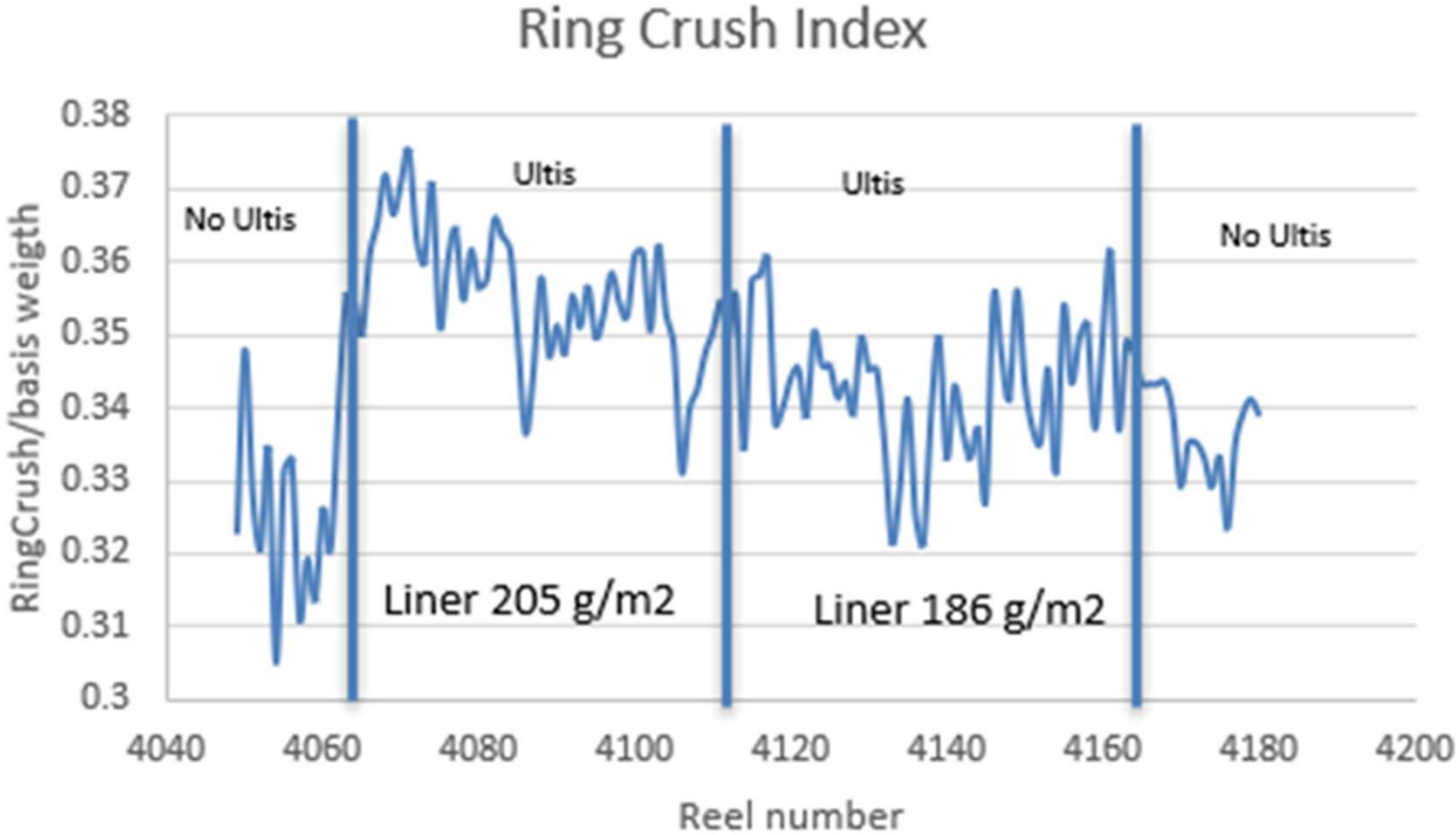
Chemical savings \$181,256.00, productivity \$111,197.00

Product Trial: Ring Crush Results



- ▲ 36 hours total run time, no paper breaks or runnability issues.
- ▲ Positive impact on all strength tests.
- ▲ Increased retention observed (FPR increased 5%), reduced other chemical dosages (ASA)

Case 3.- Latin America



Overview of Plant Results

Asia Pacific
Corrugated Medium

Situation:

An Asia Pacific 100% recycled paperboard mill desired to improve the strength quality of their production, increase productivity and improve the total cost of operation

Solution:

The mill implemented Ultis™ Dry² Strength Technology to meet their strength targets more efficiently and provided an 101% Return on their investment

Results:

INCREASED
Productivity with
4.2% break
reduction



PRODUCTIVITY

INCREASED
profitability by
\$785K / year



PROFITABILITY

Optimized 3
Paper machine
additives and
35% Size
Press Starch
resulting in
\$310K
COST SAVINGS
per year



COSTS

Sustainability Impact



90% FEWER
Product Deliveries



REDUCED
Energy Use



REDUCED
BOD/COD
in Wastewater

INCREASE PRODUCTIVITY & DECREASE TCO

Learn how Ultis™ Dry² Strength
Technology can
work for your mill

THANKS