

High-tech Control Devices for Denim Finishing

VDMA Webtalk
„Sustainable denim production: latest finishing technologies“
on November 12th, 2020

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PLEVA GmbH

Since 1969 | family business. values. innovation.

Development and production of sensors and controls “Made in Germany”

Focus on systems for on-line controls and monitoring of industrial processes

Family owned company with around 60 employees

Represented around the world

Worldwide service bases



SENSORS FOR MOISTURE CONTROL

AF 120 MICROWAVE MOISTURE MEASUREMENT

RR SENSORS FOR RESIDUAL MOISTURE MEASUREMENT

HIGH-TECH STRAIGHTENING SYSTEM AND STRUCTURE DETECTOR

SD STRUCTURE DETECTOR

SL STRAIGHT LINER

Moisture control is used in **denim production** lines like

- Sizing for **control of uniform sizing pick-up**
- Finishing for **control of minimal application**
- Finishing for **moistening control** before sanforizer

Minimal application processes like **spraying units**, **kiss-roll devices** or **foam applicators** allow a sustainable production. These processes allow **more energy efficient production** and save chemicals due to pick-up reduction, e.g. compared to padders pick-up can be reduced from 70 % down to 40 % or even more.

To ensure a constant process and a high-quality production it is **necessary to measure and control the minimal application!**

Our solution:

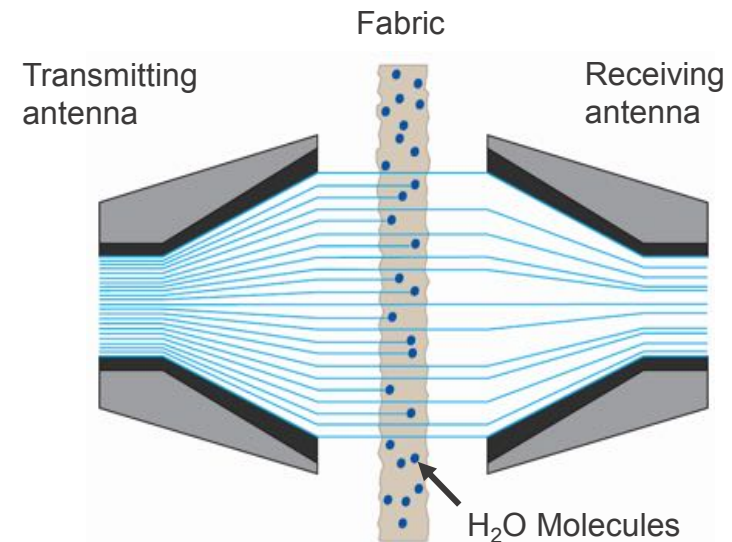
Contact-free microwave moisture measurement devices with **brand-new series 700**

Contact-free microwave moisture measurement devices with **brand-new series 700**

Measurement principle:

microwaves are absorbed by water content of fabric
ultra-fast, contact-less, non-hazardous method

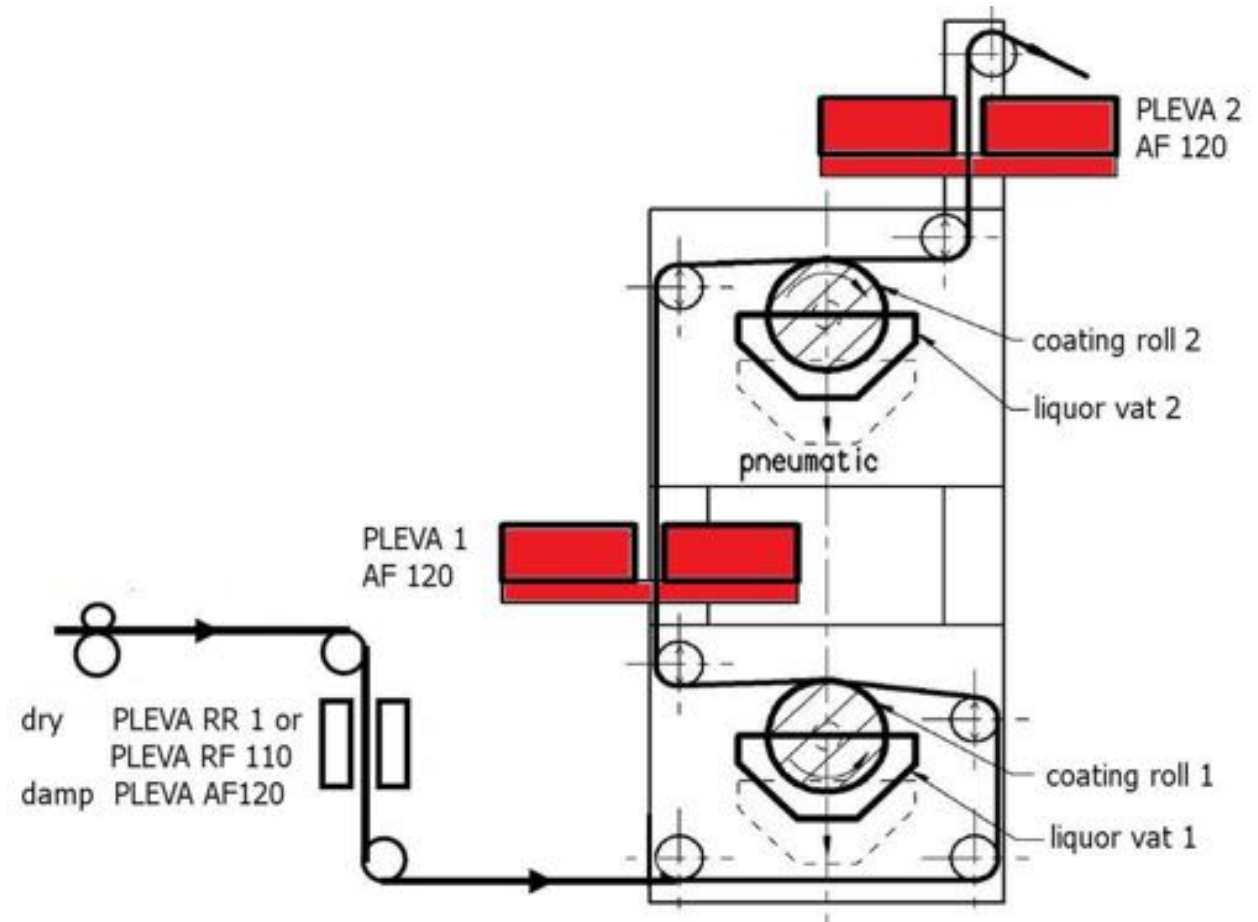
→ moisture levels up to 2000 g(H₂O)/m² with AF 120



Example: Matex Eco-Applicator®

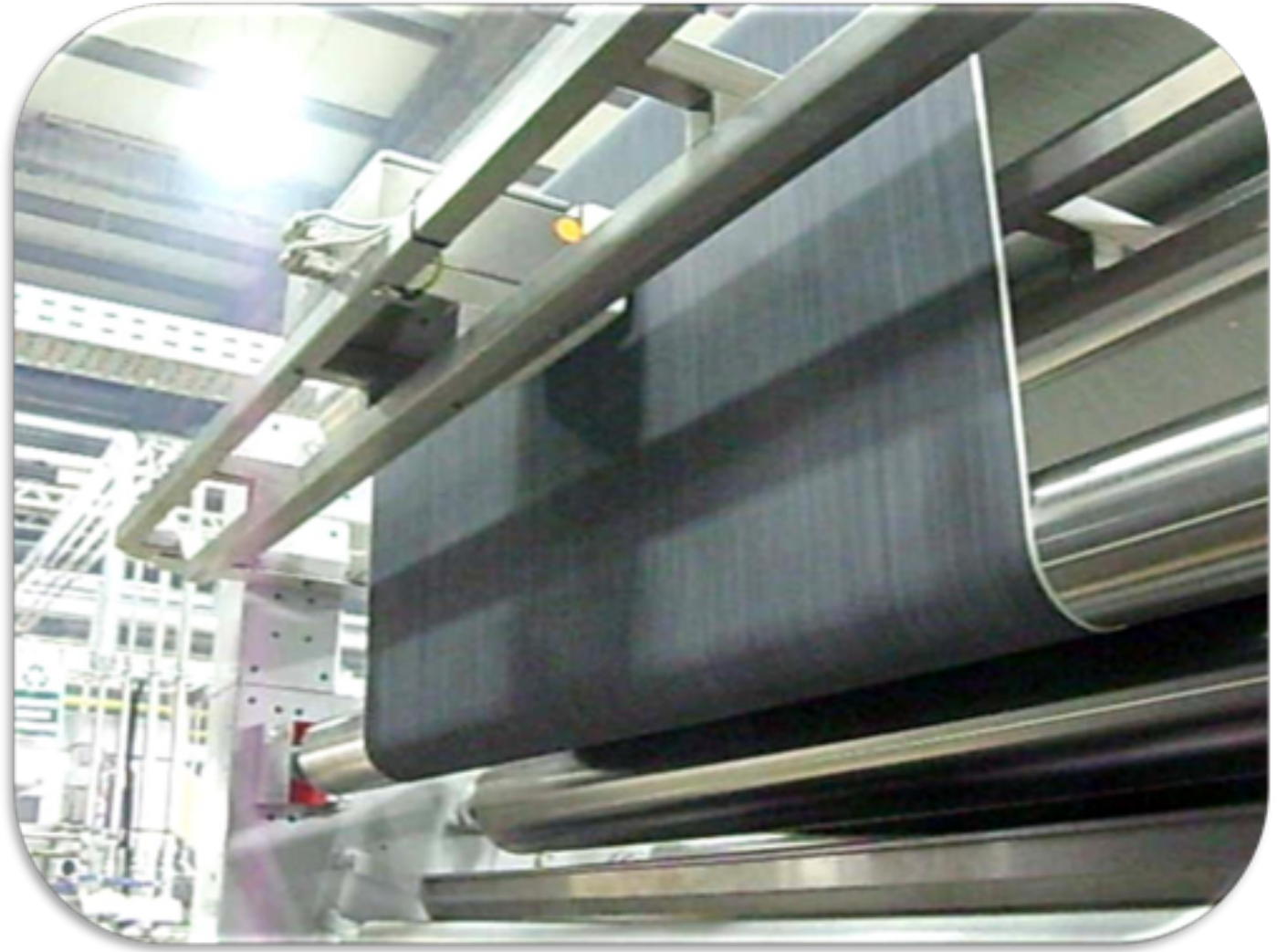
Minimal application measurement and control system with AF 120

- Minimal application by controlling the speed of coating roll (kiss-roll coating)
- One or two-sided application with different add-ons:
75 g(H₂O)/m² per side on 240 g/m² stretch denim (31 %),
e.g. on face side stabilizing indigo-blue
and on back side softener



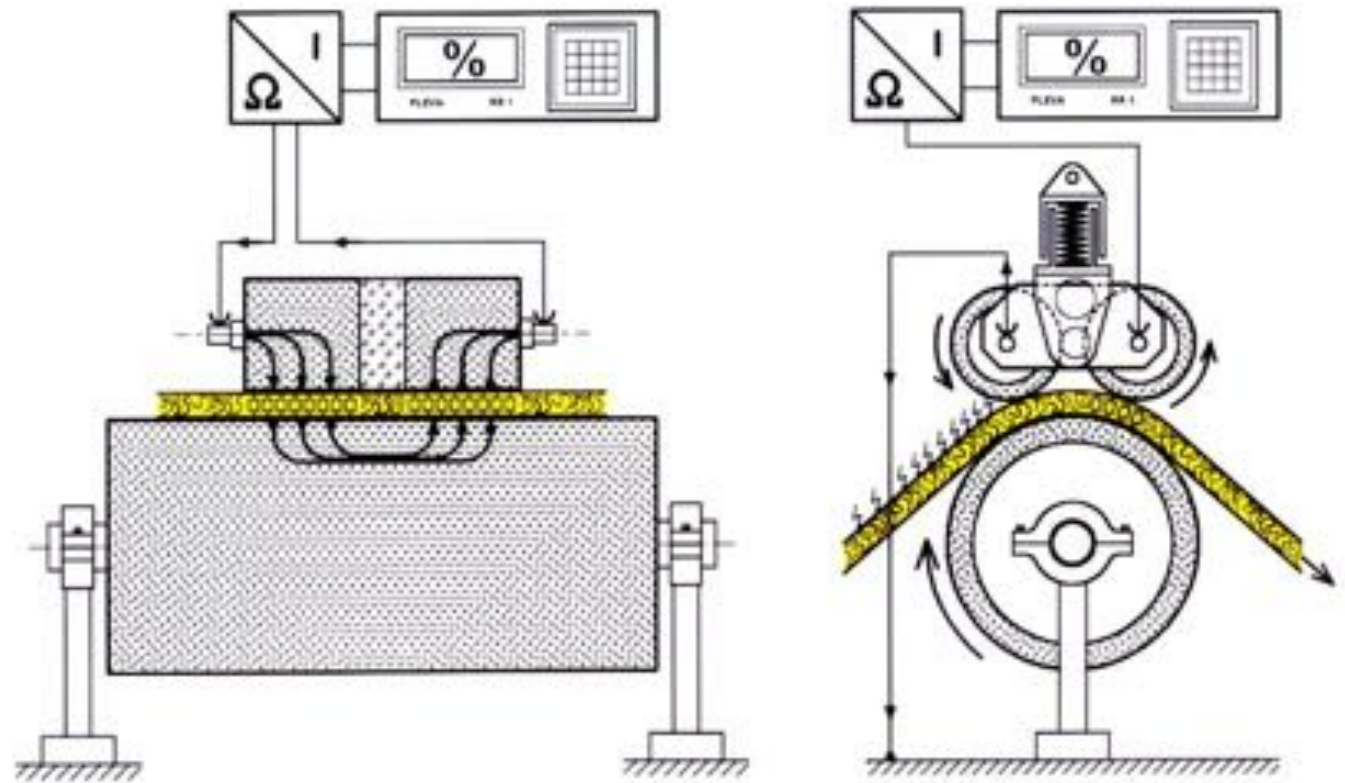
Example: Matex Eco-Applicator®

- 2 moisture sensors AF 120 with double transmission
- Large area measuring head (300 mm width)
- Robust stainless steel construction
- Control of minimal application

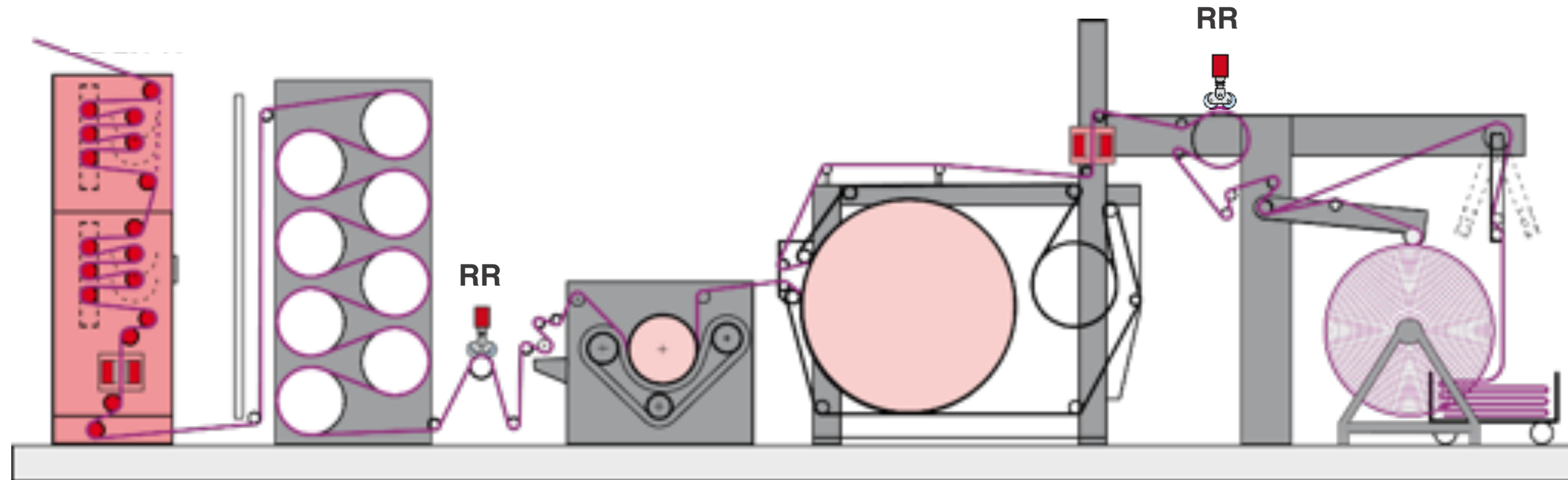


Moisture measurement with tandem roller sensor RR

- Even very low residual moisture values
- **Natural** fibers like cotton 1...20 % and **synthetics** 0,1...5 %
PA 0,2...9 %
viscose 1,7...30 %
- Protected against electrostatic tension
- Fabric can be dried to the **moisture level necessary for the following process**
- **Side-centre-side measurement before sanforizing**



Example: Denim Finishing Line

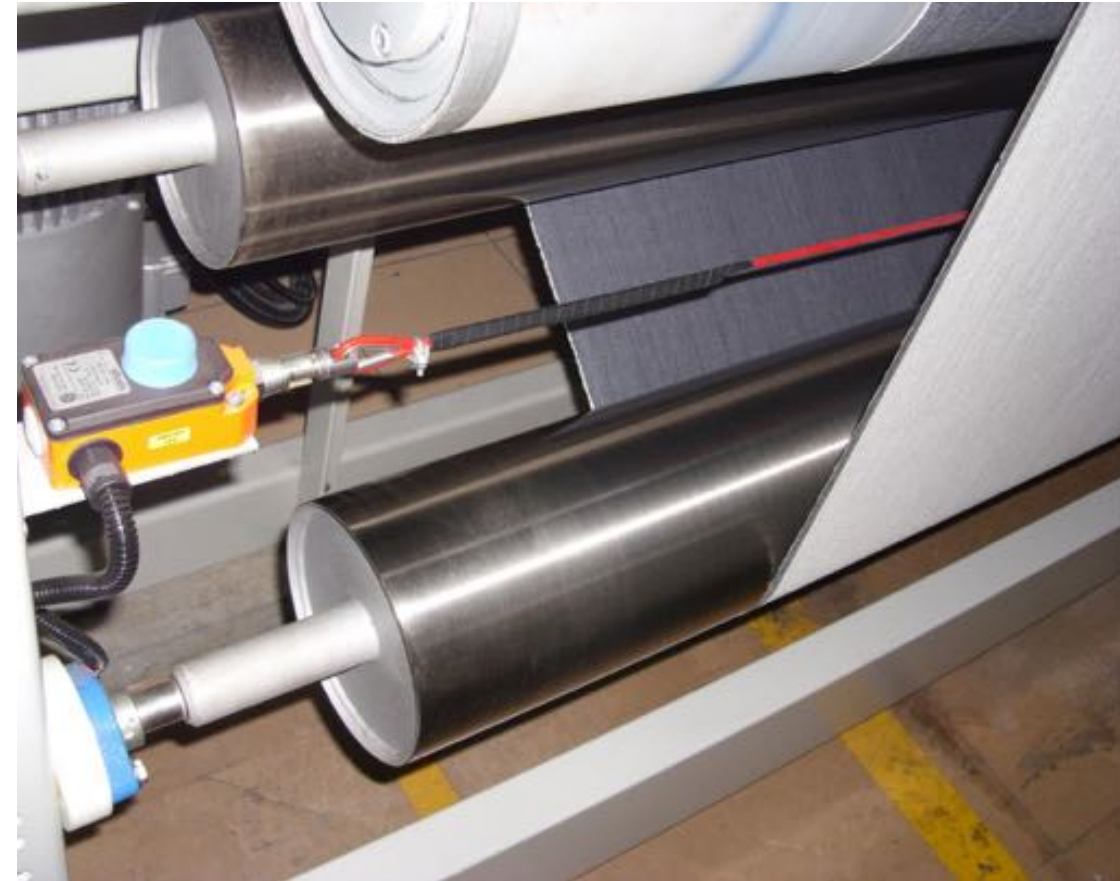


Residual moisture side-centre-side before and after sanforizing with 2x RR

Example: Denim Finishing Line



RR 3.3 after cylinder dryer before sanforizing



RR WIDE after stenter

SENSORS FOR MOISTURE CONTROL

AF 120 MICROWAVE MOISTURE MEASUREMENT

RR SENSORS FOR RESIDUAL MOISTURE MEASUREMENT

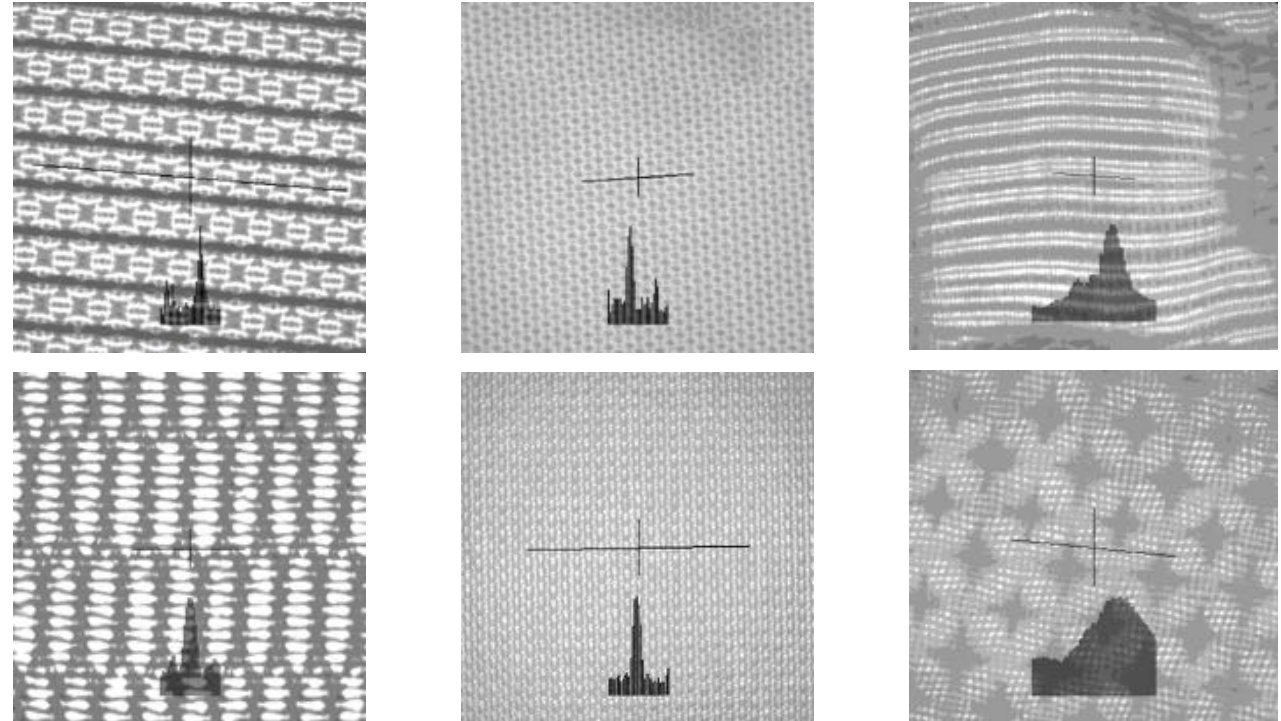
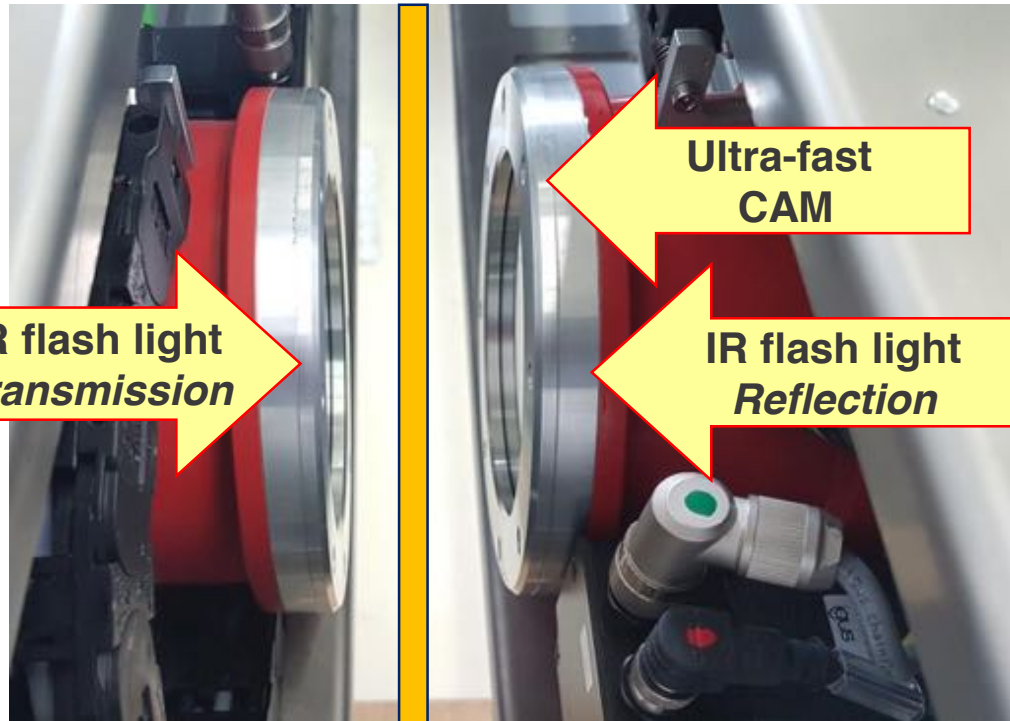
HIGH-TECH STRAIGHTENING SYSTEM AND STRUCTURE DETECTOR

SD STRUCTURE DETECTOR

SL STRAIGHT LINER

SD Structure Detector – Best CAM for Detection

CAM picture is taken within <0.000010 sec. and is analysed (distortion + density) <0.10 sec.



**SD reliably detects distortions of the most complicated fabrics
from stand still up to fabric speeds of 600 m/min**

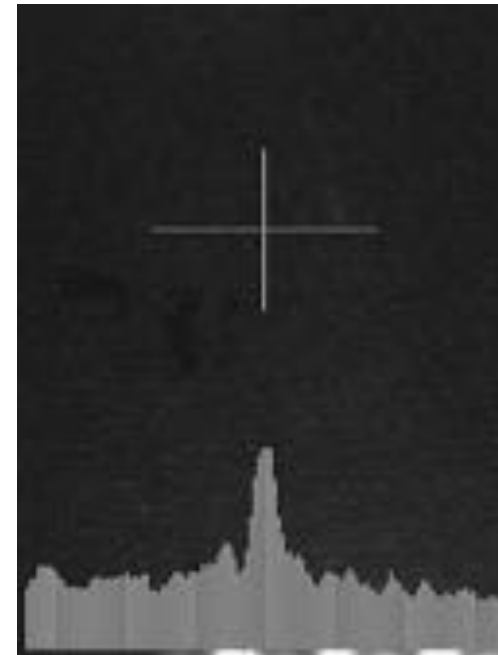
SD Structure Detector – Best CAM for Detection

Special CAM for very dark DENIM

with special sensor, optics and adapted lighting technique



Pre-Skewing: wet



Sanforizing: moist to dry



➔ **Reliable, accurate detection** independent of moisture level

SD Series 300 – Traversing Structure Detector

New ultra-robust series 300:

- ◆ Stainless-steel construction with easy maintenance
- ◆ New reliable drive system
- ◆ High-speed traversing CAM from selvage to selvage

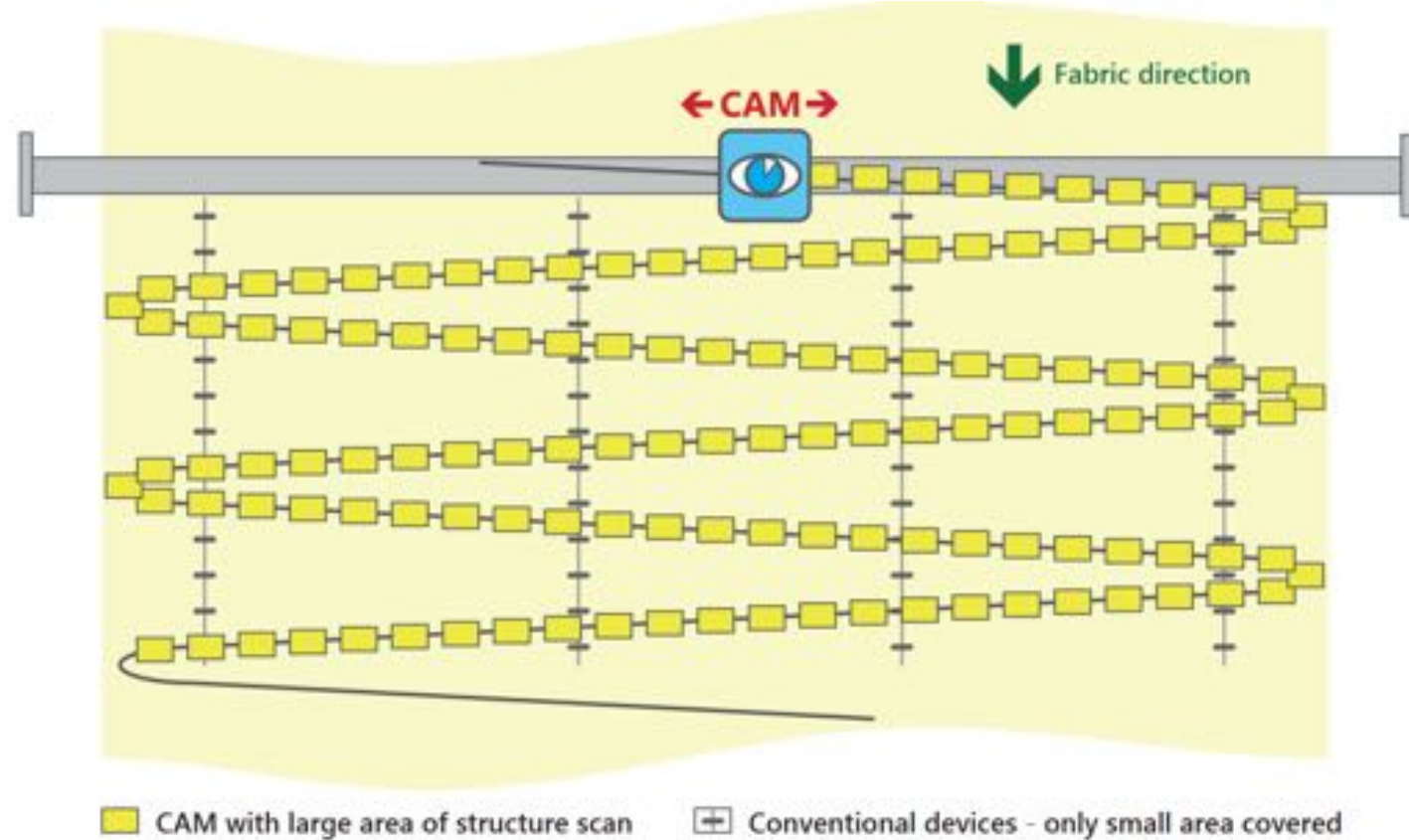
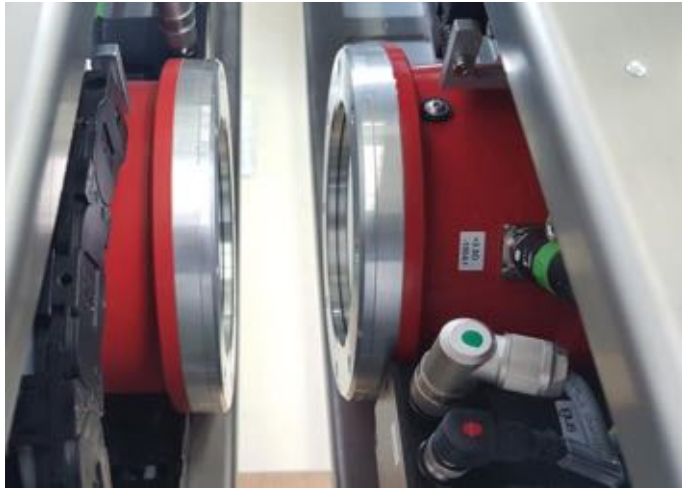


SD Series 300 – Traversing Structure Detector

- ◆ Automatic width adjustment after fabric change
- ◆ Accurate SKEW- and BOW distortion analysis
- ◆ Fabric Density (picks/courses)
- ◆ Width measurement
- ◆ Position measurement



SD Series 300 – Traversing Structure Detector



SD1

**Large number of measuring points
over the width - up to 40 points per 2.0 m**

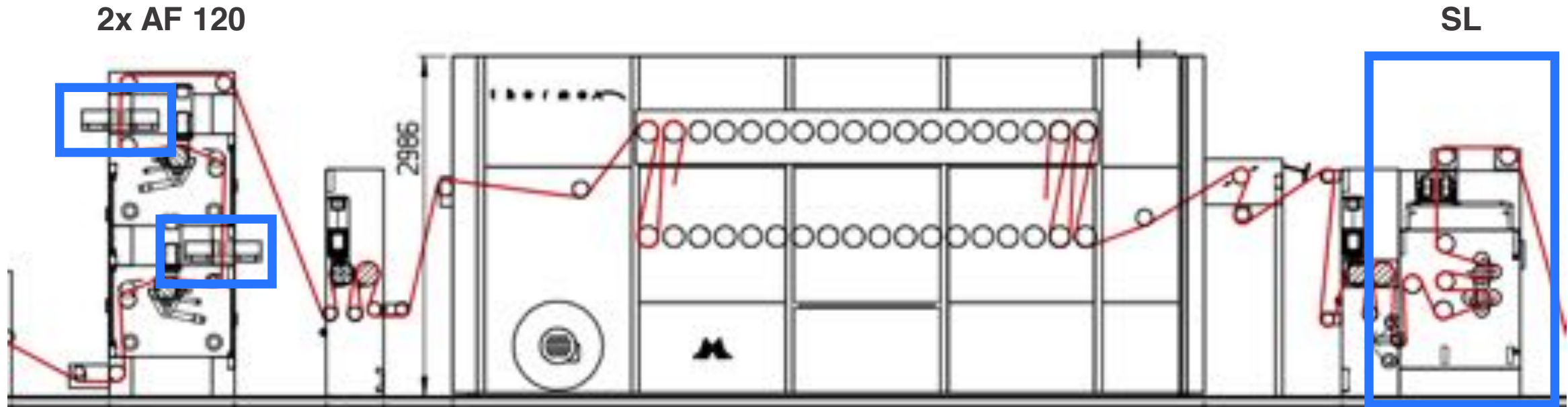
SL Series 300 – High-Tech Straightening System

- ◆ Precise **distortion** measurement **directly from selvedge** with many measuring points across width
- ◆ High-speed distortion analysis and **very accurate correction**
- ◆ Shortest roller adjustment times by extremely rapid servo drives
- ◆ High straightening action:
 - SL 1 more than ± 1200 mm (skew)
 - SL 2 more than ± 1700 mm (skew)



Straight Liner SL 2 – reinforced version for denim

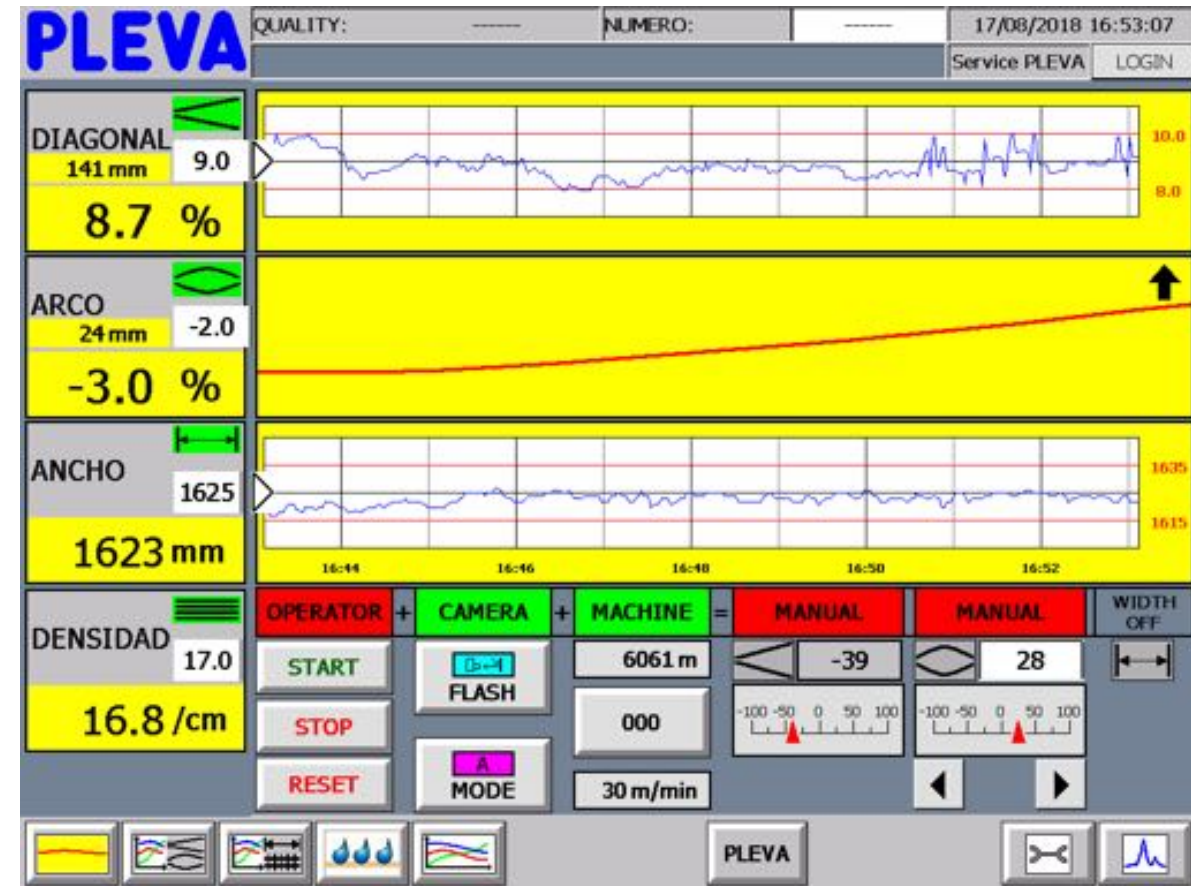
Advanced process control at Thermex Hotflue



2x AF 120 control minimal application at Matex Eco Applicator

SL controls pre-skewing and width in Thermex Hotflue, corrects bow and measures picks

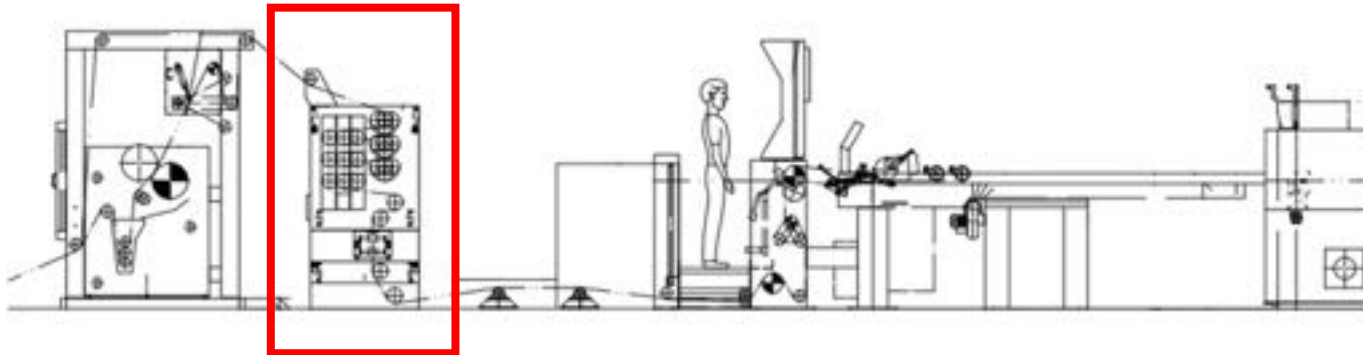
Advanced process control at Thermex Hotflue



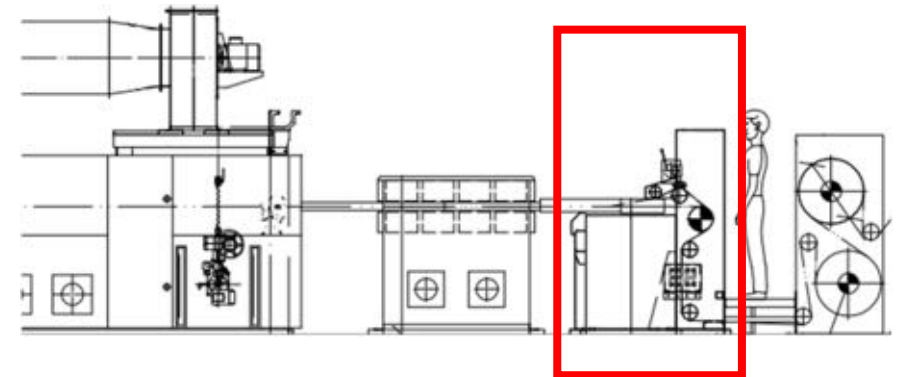
SL controls pre-skewing and width in Thermex Hotflue, corrects bow and measures picks

High-tech Straightening at Stenter

**Straight Liner
SL**

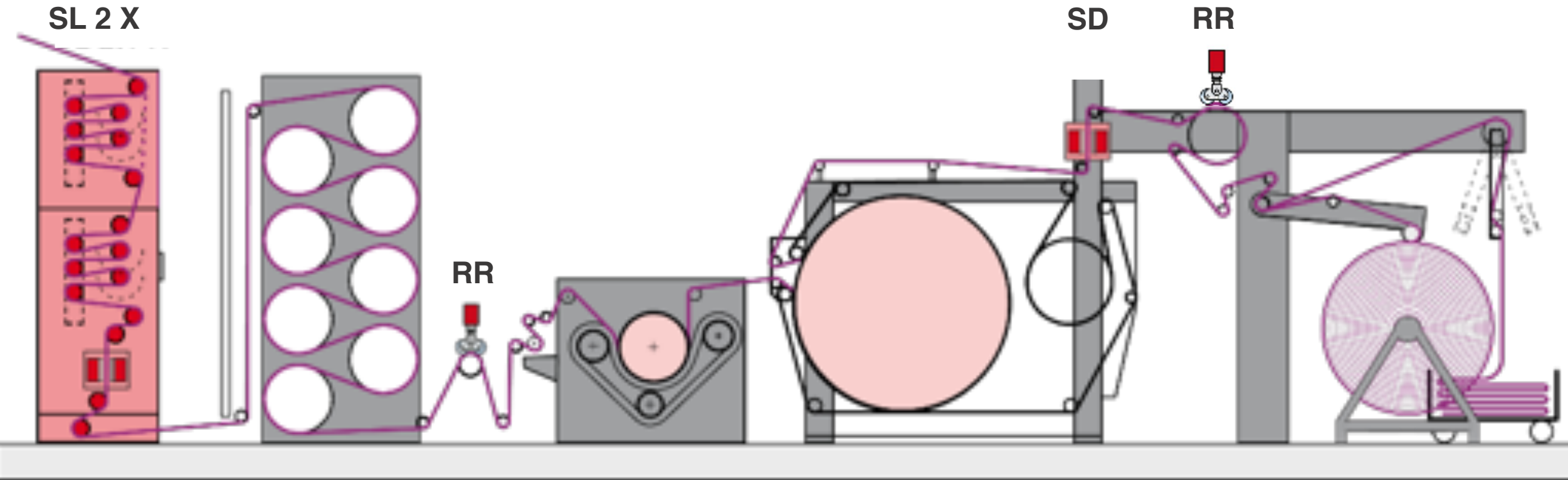


**Structure Detector
SD**



SL before stenter and SD after stenter

SL 2 + SD Denim conception for Sanforizer



SL 2 or SL 2 X
RR
SD traversing

Automatic pre-skewing for anti-twist of wet denim
Residual moisture before and after sanforizer
Quality report after sanforizer: Skew, bow, fabric width, pick density, length

SL 2 + SD Denim conception for Sanforizer

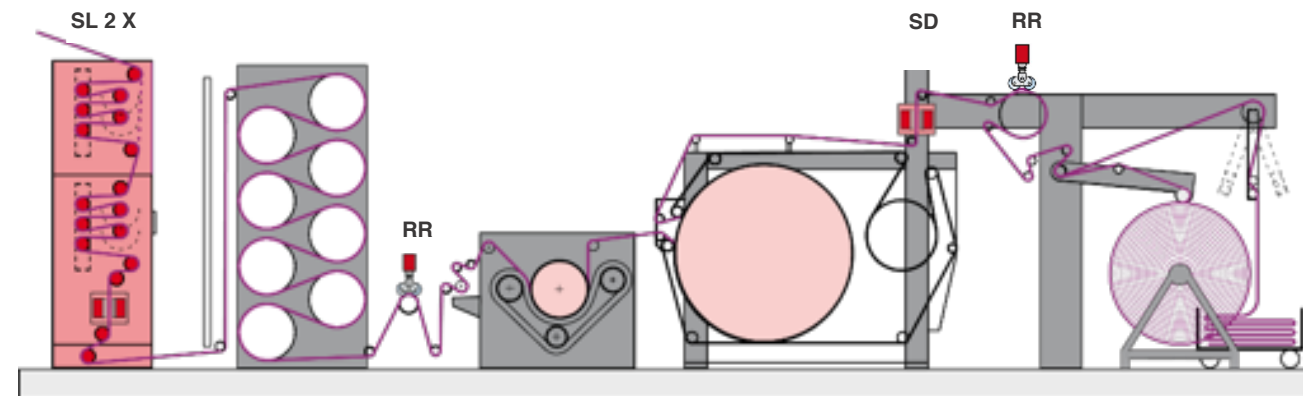
Pre-skewing with SL 2 X



Quality report with SD: Skew, bow, width, density, length



SL 2 + SD Denim conception for Sanforizer



	A	B	C	D	E	F	G	H
1	SL2.1 Inlet							
2	Date	Time	SKEW	BOW	Width	Picks	Speed	Meter
3	23.09.2016	00:01:23	11,2	0,4	64,2	37,97	38	852
4	23.09.2016	00:01:53	10,7	0	64,3	38,12	38	871
5	23.09.2016	00:02:23	11,3	0,6	64,3	37,87	38	890
6	23.09.2016	00:02:53	11,3	0	64,4	37,89	38	909
7	23.09.2016	00:03:23	11,1	0,7	64,2	37,54	38	929
8	23.09.2016	00:03:53	10,7	-0,2	64,3	37,74	38	947
9	23.09.2016	00:04:24	11,3	0,4	64,2	38,12	38	966
10	23.09.2016	00:04:54	10,5	0,3	64,3	37,79	38	985
11	23.09.2016	00:05:24	10,8	0,1	64,2	37,71	38	1004
12	23.09.2016	00:05:54	11,2	0,8	64,2	37,71	38	1023

46	Residual Moisture							
47	DATE	TIME	Left Moisture	Center Moisture	Right Moisture	Outlet Moisture	Speed	Meter
48	23.09.2016	00:01:24	14,5	14,1	14,3	6,4	38	852
49	23.09.2016	00:01:54	14,3	13,9	14,2	6,2	38	871
50	23.09.2016	00:02:24	14,2	14,0	14,2	6,3	38	890
51	23.09.2016	00:02:54	14,4	14,1	14,5	6,1	38	909
52	23.09.2016	00:03:24	14,4	14,2	14,7	6,1	38	929
53	23.09.2016	00:03:54	14,1	13,9	14,5	6	38	947
54	23.09.2016	00:04:24	13,9	13,7	14,3	6	38	966
55	23.09.2016	00:04:54	13,9	13,6	14,1	6,2	38	985
56	23.09.2016	00:05:25	14,0	13,8	13,9	6	38	1004
57	23.09.2016	00:05:54	14,0	14,1	14,0	6,2	38	1023

23	SD1C Outlet								
24	DATE	TIME	SKEW	BOW	Width	Picks	Speed	Meter	Shrinkage
25	23.09.2016	00:01:23	6,5	0	62	43,99	38	852	14,4
26	23.09.2016	00:01:53	6,2	-1	62,1	44,72	38	871	14
27	23.09.2016	00:02:23	6,8	-0,3	61,8	44,5	38	890	14,6
28	23.09.2016	00:02:53	7,3	-0,2	62	36,6	38	909	14,1
29	23.09.2016	00:03:23	7,5	-0,4	61,9	44,75	38	929	14
30	23.09.2016	00:03:53	7,1	-0,5	62,1	44,57	38	947	14,9
31	23.09.2016	00:04:24	7,1	-0,4	62	44,17	38	966	15,3
32	23.09.2016	00:04:54	7,1	-0,6	62	44,09	38	985	14,3
33	23.09.2016	00:05:24	7,3	-0,3	61,9	44,06	38	1004	13,8
34	23.09.2016	00:05:54	7,3	-0,4	62,1	44,47	37	1023	14
35	23.09.2016	00:06:24	7,3	-0,2	61,8	44,6	38	1042	14,5

Full control of all the **quality parameters**: CSV (USB, FTP), OPC UA, Profinet

Many thanks for your time!

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<https://www.linkedin.com/company/pleva-sensors-and-controls>