

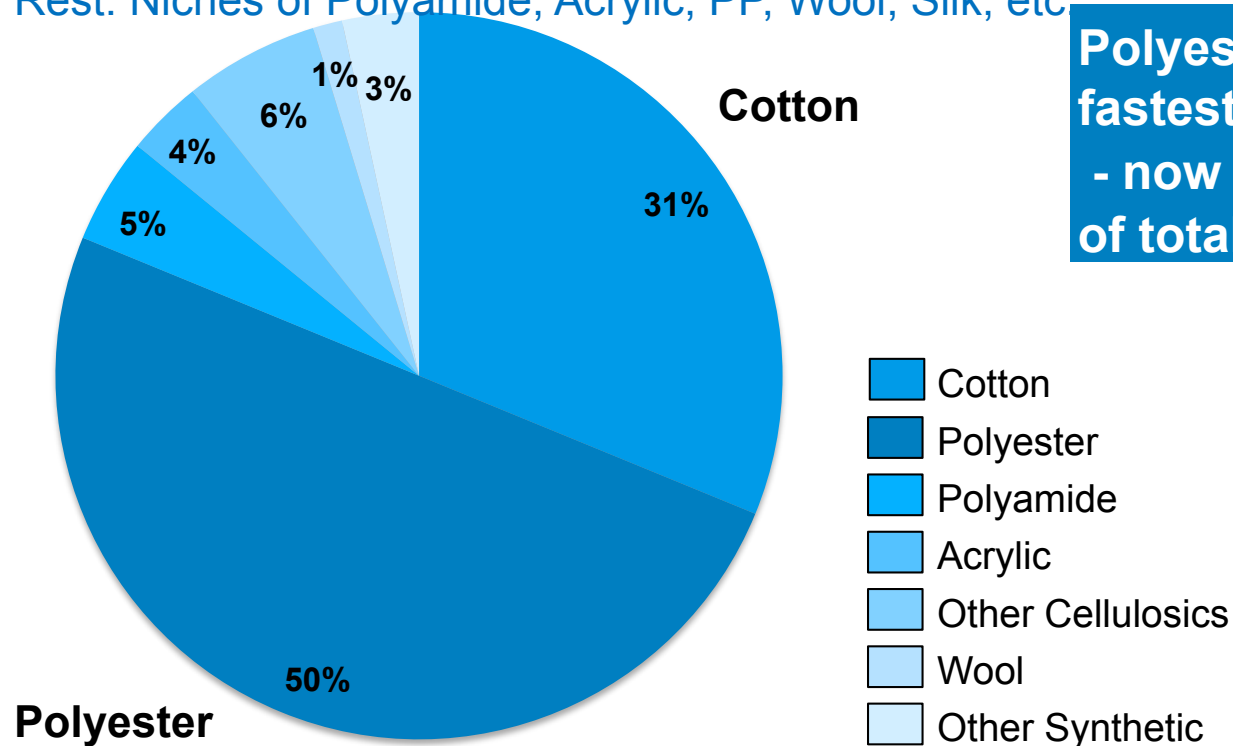
COMO 2014: STRATEGIES TO PROMOTE THE SUSTAINABLE GROWING OF PRINTED PES



Global fiber production 2012 (Total 83.0m. tonnes)

Polyester & Cellulosic cover almost 87% of total fiber production

Rest: Niches of Polyamide, Acrylic, PP, Wool, Silk, etc

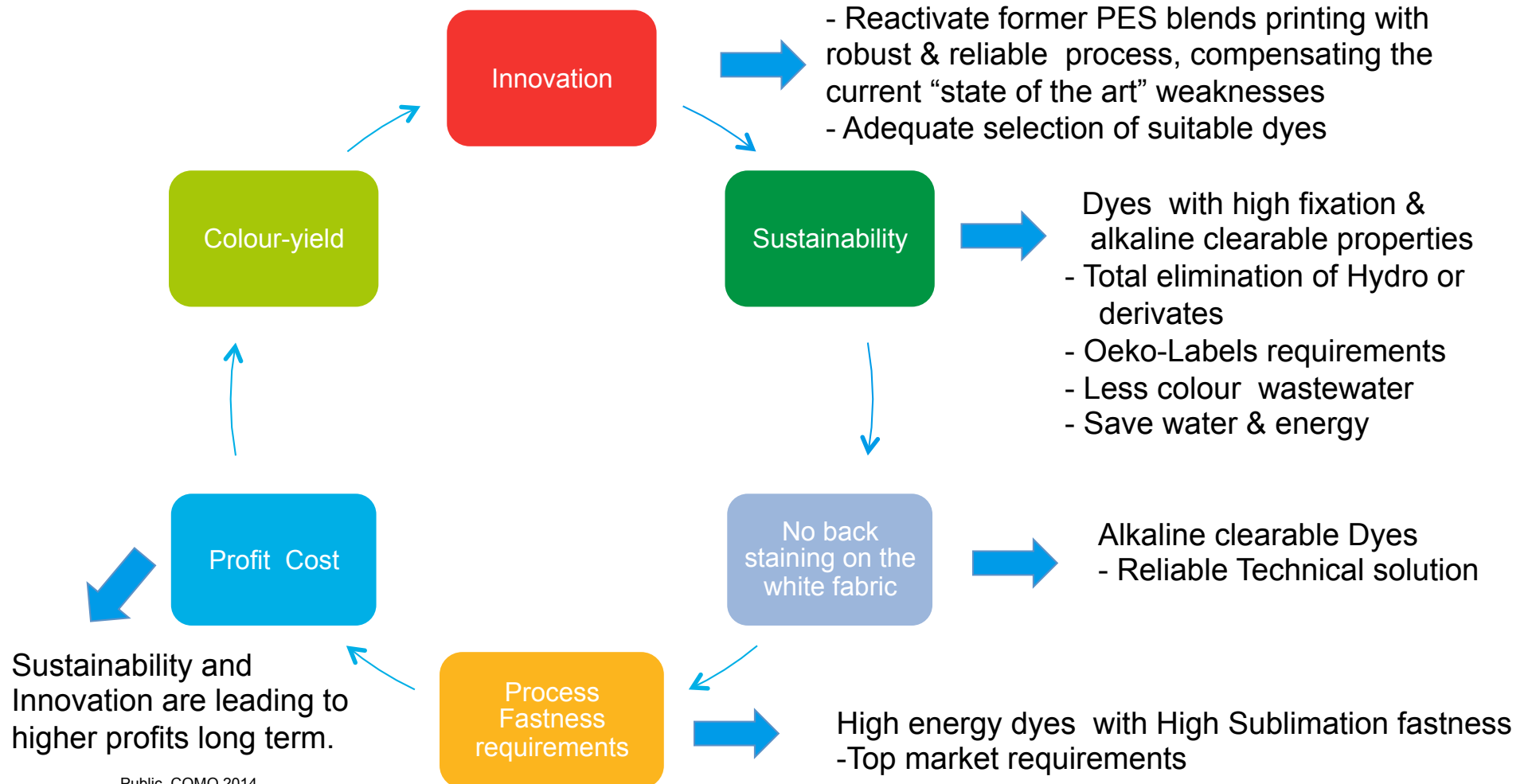


Polyester:
fastest growing, major fiber
- now crossed 50%
of total consumption

Main printing requirements for polyester & polyester blends

	PES	PES micro	PES/EL 97/3	PES/EL 50/50	PES/EL/CEL 55/5/40	PES/CEL 50/50
<i>Sublimation</i>	OK	OK	OK	Pre-trials needed	NO	NO
<i>Ink-Jet</i>	OK	OK	OK	Pre-trials needed	NO	NO
<u>Traditional printing</u>						
Pigments	OK (TEXTILE HOME) Limited	OK (SWIMWEAR) Limited	OK	NO	NO	NO
Disperse	OK	OK	OK	OK	NO (only PES part)	NO (HomeTextile only PES part)
Disperse/Reactive	-	-	-	-	OK	OK
Disperse/Vat	-	-	-	-	OK	OK

Archroma's challenges to the main requirements in the traditional PES printing



Reducing clearing issues

Ecological & safety issues	HYDROSULPHITE clearing bath	Alkali clearing
Storage and handling	Flammable and harmful	Safe
Air pollution	Can liberate toxic gases in contact with acids	Safe
Water pollution-toxic products coming from the used chemicals	Sulphites /Sulphates / Conductivity increase	Only pH
Water pollution COD	Very High	No additional
Product appearance	Powder Dust is toxic, irritant and corrosive	-----
Dosing	Complicated, difficult control, high consumption	Easy , pumpable for liquids
Cost	Around 20-25% over total cost on the printing formulation	More economical

Hydro COD + Regulation + Sulphites + Sulphates

Sodium Hydrosulphite:

Direct Financial impact: 10-15 tons/ 1 million linear meter → 20 – 30.000 €

The third most important product in cost in the PES printing formulation after the thickeners & dyes.

	tons	Price	Total €
Disperse dyes liq	5	5.5	27500
Vegetable thickener	14	2.5	35000
Acid donor	2	2	4000
Accelerant	2	3	6000
Washing off agents	10	1.5	15000
Hydrosulphite	15	2	30000
Total			117500

Ecological impact:

COD : Significantly Increase by oxidation because of sulphites+ sulphates content

Conductivity: Significantly Increase

Currently there is a no good solution to eliminate salts content on the wastewater

Reverse osmosis: Provoking reduction of the total salts amount.

Residual only can be dumping at sea: No sustainability solution in cost

Residual evaporation & crystallization: No sustainability in cost

Clearing Behaviour on PES/EL 97/3

Design with 70% cover 30% white fabric	DI.R. 167:1			Foron® Rubine S-WF		
Molecular Weight	505.9			526.5		
Standard disperse recipe 4 x SD 1/1	30 g/kg	30 g/kg	30 g/kg	30 g/kg	30 g/kg	30 g/kg
Fixation	HTS: 7 min. 175°C	HTS: 7 min. 175°C	HTS: 7 min. 175°C	HTS: 7 min. 175°C	HTS: 7 min. 175°C	HTS: 7 min. 175°C
Reductive clearing 2x 75°C , 5 min LR 30:1	No	4 cc/l Caustic soda 48°Bé 2 cc/l Hydro	4 cc/l Caustic soda 48°Bé	No	4 cc/l Caustic soda 48°Bé 2 cc/l Hydro	4 cc/l Caustic soda 48°Bé
Backstaining on white PES/EL Grey Scale ISO 105 A04	2.5	4.6	2.7	4.2	4.9	4.9
Wetfastness ISO 105/C06 C2S, 60°C Staining on PA	1.7	1.9	1.3	2.7	3.7	3.9
Post setting 30 sec. 180°C	1.8	2,2	1,4	2.7	3.4	3.1

Influence of the clearing method on the Backstaining behaviour

PES/EL 97/3

Grey Scale ISO 105 A04

Reductive clearing
2x 75°C , 5 min
LR 30:1

4 x SD 1/1

30 g/kg DI.R. 167:1

30 g/kg Foron Rubine S-WF

No clearing



2.5

4.2



Caustic +Hydro



4.6

4.9



Caustic



2.7

4.9



Clearing methods on PES/EL 97/3

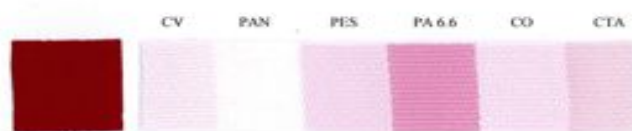
Domestic laundering ISO 105 C06 C1S, 60°C

Reductive clearing
2x 75°C , 5 min
LR 30:1

30 g/kg DR 167:1

30 g/kg Foron® Rubine S-WF

No reducing agent



Hydro + Caustic



Caustic



Post-setting 30 sec. at 180°C

No reducing agent



Hydro + Caustic



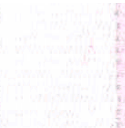
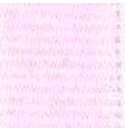
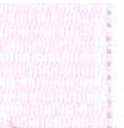
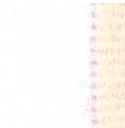
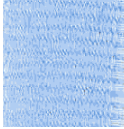
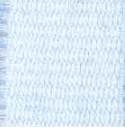
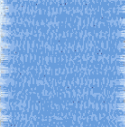
Caustic



Pad Thermosol Chemical Pad Steam Process Comparison Foron® S-WF to Foron® S

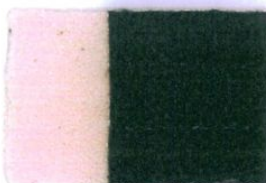
Material: PES/CO

Wash test : AATCC 2A , 49°C

CA	CO	PA 6.6	PES	PAN	WO	
						Foron® Rubine S-WF
3.8	4.6	3.6	4.2	4.7	4.4	
						D.R.167:1
3.7	4.8	2.6	4.5	4.6	4.2	
						Foron® Blue S-WF
4.5	4.8	4.3	4.6	4.7	4.6	
						D.BI .73
3.3	4.4	2.4	4.3	4.7	4.2	

Influence of clearing method on Backstaining behaviour Grey Scale ISO 105 A04

Reductive clearing
2x 75°C , 5 min
LR 30:1

Rating	8 x SD 1/1 PES/EL 97/3		6 x SD 1/1 PES Micro	Rating
	White Fabric		White Fabric	
4.8		60 g/kg Foron Black S-WF Clearing: Caustic		4.5
2.9		65 g/kg High-Energy Disper Black commodity Clearing: Caustic		3.1
4.4		65 g/kg High-Energy Disper Black commodity Clearing: Caustic + Hydro		4.7

Foron® S-WF/ Molecular engineering

- Under alkaline conditions (batching, steaming, washing off, domestic washing) the ester group is hydrolysed to form a water soluble dye anion (conversion from insoluble disperse dye to water soluble dye).
- The chromophore is stable but has no affinity to PES/PA/CA, therefore high wet fastness is achieved
- Hydrolysis occurs at a much faster rate than with the type of ester groups found in competition wet fast dyes, ensuring that high wash fastness is achieved, even under very difficult washing conditions.
- The aromatic end group of the dyestuff is determining for high sublimation fastness



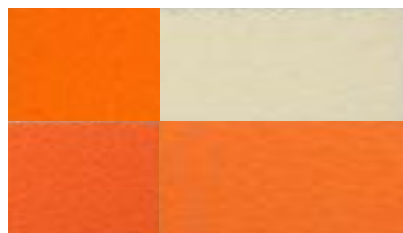
- 1. Easily clearable under alkaline conditions**
- 2. High sublimation fastness**
- 3. Low thermal migration**

Alkaline cleaning



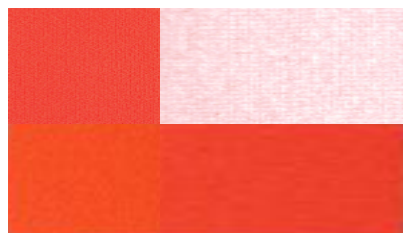
Foron®
Brill.Yellow S-WF

Foron®
Brill.Yellow S-6GL



Foron®
Golden Yellow S-WF

Foron®
Yellow Brown S-2RFL 150



Foron®
Scarlet S-WF

Foron®
Scarlet S-3GFL



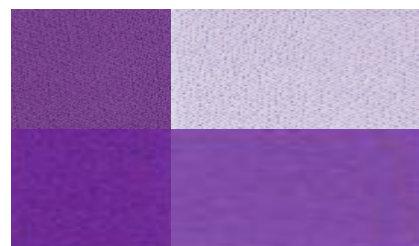
Foron®
Vermeillion S-WF

Foron®
Brill.Red S-RGL 200



Foron®
Rubine S-WF

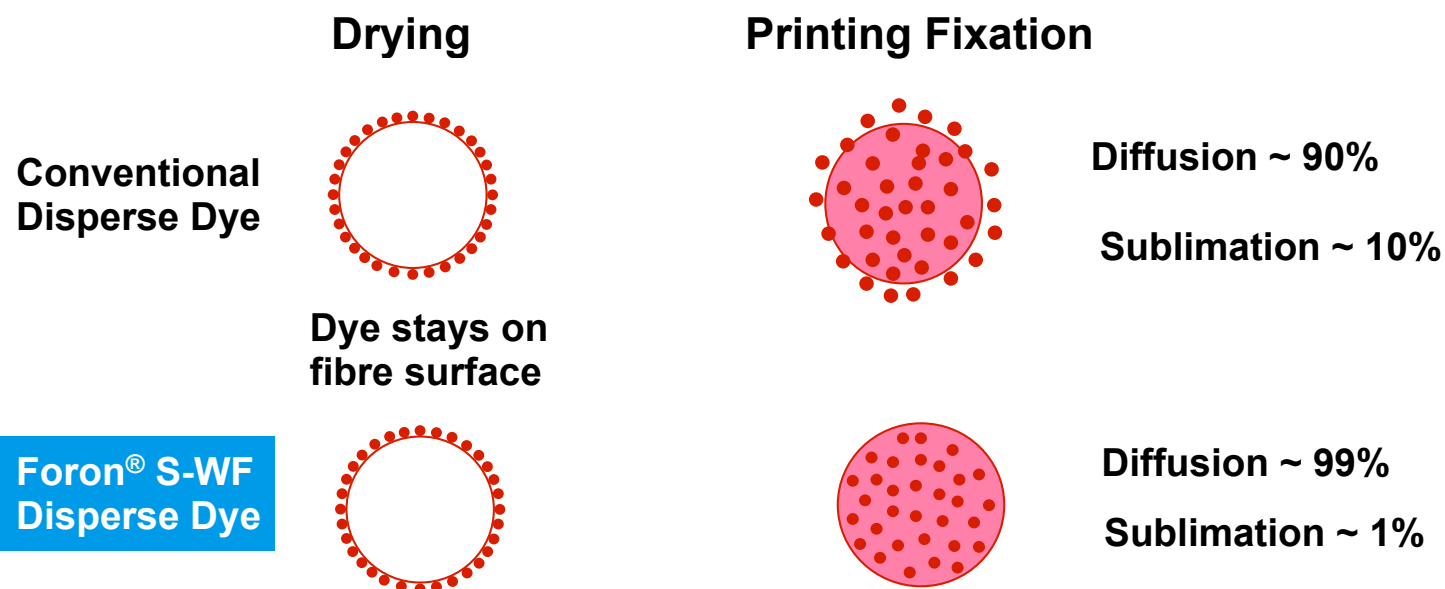
Foron®
Rubine S-2GFL 150



Foron®
Violet S-WF

Foron®
Brill.violet S-3RL 150

High Sublimation Fastness



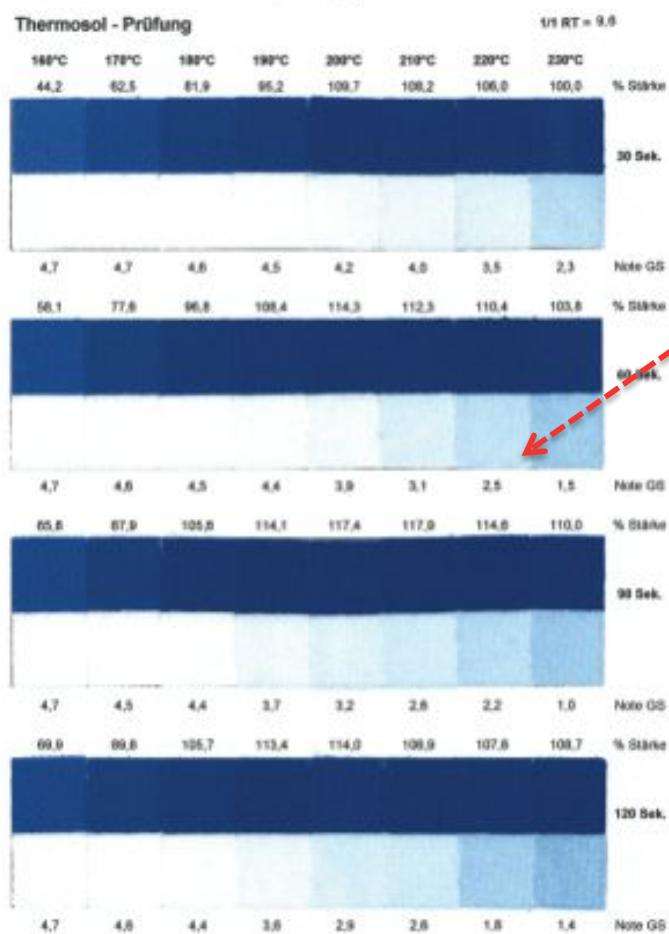
Approximately 99% of the Foron® S-WF dyestuff on the PES fibre surface, after the Printing Fixation process, diffuses into the interior of the fibre, whereas the average, commonly used, disperse dyes have a higher tendency to sublimation.

Advantages of Foron® S-WF dyes over conventional disperse dyes:

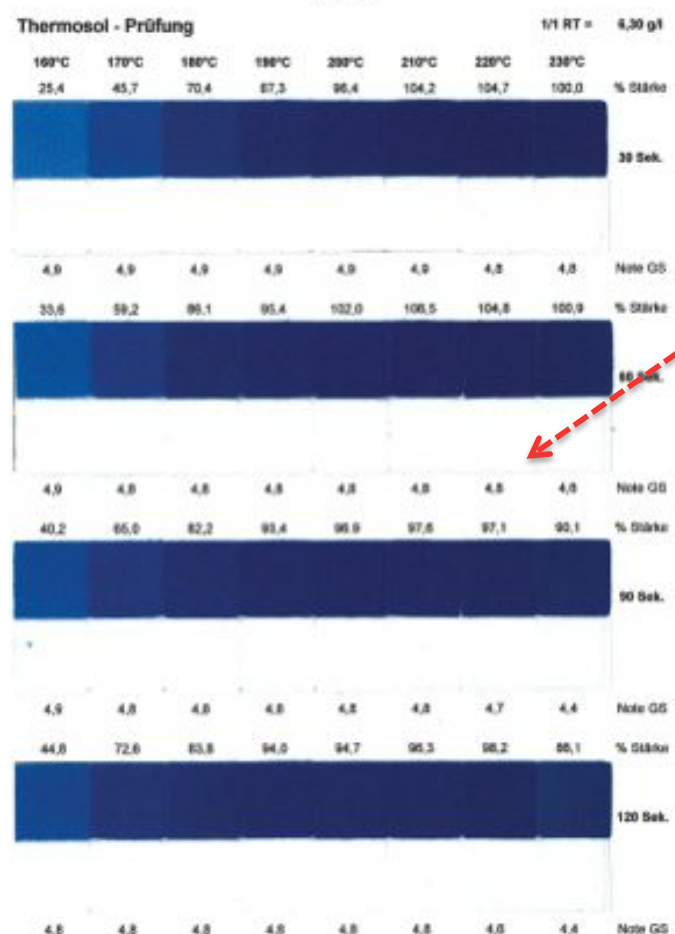
- Higher shade reproducibility
- Lower cotton staining
- Higher fastness level

Sublimation Behaviour

C.I. Disperse Blue 73

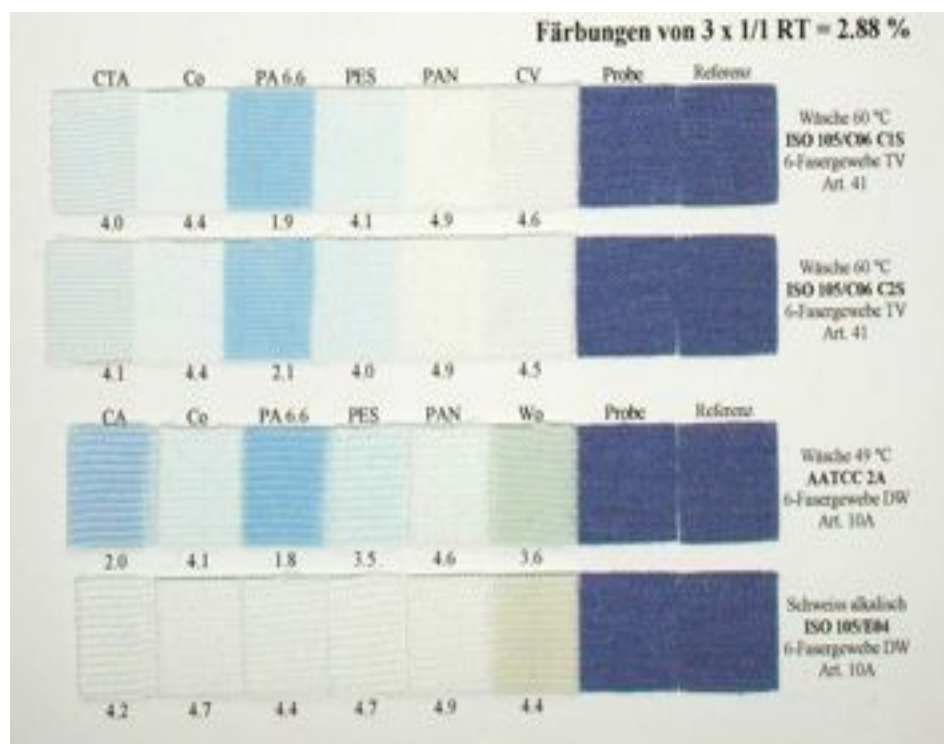


Foron® Blue S-WF

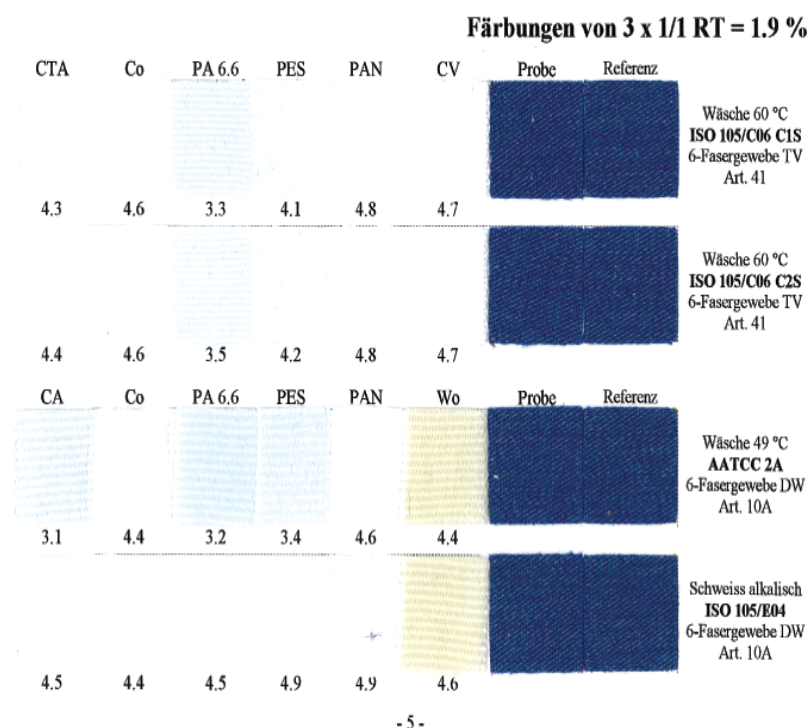


Thermal migration

D.BI 73



Foron® Blue S-WF



Foron® S-WF

	Brilliant Yellow S-WF		Cyanine S-WF
	Golden Yellow S-WF		Turquoise S-WF
	Orange S-WF		Blue S-WF
	Scarlet S-WF		Dark Blue S-WF
	Vermillion S-WF		Navy S-WF
	Red S-WF		Black S-WF
	Rubine S-WF		
	Violet S-WF		

- Suitable for High temperature steaming & thermofixation
- Very high sublimation fastness
- Low thermal migration (during post setting or finishing)
- Excellent fastness to washing & dry heat
- High colour strength and good build up
- No pre-dispersing necessary
- Very good dispersion stability (no agglomeration, no specks)
- No dusting
- Liquid form possible on demand
- **No back staining in the washing off process**
- **Low cotton staining**
- **Easy Clearable with alkaline only**
- **Suitable for natural & synthetic thickeners**

Foron® S-WF

Sustainability requirements

Product Name	Fixation rate Continuous (%)	AOX%	Oeko-tex	Inditex – RTM 2014	Zero Discharge	BlueSign
Foron® Blue S-WF	95	0.000	I-IV	A ; A ; A	√	YES
Foron® Brilliant Yellow S-WF	95	0.000	I-IV	A ; A ; A	√	YES
Foron® Cyanine S-WF	95	0.000	I-IV	A ; A ; A	√	YES
Foron® Red S-WF	95	0.000	I-IV	A ; A ; A	√	YES
Foron® Rubine S-WF	95	0.000	I-IV	A ; A ; A	√	YES
Foron® Turquoise S-WF	95	0.000	I-IV	A ; A ; A	√	YES
Foron® Vermillion S-WF	95	0.000	I-IV	A ; A ; A	√	YES

Printing on PES/Cellulose blends with disperse & reactive dyes

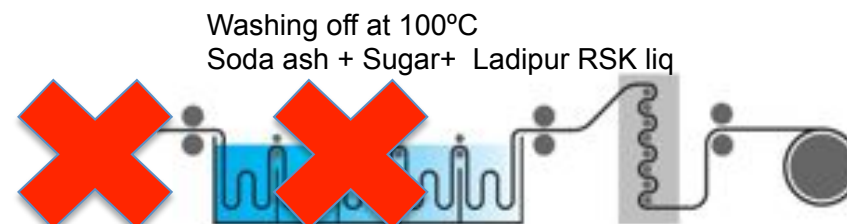
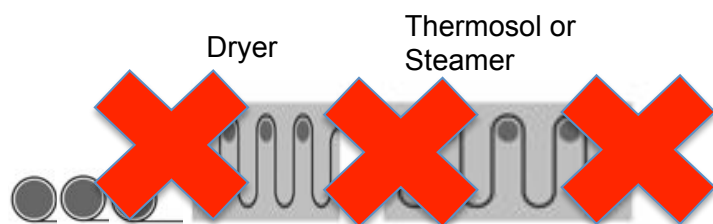
The SWIFT-in-printing process vs. the “State of the art”

“State of the art”		Swift-in-printing
Disperse dyes	Highly Restricted with medium/low energy properties	Foron® S-WF High energy properties Alkaline clearable
Reactive dyes	MCT	Drimaren® HF (DFP) / Selected Drimaren® PS (MCT) High alkaline stability dye-fibre bond High Fixation values > 92 % (HF)
pH fixation	Alkaline with: -Sodium bicarbonate -Dicyandiamide	Alkaline with: - Sodium carbonate - Caustic soda
Fixation process	Print-Dry/ Thermofixation or Steaming	Print-Dry/ Thermofixation or Steaming Alkaline shock with / without steaming
Washing off	Temperature: 100°C Hydro is not allowed as reductive agent Other reducing agents don't perform accurately. Backstaining on white fabric can occur	DFP: Temperature: 85°C / MCT: 100°C Caustic soda.
Fastness	Poor in contact & washing fastness.	Top performance even in dark shades
Reproducibility	Poor	Very good
Domestic Laundering 60°C ISO 105 C06 C2S for dark brown Staining on PA 6.6		
3.1		4.5

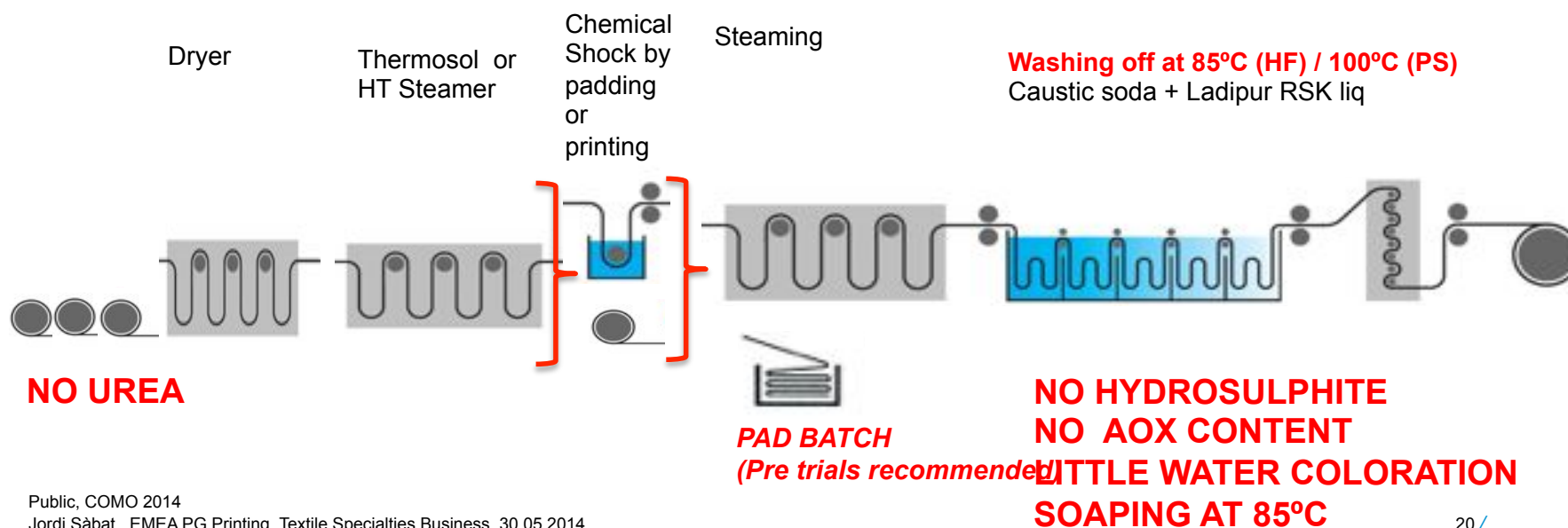
Printing on PES/Cellulose blends with disperse/reactive dyes

The SWIFT-in-printing process

State of the Art



The SWIFT-in-printing



SWIFT-in-printing process

Material : PES/CO 67:33%

“State of the art”

Print-dry-thermosol

Foron® Yellow AS-3L	22 g/l
Foron® Red AS-3L	14 g/l
Foron® Blue AS-3L	18 g/l
Drimaren® Yellow P-6GS	11 g/l
Drimaren® Red PS-BN	10 g/l
Drimaren® Black PS-SG	10 g/l

Swift-in-printing

Print-dry-thermosol-chemical pad-steam

Foron® Brill Yellow S-WF	9 g/l
Foron® Rubine S-WF	7 g/l
Foron® Blue S-WF	5 g/l
Drimaren® Yellow HF-CD	10 g/l
Drimaren® Red HF-CD	20 g/l
Drimaren® Blue HF-RL	8 g/l

SWIFT-in-printing

Print-dry-thermosol-chemical pad-steam

Material: PES/CO 67/33 caustified

Domestic Laundering 60°C ISO 105 C06

C1S

CV PAN PES PA 6.6 CO CTA

“State of the Art”



PA 6.6
3.0



Swift-in-printing



PA 6.6
4.8



Post setting 30 se. 180C

“State of the Art”



PA 6.6
3.1



Swift-in-printing



PA 6.6
4.5



Drimaren® HF

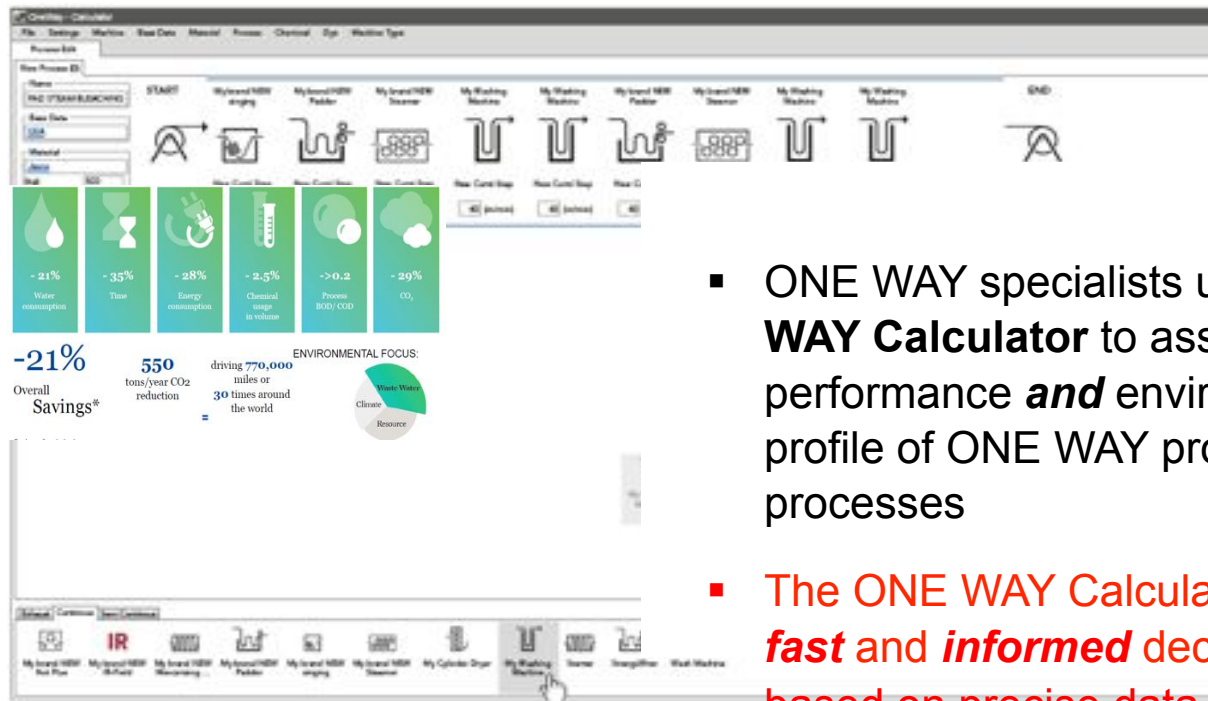
Sustainability requirements

Product Name	Fixation rate Continuous (%)	AOX%	P%	Oeko-Tex	Inditex – RTM 2014	Zero Discharge	BlueSign
Drimaren® Aquamarine HF-CD	90	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Blue HF-RL	91	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Dark Blue HF-CD	93	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Golden Yellow HF-CD	90	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Navy HF-B	97	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Navy HF-GN	96	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Orange HF-2GL	93	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Red HF-6BL	91	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Royal Blue HF-CD	90	0.000	0.000	I-IV	A ; A ; A	✓	YES
Drimaren® Scarlet HF-3G cdg	80	0.000	0.000	I-IV	A ; A ; A	✓	YES

Wednesday, 23 October 2013

REINACH - One Way, the sustainability tool of speciality chemicals business, Archroma, has won the prestigious ICIS Innovation Award for Best Business Innovation. “The company’s One Way sustainability service is being recognised for its game-changing approach to textile manufacturing based on the strong conviction that both ecological and economic benefits are reachable,” said a statement from Archroma - formerly Clariant.

STEP 3: Solution selection based on cost and eco-benefits calculations



- ONE WAY specialists use the **ONE WAY Calculator** to assess the cost, performance *and* environmental profile of ONE WAY products and processes
- The ONE WAY Calculator enables *fast* and *informed* decision-making based on precise data measurement and analysis

Summary

Foron® S-WF

- Total or partial reduction of Hydro or derivate of it in PES 100% printing.
- No backstaining on PES/EL and others even in very dark shades
- The most sustainable dyestuff chemistry (Fixation rate, AOX...)
- Reduction of water & energy & general costs

Foron® S-WF/Drimaren® HF/PS Archroma's synergy offers:

- Reactivation of PES/Cel printing,
 - Top performance in fastness
 - Complete range
 - Robust & reproducible process
 - An additional printing method for high quality printing of PES/Cel blends , complementing the existing growing Digital Printing business



Questions?