

ELEMENTAL_TEXTILES

ENHANCING THE SUSTAINABLE FEATURES OF THE TEXTILE INDUSTRY THROUGH BIOINNOVATION

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2 15/05/17 NOVOZYMES PRESENTATION



AGENDA

Novozymes & bioinnovation

Elemental_textiles

The process

Comparison of conventional and elemental textiles processes

Effect of salts & dye

Savings potential and sustainability

Achieved quality levels



Novozymes – the global leader in bioinnovation





What is bioinnovation?



BIOINNOVATION IS A WAY OF APPLYING BIOTECHNOLOGY ACROSS TRADITIONAL THINKING

BIOINNOVATION MAKES IT POSSIBLE TO REPLACE MANY OF THE POLLUTING AND RESOURCE CONSUMING PRACTICES OF INDUSTRIES TODAY



What are enzymes?

Enzymes are proteins that act as efficient catalysts in any living organism

Microbes are living organisms that can break down or build up a variety of substances





Elemental_textiles

TODAY IS THE FUTURE

USING ENZYMATIC SOLUTIONS THROUGHOUT THE PROCESS OF CREATING KNITTED FABRICS

- REDUCES PROCESSING TIME
- INCREASES OUTPUT
- LOWERS CO₂ EMISSIONS
- SAVES WATER
- MAKES A COMPETITIVE DIFFERENCE
- CREATES SUPERIOR QUALITY FABRICS





The elemental process

Bioblasting Bioscouring Biosoaping & dyeing + bleaching Step 2 Step 1 Step 3 Step 4 Low temperature Novozymes' enzyme Novozymes enzyme Novozymes enzyme bleaching enabled by (Scourzyme[®]) added (Cellusoft[®] Combi) (ERP) added bioscouring added to dye bath Durable, smoother, Add bleaching Minimizes strength Significantly fewer and cleaner chemicals directly to and weight loss water rinses after fabric surface scouring bath soaping Softer fabric Substantially less Fewer baths/rinses pilling with less water Stronger bleach penetration possible Consistent and Avoid water rinses reproducible dyeing Guaranteed hydrogen peroxide removal

IMPROVED QUALITY WITH A SUSTAINABLE TWIST



Conventional bioblasting using a catalase



CONVENTIONAL BIOBLASTING

220 MINUTES IN TOTAL



Conventional bioblasting using a reducing agent



CONVENTIONAL BIOBLASTING



Bioblasting: Cellusoft® Combi & dyeing



COMBINED PROCESSES BIOBLASTING

FROM 210 TO 105 MINUTES IN TOTAL



Bioblasting: Cellusoft® Combi & dyeing



COMBINED PROCESSES BIOBLASTING

FROM 210 TO 105 MINUTES IN TOTAL



Effect of salt on Cellusoft[®] Combi





Effect of salt on Cellusoft® Combi





Effect of dyes on Cellusoft® Combi



Enzyme	Dosage	Reactive blue 21	Reactive red 195	Reactive black 5
Cellusoft [®] Combi	1%	3%	3%	3%
Acid cellulase	1%	3%	3%	3%



Elemental process – savings potential

Process (number of baths per shade)	Light shade	Dark shade	
Conventional process route	18	22	
Sustainable route	12	14	
Saving	6	8	





Elemental process – savings potential

Mat/ utility	Unit	Conventional		Elemental_textiles		Difference
		Process	Quantity	Process	Quantity	
Electricty	kWh	Scouring	191	Bioscouring	100	
		Dyeing	274	Comb. dyeing/bb	285	
		Soaping	272	ERP	240	
		Bioblasting	128		-	
		Total	865	Total	625	240
Heat	MJ	Scouring	4.514	Bioscouring	3.762	
		Dyeing	1.463	Comb. dyeing/bb	1.463	
		Soaping	9.614	ERP	4.598	
		Bioblasting	1.254			
		Total	16.845	Total	9.823	7.022
Water	M3	Scouring	50	Bioscouring	20	
		Dyeing	10	Comb. dyeing/bb	10	
		Soaping	100	ERP	110	
		Bioblasting	60		-	
		Total	220	Total	140	80



Elemental savings

70,000-90,000 liters of water saved for each ton of fabric produced (20-30 liters per t-shirt)

1000-1,300 kg of CO2 reduced for each ton of fabric produced (0.3 – 0.4 kg of CO2 per t-shirt)

Source: Life Cycle Assessment based on Esquel case



Elemental savings

9 million tons of <u>CO₂</u> <u>reduction</u> if all knitwear were made = with enzymes

2 million cars off the road

630 billion liters of <u>water reduction</u> if all <u>=</u> knitwear were made with enzymes Water for 8 million urban or 24 million rural Chinese people every year

IMPROVED FOOTPRINT AT NO ADDED COST



Source: Life Cycle Assessment based on Esquel case



Elemental_textiles help protect the environment

Water

Save water and make waste water from textile production more environmentally friendly



Release fewer CO₂ emissions and health-damaging particles into the air



Reduce energy consumption and help prevent fossil fuels from going up into the atmosphere



Reduce waste of raw materials. Give cotton growers more fabric from their crops and leave more land untouched



Elemental quality

- ✓ SOFTER, MORE DRAPEABLE AND DURABLE QUALITY
- ✓ SAME COLORFASTNESS AND NO COLOR CHANGE
- ✓ SUBSTANTIALLY LESS PILLING AND FUZZ
- ✓ IMPROVED BURSTING/TENSILE STRENGTH
- ✓ SAME WASH STABILITY
- ✓ IMPROVED BATCH-TO-BATCH SHADE REPRODUCIBILITY





Elemental collaboration



- Enzymes developed by Novozymes
- Elemental fabric produced by Esquel
- Life Cycle Assessment conducted by Novozymes and validated by 3rd party







FOR MORE INFORMATION, PLEASE VISIT <u>WWW.ELEMENTALTEXTILES.COM</u> <u>WWW.NOVOZYMES.COM</u>



Novozymes in brief

- World leader in Industrial Enzymes & Microorganisms and Market leader in all main industries
- Enzymes account for >90% of turnover
- Sales USD ~1.5bn (FY2008)
- Long-term growth in operating profit of at least 10%
- Strong profitability (18.5% FY2008) and solid generation of cash flow (excluding acquisitions, 13% of sales)
- Main production in USA, China and Denmark
- More than 700 products used in 130 countries in >30 different industries
- More than 5,000 employees world-wide
- R&D activities in 5 different countries
- ~14% of sales invested in R&D
- New product sales around 25% of total sales in 2007
- More than 6,000 granted or pending patents

