



**DR. PETRY**  
TEXTILE AUXILIARIES

## **WEKO Fluid Application System**

**Promising results  
on Denim fabrics**





Three experts, one idea



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Textile Finishing with minimal application system  
using the example of Denim

Purpose:

- solving of problems of the traditional textile finishing systems, e.g. padder
- savings: economical, ecological, sustainable
- process simplification

# Three experts, one idea



Minimal application system



Textile chemistry and textile finishing



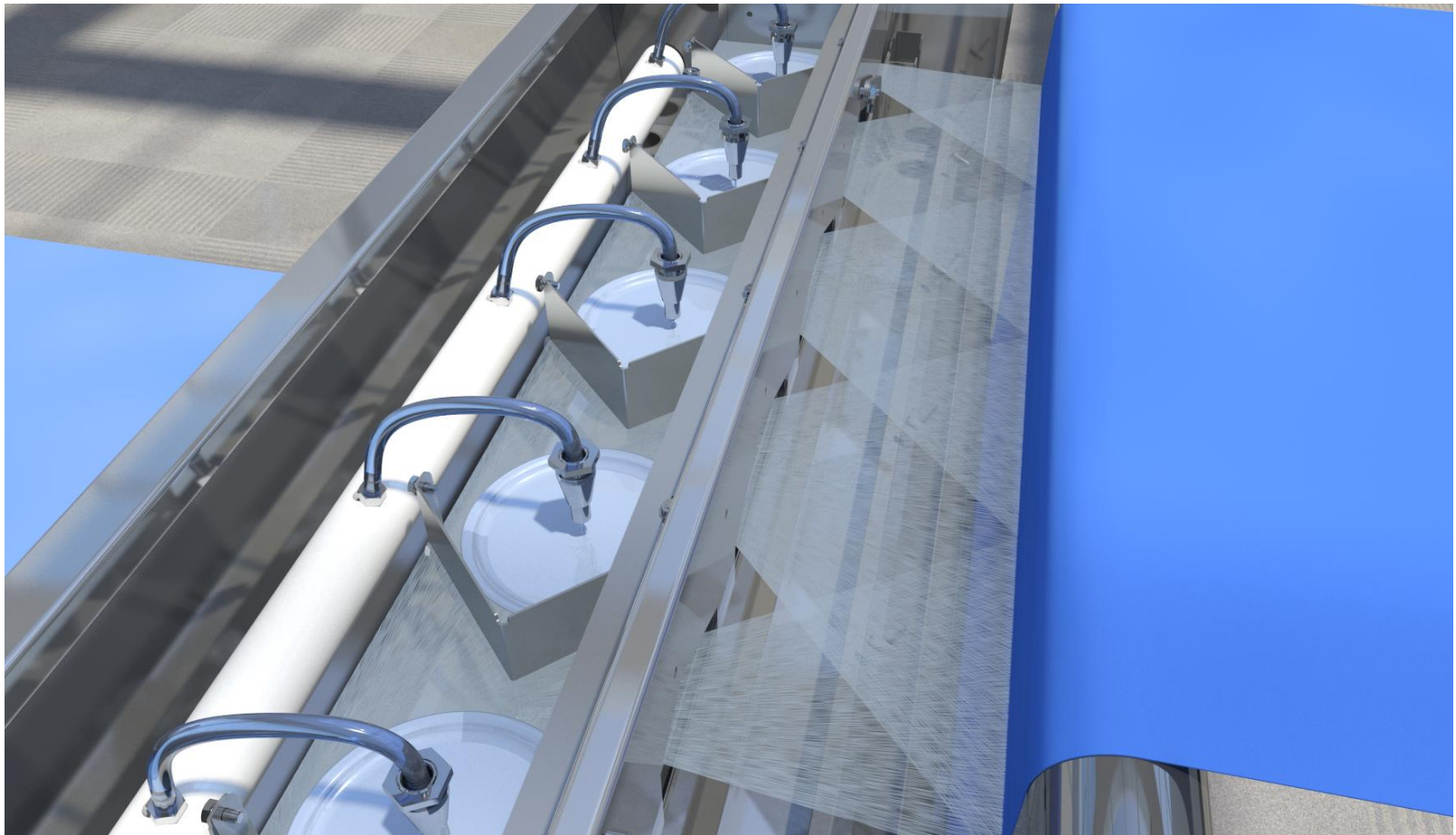
Continuous yarn dyeing and denim finishing



# WEKO-FLUID-APPLICATION-SYSTEM (WFA)



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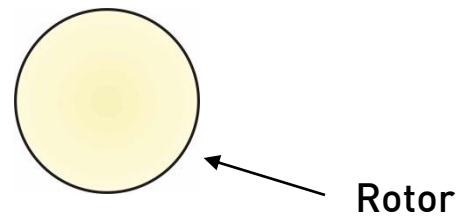


# WEKO-FLUID-APPLICATION-SYSTEM (WFA)



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Application by specially  
designed spray disks –  
so called rotors



Evenly spread liquid application in a precise and reproducible quantity

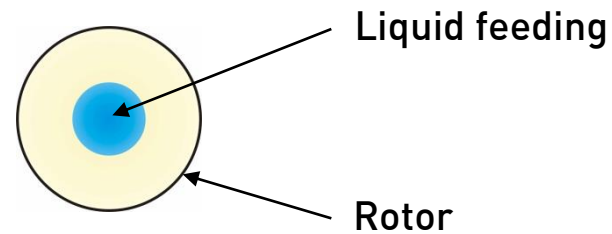


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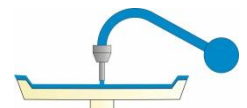


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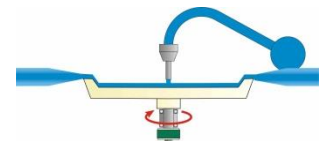
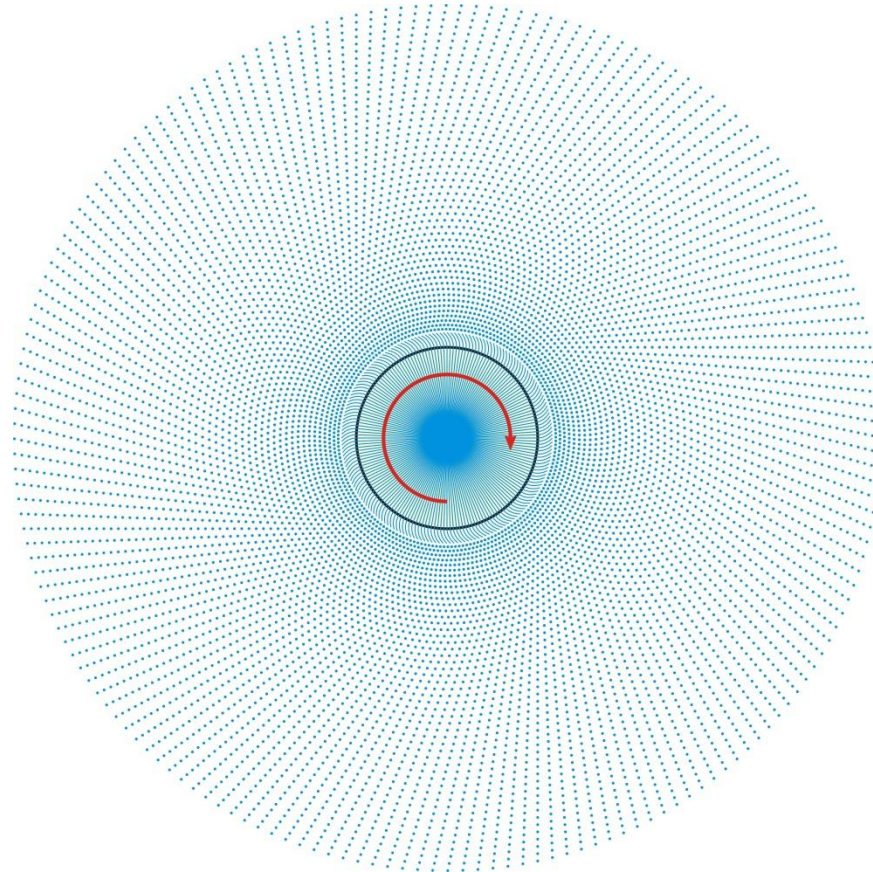
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Application by specially designed spray disks – so called rotors

These rotate at high speed and are fed with the desired liquid quantity from a supply unit

The rotors produce an evenly spread flow of microscopically small droplets

Evenly spread liquid application in a precise and reproducible quantity

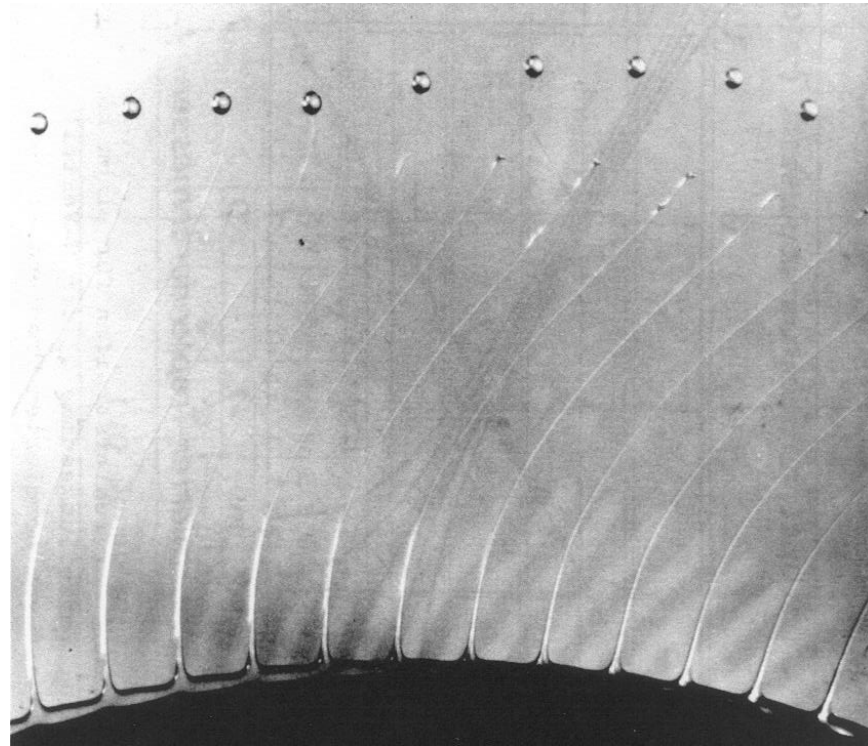


# WEKO-FLUID-APPLICATION-SYSTEM (WFA)



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The rotors produce an evenly spread flow of microscopically small droplets



**Evenly spread liquid application in a precise and reproducible quantity**



# WEKO-FLUID-APPLICATION-SYSTEM (WFA)



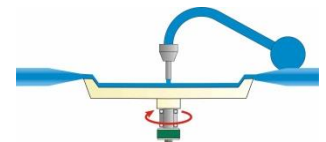
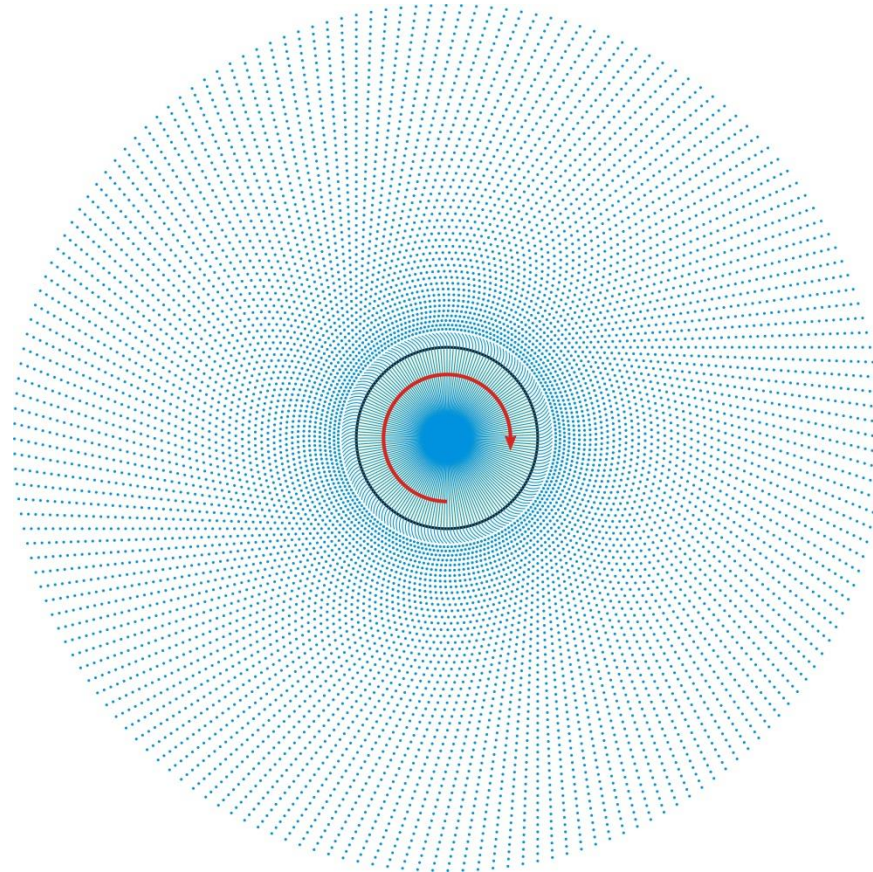
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Application by specially designed spray disks – so called rotors

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Evenly spread liquid application in a precise and reproducible quantity



# WEKO-FLUID-APPLICATION-SYSTEM (WFA)



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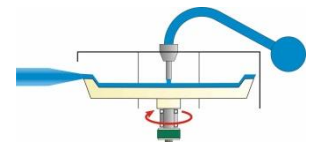
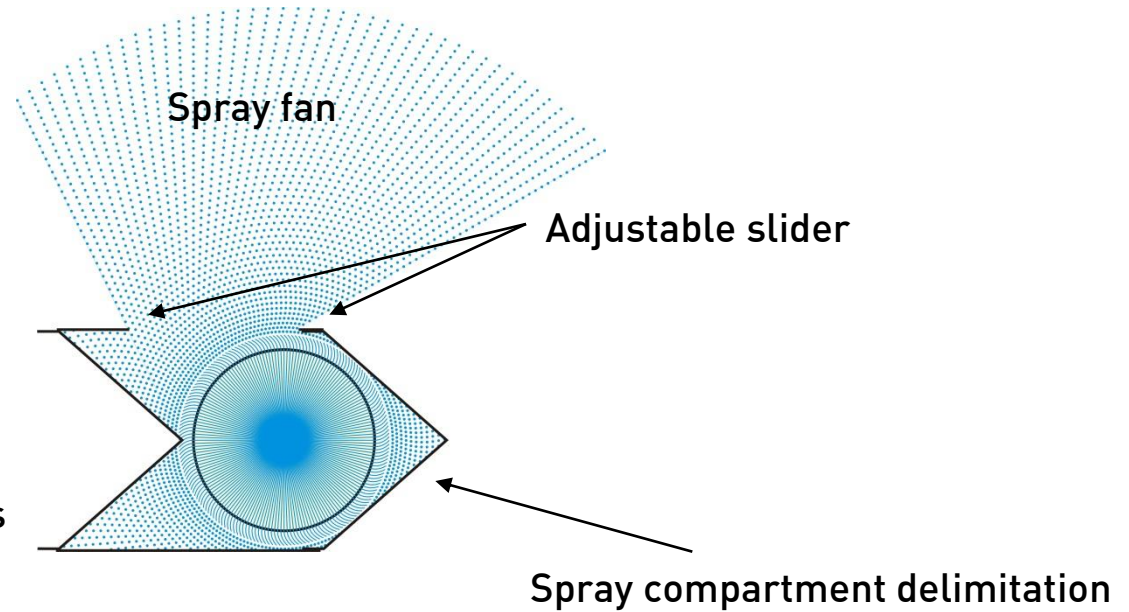
Application by specially designed spray disks – so called rotors

The micro-droplets are kept within a delimited spray compartment

A spray fan is defined by an opening with adjusting sliders

The remaining liquid in the spray compartment is collected and returned to the supply unit

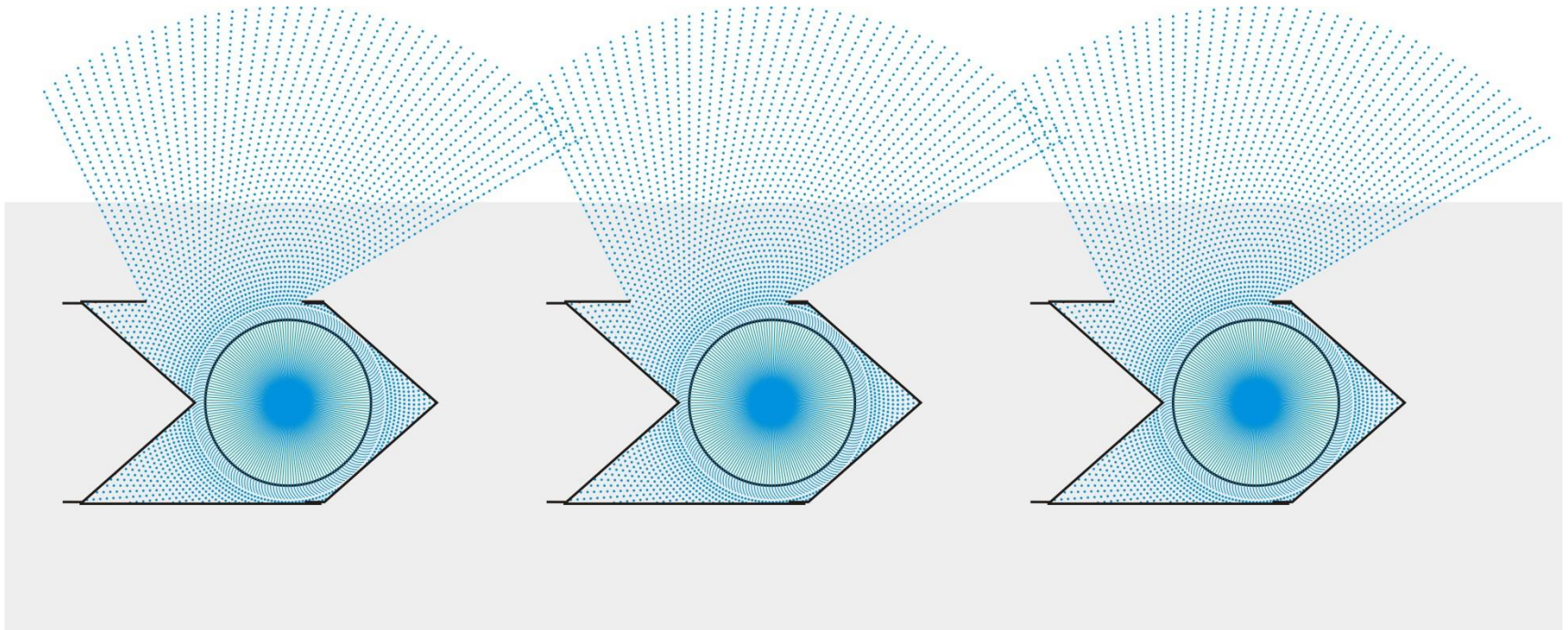
Evenly spread liquid application in a precise and reproducible quantity



# WEKO-FLUID-APPLICATION-SYSTEM (WFA)

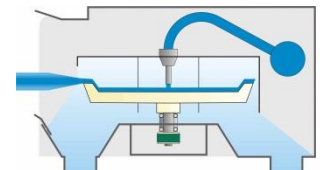


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Within a rotor carrier, the rotors are arranged next to each other in the same spray level

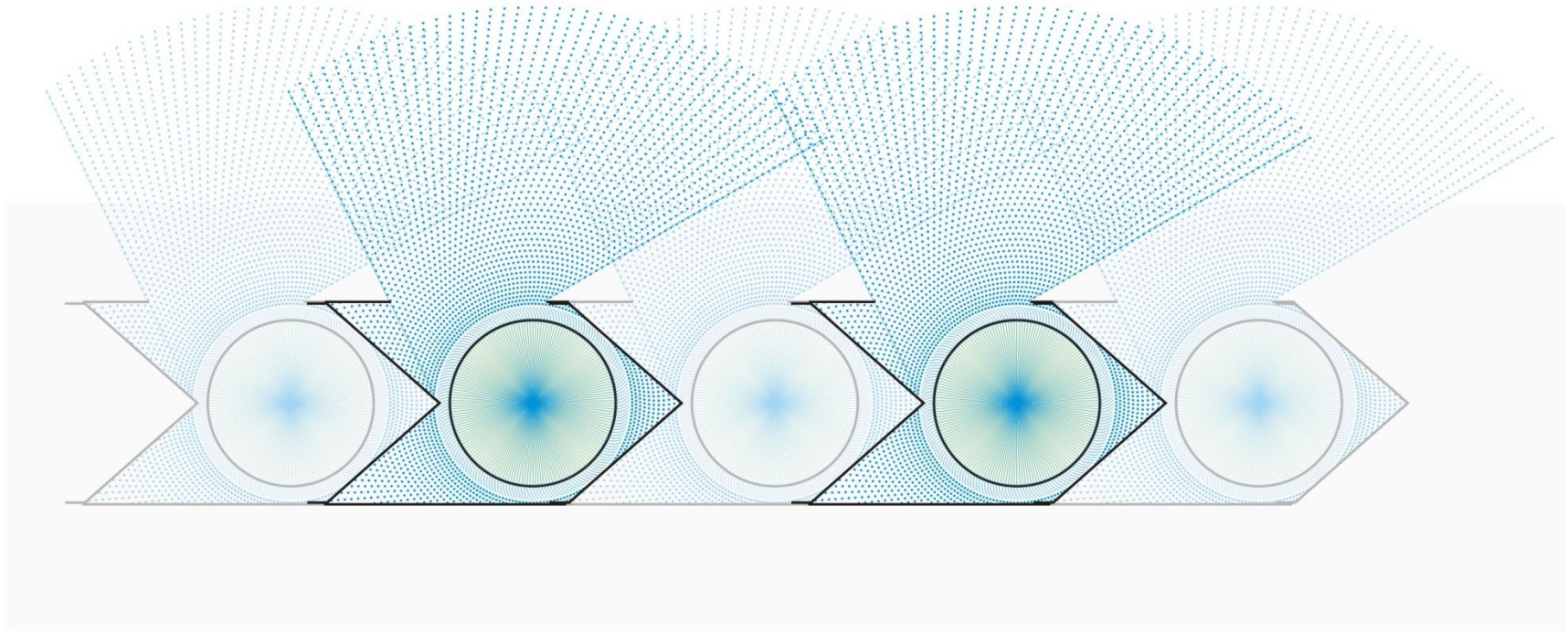
Evenly spread liquid application in a precise and reproducible quantity



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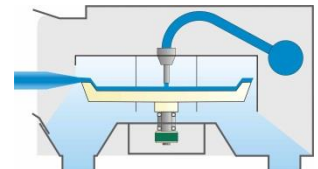


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Further rotors are arranged next to each other in a second spray level with an offset to the first spray level

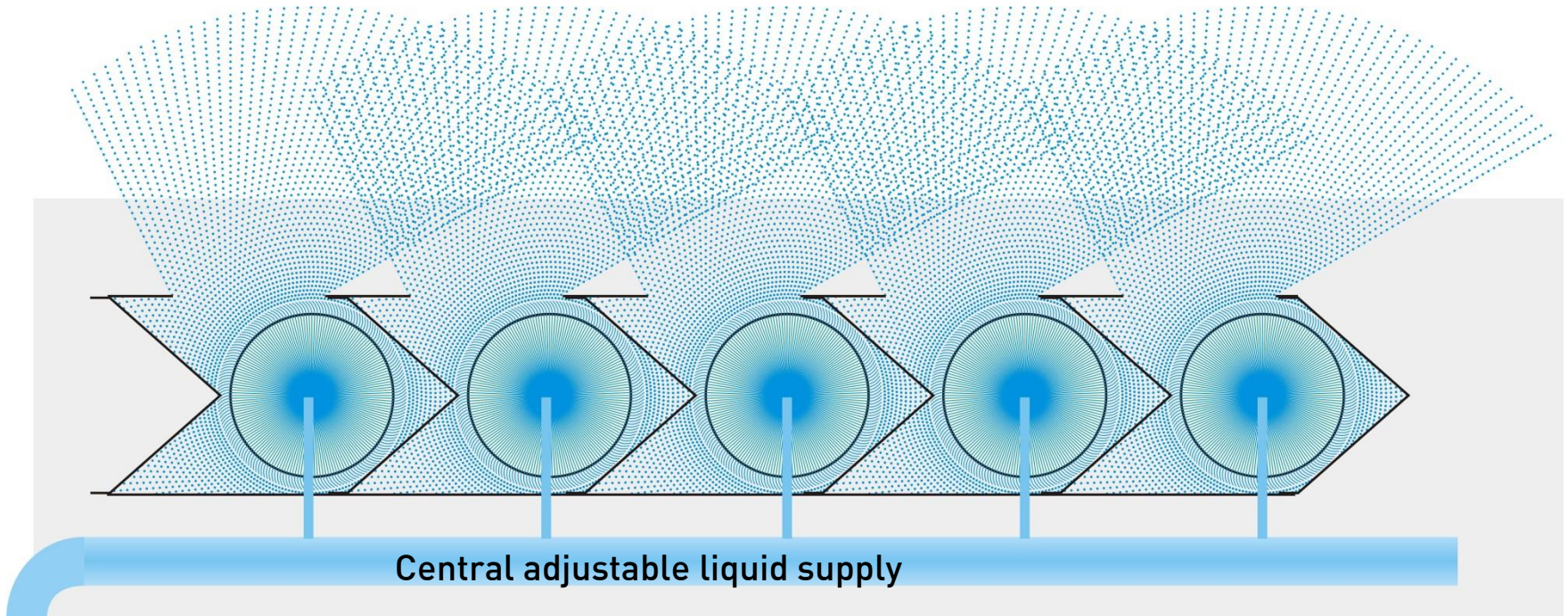
**Evenly spread liquid application in a precise and reproducible quantity**



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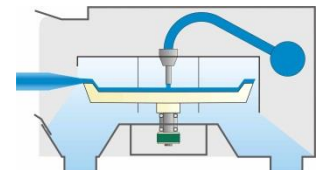


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Overlapping operation in a rotor carrier

Evenly spread liquid application in a precise and reproducible quantity



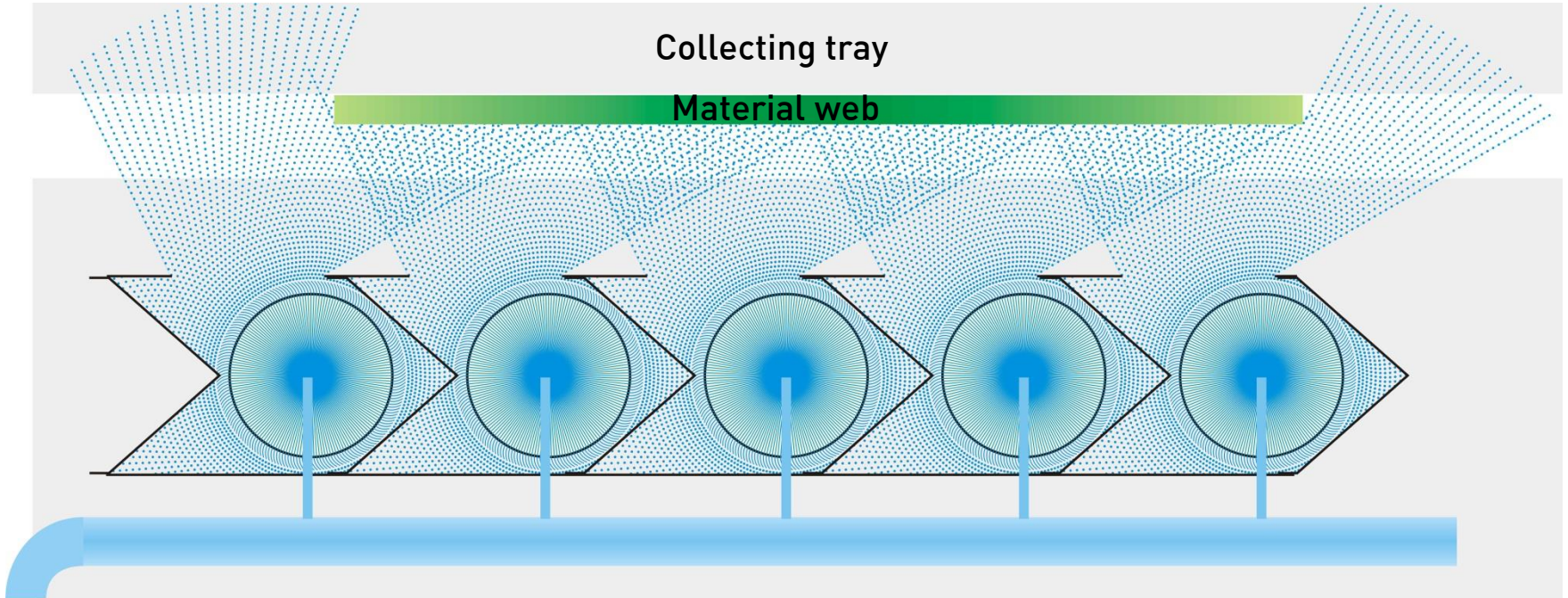
# WEKO-FLUID-APPLICATION-SYSTEM (WFA)



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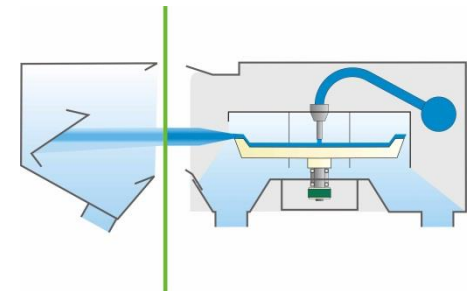
Collecting tray

Material web



The material web is evenly applied across its width

Evenly spread liquid application in a precise and reproducible quantity



# WFA – working principle



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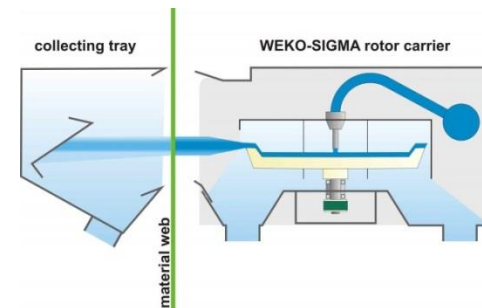
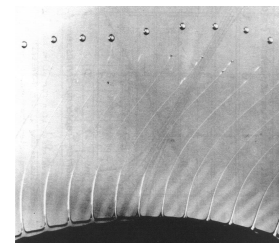
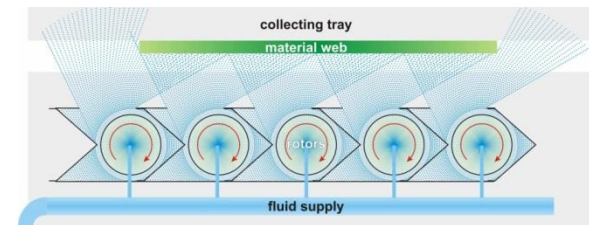
# WFA - working principle - summary



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## WEKO-Fluid-Application-System

- the application occurs via rotating discs – so called rotors
- the discs rotate at high speed and are fed with the desired liquid quantity from a supply unit
- the rotors produce an even stream of microscopically small droplets which are formed to individual fans by face plates
- the individual fans work seamless together and ensure uniform application







### Benefits of the WEKO-Fluid-Application-System (WFA) vs. traditional application systems for finishing of Denim

#### Process Simplification & Quality

- WFA can replace common padding applications and facilitates coating processes
- flexible application system – one sided or double sided leading to a variety of finishing effects
- fast exchange of liquor and simple cleaning, highly recommended for short lots
- small bath volume, less waste of chemicals when changing the treatment



## Cost Reduction, Chemical & Energy Savings

- process cost reduction by low pick up of only 15 to 25 % vs. 70 % of traditional application (padder)
- chemical savings – up to 70 %
- energy savings – up to 60 %
- remarkably higher machine speed – up to 100 %

## Quality

- no tailing potential, no back-staining, no spots
- controllable wet on wet application
- contactless application – no contamination of the liquor, baths can be recycled

## Trials on denim fabric in semi-industrial scale at the technical center of WEKO near Stuttgart during summer 2015

1	No finishing (blank)	
2	Fixation of Indigo and Sulphur dyes	
3	Resin finish and flat finish (glyoxal crosslinking resin)	
4	Resin finish and flat finish (polyurethane dispersion)	
5	Softness, lustre and brilliance	
6	Resin finish and flat finish (acrylic dispersion)	
7	Tinting and overdyeing	

# WFA finishes on denim



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**Trials on denim fabric in semi-industrial scale at the technical center of WEKO near Stuttgart during summer 2015**

1	No finishing (blank)	
2	Fixation of Indigo and Sulphur dyes	PERFIXAN PID NEW
3	Resin finish and flat finish (glyoxal crosslinking resin)	PERFIXAN PC 55 NEW
4	Resin finish and flat finish (polyurethane dispersion)	PERIPRET PUS
5	Softness, lustre and brilliance	PERIPRET LUSTER
6	Resin finish and flat finish (acrylic dispersion)	PERICOAT AC 230
7	Tinting and overdyeing	PERICOAT AC 230 + PERICOLOR ...

## WFA finishes on denim



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All finished fabrics have been cut and converted into denim trousers and pant legs. Subsequently garment wash processes were applied to show the different wash down behaviour (all done by Lilienweiß).



## Garment wash procedures at Lilienweiß:

- original denim fabric (blank)
- enzyme wash (EW)
- enzyme and stone wash (ESW)
- stone wash and bleach (SB)

WEKO:  
 WEKO-FLUID-  
 APPLICATION-  
 SYSTEM

weko

No finishing

Fixation of indigo  
 and sulphur dyes

Resin finish  
 and flat finish  
 (glyoxal crosslinking  
 resin)

Resin finish  
 and flat finish  
 (polyurethane  
 dispersion)

Softness, lustre  
 and brilliance

Resin finish  
 and flat finish  
 (acrylic dispersion)

Tinting and  
 over-dyeing

Original denim fabric



Enzyme washed



Enzyme and stone washed



Stone washed and bleached



LILIENWEISS:  
 CONTINUOUS YARN DYEING  
 AND DENIM FINISHING



DR. PETRY:  
 TEXTILE  
 CHEMISTRY  
 AND TEXTILE  
 FINISHING



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Recipe:  
 400 g/l  
 PERFIXAN PID NEW  
 Pick-up: appr. 15 %

Recipe:  
 400 g/l  
 PERFIXAN PC 55 NEW  
 Pick-up: appr. 20 %

Recipe:  
 500 g/l  
 PERIPRET PUS  
 0.5 g/l  
 PERIFOAM SER  
 Pick-up: appr. 20 %

Recipe:  
 400 g/l  
 PERIPRET LUSTER  
 0.5 g/l  
 PERIFOAM SER  
 Pick-up: appr. 20 %

Recipe:  
 300 g/l  
 PERICOAT AC 230  
 5 g/l  
 PERICOAT ADD-S  
 0.5 g/l  
 PERIFOAM SER  
 Pick-up: appr. 20 %

Recipe:  
 300 g/l  
 PERICOAT AC 230  
 5 g/l  
 PERICOAT ADD-S  
 0.5 g/l  
 PERIFOAM SER  
 40 g/l  
 PERICOLOR  
 BROWN P/MGRN  
 Pick-up: appr. 20 %

### Fixation of Indigo & Sulphur Dyes (Recipe 2)

- Improving the wash fastness of indigo and sulphur dyes
- Denim remains remarkably darker in wash-down / laundry processes
- The fixing agent can be applied single sided on the surface of the denim fabric – product savings of up to 50 % vs. traditional application methods
- Indigo and Sulphur dye savings of up to 10 %
- The fixing agent can be applied on dry or wet fabric
- No back-staining
- No tailing potential
- No spots







## Fixation of Indigo & Sulphur Dyes (Recipe 2)

**PERFIXAN PID NEW**      Auxiliary for improving the fastness properties of blue denim based on a polyammonium compound

**Applied quantity:**      200 – 400 g/l      **PERFIXAN PID NEW**

**Application:**      pick-up approx. 15 %

**Drying:**      110 – 130 °C

# WFA finishes on denim



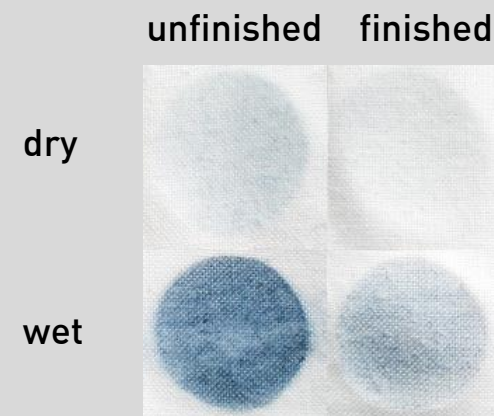
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## Resin Finish / Flat Finish (Recipe 3)

- adjustable flat and dark look after wash-down
- dimensional stability without affecting the natural elasticity and hand-feel of denim
- improving the wash and crock fastness of indigo and sulphur dyes
- dark denim remains remarkably darker in wash-down



### Crock Fastness



## WFA finishes on denim



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### Resin Finish / Flat Finish (Recipe 3)

- allows natural and authentic scraping effects and whiskers
- pre-catalysed resins for optimum process stability
- no or only little reduction of tear and tensile strength
- low or no formaldehyde content – depending on resin
- combination with dyes / pigments possible – over-dyeing, tinting





### Resin Finish / Flat Finish (Recipe 3)

**PERFIXAN PC 55 NEW** Self-catalysing crosslinking system for the finishing of cellulosic fibres and blends with synthetic fibres, low content of formaldehyde, based on modified DMDHEU

Applied quantity:	200 – 400 g/l	PERFIXAN PC 55 NEW
Application:	pick-up approx. 20 %	
Drying:	110 – 120 °C	
Condensation:	150 – 170 °C	



### Resin Finish / Flat Finish, polymer (Recipe 4)

**PERIPRET PUS** Finishing agent and handle modifier, free of formaldehyde, based on aqueous polyurethane dispersion

**PERIFOAM SER** Silicone antifoaming agent

**Applied quantity:** 200 – 400 g/l PERIPRET PUS  
0.5 – 1.0 g/l PERIFOAM SER

**Application:** pick-up approx. 20 %

**Drying:** 110 – 120 °C

**Fixing:** 150 – 160 °C

## Tinting & Over-Dyeing (Recipe 7)

- overdyeing or tinting with e.g. pigments or indigo
- subtle colouration, natural colours or heavy contrasts
- variety of over-dyeing effects – single or double sided application
- no contamination of the dyeing liquor because of contactless application
- dyeing bath recycling possible
- the dyeing liquor can be applied on dry or wet fabric
- no tailing potential
- simple cleaning while changing colours, highly recommended for short lots





## Tinting & Over-Dyeing (Recipe 7)

PERICOAT AC 230	Polymer dispersion for coating and impregnation of textiles, based on self-crosslinking polyacrylate
PERICOAT ADD-S	Additive for WEKO-Fluid-Application-System (WFA), based on modified polysiloxane
PERIFOAM SER	Silicone antifoaming agent
PERICOLOR ...P/...	Aqueous pigment dispersions (anionic)



## Tinting & Over-Dyeing (Recipe 7)

Applied quantities:	300 g/l	PERICOAT AC 230
	5 g/l	PERICOAT ADD-S
	0.5 g/l	PERIFOAM SER
	40 g/l	PERICOLOR BROWN P/MGRN
Application:	pick-up approx. 20 %	
Drying:	at 110 – 120 °C	
Fixing:	at 150 – 160 °C	



# WEKO booth at ITMA Nov 2015, Milano



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# Brochure/Flyer for ITMA, Nov 2015



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# WFA Pilot-Unit Installation: Jan 2016



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ITALDENIM, Milano





- all recipes from our ITMA presentation have been transferred into production scale in a three days trial session
- customer had prepared a large variety of ITALDENIM fabric qualities for testing Dr. Petry recipes/chemistry applied by WFA system
- the simple and headache-free start-stop opportunity while using WFA was impressive for the operator
- there have been issues regarding aerosol release and easiness of cleaning but this will be mended by WEKO

## Trials at ITALDENIM in February 2016



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- customer made trousers out of the different finished fabric and did carry out various garment wash processes thereafter (in direct comparison to their standard qualities)
- results of WFA Trials have been rated by customer as “close to perfect”

# Further activities



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Dr. Petry at Interdye & Print, Istanbul in March 2016

Denim is most probably just the start. We see further prospects for the textile finishing in general.

- finishing of woven fabrics and knits in general
- softening of terry towels and knitgoods to preserve the volume of the fabric
- Easy Care Finish on wovens and knits
- fashionable finishing effects on wovens
- application of fixing agents after dyeing processes
- base coating for technical textiles and fashion items
- overdyeing effects – single & double side
- ...



**DR. PETRY**  
TEXTILE AUXILIARIES

Textilchemie Dr. Petry GmbH  
Ferdinand-Lassalle-Straße 57  
72770 Reutlingen  
Germany

Telefon +49 7121 9589-0  
Telefax +49 7121 9589-33

E-Mail [office@drpetry.de](mailto:office@drpetry.de)  
Internet [www.drpetry.de](http://www.drpetry.de)





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The above indications are based on the latest state of our knowledge. Due to different operational conditions and requirements these are guidelines only. A legally binding assurance cannot be drawn from our indications. Our technical staff will always be at your disposal to support you in testing our auxiliaries and to answer further technical questions.

04/2016