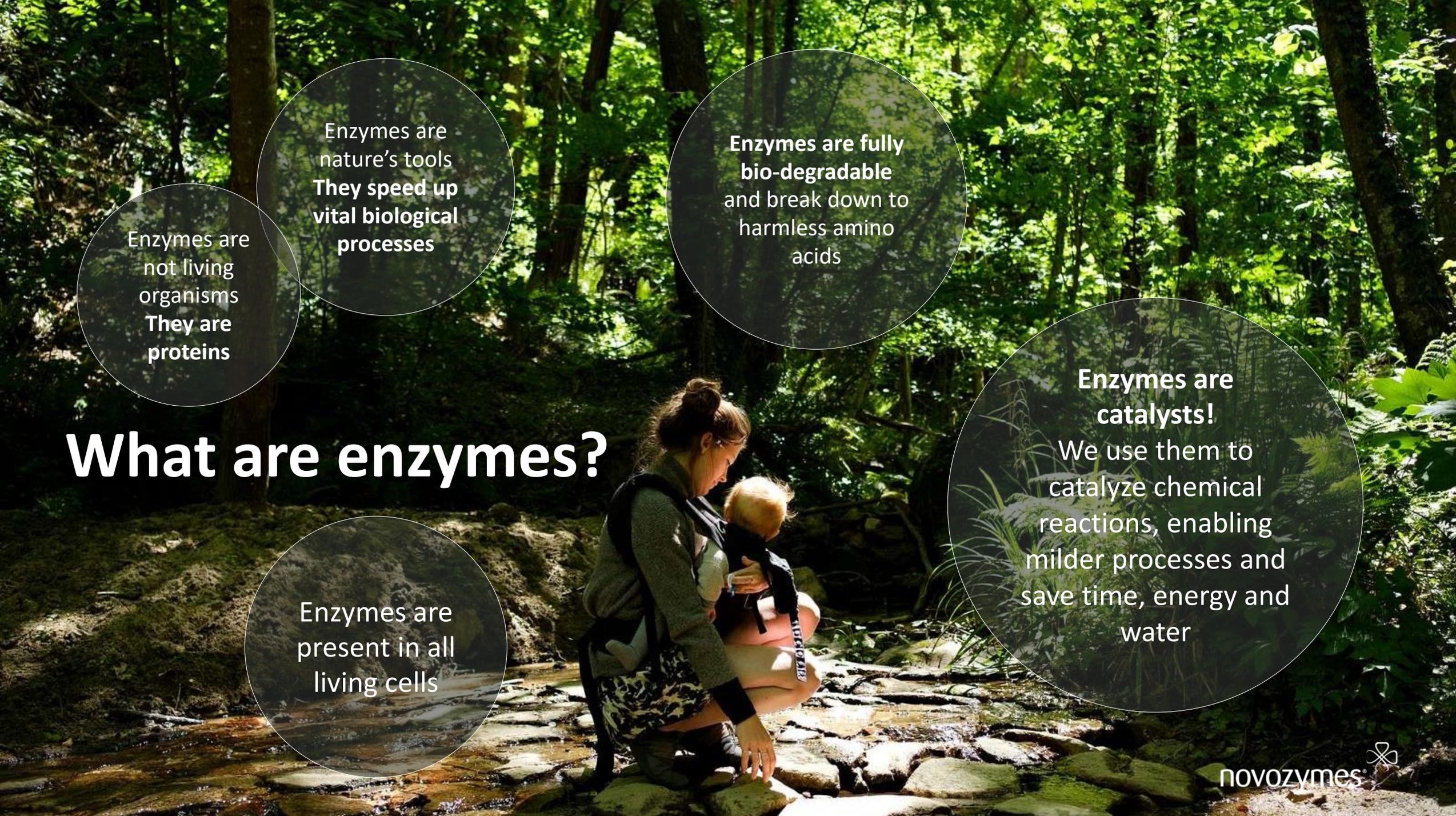




ULUDAG University Textile Engineering

May 8th, 2019



What are enzymes?

Enzymes are not living organisms
They are proteins

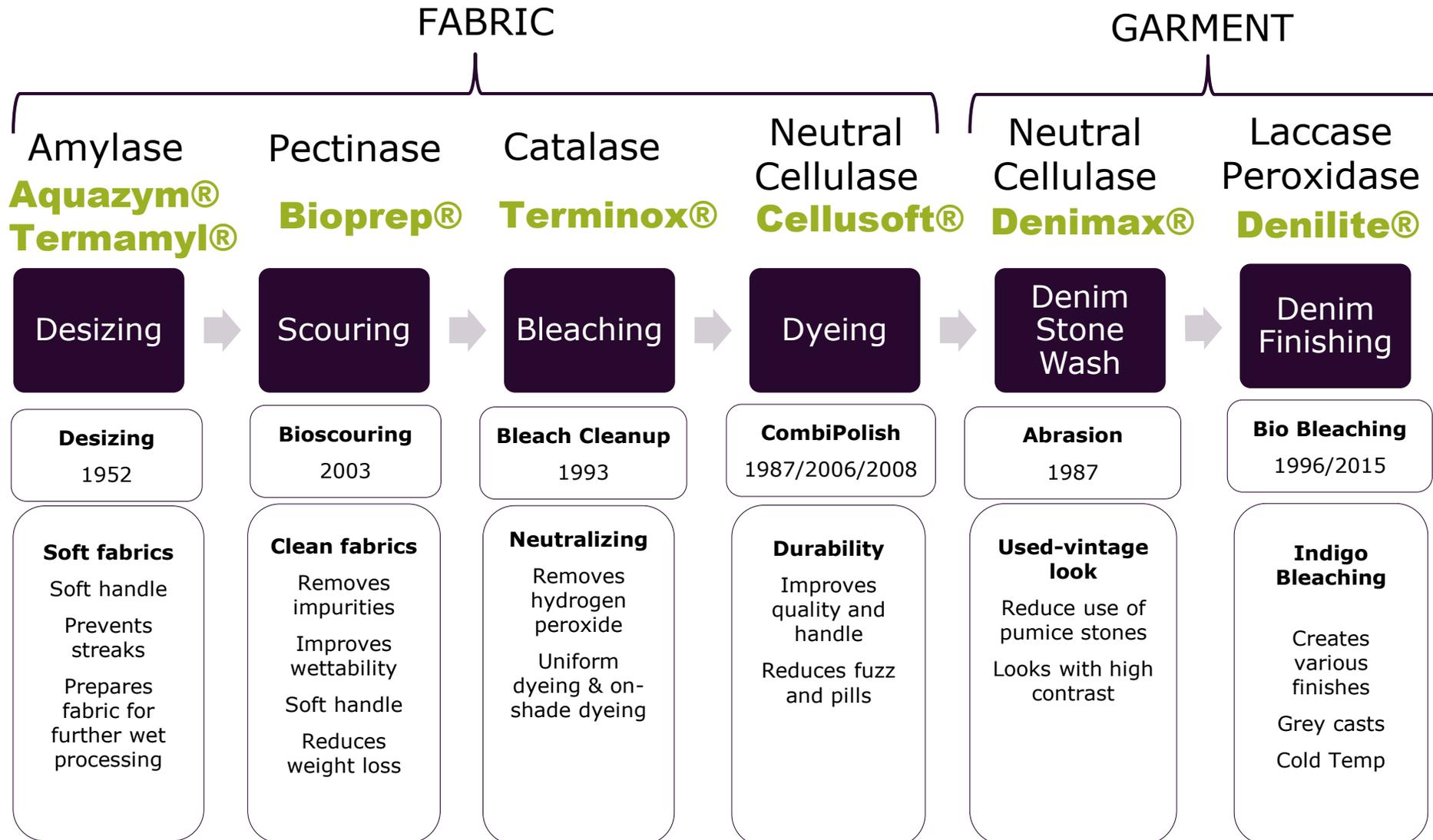
Enzymes are nature's tools
They speed up vital biological processes

Enzymes are fully bio-degradable and break down to harmless amino acids

Enzymes are catalysts!
We use them to catalyze chemical reactions, enabling milder processes and save time, energy and water

Enzymes are present in all living cells

Enzymes for textiles



New Textile Enzymes from Novozymes

- BioScouring: **Bioprep Fusion™**
- BioPolishing: **CombiPolish™ & Cellusoft LT**
- Desizing: **Aquazym AD™**
- Denim Abrasion: **Denimax Core™**
- Denim BioBleaching: **Denilite Cold™**



Enzymatic Scouring **Bioprep® Fusion**

What is BioScouring?

Bioscouring is a pre-treatment of fabric to obtain an even dyeing result



Even dyeing is dependent on efficient wax removal



Efficient wax removal is dependent on efficient pectin removal, as pectin acts like the 'glue' that binds the wax to the fiber



BioScouring removes pectin and wax



BioScouring is **more sustainable alternative** to conventional alkaline scouring



Why BioScouring ?

BioScouring is a 1 bath process, whereas conventional alkaline scouring requires 3 baths

@ Pre-treatment up to:



67% water



50% time



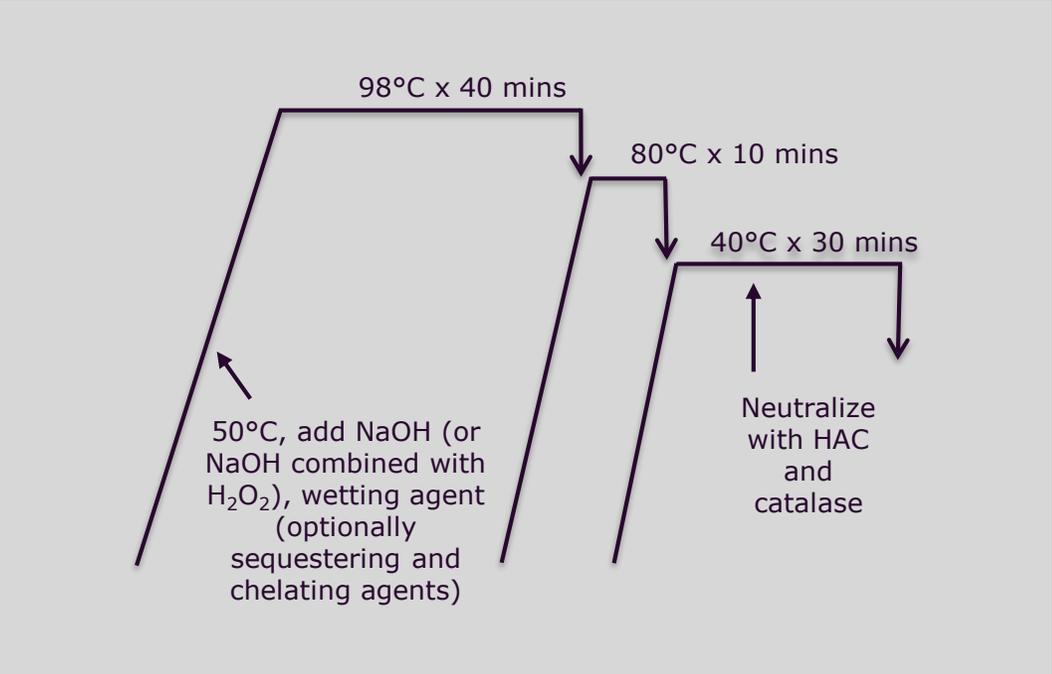
50% energy

Additional benefits

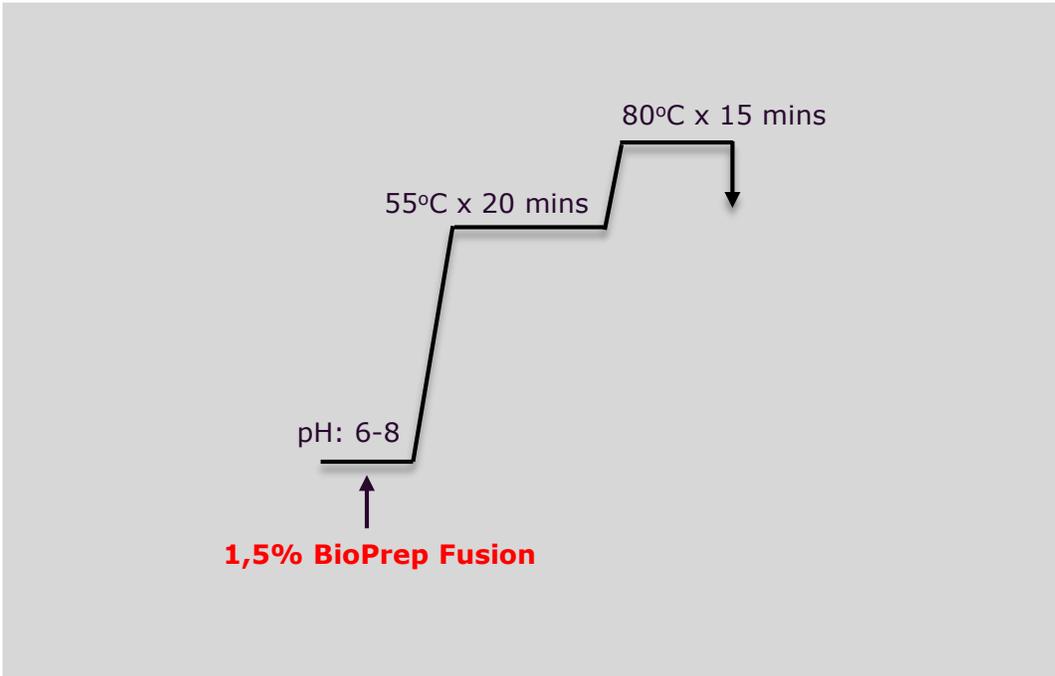
- Softer hand feel (permanent)
- Less weight (1% lower) and strength lose
- Less effluent and reduced COD
- No ph adjustment, no salt deposition

Bioscouring reduces 3 baths to 1 bath at lower temperatures

Conventional alkaline scouring or combined scouring and bleaching: 3 baths



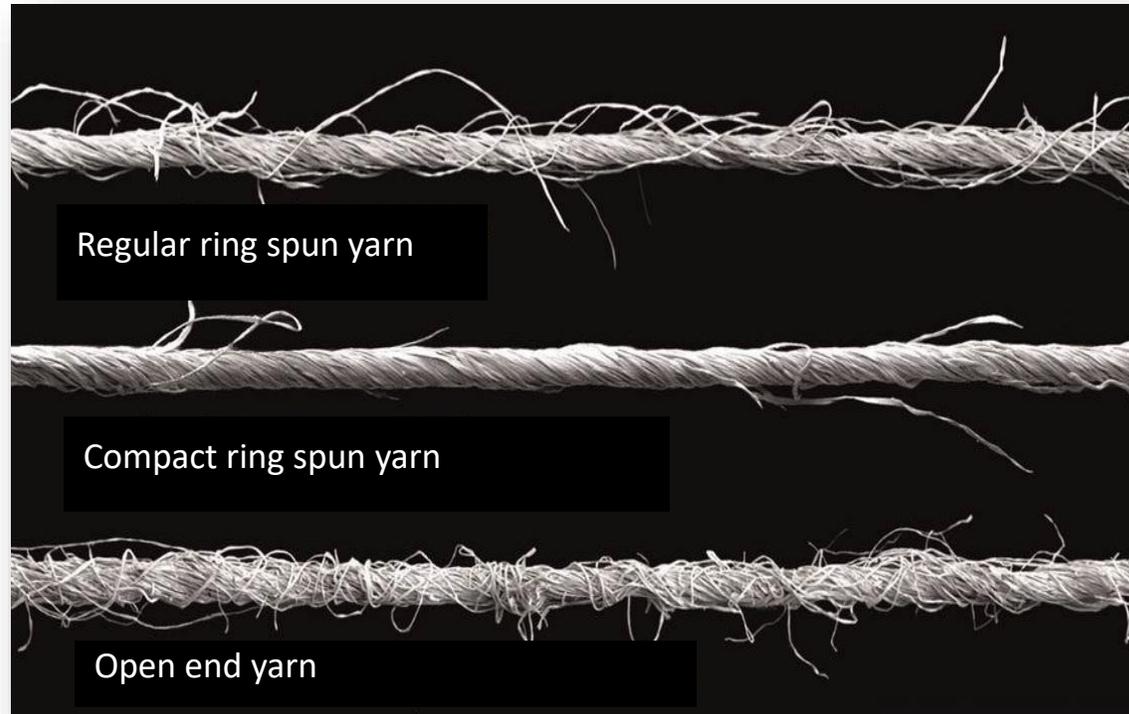
Bioscouring: 1 bath



What is biopolishing?

“An enzymatic treatment giving a durable fuzz and pill free surface with softer handle, keeping colors bright”

Cotton yarns and blended yarns have protruding fibers that cause pilling



The surface remains fuzz-free even after several home washes

New fabric



After wash and wear



Non-biopolished

Biopolished

What is CombiPolish™?

- CombiPolish™ is the most sustainable way of biopolishing
- Process optimisation invented and patented by Novozymes
- Biopolishing + Bleach clean up + Dyeing in one bath all together

CombiPolish™ saves up to 90 minutes and 2 baths compared to conventional biopolishing

Conventional method

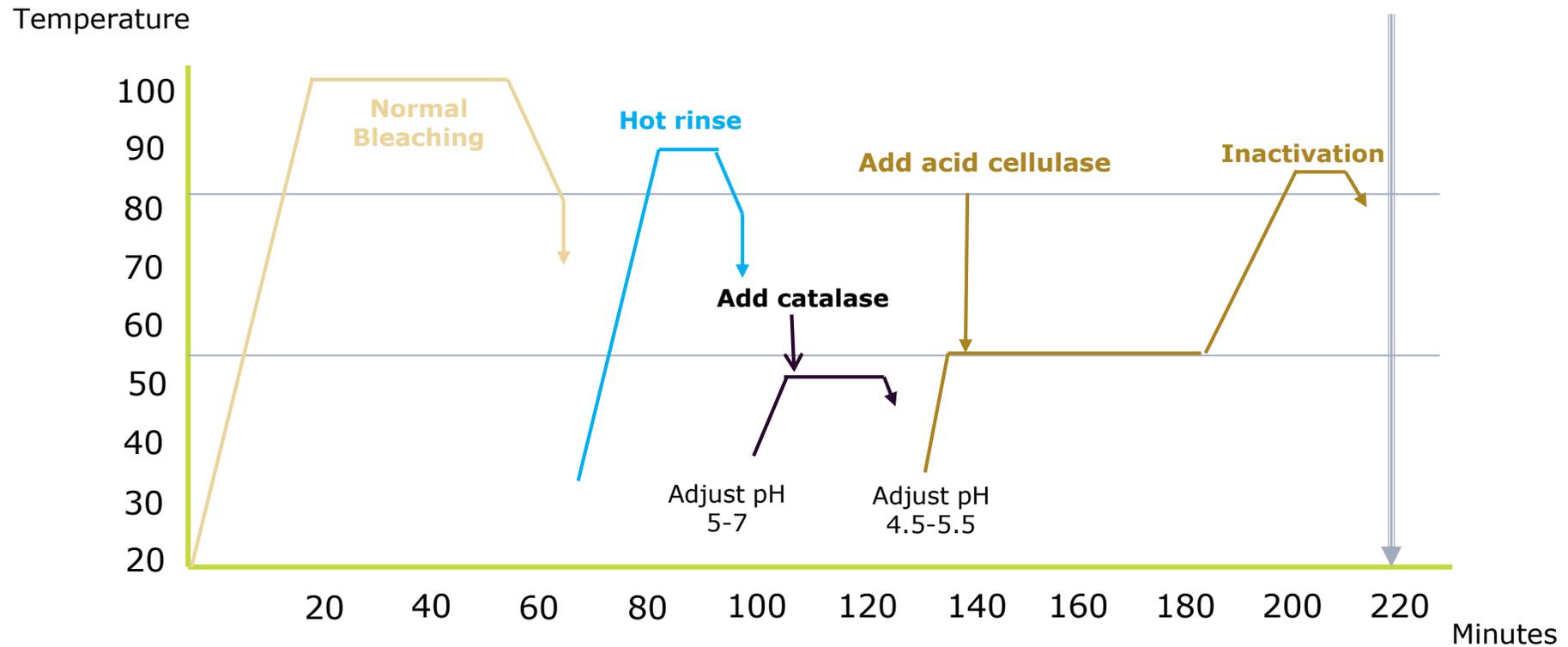


CombiPolish™

Patented by Novozymes

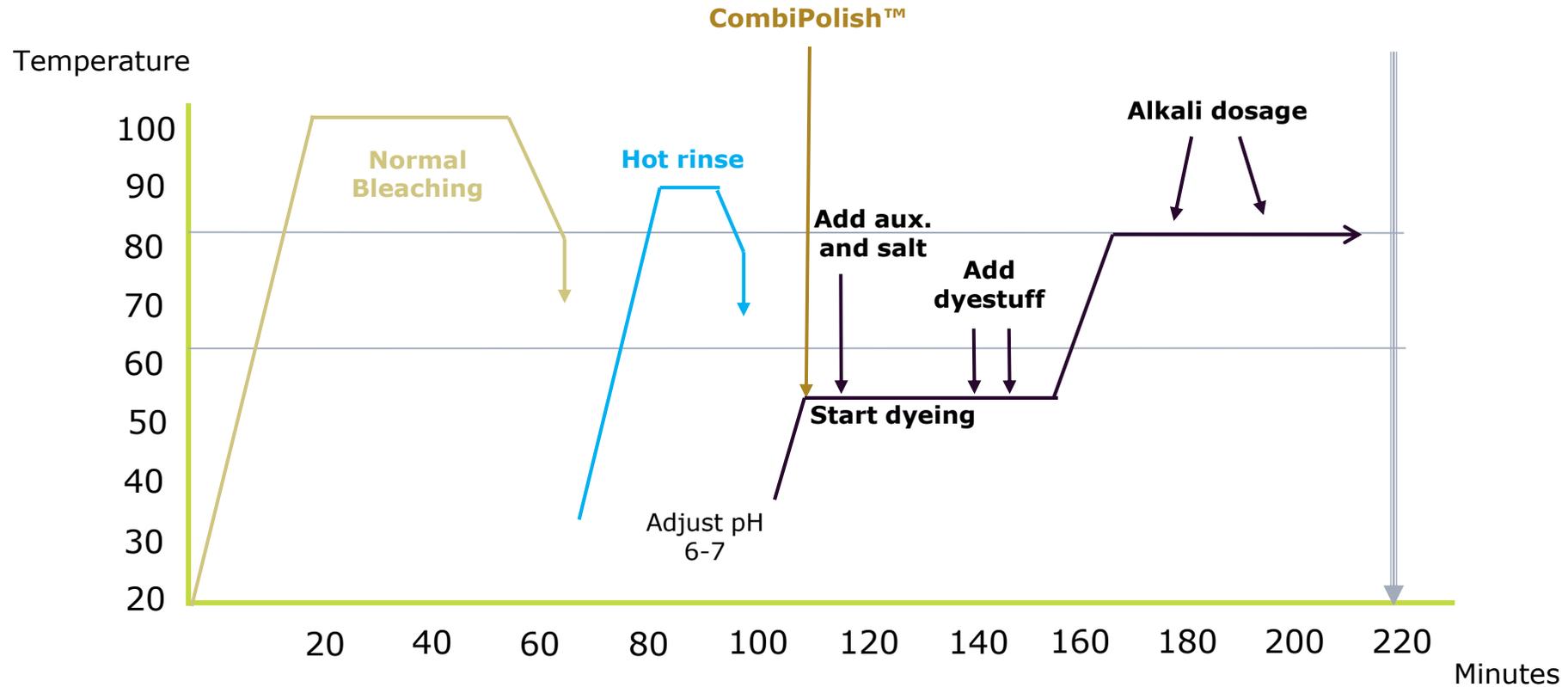


Acid biopolishing process



220 MINUTES IN TOTAL

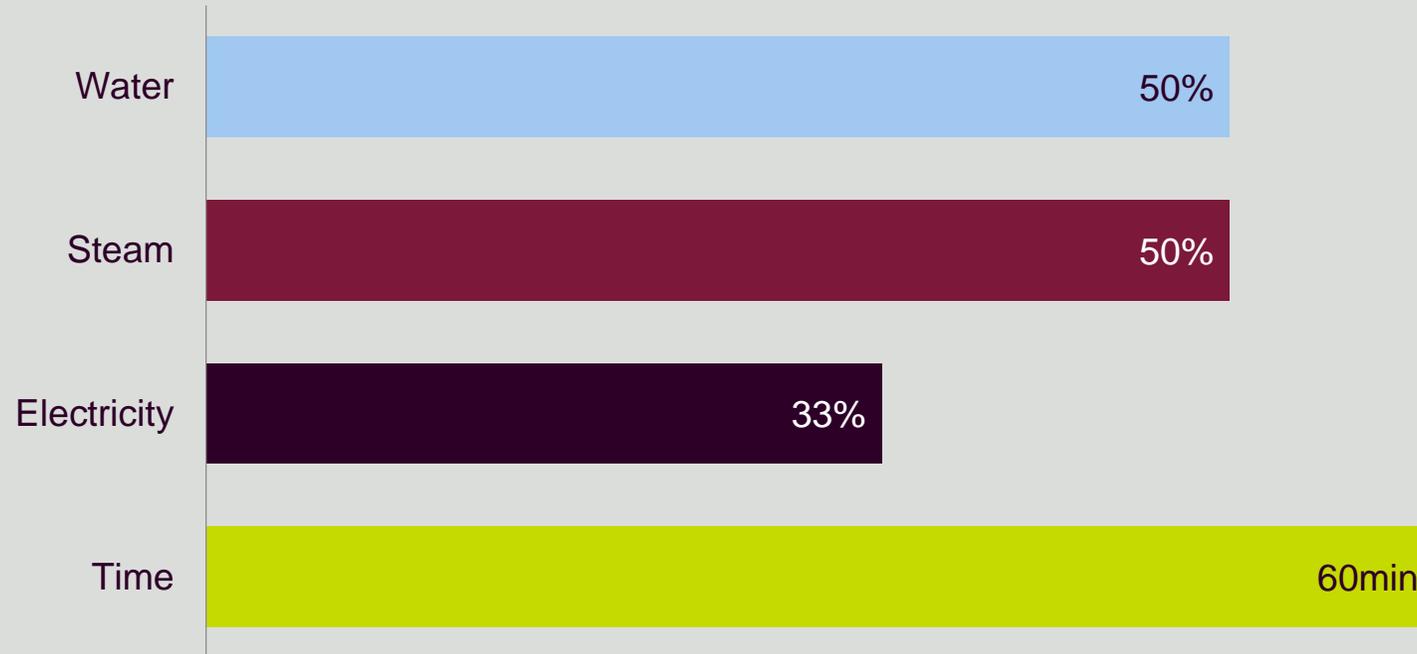
Novozymes' CombiPolish™ process



FROM 210 TO 105 MINUTES IN TOTAL

Increase in Sustainability foot print with CombiPolish®

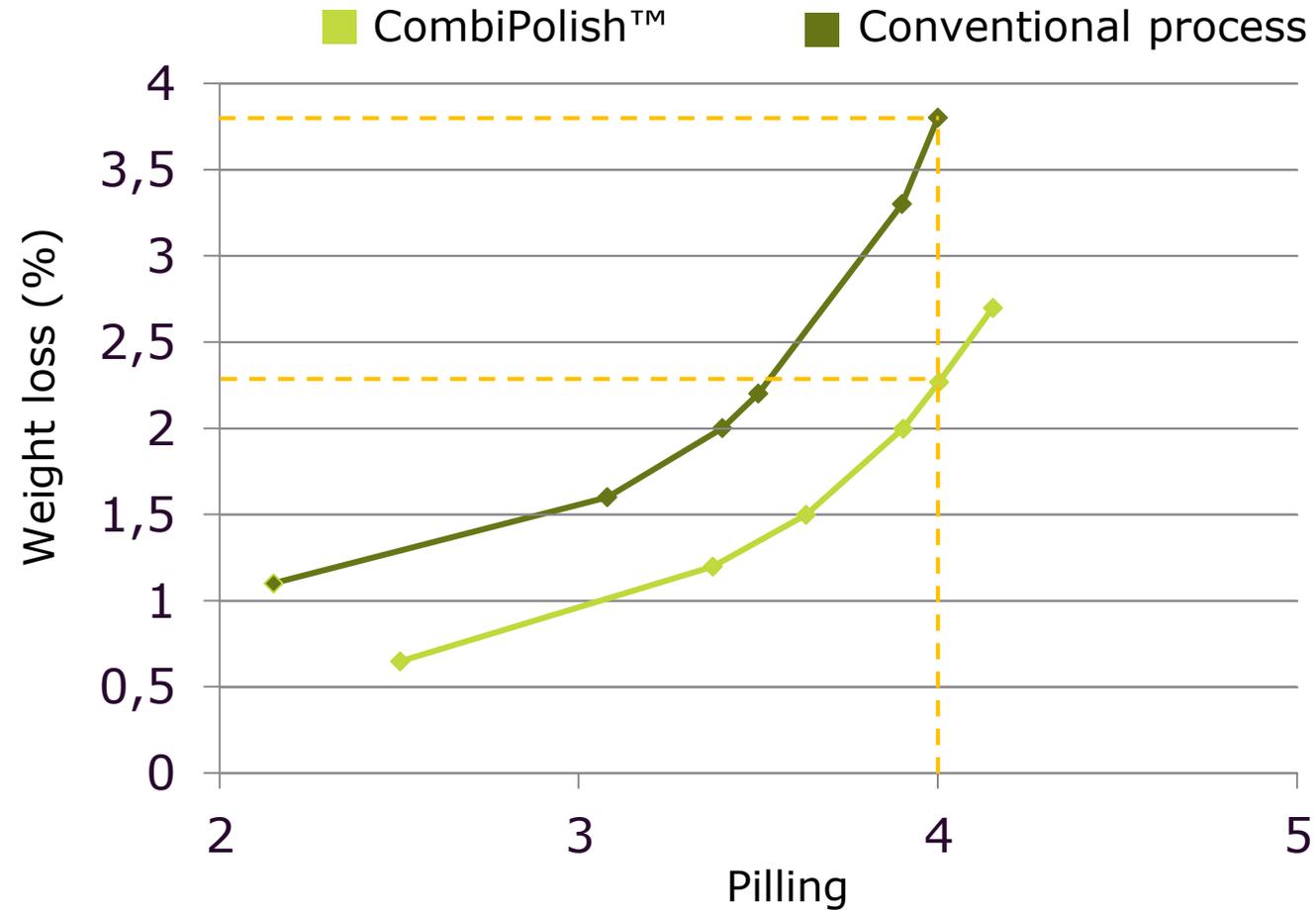
Savings vs. conventional bio polishing process:



*Savings on Bioploshing process

*Details based on the various trials conducted in DBL

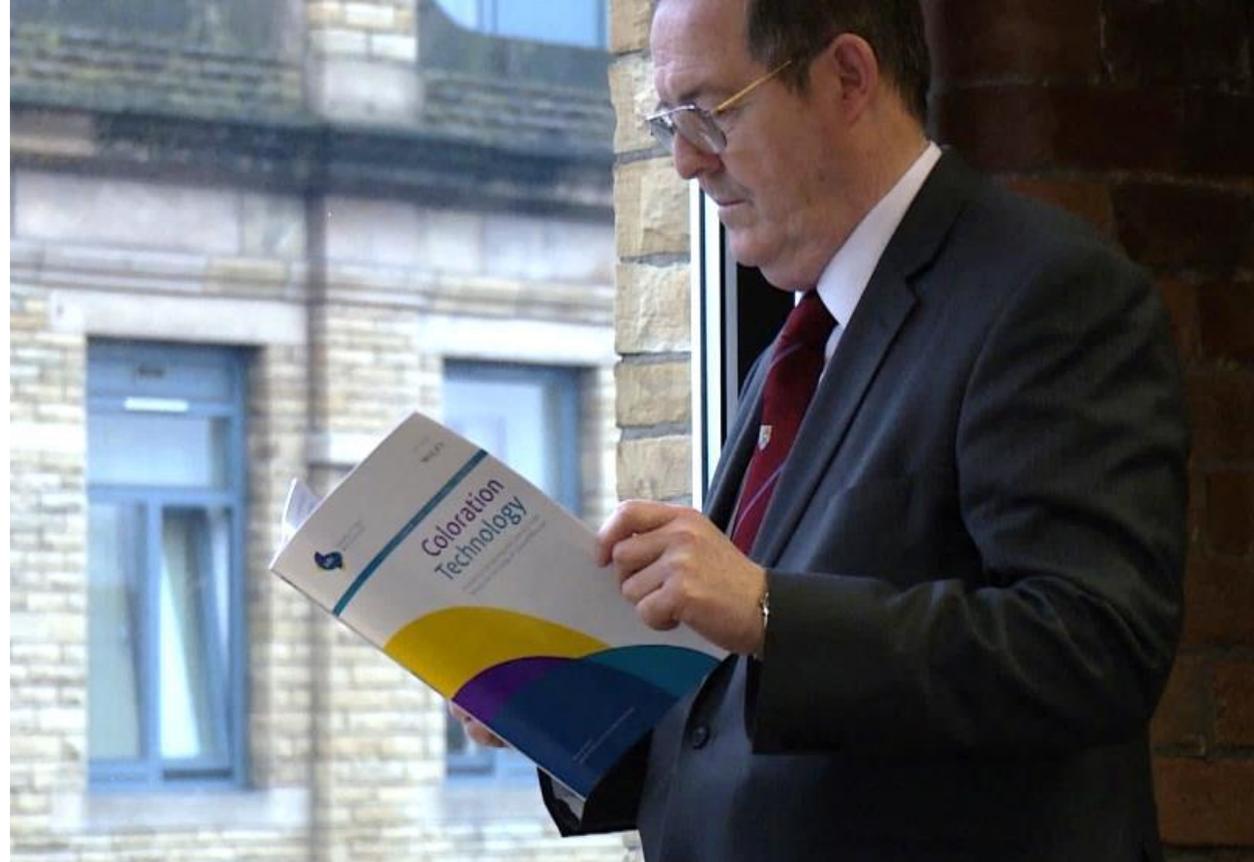
Up to 1.5% less weight loss with CombiPolish™



Case: Cambio Textile Mill in Bangladesh - *When the textile mill is selling by weight

Independent associations are recognizing CombiPolish® as best practice

- The CombiPolish® process received innovation awards from:
 - The Society of Dyers and Colourists
 - The Textile Institute
- Recognized as best practice by a number of independent textile organization – e.g. the China Knitting Industry Association, Partnership for Cleaner Textile (PaCT), Society of Dyers and Colourists

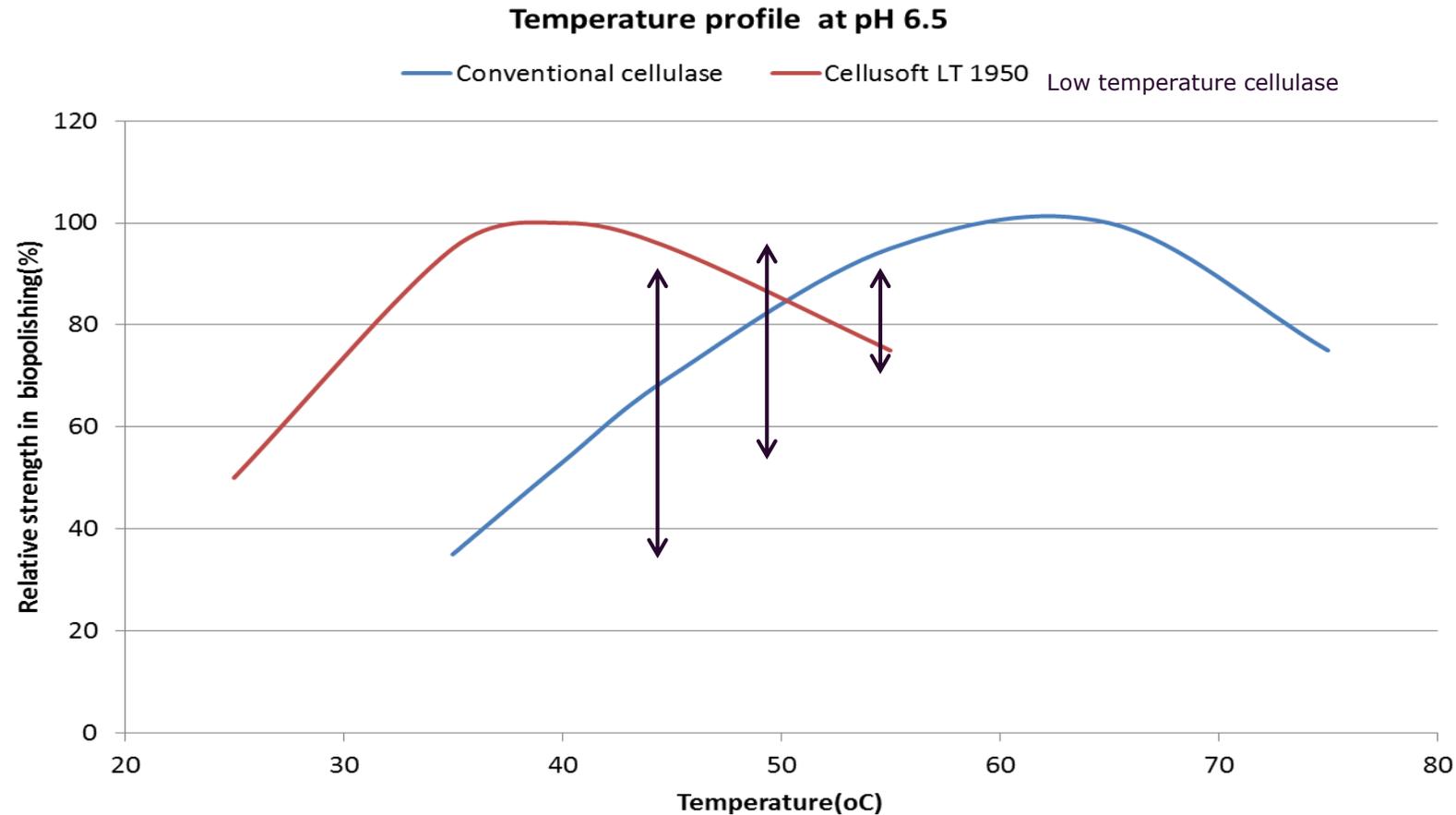


“This award is given to companies who have reached the pinnacle of achievement in textile dyeing and finishing”

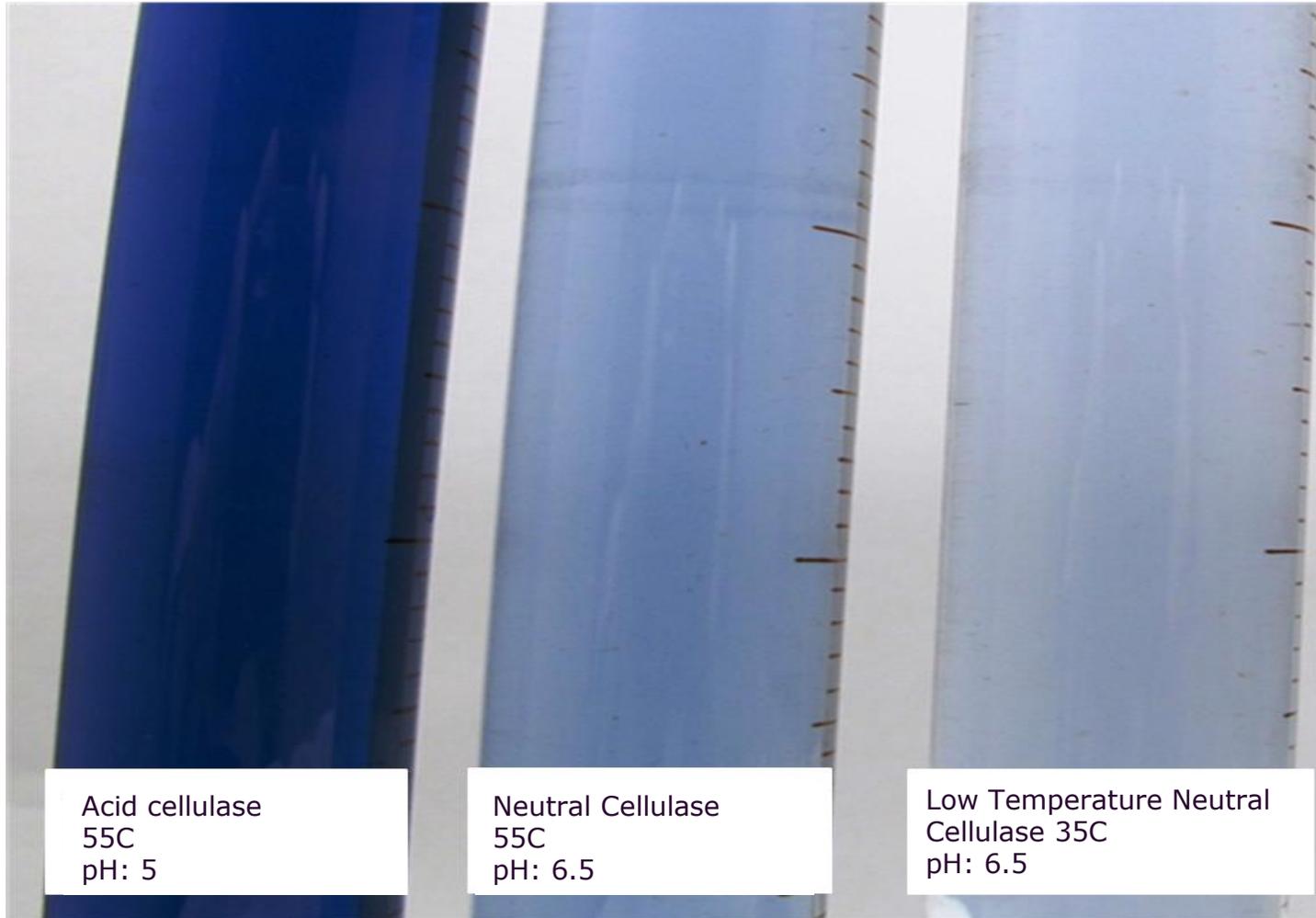
*Dr. Ian Holme
Chairman of the SDC Innovations Award committee*



Cellusoft LT → New True **L**ow **T**emp Cellulase

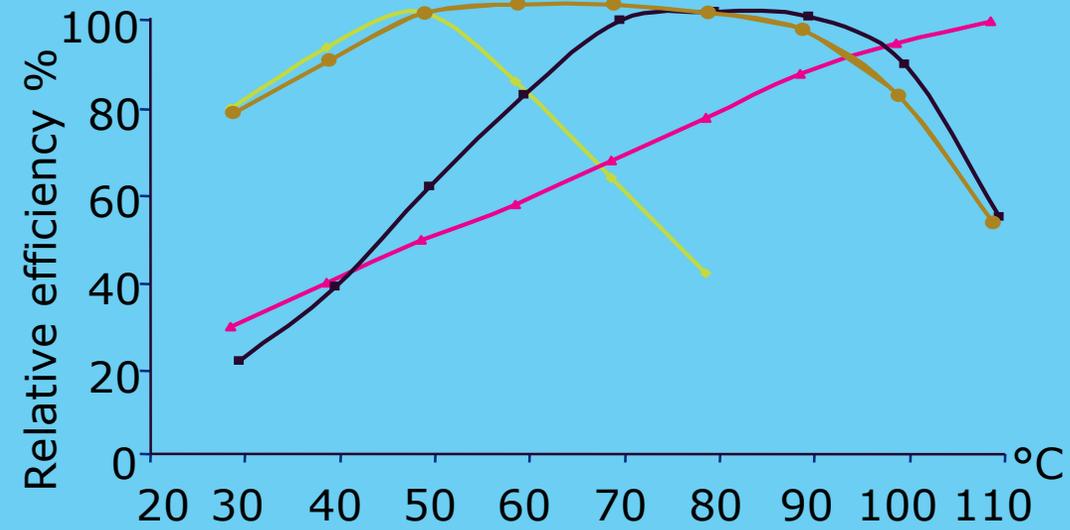


LESS COLOR PULL AT SAME PILLING RATE

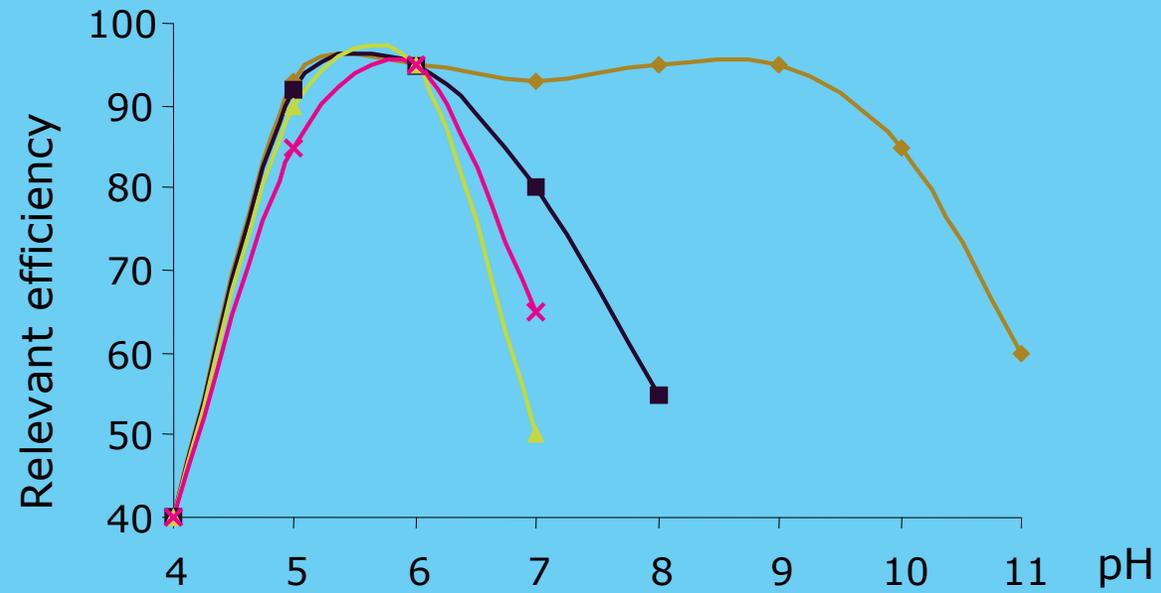


DESIZING

Temperature range of different amylases



pH range of different amylases



Aquazym AD

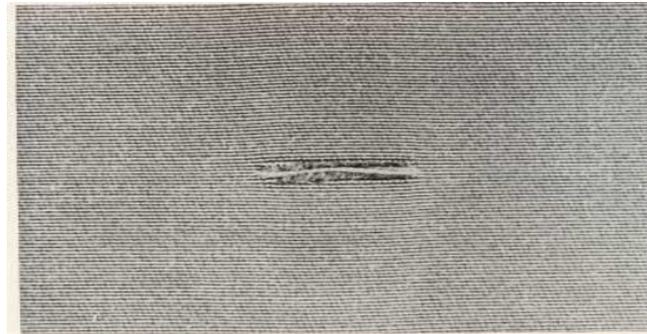
New Process & Amylase
Combined Demineralization &
Desizing

Background

– Risks of “pin holes” due to metals in bleaching...

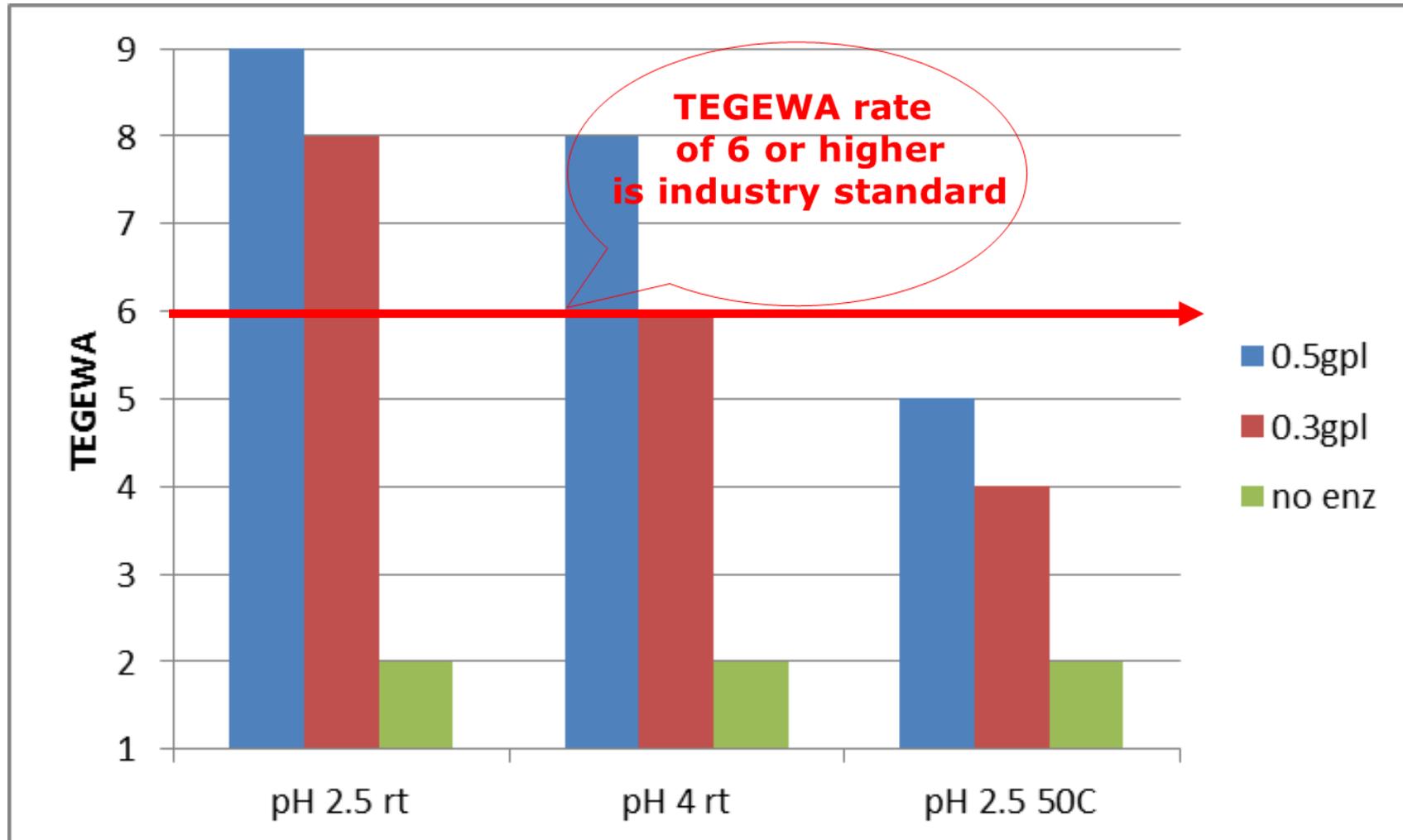
- Under alkaline conditions of peroxide bleaching, certain transition metals can decompose H_2O_2 very rapidly - 1 ppm of iron in dissolved form increases the rate of decomposition of H_2O_2 by 10x and generates very high temperatures resulting in so-called ‘pin holes’.

Mineral composition of cellulosic textile fibres			
in ppm	Ca	Mg	Fe
Cotton Egypt	425	352	29
Cotton Turkey	910	485	63
Cotton China	514	502	68
Cotton Pakistan	550	480	65
Cotton India	625	580	55
Cotton Brazil (GO)	1024	625	238
Cotton Brazil (MS)	2425	1085	208
Cotton USA	728	352	71
Linen from Normandy	3412	328	92



Tendering in bleaching due to presence of iron
(Reference: Fabric Defects, J.B.Goldberg 1950)

Aquazym AD performance (TEGEWA rating): Best performance at room temperature...



Application Guidelines for pad batch

pH	Optimal Temperature	Comments
2.5 – 5.0	20 – 50°C	<p>If pH is < 3.5 work at room temperature only. Avoid temperatures above 60°C.</p> <p>If pH is < 2.5, dosage needs to be increased by factor 2-3</p>

Dwell Time	:	2 - 4 hours
Aquazym AD dosage	:	0.2 – 0.5 g/L
Oxalic Acid	:	3.0 – 10.0 g/l
Wetting agent (Non ionic)	:	1.0 - 3.0 g/L
Sequestrant	:	Can be used



Denimax® Core

Worry-free fashion creation



What's new?

Conventional



Prewash/Desizing



Rinse



Abrasion



Rinse

Denimax® Core



Abrasion with no prewash



Rinse

Fig. 1. Abrasion with Novozymes Denimax® Core vs. conventional prewash and abrasion.

Environmental assessment

Denimax™ Core saves time, energy, and water

50% water

50% heat

15% for electricity

Replaces chemicals and pumice stones, meaning

lower environmental impact in effluent

fewer strains on equipment and occupational safety

Potential consumption savings with Denimax™ Core

Heat: 3400 MJ

Electricity: 18 kWh

Water: 30 ton

Auxiliaries : 20 kg

Data per ton fabric

Reference: Novozymes Environmental Assessment of Denimax™ Core with reference to Life Cycle Assessment of “Elemental Textiles”

29

Conventional



Prewash



Rinse



Abrasion



Rinse

Denimax® Core



Abrasion with no prewash

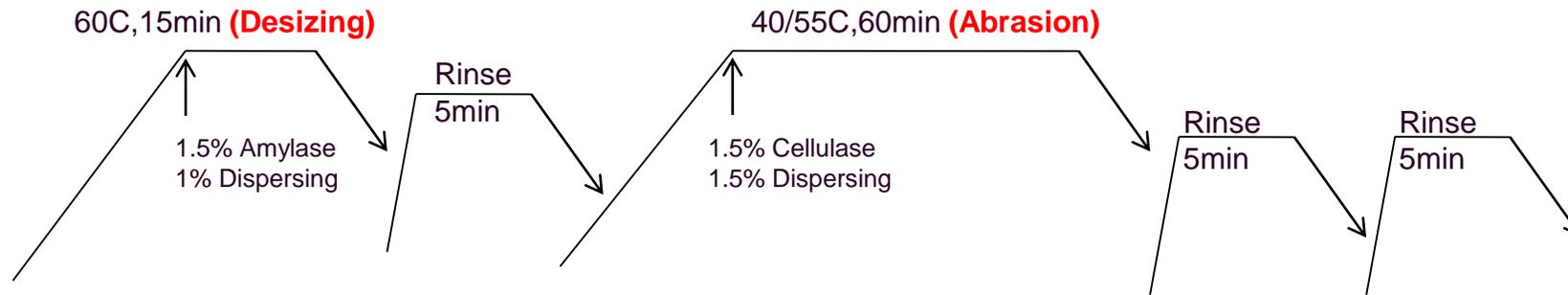


Rinse

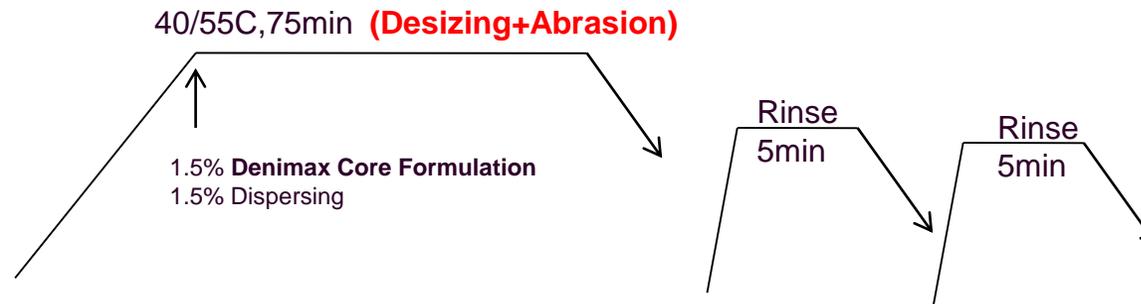
Fig. 1. Abrasion with Novozymes Denimax® Core vs. conventional prewash and abrasion.

General Washing protocol

Conventional



New BioWash Combined process with Denimax™ Core



Comparison in standard time (60' of abrasion)

Process	Time in minutes (with one rinse after prewash or desizing)	Water (lts)	Results compare with one rinse process	
			Abrasion	Backstaining
Conventional process in Belly washer	90	6000	++	++
Denimax Core Process in belly washer	85	3000	+++	+++
Conventional process in front Loader	90	3000	++	++
Denimax Core process in front loader	85	1500	+++	+++



Biowash process with Denimax® Core



Conventional process with classical enzymes

DENILITE® COLD



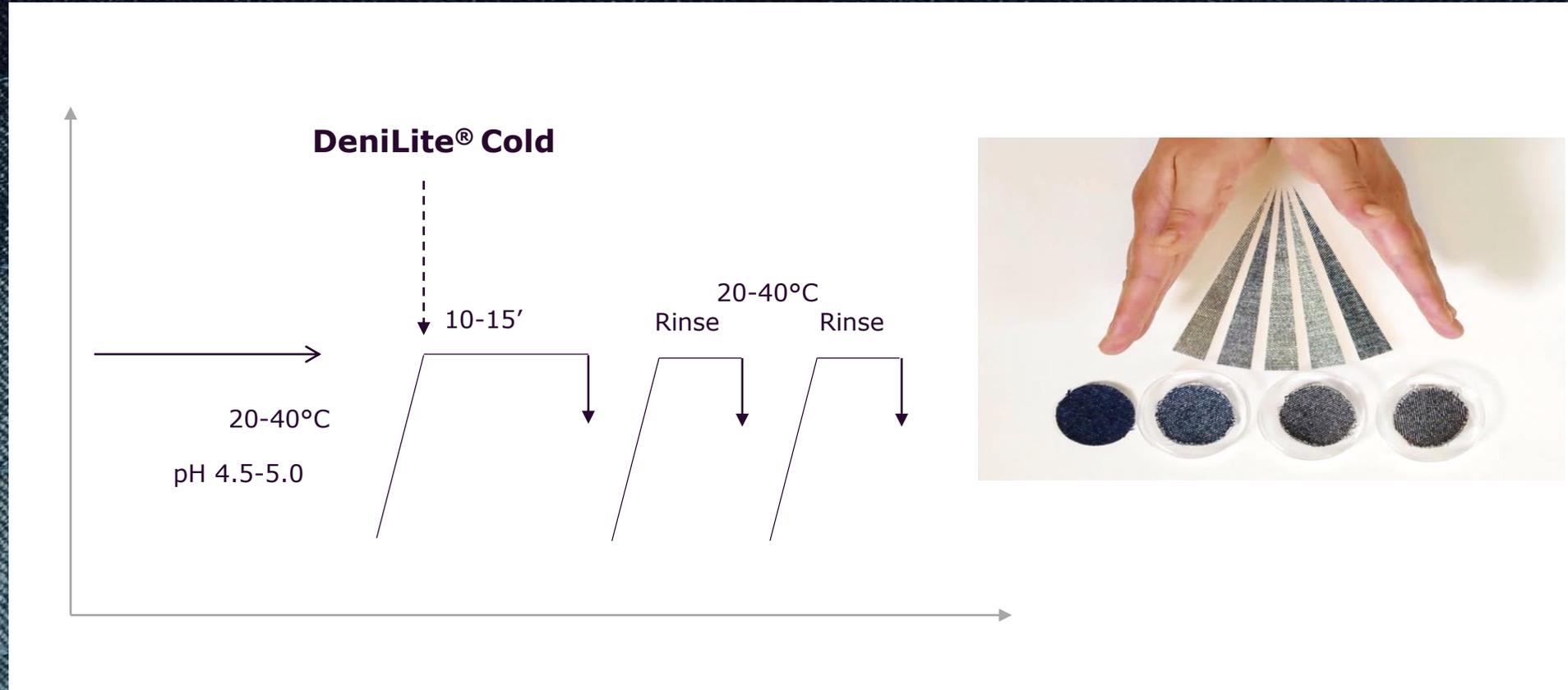


NOVOZYMES DENILITE® COLD
COOL NEW LOOKS WITH COLD AND FAST BLEACHING

novozymes 
Rethink Tomorrow



A COOL NEW SOLUTION FOR A **FASTER,** **EASIER** AND **SAFER** PROCESS



COOL NEW LOOKS THANKS TO
COLD AND **FAST** BLEACHING

Video

Reason to believe for DeniSafe + POX

3 main pains in Denim Industry today



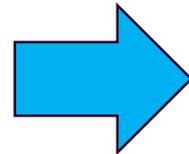
Huge amount of water consumption
>100 liters/jean



Hazardous chemical bleaching agents
(PP and Hypo)



Sludge formation due to pumice stone



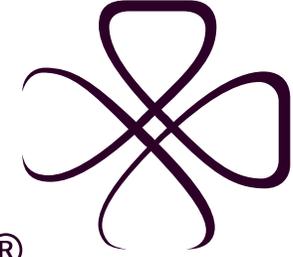
Solution with DeniSafe + POX

- 11liter/jean → **90%** water saving
- Neither PP nor Hypo.
- Friendly with Cotton and Lycra
- No / less sludge formation

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novozymes[®]



Rethink Tomorrow