SENSOR SOLUTIONS

PAPER MILLS

- ➢ High-end – Web Break Detectors
- ➢ Moisture Measurement
- ➢ Web Edge-Control
- ➢ Splice – Glue Tape Detection

① RELIABLE WEB BREAK DETECTION

We offer solutions based on three different technologies:

- ## the classical sensors - SensoWeb „Standard"

  Fiber-optic infrared high-performance photo-sensors for applications in drying groups, press section, at the coater,…

- ## the compact sensors - SensoWeb „compact"

  High-performance photo-sensors and light-barriers for applications outside the drying group

- ## the smart sensors - SensoWeb „Felt"

  Intelligent fiber-optic multi-spectral NIR-sensors for break detection in single tier drying groups

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Your advantages

- ➲ technically matured, **thousand fold approved systems**
- ➲ highest **reliability:**
  no reflectors; no distortion through high temperatures,
  moisture or pollution
- ➲ sophisticated **pollution monitoring**
- ➲ high performance, high **pollution reserve**
- ➲ extremely **robust** systems with **long life time**
- ➲ manifold **configuration** possibilities
- ➲ investment assurance thanks to our **repair services**

THE CLASSICAL SENSORS

Web break detection in drying groups, press section, coater,…

SensoWeb „Standard"

With its highly performant fiber-optic concept SensoWeb "Standard" is <u>the</u> choice for reliable break detection in drying group and press section:
The sensor electronic can be mounted outside the drying hood and will be protected from heat and pollution. The light-signal is lead to the measuring point via fiber-optic cables. Inside the hot and polluted areas only the cantilever and fiber-optic cables are found.

SensoWeb „Standard" can be applied in „free draw" („open run") situations as well as in "paper on cylinder" applications.

SensoWeb "Standard" offers convicting advantages:
- ⮞ it works without reflector
- ⮞ applicable with temperatures up to 200°C
- ⮞ 3 specialized sensor heads
- ⮞ high resistance against pollution thanks to the high light performance
- ⮞ 4 different lengths of the cantilever
- ⮞ optimal alignment by means of mobile adjustment device („Intensitester")

SensoWeb "Standard" consists of:

a) high performance-infra red photo sensor	b) Heavy-duty Fiber-optic cable
➢ enormous light performance: sensing range up to 2 m! ➢ professional pollution monitoring: intensity display at the sensor case and/or analog signal ➢ robust polyester case ➢ 24 VDC / 115 VAC/ 230 VAC ➢ clamp or plug connection ➢ accessory: "Intensitester" (alignment aid)	➢ stainless steel-protective hose ➢ liquid proof, break protection, for temperatures up to > 200°C ➢ low transmission loss ➢ lengths up to 25 m!

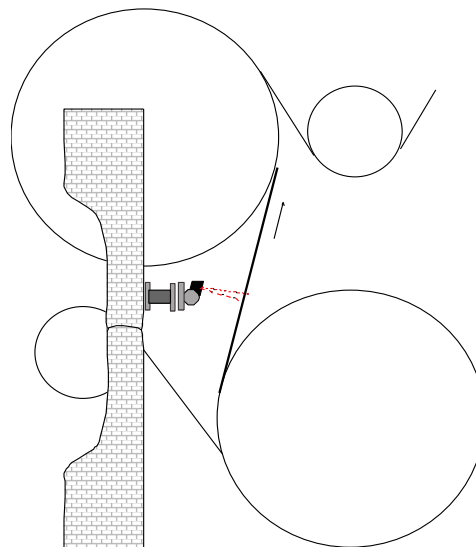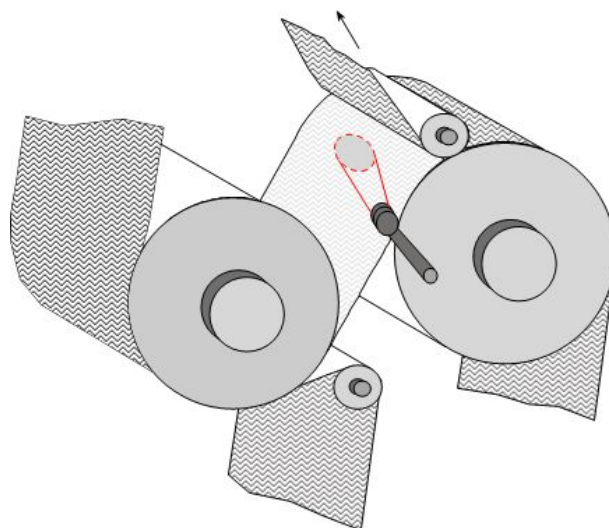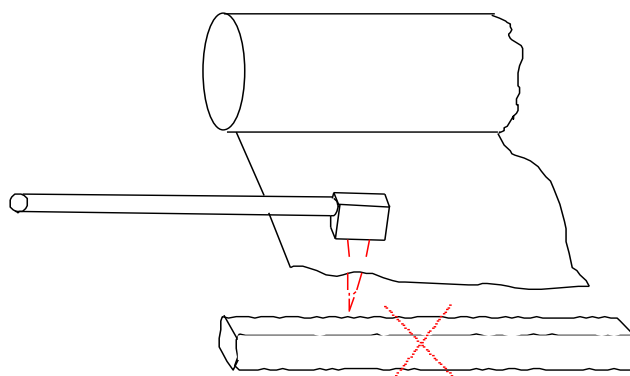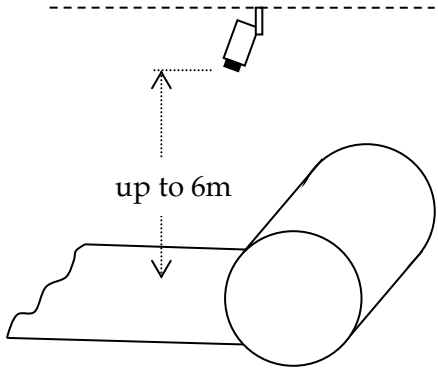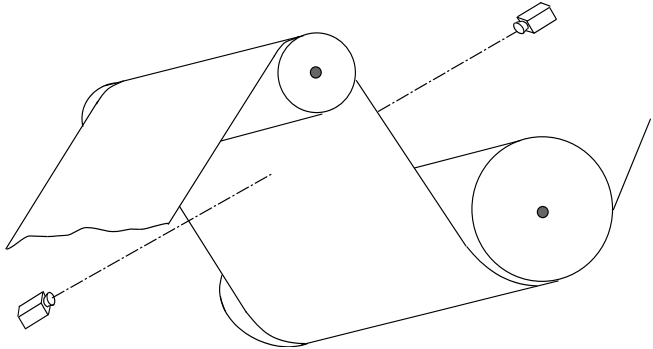| c) cantilever with sensor head …	…. for different applications:
sensor head „Standard" ➤ for open run or paper/cylinder ➤ applicable on drive side and/or operation side ➤ easy alignment by means of ball-joint bracket ➤ cantilever length 400 / 800 / 1200 / 1800mm	open run situations:
sensor head „Slalom" ➤ for paper/cylinder (between slalom groups) ➤ with air purge ➤ easy alignment by means of ball-joint bracket ➤ cantilever length 400 / 1200mm	paper on (steel) cylinder situations:
sensor head „Trian" ➤ for open run applications with distorting background (adjustable background elimination) ➤ optionally air flushable ➤ cantilever length 400 / 800 / 1200mm	open run with background:

THE COMPACT SENSORS

Web break detection without fiber-optic cable

For applications outside the high temperature areas we also offer non fiber-optic solutions: high performance- photo sensors and light-barriers that enable to realize even demanding applications:

- ➲ enormous light performance for high pollution tolerance
- ➲ highest working distances
- ➲ optional air purge
- ➲ temperatures up to 60°C

SensoWeb „compact"	… for extreme distances

➲ enormous light performance: sensing range up to 6 m
 ➲ professional pollution monitoring:
    o intensity display on sensor case
    o and /or analog signal
 ➲ optional with air purge for positions with high pollution
	➢ applicable in open runs at calendar, pope roller,… (for temperatures 60°C)
	 ➢ easy alignment by means of ball joint bracket

SensoWeb „compact-LB"	… for narrow open runs
➲ highly performant light barrier: sensing range up to 30m ➲ high pollution tolerance ➲ optional air purge ➲ also available in versions insensitive against extraneous light (FSP30-7)	➢ applicable for open run in press section, calendar, … (for temperatures < 60°C), especially when only narrow gaps are given ➢ high resistance against pollution ➢ easy alignment by means of ball joint bracket

APPLICATION	break detection in drying group, press section, coater, calendar,…	
Working distance	SenoWeb "Standard": SensoWeb „compact" SensoWeb „compact-LB":	app. 0,1-1 m up to 6 m up to 30m
Ambient temperatures	sensor head: up to > 200°C sensor: max. + 40° C / 60° C (depending on model)	
SENSOR	SensoWeb „Standard"/ „compact"	SensoWeb „compact-LB"
Light	IR, 880 nm, pulsed	
Sensitivity against extraneous light	insensitive against extraneous light	insensitive against extraneous light only models „FSP30-7"
Switching frequency	15 Hz	
Sensing range adjustment	18-gear potentiometer	
Electric data — Supply voltage	24 VDC / 115 VAC / 230 VAC	
Electric data — Power consumption	230 VAC: 22 - 26mA / 24 VDC: 120-200mA	
Outputs — Switching outputs (paper/alarm)	a) 2x SPDT-relays (NO/NC) b) 2x transistor output PNP/NPN c) 2x SPST relays (paper: 2x NO/2x NC/NO+NC) + SPDT relay (alarm)	a) 1x SPDT-relay (NO/NC)
Outputs — Analog signal	2 x 4-20mA: intensity, reference (only models FSP60A3/A4)	
Signal indicators	power (green), paper (yellow), alarm (red)	power (green), paper (yellow)
Pollution monitoring	FSP 60A2/A4: intensity display FSP 60A3/A4: analog signal	
Protection	IP 65	
Connection	clamp / plug connection	
FIBER-OPTIC CABLE	fiber bundle in stainless steel protective hose break protection, liquid proof, flexible, up to > 200°C low transmission loss length up to 25m	
CANTILEVER/SENSOR HEAD	stainless steel; length 400 – 1800 mm;	
	quick release mounting bracket MP 150-S	
	„Standard": „Slalom": „Trian":	with ball joint head (2,5D adjustment) ball joint head with air purge background elimination, air purge
ACCESSORIES	• console, height adjustable (128-200 / 200-340/340-600mm) • "Intensitester" - mobile alignment aid	

THE SMART SENSORS

Web break detection in single tier drying groups

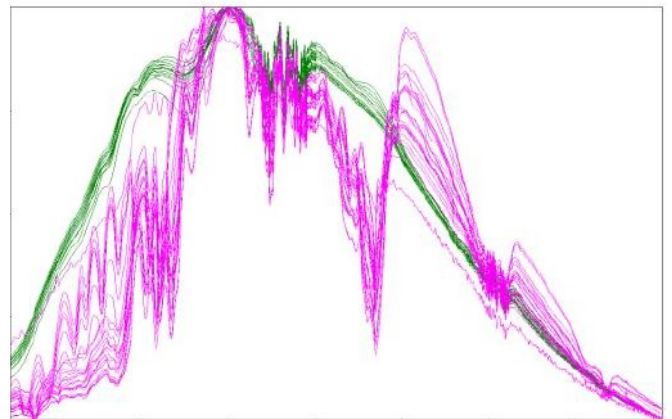The reliable detection of web breaks above felt background is no trivial task:

Whereas the absorption properties of paper and felt are too similar for classical photo sensors, color sensors often have problems to deal with varying colors in case of felt exchange or alteration of the felt material and the like.

SensoWeb "Felt" offers an innovative solution:

- ➲ quasi spectroscopic working principle
- ➲ near infrared (NIR)-light beyond classical photo sensors or color sensors
- ➲ paper and felt are recognized according to their *specific* absorption profile
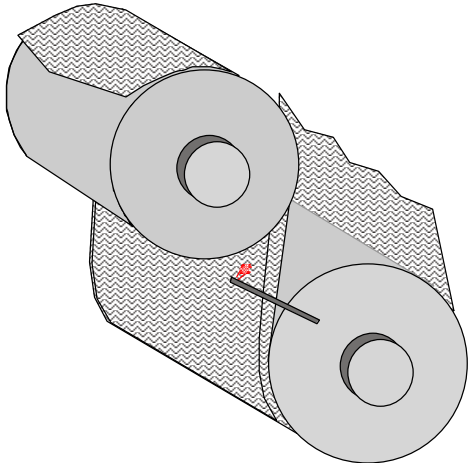
This way SensoWeb "Felt" is able to detect web breaks in drying groups also against felt background, reliably and fast.

The detector can be easily aligned, the parametrization is done by means of the PC-based user software „TriIdentMaster".

SensoWeb „Felt consists of:

a) Multispectral-NIR-Sensor	b) High-end Quartz glass-Fiber-optic cable
➤ distinguishes paper-web from felt thanks to innovative <u>near infrared</u>-technology ➤ the multispectral-sensor measures the material specific absorption profiles of paper and plastic (no color sensor!) ➤ parametrization via intuitive user software	➤ high value quartz glass-fiber bundle ➤ also protected in well-proven stainless steel hose (liquid proof, break protection, temperature proof up to >200°C) ➤ low transmission loss ➤ length up to 10 m

c) Cantilever with sensor head	
cantilever „tri²dent"	break detection against background felt
➤ high pollution resistance thanks to air purge ➤ stainless steel ➤ cantilever length 1200 mm	

TECHNICAL DATA   SENSOWEB „FELT"

APPLICATION		break detection in single tier drying groups
Working distance		app. 200mm
Ambient temperatures		sensor head up to > 200°C
		sensor: max. + 50° C
SENSOR		
Light		NIR, 1-2µm, pulsed
Sensitivity against extraneous light		insensitive against extraneous light
Switching frequency		~ 20 Hz
Sensing range adjustment		PC-software "TriIdentMaster"
Electric data	Supply voltage	24 VDC / 230 VAC
	Power consumption	230 VAC: 22 - 26mA / 24 VDC: 120-200mA
Outputs	Switching outputs (paper/alarm)	2x SPDT-relays (NO/NC)
	analog signal	2 x 4-20mA: break signal, intensity
Signal indicators		power (green), paper (yellow), alarm (red)
Pollution monitoring		analog signal "intensity"
Protection		IP 65
Connection		clamp / plug connection
FIBER-OPTIC CABLE		quartz glass fiber bundle in stainless steel protective hose break protection, liquid proof, flexible, up to > 200°C low transmission loss length 6,5 / 8 / 10m
CANTILEVER/SENSOR HEAD		stainless steel; length 400 – 1800 mm; quick release mounting bracket air purge
ACCESSORIES		• console, height adjustable (128-200 / 200-340/340-600mm)

② MOISTURE MEASUREMENT – EVEN IN HIGH TEMPERATURE

The measurement of the material moisture anywhere along the production line may be of vital interest for improved process control in paper, board and pulp production:

It may help to intensify the knowledge of individual process steps, to improve process control and to improve product quality.

Furthermore it may contribute to decrease the costs of energy in energy intensive processes on press section and drying group.

SensoWeb „Moist" is the first fiber-optic moisture sensor for application also in the drying group:

- ⊃ contact less
- ⊃ applicable also in extreme environmental conditions (temperatures up to > 200°C, humidity, pollution)
- ⊃ installable in almost any position along the paper machine

Applications in paper manufacturing enclose e.g.:

- ➢ Optimization of the press efficiency
- ➢ Monitoring of the dry matter content at the entrance or exit of the drying group
- ➢ Monitoring of the moisture of the feed strip
- ➢ Optimization of the vacuum-parameters
- ➢ Optimization of the coating process, …

The sensor delivers the relative moisture content of the paper web via an analog signal (4-20mA).

The parametrization of the moisture sensor is done by means of the PC based user software „TriIdentMaster".

TECHNICAL DATA   SENSOWEB "MOIST"

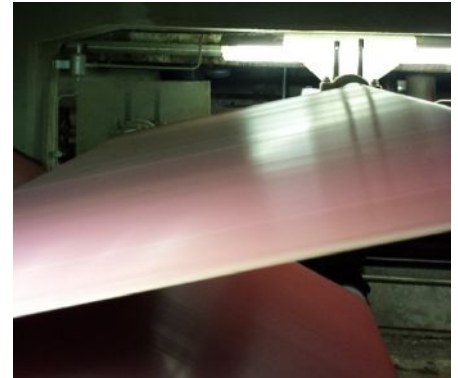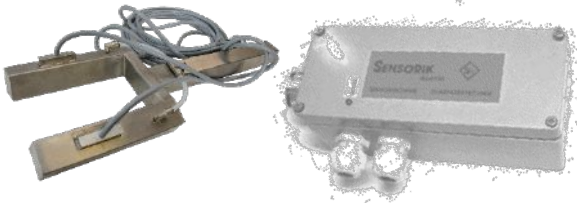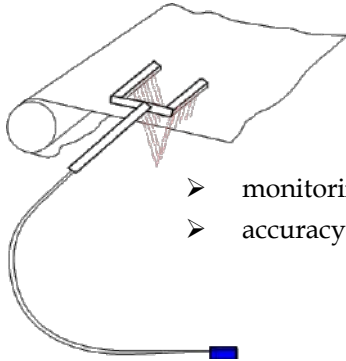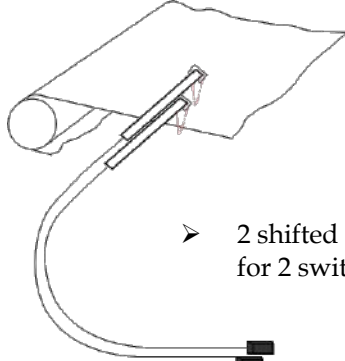| APPLICATION	measurement of the moisture content of paper, board, pulp (relative moisture)
Working distance	100 mm (sensor head – paper web)
Ambient temperatures	up to >200°C
SENSOR	tri²dent multi spectral sensor
Light	NIR, 1-2µm, pulsed
Measuring range	0 – 80% relative moisture content
Supply voltage	24VDC / 230VAC
Sensitivity against extraneous light	insensitive against extraneous light
Outputs	up to 4 x analog signal (4-20mA)
Pollution monitoring	analog signal
Signal indicators	power (green)
Protection	IP 65
Connection	clamp connection
Ambient temperatures	- 10° ... + 50° C
FIBER-OPTIC CABLE	quartz glass fiber bundle in stainless steel protective hose low transmission loss
Protection	break protection, liquid proof, flexible, up to > 200°C
Length	6,5 /8/10 m
CANTILEVER/SENSOR HEAD	stainless steel, 2D-adjustment (longitudinal, radial) quick release mounting bracket MP 150-S
Length	1200 mm
Pollution prevention	air purge
ACCESSORIES	calibration plate console, height adjustable (128-200mm / 200-340mm/340-600mm)

③ WEB EDGE CONTROL

SensoWeb „Edge"

If the given felt guides won´t sufficiently manage the horizontal oscillation of felt or paper web, or the abrasion of mechanical sensors is too high, our fiber-optic edge control sensors offer an interesting alternative:

- ➲ contactless and not abrading
- ➲ applicable also in high temperature areas
- ➲ with analog or binary output
- ➲ with background elimination

(Please note: our systems do not include any actors)

SENSOWEB "EDGE" - ANALOG	movement monitoring for pro active steering
➢ sensor: FSP60A3-xxxx-W ➢ fiber-optic cable: LQ12-Type, Silicon cover, up to 10m length	➢ monitoring width: up to 200 mm ➢ accuracy: +/- 5mm
SENSOWEB "EDGE" - BINARY	limit position detection
➢ sensor: EFS 2000 ➢ fiber-optic cable: LY/6- Type, Stainless steel cover, up to 12m length	➢ 2 shifted parallel sensor systems for 2 switching points

TECHNICAL DATA:

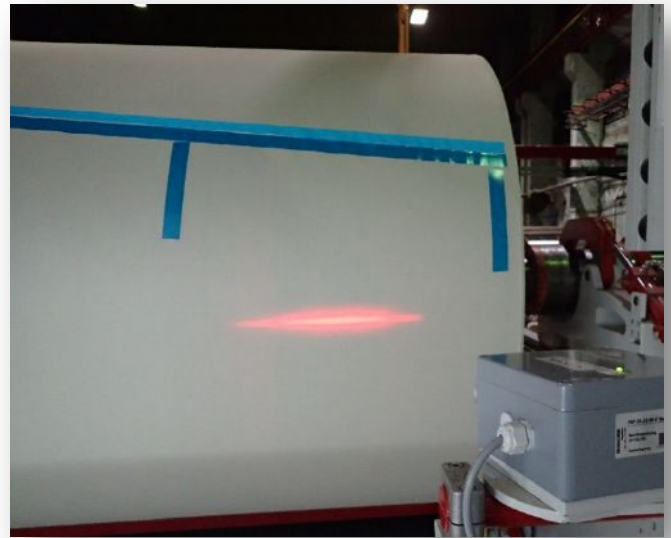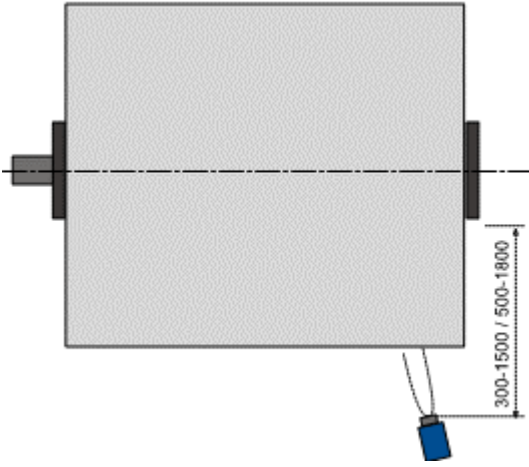|	SensoWeb "Edge" - Analog	SensoWeb "Edge" - Binary
Supply voltage	24 VDC / 230 VAC	10-30 VDC
Switching output	analog output (4-20mA)	transistor output
Connection	clamp connection	Cable / plug connection
Switching frequency	100 Hz	
Air purge	yes	
Working distance	ca. 150 mm	

④ FLYING-SPLICE GLUE-TAPE RECOGNITION

SensoWeb „Splice"

Tambours, which shall be processed in flow process in a subsequent offline- coater, calendar etc., are mutually connected on the run, with special glue tapes.

SensoWeb „Splice" enables to optimize this „flying splice"- process:

- ➲ by detecting the glue tape, the circumferential velocity can be computed without any further marking
- ➲ the glue tape can be detected along an impressive sensing range, therefore both on small and big tambours (300…1800mm)
- ➲ the completely "repulpable" glue tapes can be redirected in the pulper after the slitter winder

GLUE-TAPE SENSOR FSP25D	… for big <u>and</u> small tambours
➢ contactless and not abrading ➢ for blue "Splice- glue tapes" (zB. Tesa easy splice) ➢ short response time ➢ optimized working range	300-1500 / 500-1800

TECHNICAL DATA:

Measuring principle	IR-analog sensor
Supply voltage	24 VDC / 230 VAC
Switching output	solid state relay SPST
Connection	clamp connection
Switching frequency	10 kHz
Sensing range	300 – 1500 // 500 - 1800 mm

➢ more than **30 years**' experience in paper mill´s sensors

➢ tailor made sensor solutions for toughest conditions

➢ app. 200 paper mills equipped, worldwide

✓ Highest quality due to inhouse manufacturing and manual confectioning
✓ 100% quality- & function control before shipment
✓ Repair service for sensors and fibre optics in house

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