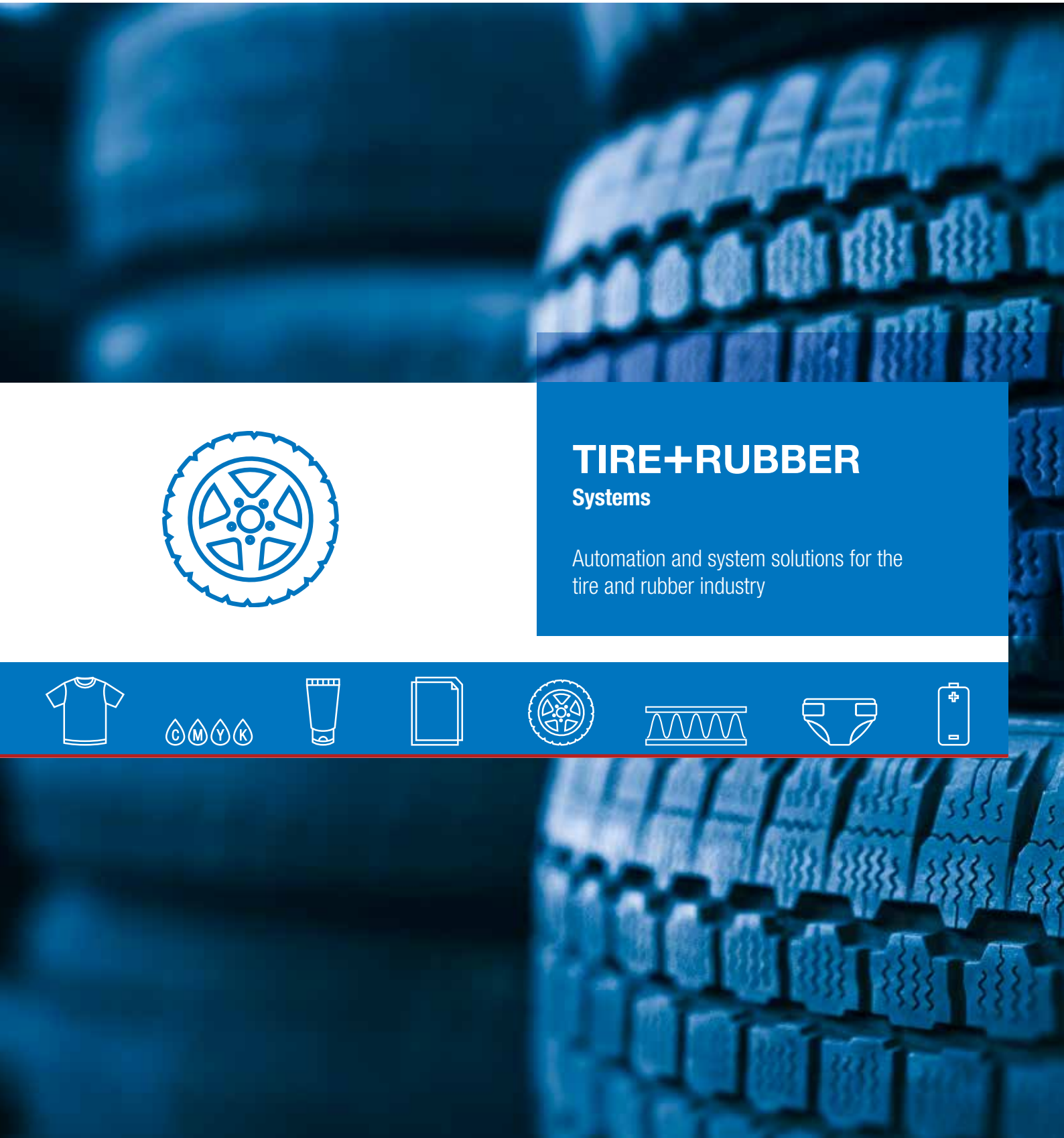


TIRE+RUBBER

Systems

Automation and system solutions for the tire and rubber industry

Content

ELGUIDER/pivoting frame systems from E+L

Function

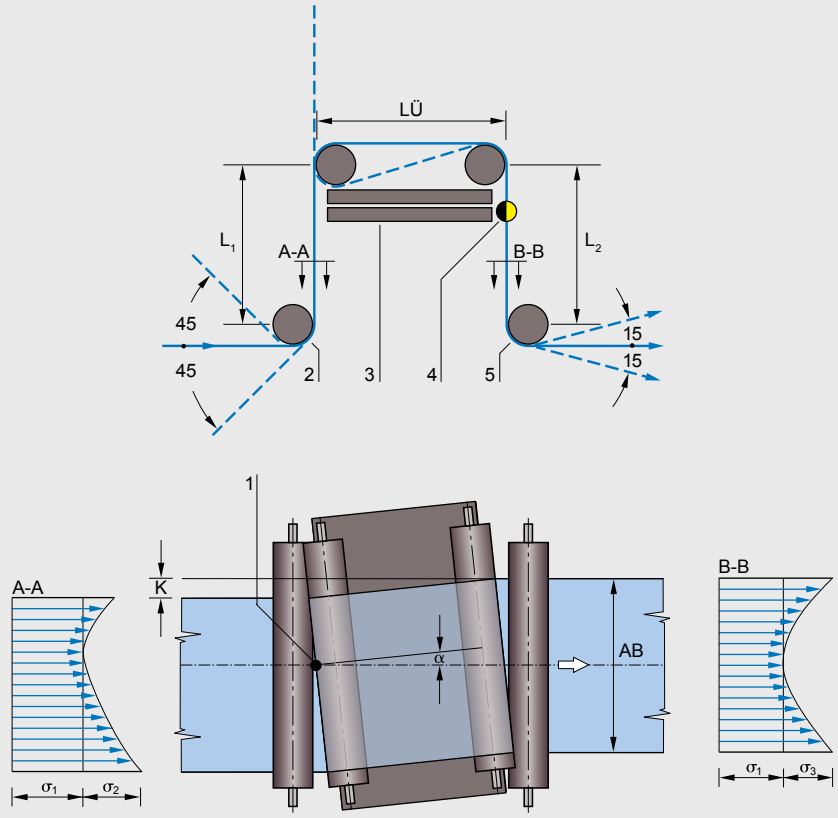
On an ELGUIDER pivoting frame system, the web changes direction four times, each time by 90°. The system is based on a pivoting frame with two path rollers. The imaginary pivot point is located on the infeed plane. Lateral web corrections can only be achieved by pivoting around this pivot point. The prerequisite here is always sufficient tension for traction between the web and the guide roller.

Area of use

Thanks to optimized exploitation of elasticity ranges, the pivoting frame is particularly suited to use even in really tight spaces.

Application

The greater the web tension, the module of elasticity and the required correction, the longer the infeed, outfeed and transfer paths should be designed. Experience has shown that these paths should be the equivalent of 60 to 100% of the web width. The sensor should be positioned behind the positioning roller, as near to it as possible.



Legend

A-A	Web tension distribution at infeed
B-B	Web tension distribution at web outfeed
K	Web correction
a	Correction angle max. ±5°
s1	Basic web tension
s2	Tension distribution due to pivoting movement of the roller frame at the infeed
s3	Tension distribution due to pivoting movement of the roller frame at the outfeed
1	Pivot point
2	Infeed roller
3	Roller frame
4	Sensor
5	Locking roller
LÜ	Transfer length
L1	Infeed path
L2	Outfeed path
AB	Operating width

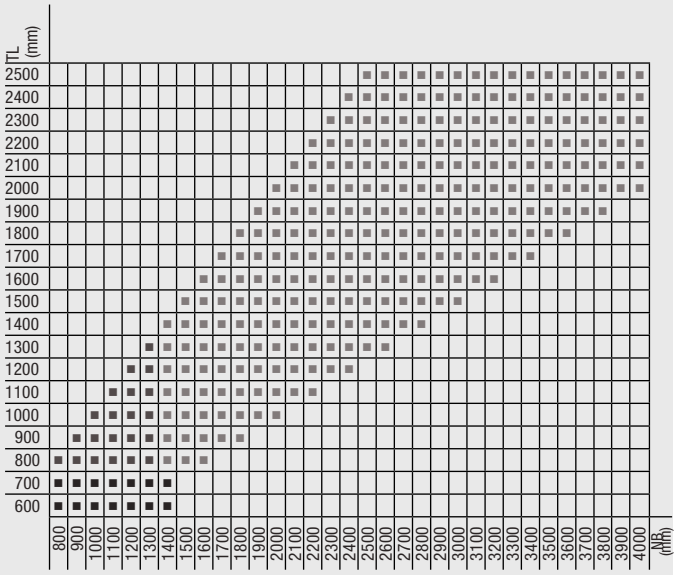
Pivoting frame system DRB73

+ Pivoting frame system with wear-free, brushless digital drive technology for the highest control accuracy and control dynamics
+ Can be combined with infrared wide band sensor FE 46 or CCD camera OL 82
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

Pivoting frame system DRB73

Selection table

ELGUIDER DRB73



TL = Transfer length NW = Nominal width

Technical data

Positional accuracy	< ± 0.15 mm (sensor-dependent)
Nominal actuating travel TL 600 to 700 mm TL 800 to 1300 mm TL 800 to 2500 mm	 Max. ±25 mm Max. ± 50 mm Max ± 80 mm
Nominal actuating speed at outfeed roller	1 to 30 mm/s (AG 93 with F = 3000 N)
Web tension	Max. 2000 N (strengthened version up to 3000 N, optionally up to 20,000 N)
Roller diameter	100/120/160/200 mm
Ambient temperature	+10°C to +50°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 7.7 A DC
Field bus interface	Ethernet UDP/IP, EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

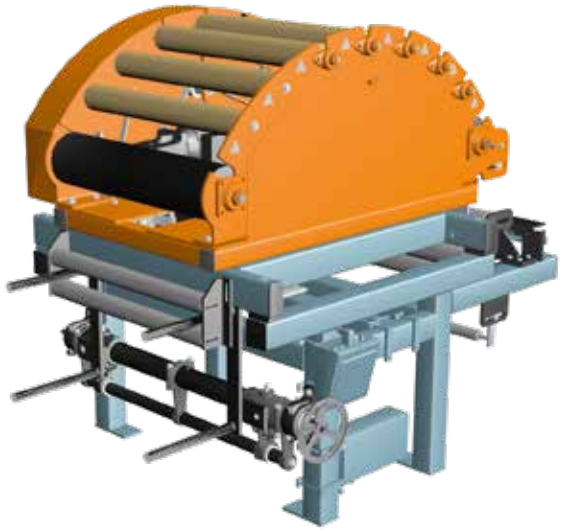
FE 46, OL 82
Other sensors on request

Actuators

AG 9

Pivoting frame system DRB73 with roller basket

+ Pivoting frame system with roller basket for control of steel cord from the loop
+ Wear-free, brushless digital drive technology for highest control accuracy and control dynamics
+ Can be combined with CCD line scan camera OL 82 in conjunction with camera computer DO 82
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36



Technical data

Positional accuracy	< ± 0.2 mm
Nominal width	500 - 700 mm
Transfer length	1300 mm
Nominal actuating travel	Max. ±25 mm
Nominal actuating speed	1 to 30 mm/s (AG 93 with F = 3000 N)
Web tension	Max. 2000 N
Roller diameter	2 x 168 / 5 x 84 mm
Ambient temperature	+10°C to +50°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC
Field bus interface	Ethernet UDP/IP, EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

OL 82
Other sensors on request

Actuators

AG 9

ELROLLER – Steering roller systems

Function

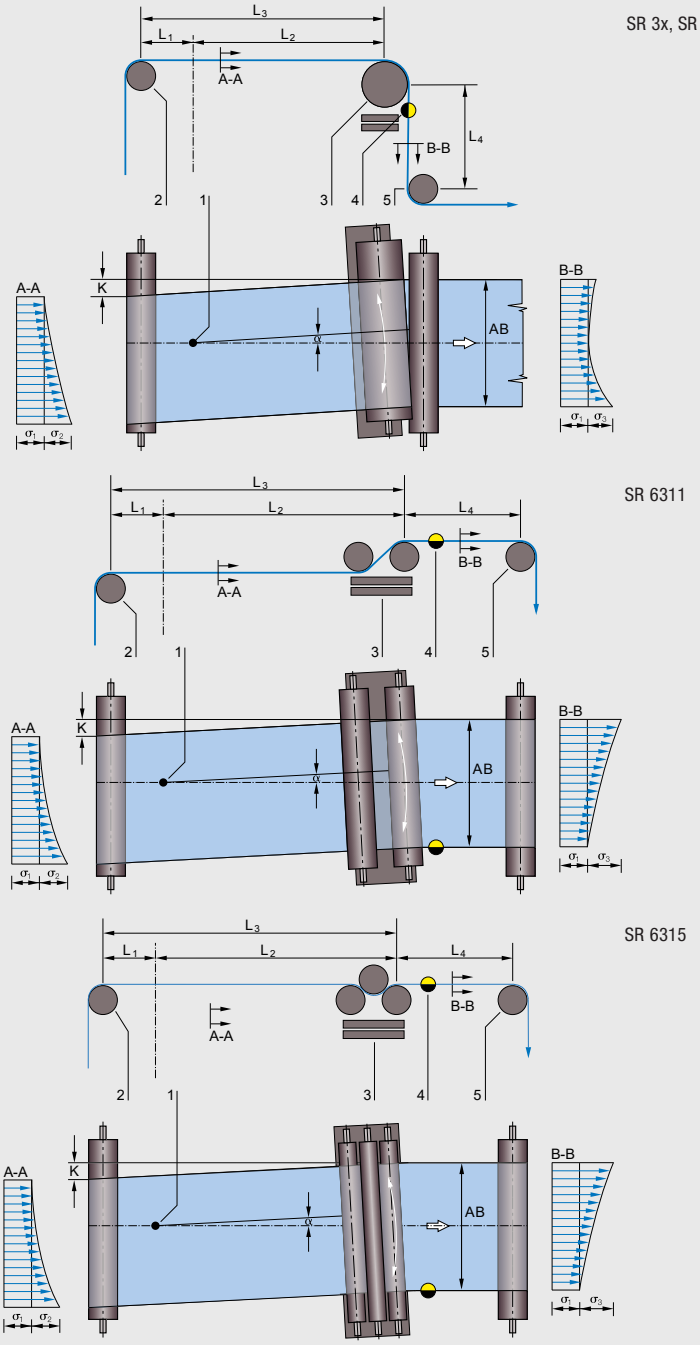
ELROLLER steering roller systems already correct the web position on the infeed plane. They consist of a fixed base frame and a movable guide frame. The latter accommodates one or two positioning rollers and swivels round an imaginary pivot point on the infeed plane. The pivot point should, on the one hand, be far enough away from the infeed roller to ensure that the web correction does not influence the infeed roller. On the other hand, it must be far enough away from the guide roller to ensure that the elasticity of the web may be fully exploited but not over-strained. A steering roller is termed a proportional actuator. It must therefore operate friction-locked and may not permit any sliding between the web and the guide roller.

Area of use

ELROLLER systems are always used where there is a long entry path due to technical process reasons.

Application

Depending on the space available, steering rollers may be fitted with one, two or three guide rollers. On versions with one guide roller (SR 3x, SR 4x), the web is guided with a wrap angle of 90°. On versions with two or three guide rollers, a lesser wrap angle is possible. In this case, the web runs at almost the same level as the outfeed roller. The following applies when mounting an ELROLLER: the infeed path should be the equivalent of two to three times the web width, the outfeed path should be approx. 50% of the web width. The position of the sensor in the outfeed depends on the particular application.



Legend

A-A	Web tension distribution at infeed
B-B	Web tension distribution at web outfeed
K	Web correction
α	Correction angle
σ_1	Basic web tension
σ_2	Tension distribution due to pivoting movement of the roller frame at the infeed
σ_3	Tension distribution due to pivoting movement of the roller frame at the outfeed
1	Pivot point
2	Infeed roller
3	Positioning roller
4	Sensor
5	Locking roller
L_1	Infeed path to pivot point
L_2	Infeed path from pivot point to steering roller
L_3	Infeed path
L_4	Operating width

Steering roller system SRB33

+ Compact steering roller system with one or two rollers for different wrap angles and wear-free, brushless digital drive technology for highest control accuracy and control dynamics.
+ Can be combined with FR 53 infrared edge sensor for reliable detection of rubber edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

Steering roller system SRB73

Selection table

Type	NB min. (mm)	NB max. (mm)
SR 3319	200	250
SR 3329	300	350

Technical data

Positional accuracy	< ± 0.15 mm (material-dependent)
Nominal width	200/250/300/350 mm
Nominal actuating travel	± 22 mm
Nominal actuating speed at outfeed roller	1 to 60 mm/s
Web tension	Max. 200 N
Roller diameter	60/80 mm
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Current draw	Max. 5.5 A DC
Field bus interface	Ethernet UDP/IP, EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

FR 53

Actuators

AG 9

Steering roller system SRB43

+ Compact steering roller system with one roller and wear-free, brushless digital drive technology for highest control accuracy and control dynamics.
+ Can be combined with infrared photoelectric scanner for detection of the web edge
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

Selection table

Type	NB min. (mm)	NB max. (mm)	with PD 2115
SR 4309	400	600	
SR 4309	300	500	x
SR 4319	700	800	
SR 4319	600	700	x
SR 4329	900	1200	
SR 4329	800	1100	x
SR 4339	1300	1800	
SR 4339	1200	1700	x

Technical data

Positional accuracy	< ± 0.15 mm (material-dependent)
Nominal width	400 to 1800 mm
Nominal actuating travel	±25 mm
Nominal actuating speed at outfeed roller	1 to 60 mm/s (AG 91 with F = 1000 N)
Web tension	Max. 500/700 N
Roller diameter	120 mm
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC (manual sensor positioning)
Field bus interface	Ethernet UDP/IP, EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors
Tippkemper

Actuators
AG 9

Steering roller system SRB63

+ Compact steering roller system with two or three rollers and wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry.
+ Can be combined with infrared wide band sensor FE 46 or CCD cameras OL 82 for detection of the tire cord and rubber edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

SRS63 with 2 rollers

SRS63 with 3 rollers

Selection table

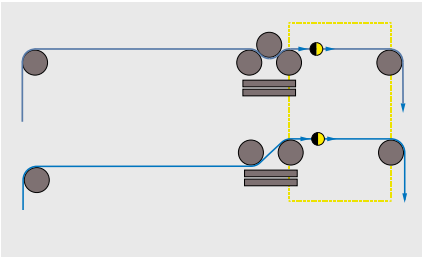
Type	Ø roller (mm)	Number of rollers	Web tension max. (N)
SR 6311 KBT 0900	157	2	5,000
SR 6315 KBT 0900	120	3	20,000

Sensors

FE 46, OL 82

Actuators

AG 9



Technical data

Positional accuracy	< ± 0.15 mm (sensor-dependent)
Nominal width	1400 to 1800 mm
Nominal actuating travel	± 75 mm
Nominal actuating speed at outfeed roller	1 to 30 mm/s (AG 93 with F = 3000 N)
Web tension	See selection table
Roller diameter	See selection table
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 7.7 A DC
Field bus interface	Ethernet UDP/IP/IP, EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

ELWINDER – Winding station controllers

Function

In production processes with moving webs, there is typically an unwinding station at the machine infeed and a rewinding station at the outfeed. During unwinding, the winding station is moved via a linear drive to feed the web in the desired position. On the other hand, during rewinding, the winding station follows the constantly changing web position via a linear drive to achieve an evenly wound reel.

Area of use

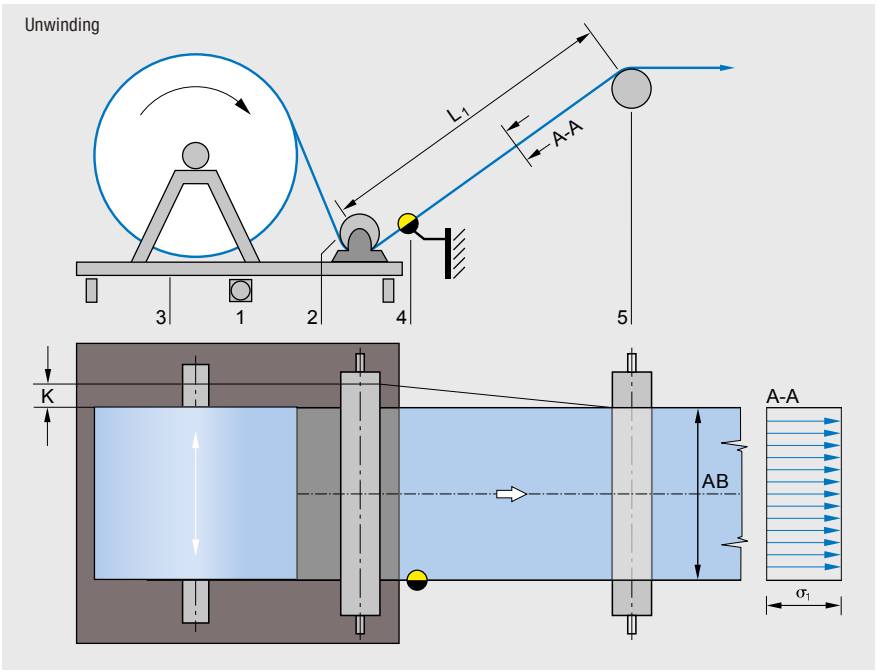
Web guiders with ELWINDER winding stations are used wherever it is not possible to use ELGUIDER or ELROLLER systems due to lack of space.

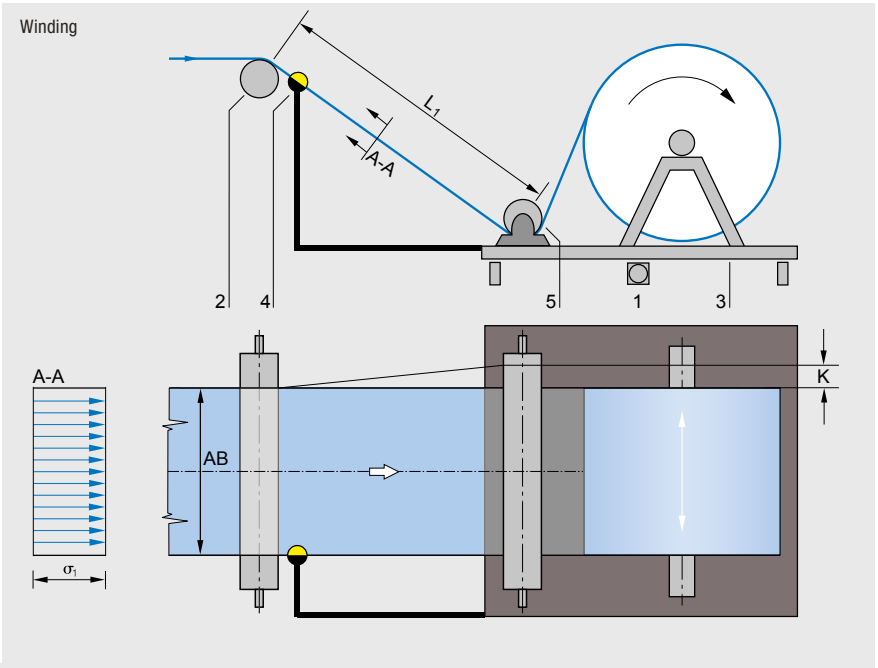
Application, unwinding

During unwinding, the sensor is mounted on the machine frame to define the target web position. Here, the position detection system should be located as close to the final winding station guide roller as possible.

Application, rewinding

During rewinding the sensor is fastened to the movable winding station to set the target position of the winding station for the controller. Here, the position detection system should be located as close to the final machine guide roller as possible. The guiding path L1 depends on the elasticity of the web. The larger the transverse elasticity range, the shorter the path L1 can be. Experience has shown that the guiding path should be the equivalent of half a web width.





Legend

A-A	Web tension distribution on the guiding path	1	Linear drive
K	Web correction	2	Infeed rollers
α	Basic web tension	3	Winding station
AB	Operating width	4	Sensor
		5	Locking roller
		L1	Guiding path

Winding station system WSB91 / WSB93

+ Control components for winding stations with wear-free, brushless digital drive technology for highest control accuracy and control dynamics
+ Can be combined with infrared edge sensor FR 53 or infrared wide band sensor FE 46 or CCD camera OL 82
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36
+ Optionally with camera computer DN 1002 or with graphical touchscreen operating unit DO 3301/3311 or OP 36.


OP 36


DO 3301


Actuating drive AG 9


DN 1002

Selection table

Type	Nominal actuating travel (mm)	Nominal actuating force (N)
AG 9101	±25	1000
AG 9111	±50	1000
AG 9121	±75	1000
AG 9311	±50	3000
AG 9331	±100	3000

Technical data

Positional accuracy	< ± 0.15 mm (sensor-dependent)
Nominal actuating travel	± 25 / 50 / 75 / 100 mm
Nominal actuating speed	1 – 30 mm/s (AG 93) 1 – 60 mm/s (AG 91)
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC (AG 91 with manual sensor positioning) Max. 7.7 A DC (AG 93 with manual sensor positioning)
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors
FE 46, FR 53, OL 82

Actuators
AG 9

Type	WBM	Graph. touch	Fieldbus
OP 36	x	x	–
DN 1002	–	–	Ethernet UDP/IP, EtherNet/IP, optionally Profinet and other databus systems Up to 4 systems can be networked/operated
DO 33	–	x	Ethernet UDP/IP, EtherNet/IP

ELPLACER – Lateral displacement roller systems

Function

ELPLACER lateral displacement roller systems position running webs via axial adjustment of the positioning roller. Here, if the positioning roller reaches the end position, the material is lifted by a device, the positioning roller is centered and the web is set back down. As the lateral displacement roller is only used in production systems with cycled operation, the process of lifting the web must always take place during stop times.

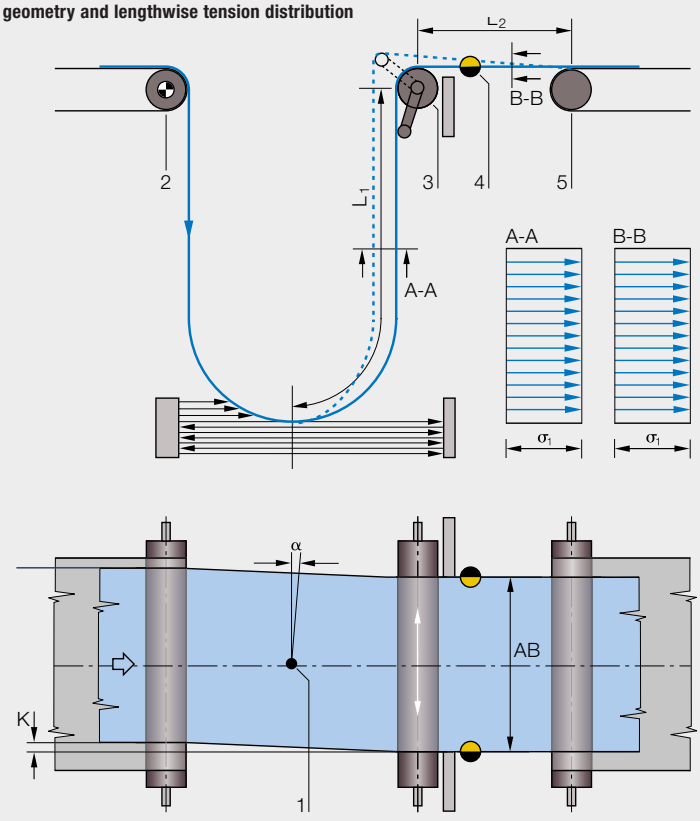
Area of use

The field of applications extends primarily to tire building machines, as the webs like the ply and the inner liner are fed in from the loop in cycled operation.

Application

The infeed always takes place from the loop from the bottom upward and should be kept as short as possible. The sensor should be positioned behind the positioning roller, as near to it as possible. Here, the infeed length should be half to a full web width.

Guiding geometry and lengthwise tension distribution

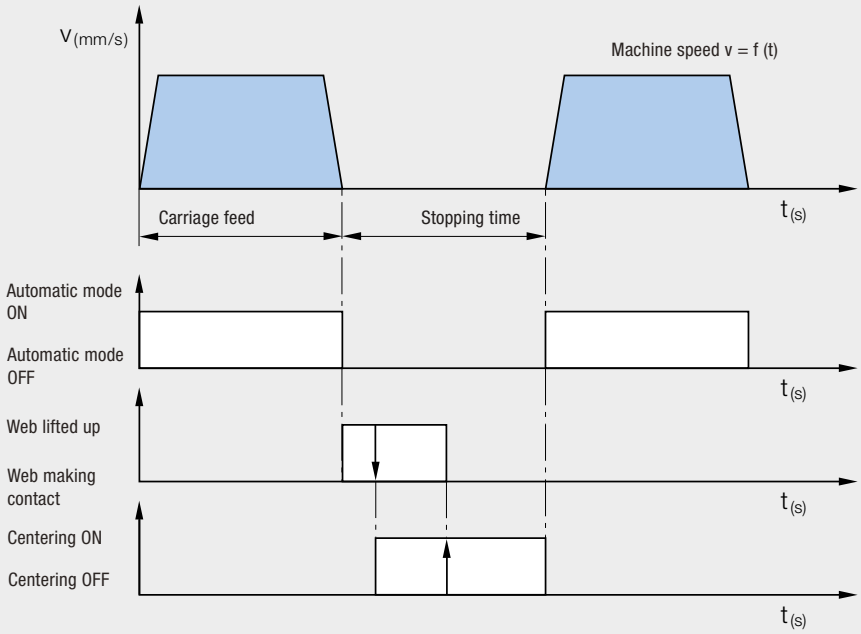


Legend

A-A	Web tension distribution at infeed
B-B	Web tension distribution at web outfeed
K	Web correction
α	Correction angle
σ_1	Basic web tension

1	Pivot point
2	Infeed roller
3	Lateral displacement roller
4	Sensor
5	Locking roller
L_1	Infeed path
L_2	Outfeed path

Function sequence – lateral displacement roller



Lateral displacement roller system SVB13

+ Compact lateral displacement roller system with one roller for pre-control of internal insulation (inner liner) / carcass (ply) on the tire building machine
+ Wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry
+ Can be combined with infrared edge sensor FR 53 or infrared wide band sensor FE 46 for detection of rubber edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

Technical data

Positional accuracy	< ± 1 mm (material-dependent)
Nominal width	600 to 1900 mm
Nominal actuating travel	± 50 mm
Nominal actuating speed at outfeed roller	1 to 60 mm/s (AG 91 with F = 1000 N)
Web tension	500 N
Roller diameter	160 mm
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54
Operating pressure, lifting device	3 bar

Sensors

FE 46/ FR 53
Other sensors on request

Actuators

AG 9

Lateral displacement roller system SVB23

+ Compact lateral displacement roller system with 2 rollers for pre-control of 2 sidewalls on the tire building machine
+ Wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry
+ Can be combined with infrared edge sensor FR 53 or infrared wide band sensor FE 46 for detection of rubber edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

Technical data

Positional accuracy	< ± 1 mm (material-dependent)
Nominal width	2 x 300 to 600 mm
Nominal actuating travel	± 50 mm
Nominal actuating speed at outfeed roller	1 to 60 mm/s (AG 91 with F = 1000 N)
Web tension	2 x 250 N
Roller diameter	160 mm
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54
Operating pressure, lifting device	3 bar

Sensors

FE 46/ FR 53

Actuators

AG 9

Lateral displacement roller system SVB43

+ Compact lateral displacement roller system with 3 rollers for pre-control of a tread on the tire building machine
+ Wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry
+ Can be combined with infrared edge sensor FR 53 and infrared wide band sensor FE 46 for detection of rubber edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

Technical data

Positional accuracy	< ± 1 mm (material-dependent)
Nominal width	400 to 1550 mm
Nominal actuating travel	± 75 mm
Nominal actuating speed at outfeed roller	1 to 60 mm/s (AG 91 with F = 1000 N)
Web tension	500 N
Roller diameter	3 x 60 mm
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54
Operating pressure, lifting device	3 bar

Sensors

FE 46/ FR 53

Actuators

AG 9

ELSMART – Segmented roller guider systems

Function

Guiding slats arranged around the circumference form the basis of the web guiding. In the basic version, the guiding slats are fixed to a guide plate so that they can be adjusted to the side via an actuating drive. In the case of segmented guiding slats, both guide plates are connected with a push rod and adjusted synchronously via an actuating drive. This means that, in addition to the web guiding function, the system also acts as a spreader on the textile web.

When using two actuating drives, two webs can be controlled independently of each other, or a transversely elastic web can be regulated based on a target width.

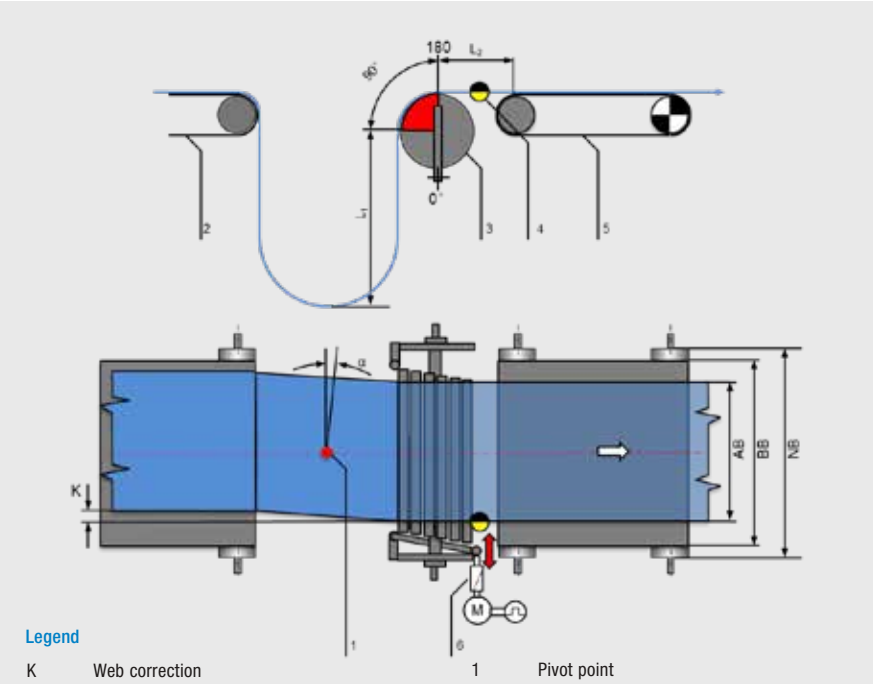
Area of use

Thanks to the minimal degree of material stressing by the segmented roller guider, the ELSMART system for web guiding and spreading can be used in practically all production processes.

Application

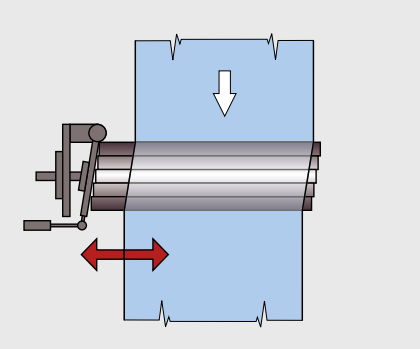
Segmented roller guiders can be used freely in terms of position.

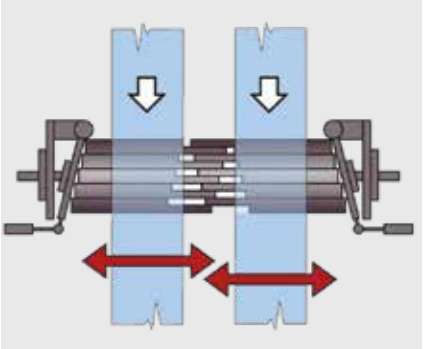
Here, wrapping of 90° is a mandatory requirement. Entry point 90°, exit point 180°. The infeed path should be at least one web width. By contrast, the outfeed should be kept as short as possible. Rolled-in edges can be rolled out in the infeed plane with the aid of an additional spreading device.



Legend

K	Web correction	1	Pivot point
α	Correction angle	2	Infeed conveyor belt
AB	Operating width	3	Segmented roller guider
BB	Belt width	4	Sensor
NB	Nominal width	5	Conveyor belt fixing
L_1	Infeed path	6	Actuating drive
L_2	Outfeed path		





Web guiding only

The version with undivided guide profiles across the full web width offers a particularly cost-effective solution for web guiding only.

Two-lane operation

With this design, two webs can be controlled individually independently of each other using split guiding slats and two independent drives. Spreading is not possible in this mode.

Segmented roller guider system SWB11

+ Compact segmented roller guider system for controlling one or two webs from the loop
+ Wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry
+ Can be combined with infrared wide band sensor FE 46, FR 60 und OL 82 for detection of the edges of the tire cord and rubber
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser and via OP 34/OP 36

Technical data

Positional accuracy	± 1 mm (sensor-dependent)
Operating width	300 to 2600 mm
Nominal actuating travel	± 17.5 mm
Nominal actuating speed	up to 42 mm/s (AG 91 with F = 1000 N)
Web tension	500 N
Correction range	± 100 mm (depending on web width, infeed path and web type)
Roller diameter	160 mm
Profile coating	Stainless steel profile with non-stick coating
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.6 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Selection table

Type	Sensor	Type of control
SW 1162 KBT 0801	FE 46	Web center, single web
SW 1180 KBT 0801	FR 60	Web edge, two-web

Sensors

FE 46, FR 60, OL 82

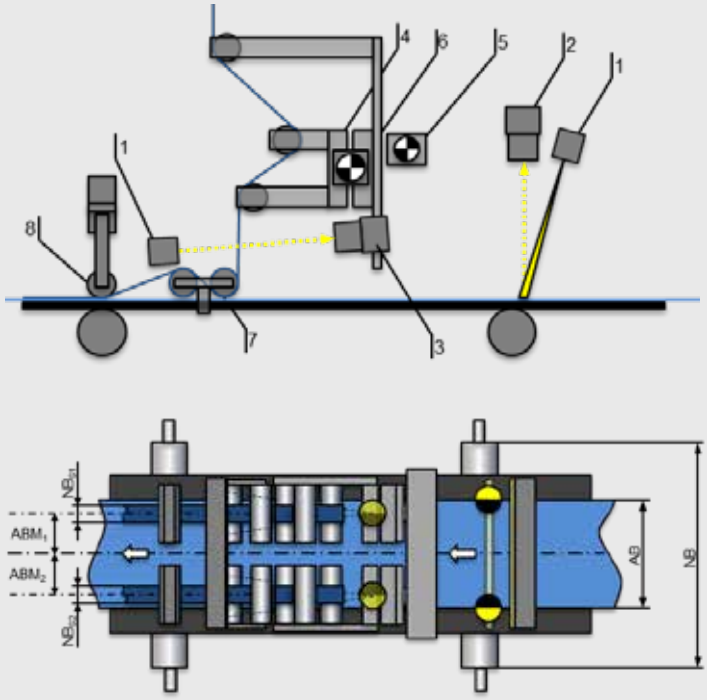
Actuators

AG 9

Complexer

Function

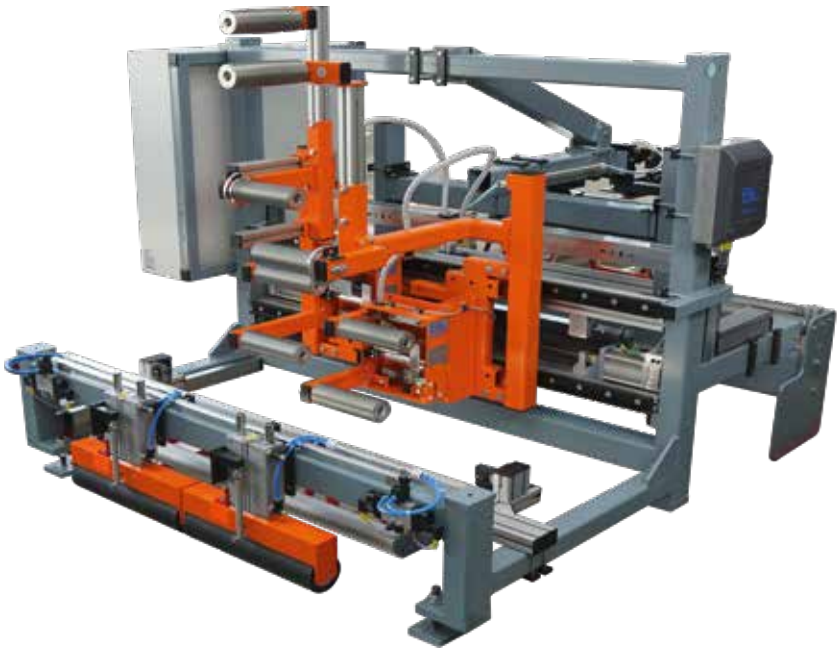
In order to ensure precise tire building, the infeed, the laying in place and the complexing of the pre-cut strips must be extremely exact. CCD cameras or wide band sensors detect the current web position and control digital positioners and actuators. These in turn move pivoting conveyor belts, which enable the required correction of the web or strips.



Legend

AB Operating width
NB Nominal width
NBS1 Width of strip 1
NBS2 Width of strip 2
ABM1 Distance from strip 1 center to web center
ABM2 Distance from strip 2 center to web center

1 Light transmitter
2 CCD line scan camera ply
3 CCD line scan camera, web guider
4 Web guider
5 Support beam
6 Actuating drive
7 Locking roller
8 Pressure roller



Sensors
OL 82, FE 46, FR 60
Actuators
AG 9

Belt guiding

Function

The belt (steel cord) is scanned by means of a line scan camera OL 82. The camera scans in the gap between 2 conveyors. The conveyor before the camera (viewed in the direction of transport) can be positioned with the aid of a positioning device (AG 91) to the side, i.e. at an angle of 90° to the material transport direction, in order to adjust the material. The conveyor after the camera (magnetic) fixes the adjusted material.

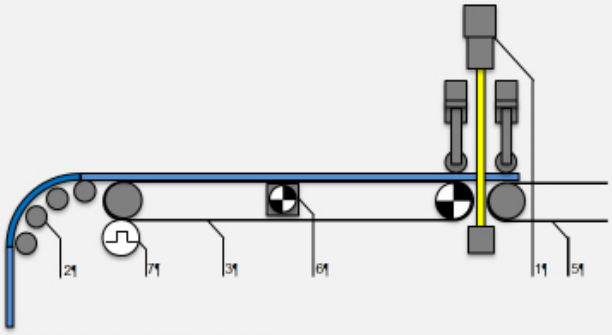
Area of use

Tire assembly machine

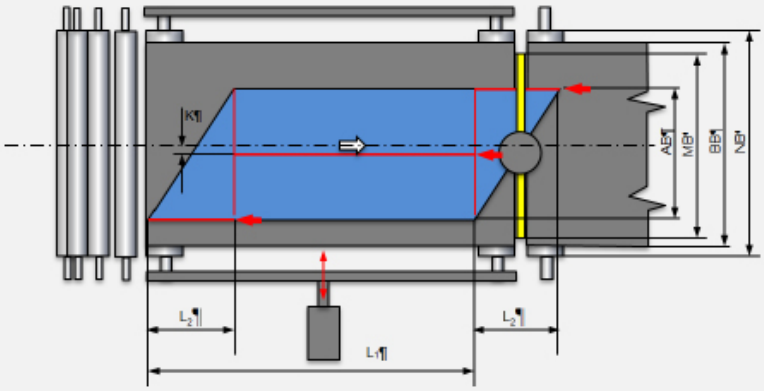
Control process

As soon as the camera detects the material tip, the conveyor is stopped and aligned to the side in accordance with the material position. Afterwards the material is adjusted in the area of the inclined cutting edge either based on the outer edge or the cutting edge itself, while the material is transported onward.

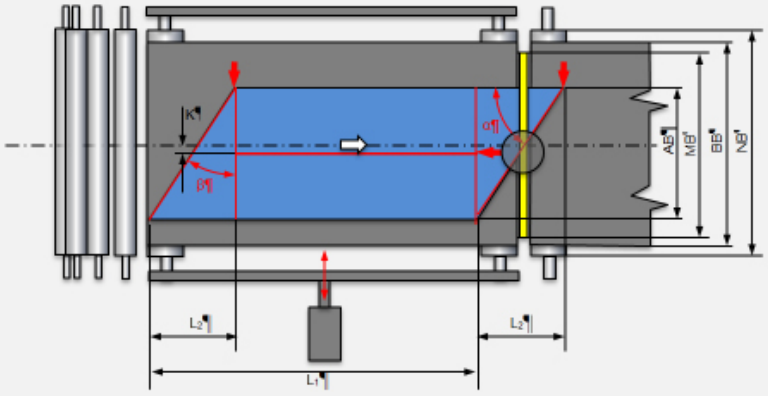
In the area without a cutting edge the control mode switches to "Center of material". The adjustment of the inclined edge at the end of the material is then performed again based on an outer edge or the cutting edge. The adjustment based on the cutting edge is performed mostly for wider materials (e.g. truck tires), as the cut edges may no longer be straight here due to tensions in the material and therefore gaps (splices) could potentially arise on the drum during the adjustment based on the material edge.



Belt guiding – standard



Belt guiding – based on the cut edge



Legend

K	Web correction	1	CCD line scan camera
AB	Operating width	2	Infeed rollers
MB	Measuring width	3	Conveyor belt
BB	Belt width	4	Sensor
NB	Nominal width	5	Conveyor belt fixing
L_1	Length of belt	6	Actuating drive
L_2	Length of cut edge	7	Incremental encoder
α	Angle of cut edge		

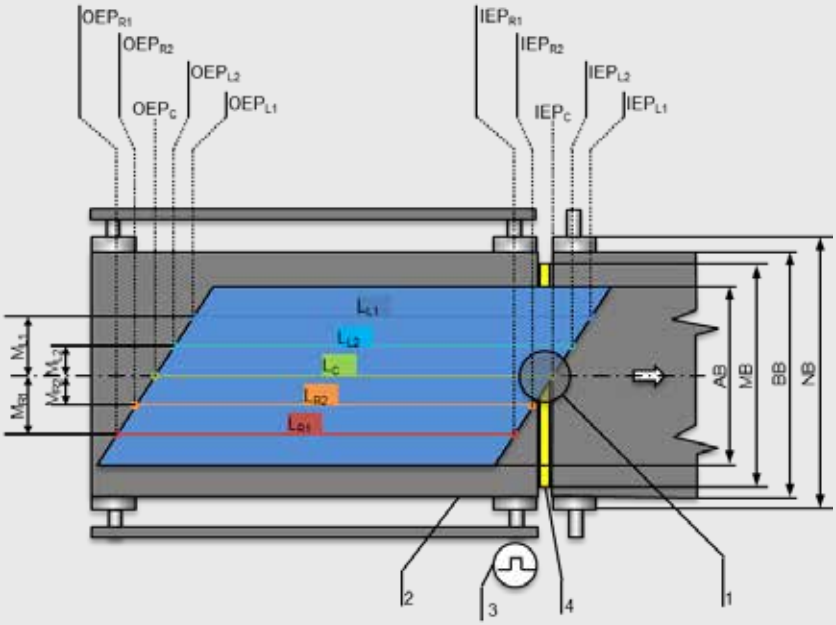
Belt length measurement

Function

The same camera that is used for guiding the belt can also be used to measure the length of the material. To do this, the length is determined in multiple positions transversely to the material. From these measured values, an average is then calculated and transmitted via the Ethernet interface to the customer's PLC.

Area of use

Tire building machine – belt guiding



Legend

AB	Operating width	
MB	Measuring range	
BB	Belt width	
NB	Nominal width	
ML1	Left-hand measuring position 1	
ML2	Left-hand measuring position 2	
MR1	Right-hand measuring position 1	
MR2	Right-hand measuring position 2	
LL1	Length of left-hand measuring position 1	
LL2	Length of left-hand measuring position 2	
LC	Length of central measuring position	
LR1	Length of right-hand measuring position 1	
LR2	Length of right-hand measuring position 2	
1	CCD line scan camera	
2	Conveyor belt	
3	Incremental encoder	
4	Light transmitter	
IEPR1	Input encoder pos. right 1	(Incoming)
IEPR2	Input encoder pos. right 2	(Incoming)
IEPL1	Input encoder pos. left 1	(Incoming)
IEPL2	Input encoder pos. left 2	(Incoming)
IEPC	Input encoder pos. center	(Incoming)
OEPC	Output encoder pos. center	(Outgoing)
OEPR1	Output encoder pos. right 1	(Outgoing)
OEPR2	Output encoder pos. right 2	(Outgoing)
OEPL1	Output encoder pos. left 1	(Outgoing)
OEPL2	Output encoder pos. left 2	(Outgoing)

Belt guiding system

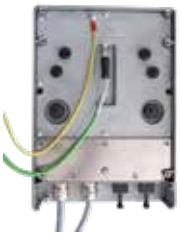
+ Control components for belt guiding with peak correction
+ Wear-free, brushless digital drive technology for highest control accuracy and control dynamics
+ Can be combined with infrared edge sensor, CCD line scan camera OL 82 or OL 91 Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

CCD camera OL 82

Light transmitter FS 42

CCD camera OL 91

Actuating drive AG 9



Camera computer DO 82

Camera holder VA 5538

Selection table

Type	Nominal actuating travel (mm)	Nominal actuating force (N)
AG 9101	±25	1000

Technical data

Positional accuracy	< ± 0.25 mm (material-dependent)
Nominal actuating travel	±25 mm
Nominal actuating speed	1 – 60 mm/s (AG 91)
Nominal actuating force	1000 N
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

OL 82, OL 91

Control of the carcass conveyor

Function

The material is scanned by means of two line scan cameras OL 82 or OL 91.
The cameras scan the material optionally before the conveyor or in the gap between the conveyor and the tire building drum.

Option: separate adjustment of inner liner and sidewalls

There are two parallel conveyors in front of the camera (seen in the direction of transport).
To adjust the material, the two conveyors can be positioned individually or synchronously by means of two adjustment devices (AG 91) to the side, i.e. at an angle of 90° to the material transport direction.
This means that the conveyors can be adjusted synchronously for control of inner liners and ply 1/2, while they can be adjusted individually for the sidewalls.

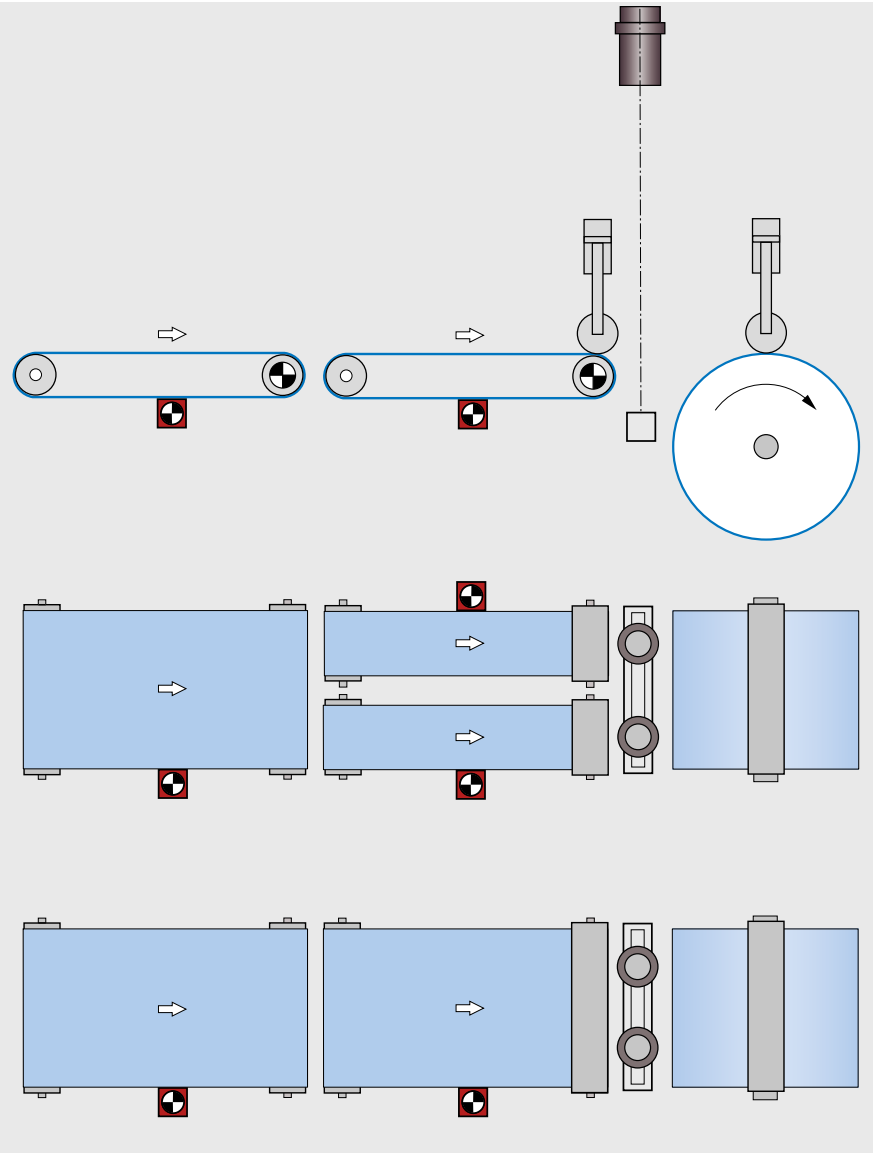
Joint adjustment of inner liners and sidewalls

In this case there is only one conveyor in front of the camera. Inner liners and sidewalls (pre-laminated) are adjusted in this case with one conveyor, identically to ply 1/2.

The drum or the conveyor after the cameras fix the adjusted material.
A combination of adjustment and hole detection (e.g. on inner liners) is also possible when using the OL 91 cameras. If a hole is detected, a message is sent via the Ethernet interface to the customer's PLC.

Area of use

Tire building machine – adjustment of inner liners, sidewalls and ply 1/2 before the tire building drum



Tread control

Function

The tread is scanned by means of a line scan camera OL 82 / OL 91.
The camera scans in the gap between two conveyors, before the gap on the belt conveyor or in the gap between the conveyor and the drum.
The conveyor before the camera (viewed in the direction of transport) can be positioned with the aid of a positioning device (AG 91) to the side, i.e. at an angle of 90° to the material transport direction, in order to adjust the material.
The conveyor/drum after the camera (magnetic) fixes the adjusted material.
The adjustment can be performed based on the following criteria:

- Outer edges
- Shoulder positions
- Groove in the material

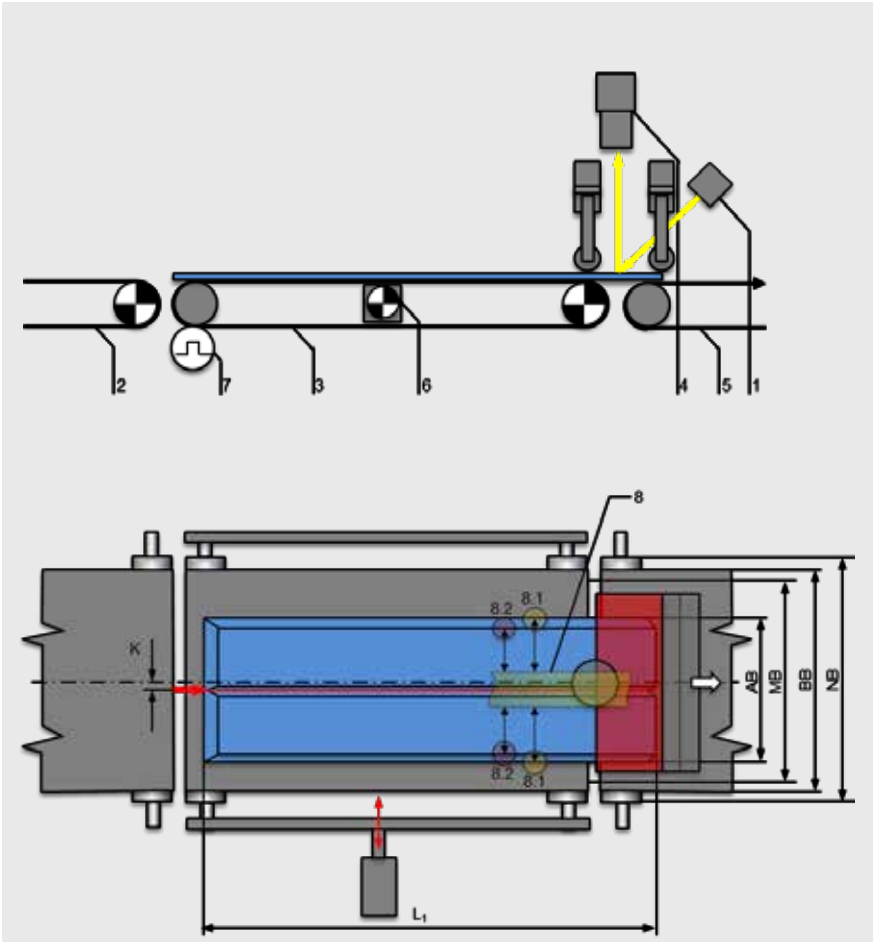
Procedure for adjustment (example):
The adjustment is performed based on a small groove in the material. As an option, the position of the groove can be specified as a distance to the outer edge in the formula parameters. As a result, the search area can be reduced in size and the process reliability can be increased.
As soon as the camera detects the groove, the conveyor is stopped and aligned to the side in accordance with the material position. Depending on the position of the camera, the conveyor is briefly stopped to do this, or the transport speed is temporarily reduced.
Afterwards the material is adjusted in the area of the inclined cutting edge based on the groove, while the material is transported onward.
If the system is unable to detect the groove, the the adjustment system automatically switches to "Edge control".

Length measurement

A measurement of the length of the material with the same camera that is used for the adjustments is also possible. However, a groove in the material or an uninterrupted colour line is required for this.

Area of use

Tire assembly machine



Legend

K	Web correction	1	Light transmitter
AB	Operating width	2	Infeed conveyor belt
MB	Measuring range	3	Conveyor belt
BB	Conveyor width	4	CCD line scan camera
NB	Nominal width	5	Conveyor belt fixing
L1	Length of tread	6	Actuator
		7	Incremental encoder
		8	Lane search area dependent upon
			8.1 – Outer edges
			8.2 – Inner edges

Tread system

+ Control components for winding stations with wear-free, brushless digital drive technology for highest control accuracy and control dynamics
+ Can be combined with OL 82 or OL 91
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36 (optionally DO 33)

CCD camera OL 82

Light transmitter FS 41

CCD camera OL 91

Actuating drive AG 9

DN 1002/DO 8221

Selection table

Type	Nominal actuating travel (mm)	Nominal actuating force (N)
AG 9111	±50	1000
AG 9121	±75	1000

Technical data

Positional accuracy	< ± 0.25 mm (sensor-dependent)
Nominal actuating travel	± 25 / 50 / 75 mm
Nominal actuating speed	1 – 60 mm/s (AG 91)
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC (AG 91 with manual sensor positioning)
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensoren

OL 82, OL 91

Aktoren

AG 9

Conveyor belt control

Function

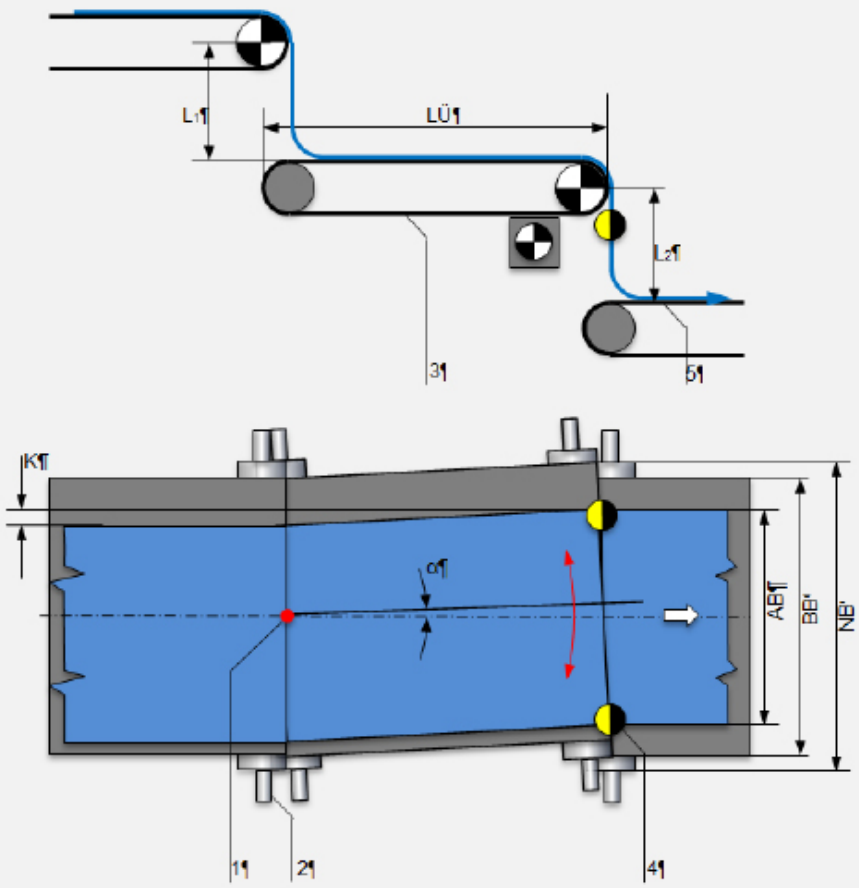
On conveyor control system, the web changes direction four times, each time by 90°. A pivotable conveyor belt forms the basis here. Its pivot point is located on the infeed plane. Lateral web corrections can only be achieved by pivoting around this pivot point.

Area of use

Wherever rubber webs are transported on belts, these can also be used as a web guiding control system.

Application

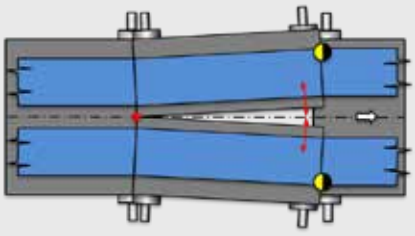
Care must be taken to ensure that both the incoming and outgoing rubber web come into and exit from the conveyor belt at an angle of 90°. The infeed and outfeed path should be at least 50% of the maximum web width. The sensor must detect the rubber web as closely to the run-off point of the conveyor belt as possible.



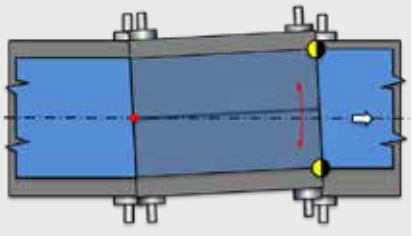
Legend

K	Web correction	1	Pivot point
α	Angle of cut edge	2	Infeed conveyor belt
AB	Operating width	3	Conveyor belt
BB	Belt width	4	Sensor
NB	Nominal width	5	Conveyor belt fixing
LÜ	Transfer length	L_1	Infeed path
L_2	Outfeed path		

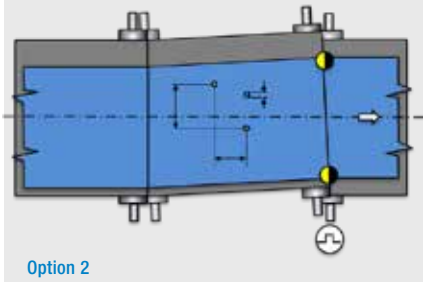
Options



Option 1
Operation in split mode: Sidewall control



Option 1
Operation in coupled mode: Inner liner control



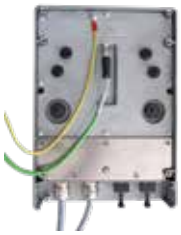
Option 2
Hole detection with additional encoder

Conveyor belt control system

+ Control components for winding stations with wear-free, brushless digital drive technology for highest control accuracy and control dynamics
+ Can be combined with infrared edge sensor FR 53 or infrared wide band sensor FE 46 or OL 82
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via DO 33 or OP 34/OP 36

CCD camera OL 82

Infrared edge sensor FR 53



Camera computer DO 82

Digital wide band sensor FE 46

Light transmitter FS 42

Camera holder VA 5538

Actuating drive AG 9

Selection table

Type	Nominal actuating travel (mm)	Nominal actuating force (N)
AG 9111	±50	1000
AG 9121	±75	1000

Technical data

Positional accuracy	< ± 0.25 mm (sensor-dependent)
Nominal actuating travel	±25 / 50 / 75 mm
Nominal actuating speed	1 – 60 mm/s (AG 91)
Ambient temperature	+10°C to +50°C
Storage temperature	-20°C to +80°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range Nominal range with power supply	 24 V DC 20 to 30 V DC (ripple included) 100 to 240 V, 50/60 Hz
Current draw	Max. 5.5 A DC (AG 91 with manual sensor positioning)
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensoren

FE 46, OL 82, FR 53

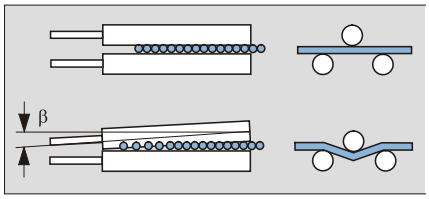
Aktoren

AG 9

EPILiner – Edge spreading systems

Function

The EPILiner edge spreading system comprises two spreader units, each of which has a three-finger roller arrangement. The two fixed rollers are always in contact with the cord, and the movable roller engages in the edge area of the cord. The width of the cord can be controlled by varying the roller bite angle. Spreadability can be optimized by manually adjusting the cant angle.

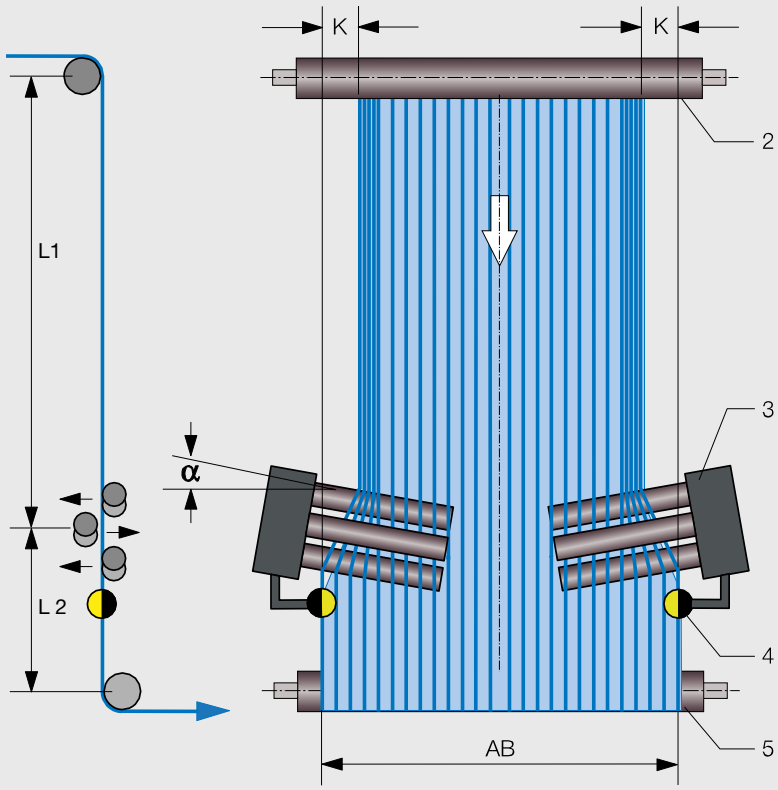


Area of use

In particular, on calender lines ahead of the calender gap, or in hot-stretching lines ahead of the dip or ahead of the rewinding section, the use of an edge spreading system is essential in order to ensure uniform thread distribution.

Application

The EPILiner edge spreading system can be mounted in all positions. The infeed length should be at least half a web width, and the outfeed length should be kept as short as possible. Optimum web width control can only be achieved with the aid of a web guider arranged in the run-up.



Legend

K	= Correction of the web edge	2	= Infeed roller
α	= Cant angle	3	= Edge spreading system EPILiner
AB	= Operating width	4	= Sensor
L1	= Infeed length	5	= Locking roller
L2	= Outfeed length	β	= Bite angle

Edge spreading system BCB11

Edge spreading system BCB11

+ Compact edge spreading system for constant web width control for tire cord in the edge area with wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry.
+ Improved spreading effect through manually adjustable correction angle
+ Can be combined with infrared edge sensor FR 53 for detection of tire cord edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

Selection table

Type	Roller diameter	Roller length
BC1133	3 x 38 mm	178 mm
BC1135	3 x 57 mm	432 mm

Technical data

BC 11	
Positional accuracy	± 1 mm (infrared edge sensor FR 53)
Web edge feeding precision	± 5 mm
Operating width	1400 to 1800 mm
Nominal actuating speed	3 mm/s (AG 91 with F = 1000 N)
Web tension	18000 N
Ambient temperature	0°C to +50°C
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC (ripple included)
Current draw Manual positioning Motorized positioning	 Max. 12.4 A DC Max. 27.8 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

FR 53

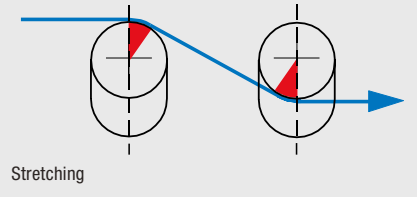
Actuators

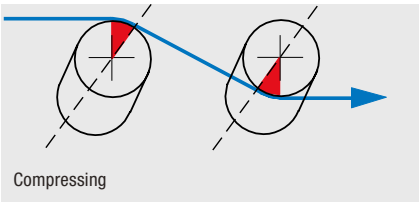
AG 9

Spreading systems

Function

Two curved rollers form the basis of the web width control system. Depending on the pivot angle, the two mechanically coupled rollers either stretch or compress the tire cord.



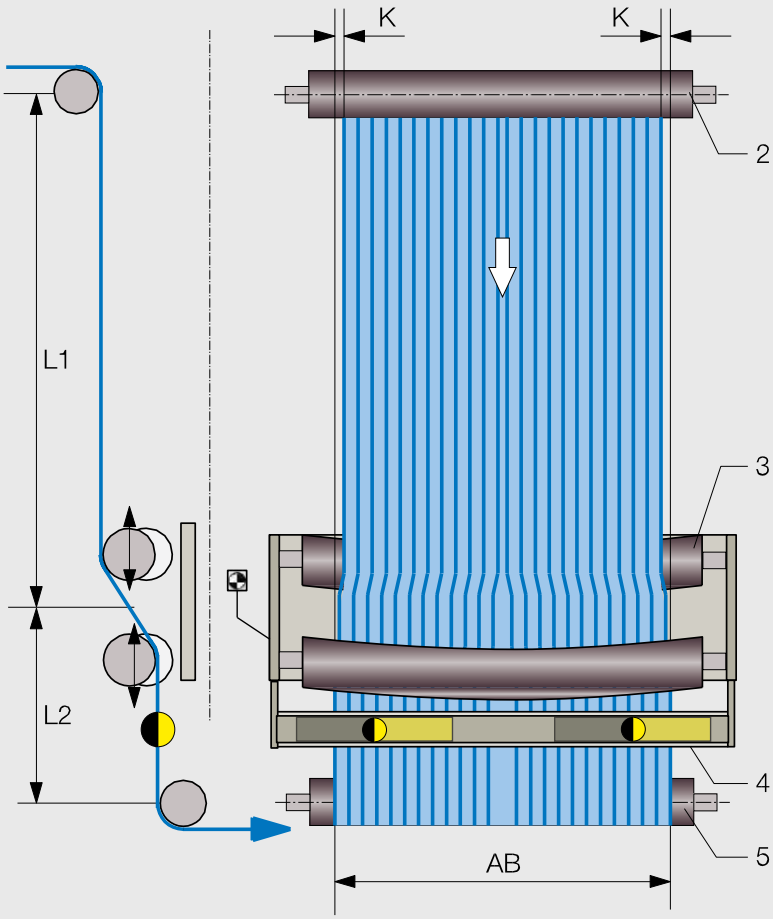


Area of use

Web width control systems are necessary for ensuring even cord distribution across the entire material width and for ensuring consistently uniform material width.
This is particularly important upstream of the process and winding operation on calender sections or tire cord processing lines.

Application

The spreading system can be mounted in all positions. The infeed length should be at least half a web width, and the outfeed length should be kept as short as possible.
It is a prerequisite that the web is fed centrally into the spreading system.



Legend

K	= Correction of the web edge	2	= Infeed roller
AB	= Operating width	3	= Spreading system CordAliner
L1	= Infeed length	4	= Wide band sensor
L2	= Outfeed length	5	= Locking roller

Spreading system BCB21

Spreading system BCB21

+ Compact spreading system for constant web width control for tire cord across the entire web width with wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry.
+ Improved quality of tire cord thread distribution in the high tension area of the calender system
+ Can be combined with infrared wide band sensor FR 46 or OL 82 for detection of tire cord edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

Technical data

BCB21	
Positional accuracy	± 1 mm (sensor-dependent)
Spreading effect on web	Max. 50-100 mm
Web edge feeding precision	± 10 mm
Nominal width	1400 to 2100 mm
Nominal actuating speed	1-10 mm/s
Roller diameter	150 mm
Roller lining	NBR, Hypalon, customer request
Web tension	20,000 N
Ambient temperature	0°C to +50°C
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC (ripple included)
Current draw	Max. 7.7 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

FE 46, OL 82

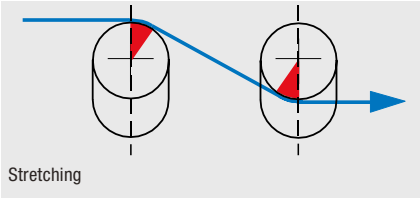
Actuators

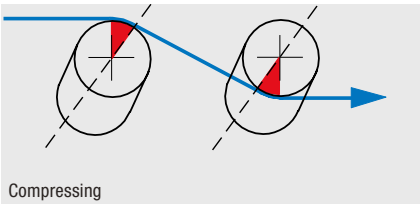
AG 9

CordAliner – Spreading systems

Function

Two curved rollers that are split in the middle form the basis of the web width control system. Depending on the pivot angle, the two mechanically coupled rollers either stretch or compress the tire cord.



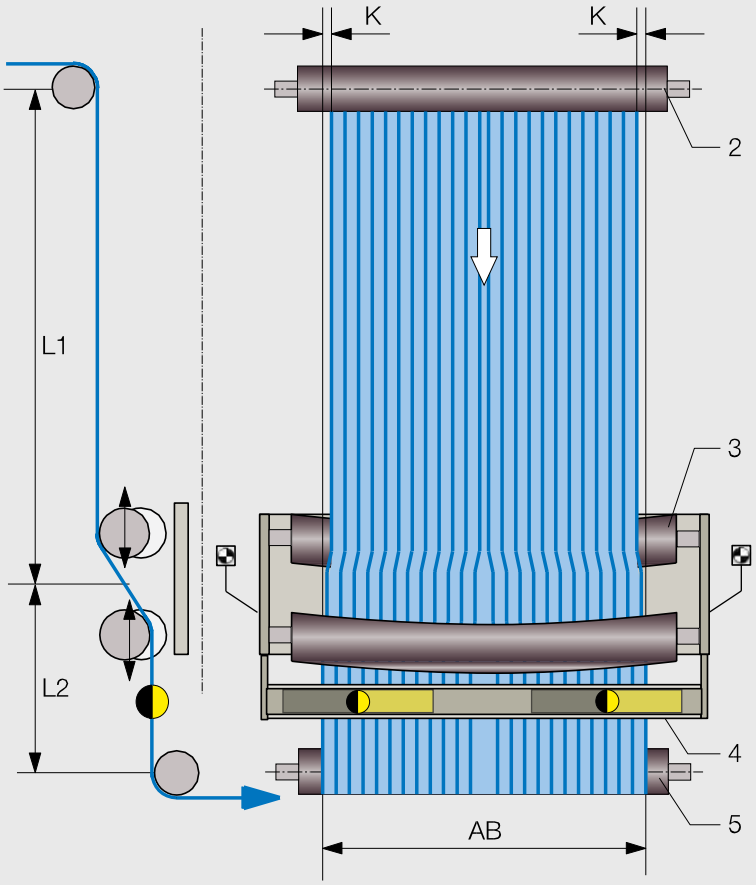


Area of use

In particular on calender lines or in hot-stretching lines ahead of the rewinding section, the use of spreading rollers is essential in order to ensure uniform thread distribution.

Application

The CordAliner spreading system can be mounted in all positions. The infeed length should be at least half a web width, and the outfeed length should be kept as short as possible.
Optimal web width control can be achieved if a web guiding system is also used before the CordAliner.



Legend

K = Correction of the web edge
AB = Operating width
L1 = Infeed length
L2 = Outfeed length

2 = Infeed roller
3 = Spreading system CordAliner
4 = Wide band sensor
5 = Locking roller

Spreading system BCB31

Spreading system BCB31

+ Compact spreading system for constant web width control for tire cord across the entire web width with wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry.
+ Improved quality of tire cord thread distribution in the high tension area of the calender system
+ Can be combined with infrared wide band sensor FR 46 or OL 82 for detection of tire cord edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

Technical data

BCB31	
Positional accuracy	± 1 mm (sensor-dependent)
Spreading effect on web	Max. 50-100 mm
Web edge feeding precision	± 10 mm
Nominal width	1400 to 2100 mm
Nominal actuating speed	1-10 mm/s
Roller diameter	150 mm
Roller lining	NBR, Hypalon, customer request
Web tension	20,000 N
Ambient temperature	0°C to +50°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC (ripple included)
Current draw	Max. 15 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

FE 46, OL 82

Actuators

AG 9

Full width X-Pander – Spreading systems

Function

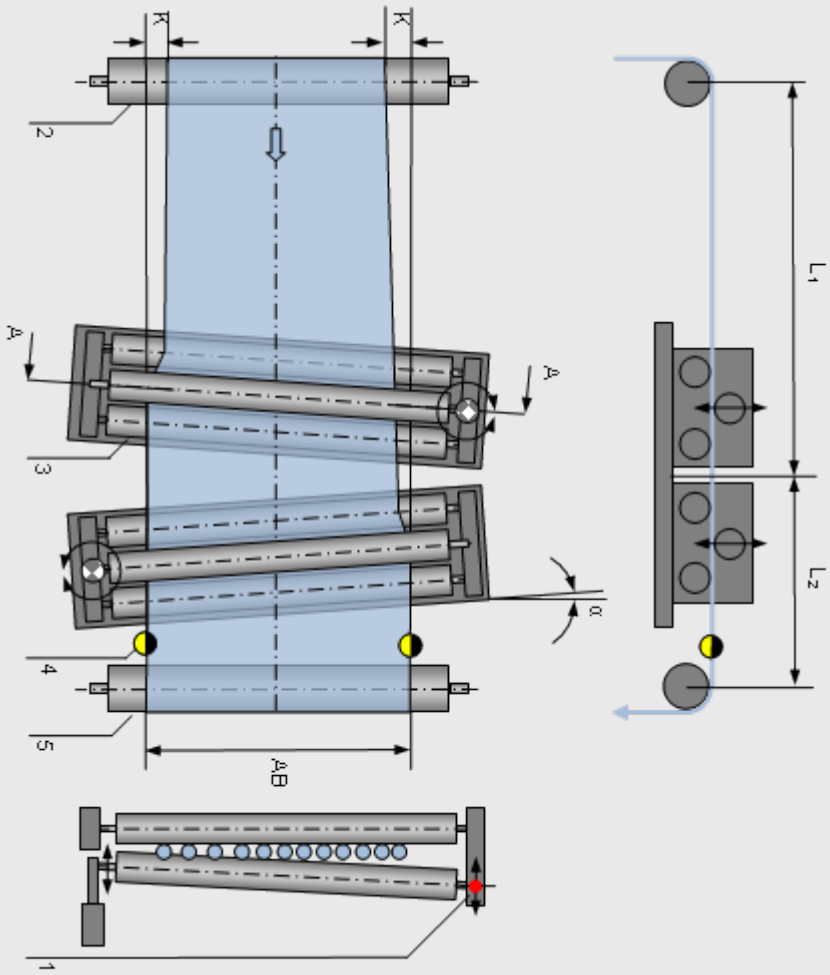
The spreading system X-Pander comprises two roller units each with three rollers. Each side has two fixed rollers and one movable roller. The width of the web can be controlled by varying the immersion angle of the movable center rollers. Spreadability can be optimized by manually adjusting the cant angle.

Area of use

X-Pander spreading systems are used exclusively in hot-stretching plants ahead of the pulling station in order to achieve consistent web width and uniform thread distribution.

Application

The X-Pander spreading system can be mounted in all positions. The infeed length should be at least half a web width, and the outfeed length should be kept as short as possible.



Legend

K	= Spreading effect	2	= Infeed roller
α	= Cant angle	3	= Spreading system
AB	= Operating width	4	= Sensor
L1	= Infeed length	β	= Bite angle
L2	= Outfeed length		

Spreading system BCB41

Spreading system BCB41

+ Compact spreading system for constant web width control for tire cord across the entire web width with wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry.
+ Improved quality of tire cord thread distribution in the high tension area of the hot spreading system
+ Improved spreading effect through manually adjustable correction angle
+ Can be combined with infrared wide band sensor FR 46 or OL 82 for detection of tire cord edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

Technical data

BCB41	
Positional accuracy	± 2 mm (sensor-dependent)
Spreading effect on web	Max. 50 to 100 mm
Nominal width	1400 to 2100 mm
Web tension	66,000 N
Ambient temperature	+10°C to +60°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC (ripple included)
Current draw	Max. 15 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors
FE 46, OL 82

Actuators
AG 9

Half width X-Pander – Spreading systems

Function

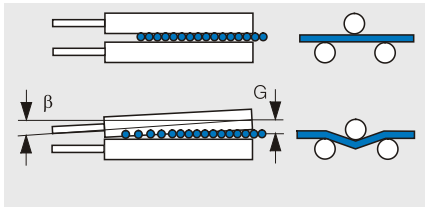
The spreading system X-Pander comprises two roller units each with three rollers. Each side has two fixed rollers and one movable roller. The width of the web can be controlled by varying the immersion angle of the movable center rollers. Spreadability can be optimized by manually or motorized adjusting the cant angle.

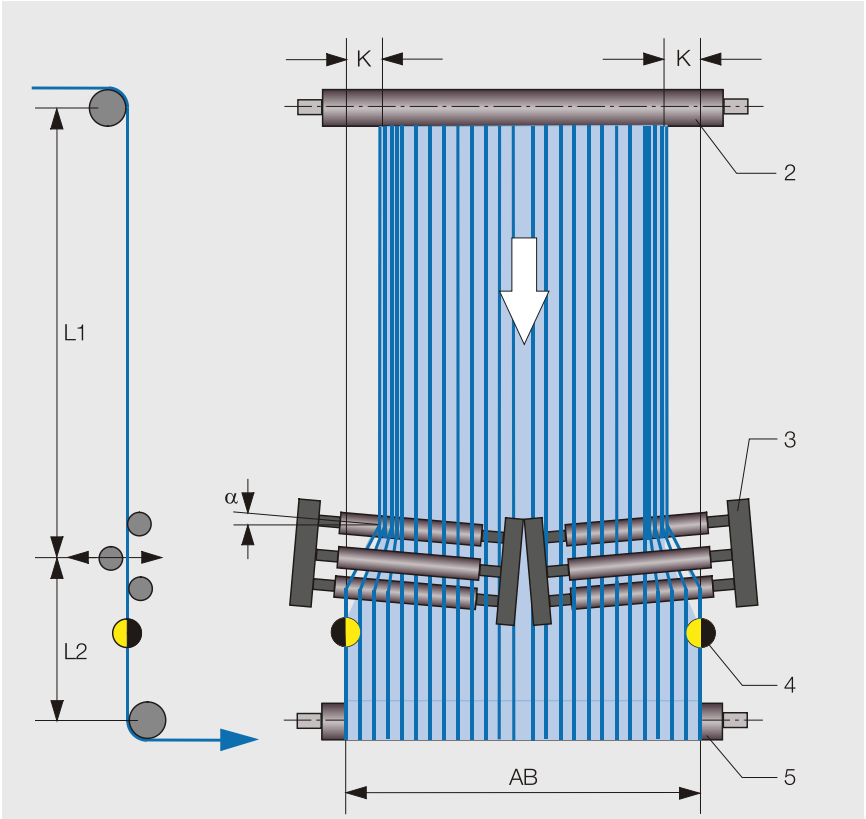
Area of use

X-Pander spreading systems are used exclusively in hot-stretching plants ahead of the pulling station in order to achieve consistent web width and uniform thread distribution.

Application

The X-Pander spreading system can be mounted in all positions. The infeed length should be at least half a web width, and the outfeed length should be kept as short as possible.





Legend

K	= Spreading effect
α	= Cant angle
AB	= Web width
L_1	= Infeed path
L_2	= Exit path
2	= Infeed roller
3	= Spreading device
4	= Sensor
5	= Locking roller
β	= Bite angle
G	= Center gap

Spreading system BCB51

Spreading system BCB51

+ Compact spreading system for constant web width control for tire cord across the entire web width with wear-free, brushless digital drive technology for highest control accuracy and control dynamics in the tire industry.
+ Improved quality of tire cord thread distribution in the high tension area of the hot spreading system
+ Improved spreading effect through manually adjustable correction angle
+ Can be combined with infrared wide band sensor FR 46 or OL 82 for detection of tire cord edges
+ Integrated fieldbus interface Ethernet UDP/IP, EtherNet/IP, Profinet (optional) and other databus systems
+ Operation, service and diagnostic capability via web-based management based on a standard web browser or via OP 34/OP 36

Technical data

BCB51	
Positional accuracy	± 2 mm (sensor-dependent)
Spreading effect on web	25 to 50 mm
Web edge feeding precision	± 5 mm
Nominal width	1400 to 2100 mm
Nominal actuating speed	Max. 1 to 3 mm/s
Roller diameter	89 mm
Web tension	Up to 120,000 N max.
Ambient temperature	0°C to +50°C
Relative humidity	15 to 95% (non-condensing)
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC (ripple included)
Current draw	Max. 15 A DC
Field bus interface	Ethernet UDP/IP EtherNet/IP Optional: Profinet and other databus systems
Protection class	IP 54

Sensors

FE 46, OL 81

Actuators

AG 9

Blade follow-up

Function

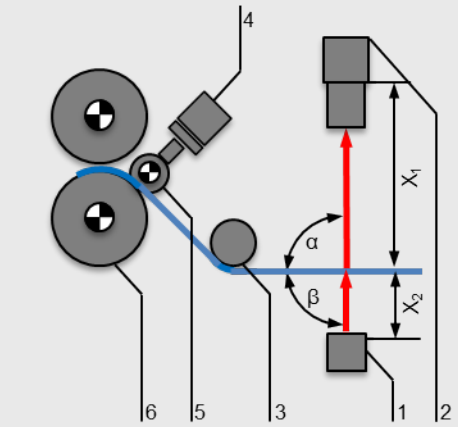
With follow-up control, the sensor and tool are mounted jointly on a linear guide. Here, the sensor detects the position of the web and thus determines the target position value of the tool. This is compared with the actual value and
a correction signal is output to the actuator. As a result, the tool is always followed up at a constant distance to the guide reference.

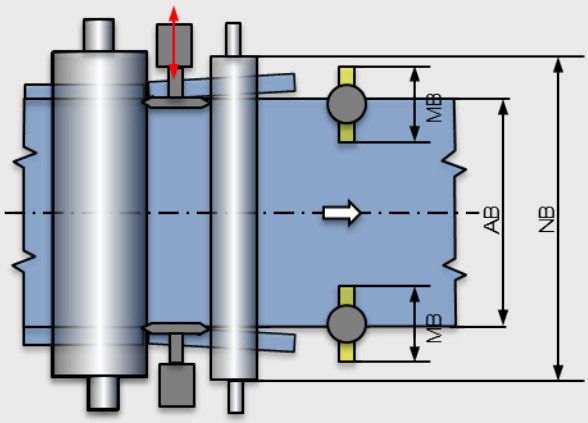
Area of use

Follow-up control systems are used when processes such as coating or cutting must be executed with a constant distance to the web edge or to a guide reference on the web.

Application

The highest control accuracy is reached when the sensor and tool (doctor blade limitation) can be assembled in compact form on a linear unit.





Legend

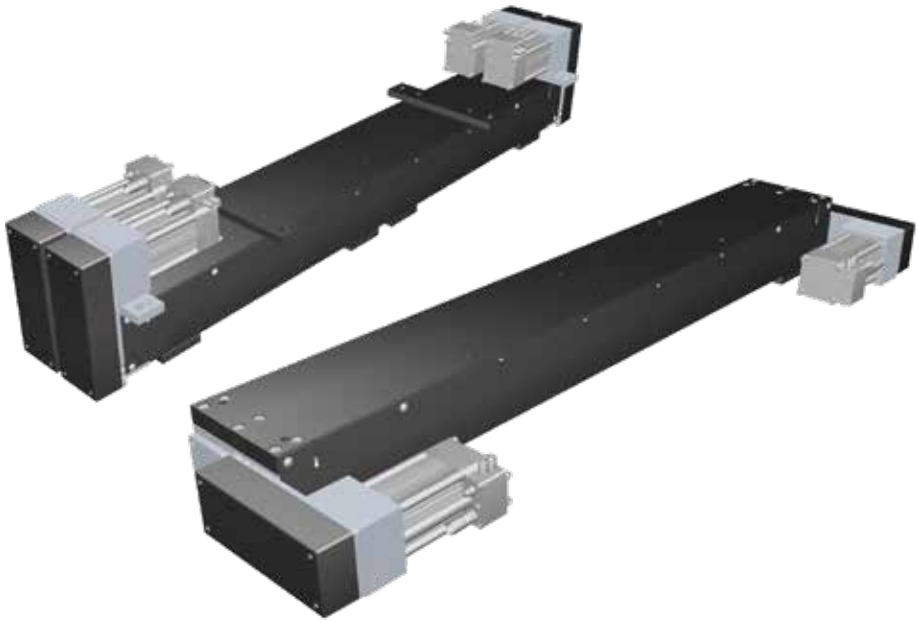
AB	= Operating width	1	= Light transmitter
MB	= Measuring range	2	= CCD line scan camera
NB	= Nominal width	3	= Guide roller
X_1	= Distance from surface to camera	4	= Support beam
X_2	= Distance from surface to light transmitter	5	= Blade
X_3	= Distance cameras	6	= Calender
α	= Angle between web surface and camera		
β	= Angle between web surface and light transmitter		

Support beam VS 97

Function

Changing web widths and web positions require a wide range of linear positioning systems. Positioning systems from E+L enable you to use to 4 completely independent adjustment units in a single machine up that are to be positioned along the web. Depending on the requirements, these units can e.g. move sensors or cutters into the required position.

+ Highly compact design for easiest possible machine integration
+ With two or four motors
+ Highly-precise positioning with AG 9
+ Connectable via Ethernet
+ Web-based setup



Technical data

VS 97	
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC
Nominal operating width	Min. 140 mm – max. 2200 mm
Speed	Max. 37.5 mm/sec
Actuating force	Max. 1000 N
Centered load per carriage	Max. 500 N
Ambient conditions	Dry
Protection class	IP 54
AB = 1000 mm	70 kg

Missing skin detection

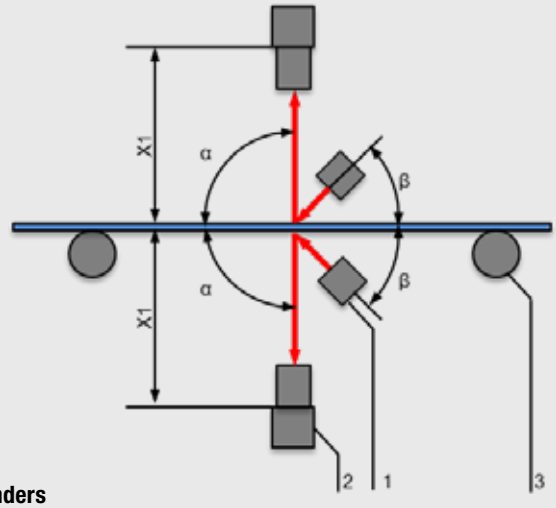
Function

A row of CCD cameras OL 91 is mounted on both the front and rear side of the calendered steel cord. High-intensity LED lamps provide enough light to allow even smallest faults to be detected.
The cameras continuously evaluate the surfaces; as an option, the fault data can be saved in a database for quality control purposes.

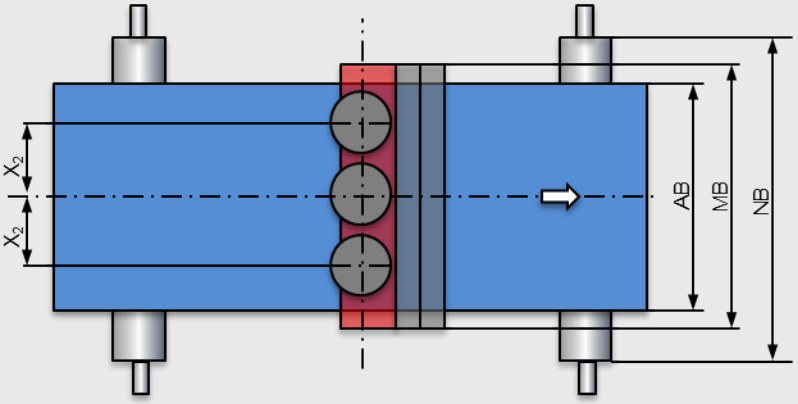
Application

+Steel/textile cord calender
+Steel/textile cord cutter

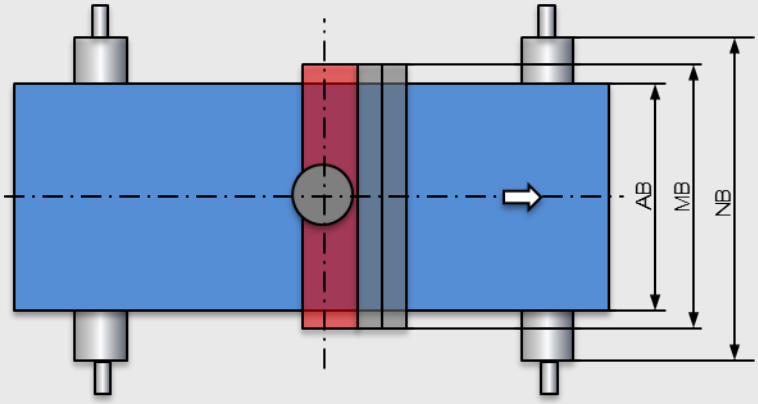
Missing skin software



Calenders



Cutter



Legend

AB = Operating width
MB = Measuring range
NB = Nominal width
X = Distance between cameras
X_1 = Distance between web surface and cameras
X_2 = Distance between cameras
α = Angle between web surface and camera
β = Angle between web surface and light transmitter

1 = Light transmitter
2 = CCD line scan camera
3 = Guide roller

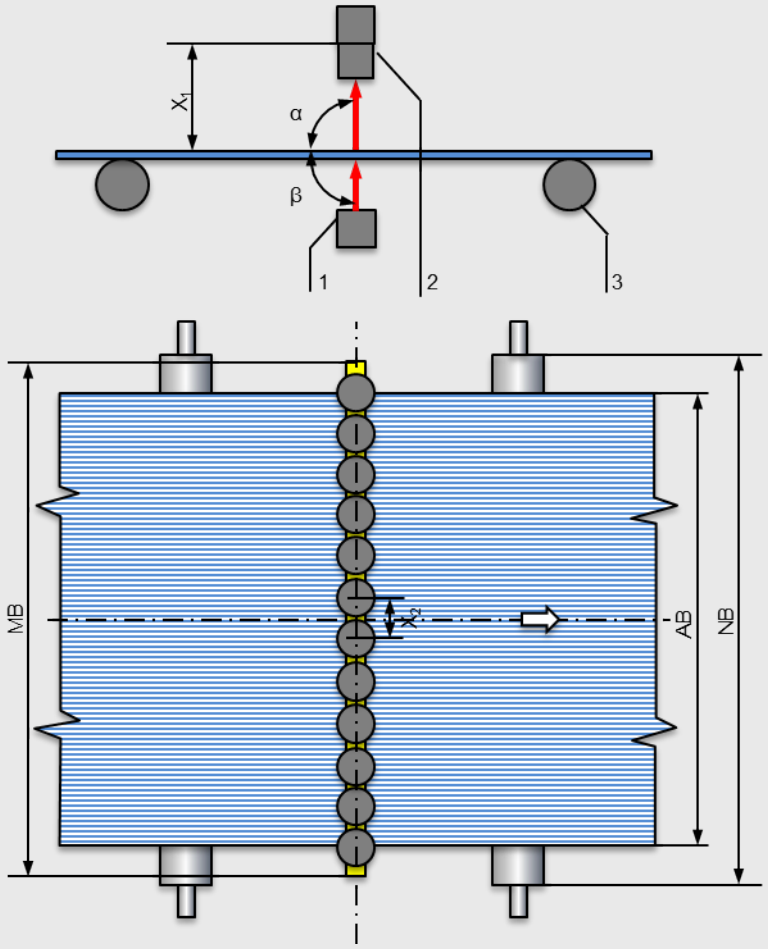
EPI

Function

With the cord distribution system, the product can be measured and inspected simultaneously within a single system. With an intelligent combination of closed-loop control and inspection systems, the system automates the production process and thus guarantees improved quality and higher efficiency at the same time.

The key feature is a CCD camera system with several OL 82 cameras. It automatically intervenes in the control of the upstream components to achieve optimal positioning and cord distribution.

- + Control and inspection in one product
- + Measurement of the cord distribution across the entire material width
- + Feedback to the upstream control units
- + Automatic detection of cord thickness and cord spacing
- + Flexible control (outer edges, center cord, cord counting or uniform cord distribution)
- + Recipe management incl. settings for web width controller and web guider
- + Automatic recipe change on detection of a splice
- + Online view and logging of defects
- + Parallel control via interface and/or control panel
- + Multilingual, easy to understand, easy to use user interface
- + Indication of width from any E+L width measurements
- + Cord distribution, outer edges and center cord can be checked at a glance
- + User rights can be configured individually for each user
- + Offline version for quality management for browsing the archive
- + Recording of the production speed
- + Statistical calculations (standard deviation, Cp, Cpk)
- + PDF reports, CSV data export



Legend

AB	= Operating width
MB	= Measuring range
NB	= Nominal width
X_1	= Distance between web surface and cameras
X_2	= Distance between cameras
α	= Angle between web surface and camera
β	= Angle between web surface and light transmitter
1	= Light transmitter
2	= CCD line scan camera
3	= Guide roller

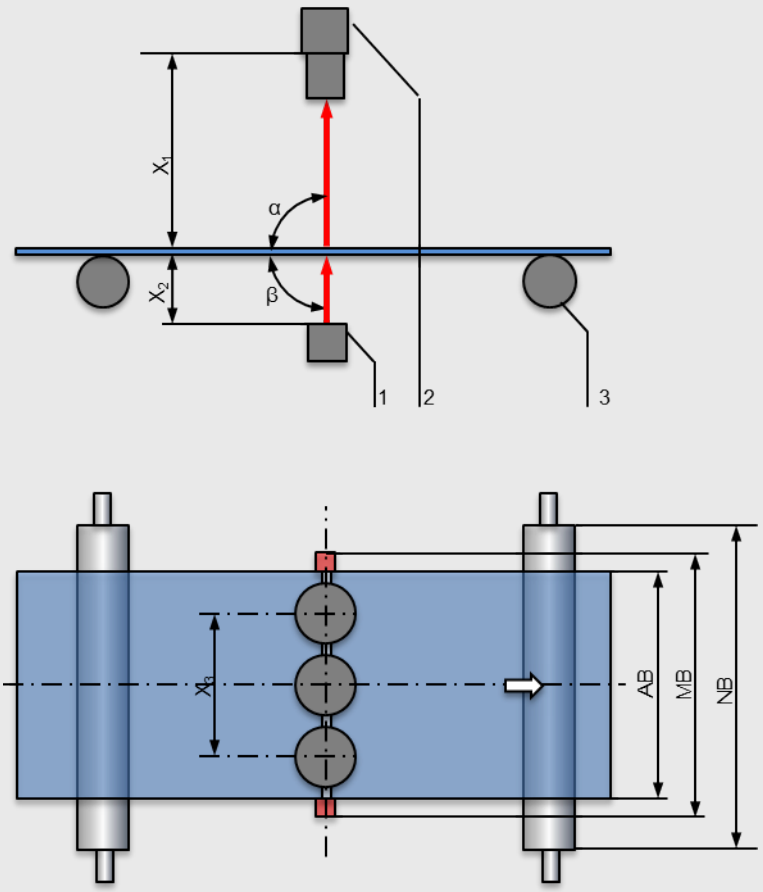
Inner liner hole inspection system

Function

(Example: inner liner extrusion line):
The inner liner is scanned with up to 3 line scan cameras OL 91. The scanning frequency can be up to 10 kHz.
With "simple" hole detection, the width of the holes is measured and a warning or fault message is output to the customer's PLC if an adjustable tolerance limit is exceeded.
With the hole inspection, the size (area) and position of the detected holes is determined and saved in a PC in relation to the material transport.
High-precision camera lenses are used to accurately determine the hole sizes during the hole inspection.
If a pre-set hole area is exceeded, here again a warning or fault message is sent to the customer's PLC.
With the aid of the E+L PC software it is also possible to display a hole as a 2D image.
The determined hole data is than saved on the PC as roll protocols.

Area of use

Inner liner extrusion/RH line
Tire building machine: carcass control (final guider) before the drum



Legend

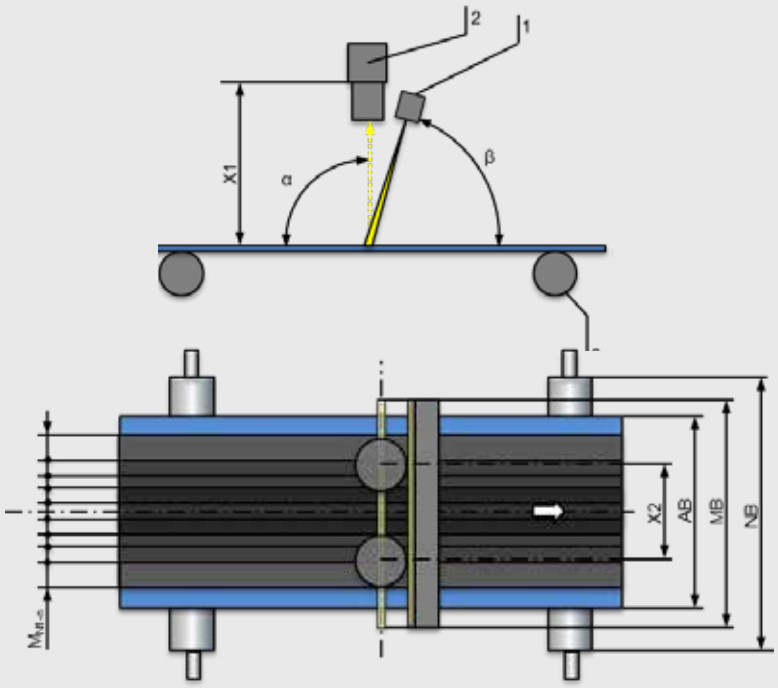
AB	= Operating width	α	= Angle between web surface and camera
MB	= Measuring range	β	= Angle between web surface and light transmitter
NB	= Nominal width	1	= Light transmitter
X_1	= Distance between web surface and cameras	2	= CCD line scan camera
X_2	= Distance between cameras	3	= Guide roller

EL-BOB

Function

BOB (black-on-black) which is a camera application for reliable, contactless detection of web edges with minimal contrast, such as strips of tire material on black conveyors, laminated strips, grooves and ridges. Here again, width measurements and control are possible based on a minimal groove or a GI strip. Fluctuations in the material thickness are compensated for in the process without impacting on the accuracy of the measurement. With the aid of an encoder, the cameras are synchronized with the production machine, so that the running meters can be analyzed whenever needed.

+ Used to detect edges on low-contrasting materials, such as black strips on a black background or grooves or ridges
+ Used for measurement and/or control
+ Image processing integrated in the camera
+ OL91 monochrome CCD line scan chip with 6144 pixels
+ Measuring accuracy: ± 0.1 mm

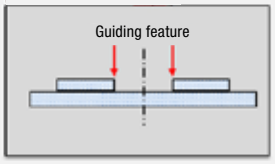


Legend

AB	= Operating width	α	= Angle between web surface and camera
MB	= Measuring range	β	= Angle between web surface and light transmitter
NB	= Nominal width	1	= Light transmitter
X_1	= Distance between web surface and cameras	2	= CCD line scan camera
X_2	= Distance between cameras	3	= Guide roller
		MN1-n	= measuring points nos. 1 – n

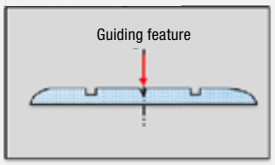
Final check

Inner liner with rubber strips



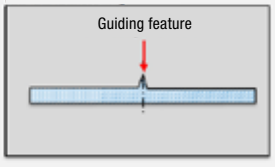
Groove detection

Tread with groove



Ridge detection

Inner liner with nose



Sensors

OL 91

Technical data

Number of pixels	6144
Resolution in sub-pixels	8-fold sub-pixeling
Lens	f = 50 mm
Minimum distance to web	500 mm
Active chip length	43 mm
Spectral maximum	660 nm
Weight	2.0 kg
Protection class	IP 54
Ambient temperature	+10°C to +55°C
Dimensions (camera)	197 x 135 x 171 mm
Operating voltage, nominal value Nominal range	24 V DC 20 to 30 V DC
Power consumption	16 W
Operating system	Linux
Soft-PLC	Optional
Application software	Optional
Measuring accuracy	±0.1 mm
Scan rate	Up to 10 kHz
Interfaces	1 Gbit Ethernet / 100 Mbit Ethernet / Encoder / I/O

Web width measurement

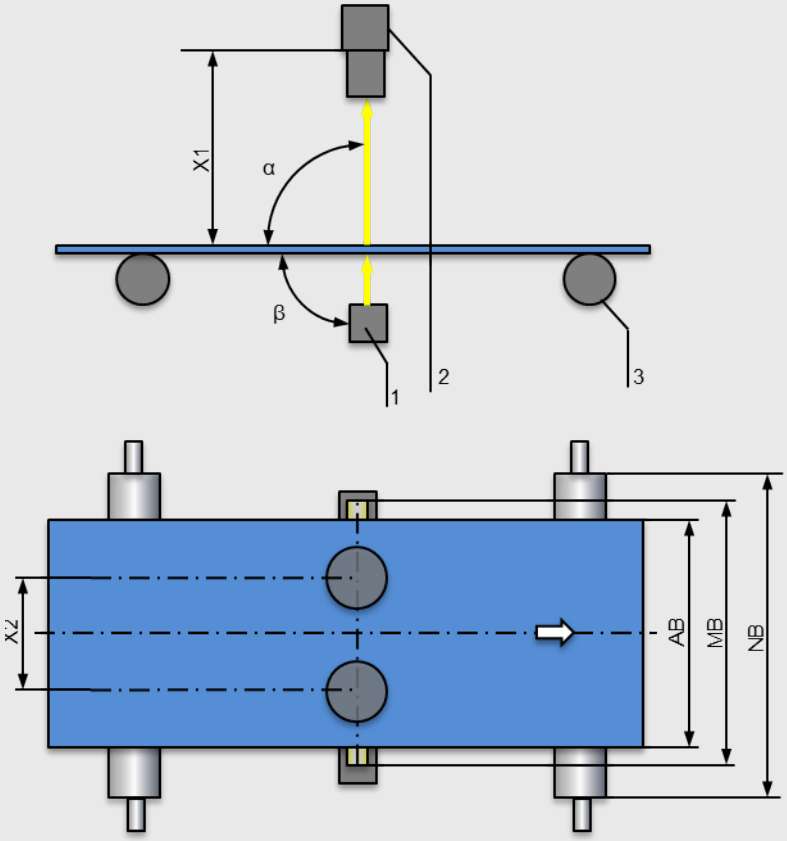
Function

Highly compact CCD cameras or wide band sensors contactlessly measure the material edges and supply one or more width value(s) depending on the requirements. These can be displayed or output for the purpose of quality control. Width monitoring is also possible with our system.

+ Reliable, contactless detection of material edges
+ Feedback of the material width to upstream control and spreading systems
+ Width monitoring
+ Continuous documentation of up to 6 measurement points in conjunction with the optional ELQVS software in relation to material length

Optional ELQVS

Width measurement with CCD cameras



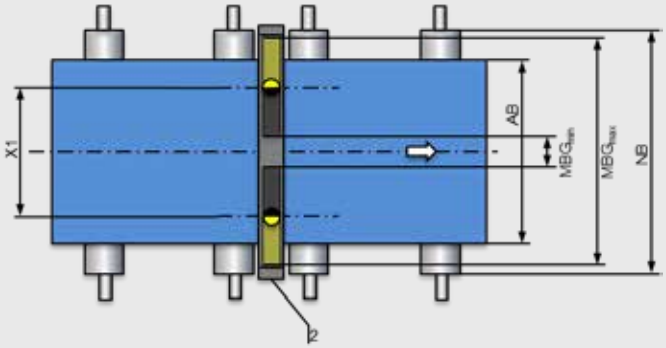
Legend

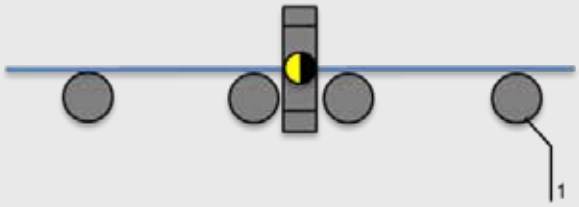
AB	= Operating width	α	= Angle between web surface and camera
MB	= Measuring range	β	= Angle between web surface and light transmitter
NB	= Nominal width	1	= Light transmitter
X	= Distance between cameras	2	= CCD line scan camera
X_1	= Distance between web surface and cameras	3	= Guide roller
X_2	= Distance between cameras	BSn	Width of strips 1 – n

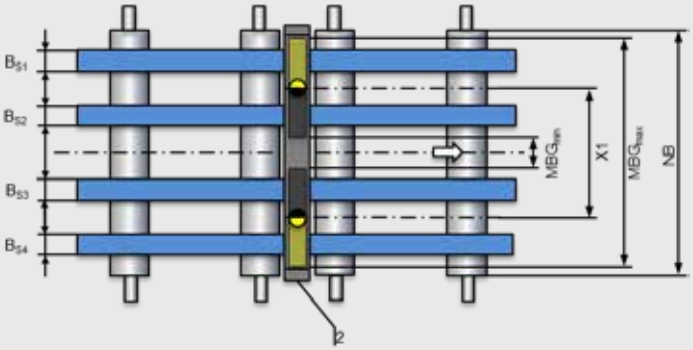
Sensors

OL 82, OL 91, FE46, FR 60

Width measurement with wide band sensor FE 46





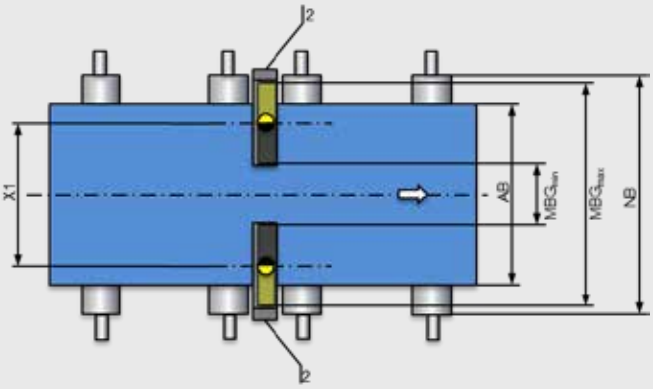


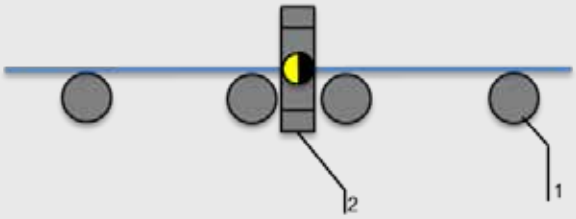
Legend

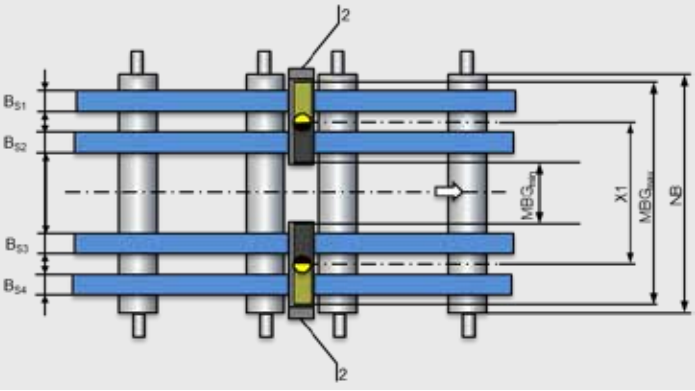
AB = Operating width
MBG $_{min}$ = Total measuring range, min.
MBG $_{max}$ = Total measuring range, max.
NB = Nominal width
X_1 = Distance between sensors A (center MB)

1 = Light transmitter
2 = Wide band sensor FE46
BSn Width of strips 1 – n

Width measurement with wide band sensor FR 60







Legend

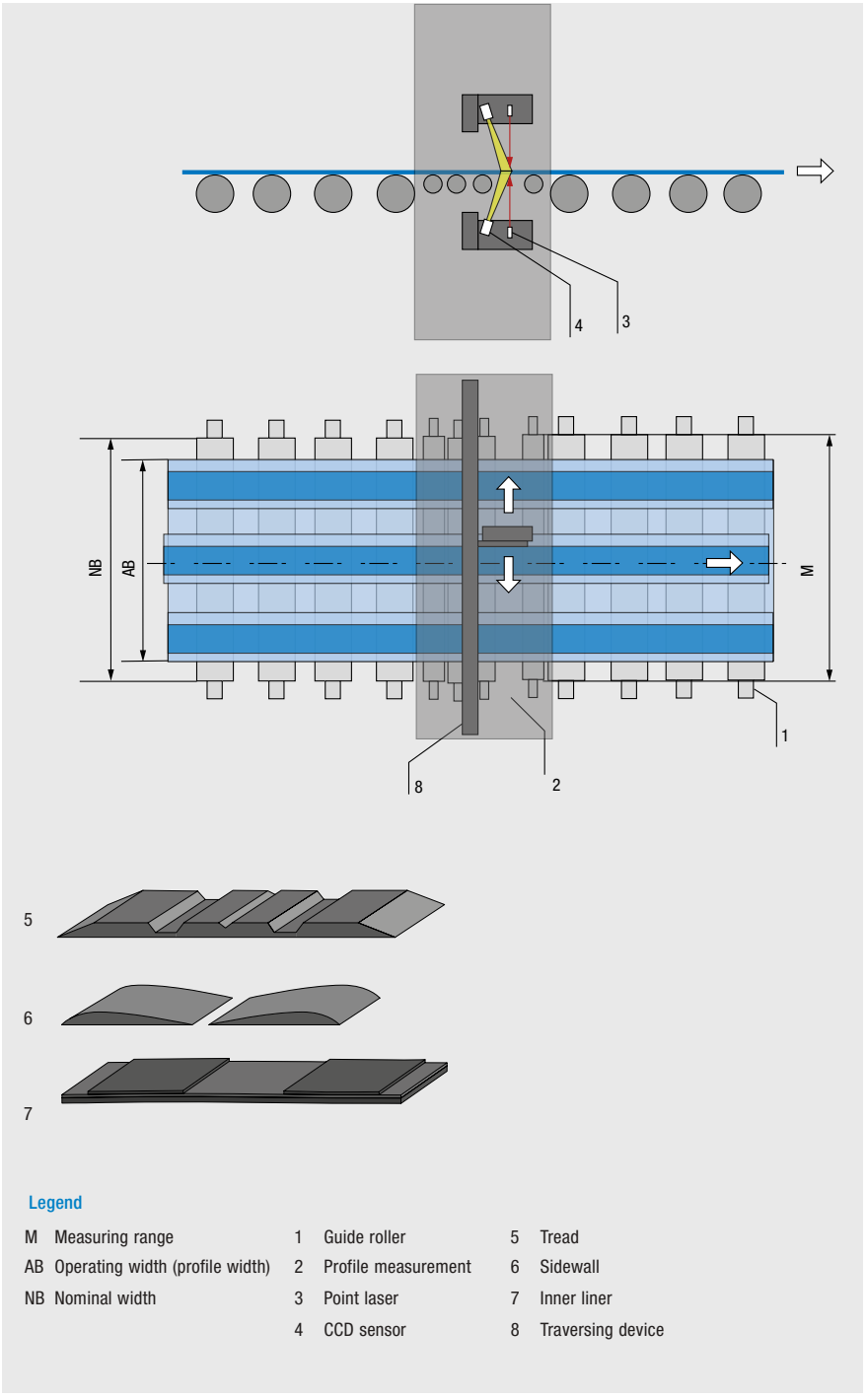
AB = Operating width
MBG $_{min}$ = Total measuring range, min.
MBG $_{max}$ = Total measuring range, max.
NB = Nominal width
X_1 = Distance between sensors (center MB)

1 = Light transmitter
2 = Wide band sensor FR 60
BSn Width of strips 1 – n

Online profile measurement

Function

Two point-type laser sensors synchronously traverse the running product (tread, sidewall, inner liner, cord) and measure its external contours. The granite frame, on which the precise linear guides are mounted, ensures highly accurate profile measurements thanks to its high temperature stability and reduced vibrations.



Legend

M	Measuring range	1	Guide roller	5	Tread
AB	Operating width (profile width)	2	Profile measurement	6	Sidewall
NB	Nominal width	3	Point laser	7	Inner liner
		4	CCD sensor	8	Traversing device

EL-TRISCAN TR

Product description

+ Contactless profile measurement of treads, sidewalls and inner liners
+ Comparison of the actual profile with the target profile
+ Final quality reports
+ Traversing laser point sensor for precise profile recording
+ Secure recording with automatic intensity control for matt and glossy surfaces
+ Temperature-stable, vibration-resistant granite O frame
+ Checking of the thickness, shoulder width, total width, cross-section area
+ Trend display
+ Reduction in rejects and maximum quality assurance

Technical data

Profile width	450 - 2000 mm		
Web speed	Max. 100 m/min		
Profile thickness	Up to 8 mm	Up to 28 mm	Up to 68 mm
Measuring gap	56 mm	115 mm	225 mm
Traversing width	Profile width + 50 mm		
Traversing speed, laser	150 mm/s		
Laser sensor	Point sensor		
Scan frequency	max. 4 kHz		
Laser class	2 (no designated laser safety officer required)		
Resolution in profile width	0.1 mm		
Repeat accuracy for thickness measurement	± 0.01 mm	± 0.01 mm	± 0.02 mm
Measuring accuracy of thickness measurement	± 0.02 mm	± 0.035 mm	± 0.055 mm
Repeat accuracy for width measurement	± 0.1 mm	± 0.1 mm	± 0.1 mm
Measuring accuracy of width measurement	± 0.15 mm	± 0.15 mm	± 0.15 mm
Opening height max.	400 mm		
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net		
Relative humidity	15–95%, non-condensing		
Ambient temperature	+10 to +50°C		
Operating voltage	115 – 230 V 50 / 60 Hz		
Power consumption	~1.5 kW (type-dependent)		
Protection class	IP 54		

Online profile measurement

Function

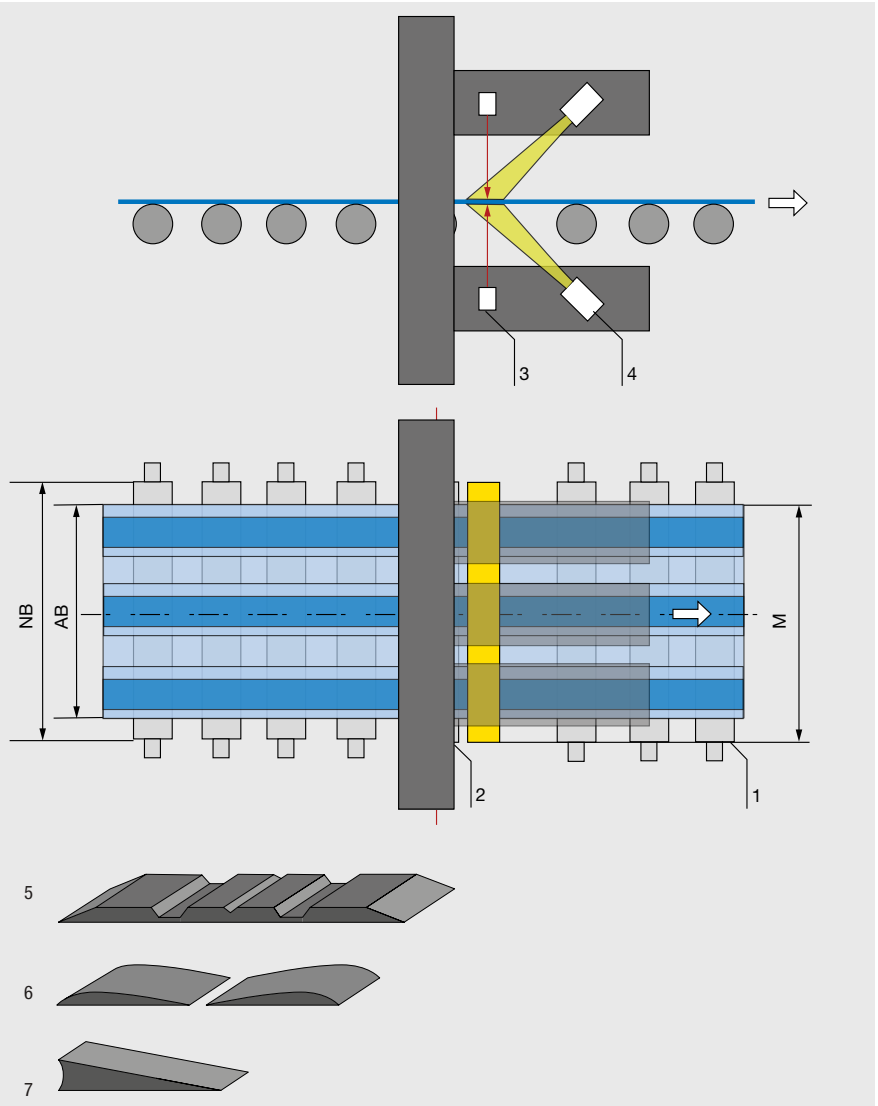
Light section sensors measure the external geometry of the running product (tread, sidewall). The granite frame, onto which the sensors are mounted, offers high temperature stability and reduced vibrations for highly accurate profile measurements.

Area of use

The online profile measurement system is used primarily in extrusion systems for the continuous inspection of treads and sidewalls as well as inner liners. In hot areas, the profile measurement is used for production control in order to detect deviations from the specification as early as possible and alert the PLC. In cold areas, the profile measurement system provides optimum quality control and documentation.

Application

EL-TRISCAN LS Online light section system for profile measurement is used for process control in the extrusion line after the extruder and/or at the end of the cooling line for quality assurance. The granite frame reduces the thermally induced expansion many times over.



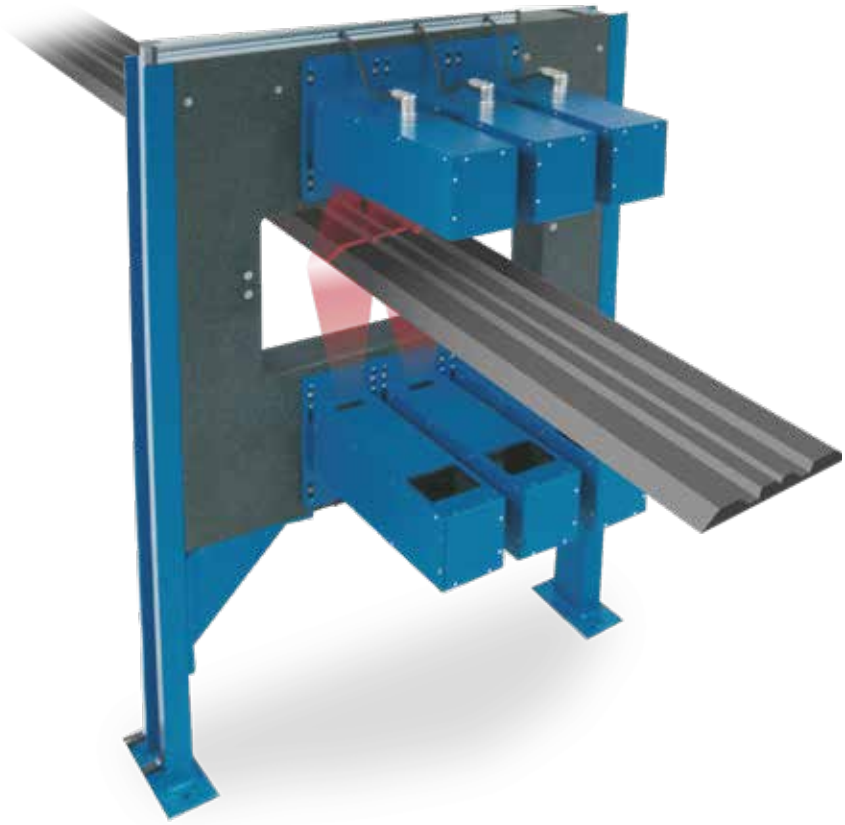
Legend

M	Measuring range	1	Guide roller	5	Tread
AB	Operating width	2	Profile measurement	6	Sidewall
NB	Nominal width	3	Laser line	7	Apex strip
		4	Matrix camera		

EL-TRISCAN LS

Product description

+ Contactless profile measurement system using difference procedure
+ Comparison of the actual profile with the target profile
+ Real-time measurement
+ Final quality reports
+ Incl. communication with customer PLC
+ Temperature-stable, vibration-resistant granite O frame
+ Checking of the thickness, shoulder width, total width, cross-section area
+ Trend display



Technical data

Profile width	150 – 1200 mm (gradation 150 mm)
Web speed	Max. 100 m/min
Profile thickness	50 mm
Measuring gap	200 mm
Laser sensor	Light section sensor
Scan frequency	Max. 8 Hz
Laser class	2 (no designated laser safety officer required)
Resolution in profile width	0.1 mm
Measuring accuracy of thickness measurement	± 0.05 mm
Measuring accuracy of width measurement	± 0.25 mm
Opening height max.	280 mm
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net
Relative humidity	15–95%, non-condensing
Ambient temperature	+10 to +50°C
Operating voltage	115 – 230 V 50 / 60 Hz
Protection class	IP 54

Offline profile measurement

Function

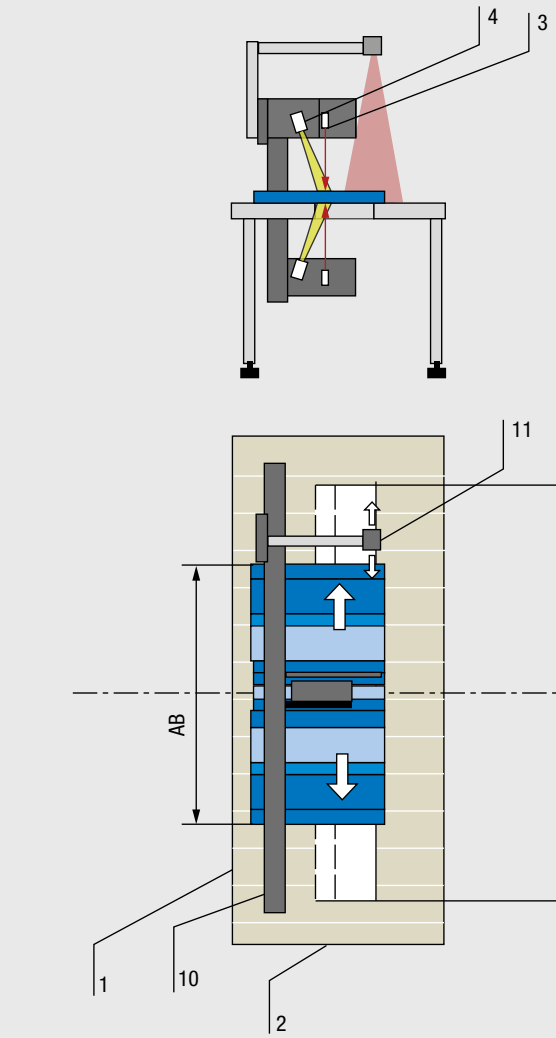
Two or three point-type laser sensors (depending on the required accuracy) traverse the resting product (tread, sidewall, inner liner, cord) and measure its external geometry.

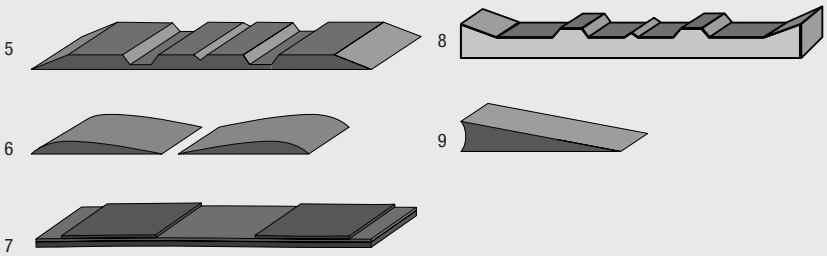
Area of use

In the DIE shop, profile measurement is used for DIE documentation (optional DIE measurement), while the profile measurement system is used in test laboratories and in extrusion lines for quality assurance and documentation purposes.

Application

The profile measurement system is operated in DIE shops, test laboratories or directly in extrusion lines in a temperature-controlled measuring cabin.





Legend

M	Measuring range	4	CCD sensor	9	Apex strip
AB	Operating width	5	Tread	10	Traversing device
1	Measuring table	6	Sidewall	11	Laser positioning aid
2	Profile measurement	7	Inner liner		
3	Point laser	8	DIE		

EL-TRISCAN offline

Product description

+ Offline profile measurement of treads, sidewalls and inner liners
+ Optionally, also for measurement of the die
+ Traversing laser point sensor for precise profile recording
+ Secure recording with automatic intensity control for matt and glossy surfaces
+ Replacement for manual measurements with statistical documentation for improvement of the quality

Technical data

Profile width	750 / 1000 mm			
Profile thickness	Up to 8 mm	Up to 28 mm	Up to 50 mm	Up to 68 mm
Measuring gap	59	128	128	258
Number of sensors	2	2	3	2
Traversing speed, laser	12 mm/s			
Laser sensor	Point sensor			
Scan frequency	< 4 kHz			
Laser class	2 (no designated laser safety officer required)			
Resolution in profile width	0.1 mm			
Repeat accuracy for thickness measurement	± 0.01 mm	± 0.01 mm	± 0.01 mm	± 0.02 mm
Measuring accuracy of thickness measurement	± 0.02 mm	± 0.02 mm	± 0.035 mm	± 0.05 mm
Repeat accuracy for width measurement	± 0.1 mm	± 0.1 mm	± 0.1 mm	± 0.1 mm
Measuring accuracy of width measurement	± 0.15 mm	± 0.15 mm	± 0.15 mm	± 0.15 mm
Relative humidity	15–95%, non-condensing			
Ambient temperature	+10 to +50°C			
Operating voltage	115 – 230 V 50 / 60 Hz			
Protection class	IP 54			
Dimensions (LxWxH) in mm	Profile width 750 mm		710 x 1300 x 1266 mm	
	Profile width 1000 mm		710 x 1543 x 1266 mm	

Tread length measurement

Function

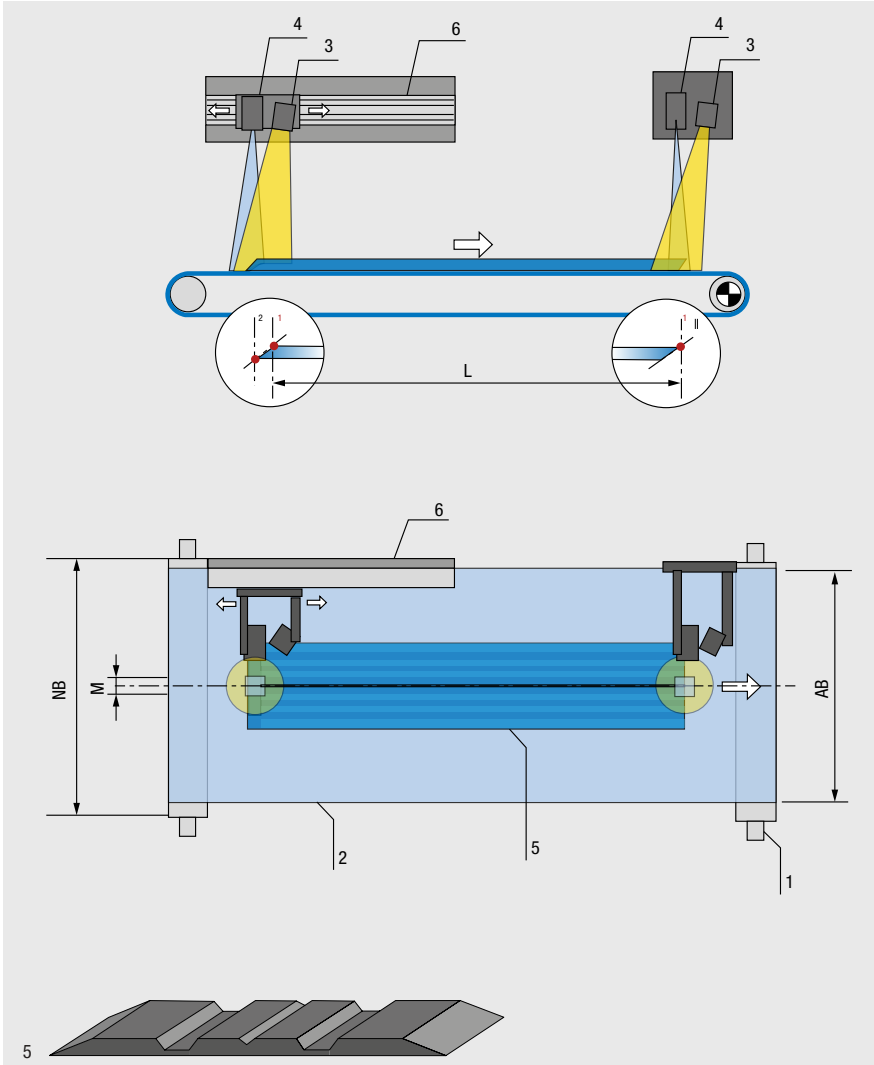
Two synchronized cameras record the ends of the cut product. The edges are detected in the image with the aid of a special algorithm. After prior calibration of the two cameras to each other, the length measurement system can finally determine the length of the measured tread.

Area of use

The length measurement system is used at the end of the extrusion line for quality documentation and for sorting out material that is outside the tolerance limits.

Application

The length measurement system EL-LENGTH is installed after the skiver. Due to material shrinkage, it is recommended that the measurements are taken as close as possible before the booking station. Only at this point has the tread almost reached its final length.



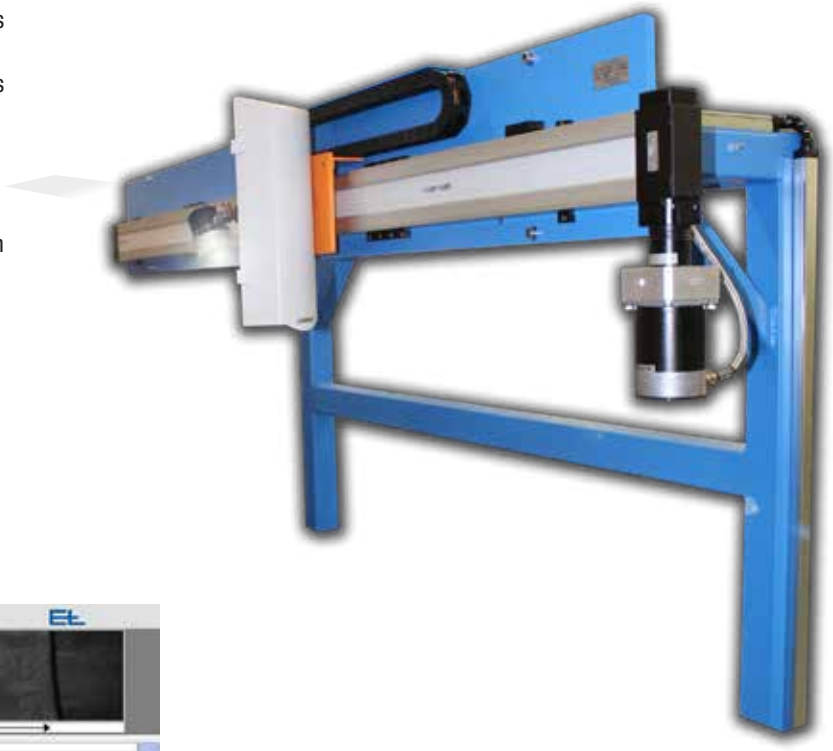
Legend

M	Measuring range	3	Light spot
AB	Operating width (conveyor width)	4	Matrix camera
NB	Nominal width	5	Tread
1	Guide roller	6	Support beam
2	Conveyor belt	L	Tread length

EL-LENGTH

Product description

+ Slip-free length measurement for cut treads and sidewalls
+ Precise edge detection with matrix cameras with a wide field of vision
+ Visualization of the edge recording and the measuring results
+ Automatic pre-positioning of the upper matrix camera to the required profile length
+ Quality assurance to avoid overlaps or the creation of gaps in the subsequent production process



Screenshot

Technical data

Measuring interval	1000 / 1500 / 2000 / 2500 / 3000 (mm)	
Web speed	Max. 100 m/min	
Number of cameras	2	
Camera position	Profile side facing downwards	Camera fixed above Camera for positioning above
	Profile side facing upwards	Camera fixed below Camera for positioning above
Field of view matrix camera	60 x 60 mm	
Resolution	0.1 mm	
Measuring accuracy for length measurements up to 100 m/min	Fixed camera above	± 0.85 mm
	Camera fixed below	± 0.4 mm
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net	
Relative humidity	15–95%, non-condensing	
Ambient temperature	+10 to + 50°C	
Operating voltage	115 – 230 V 50 / 60 Hz	
Current consumption	16 A	
Protection class	IP 54	

Color line inspection / Ink bottle positioning

Color line inspection function
A triple-chip CCD camera compares the colors applied to the product with the nominal color sample. This makes it possible to detect irregularities in the color application.

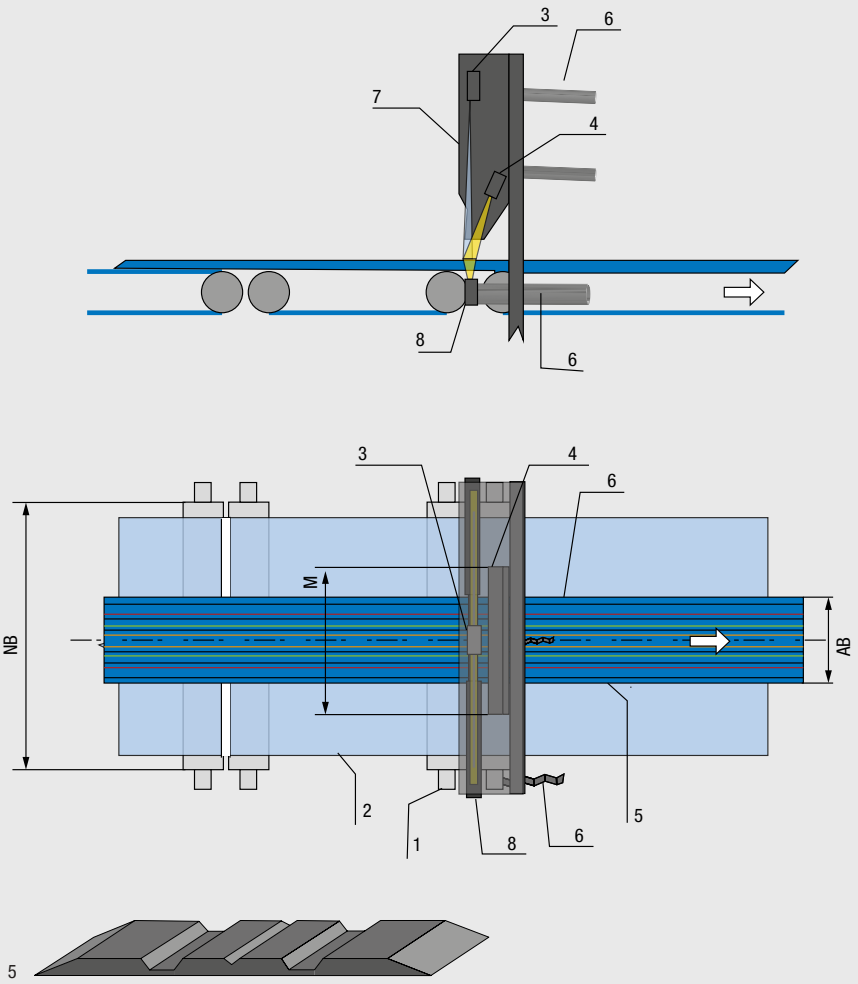
Color line inspection area of use
EL-Color Line Inspection is used after color application for quality documentation and process control. In addition, it is also used to trigger alarms if colors are applied incorrectly and/or in the wrong positions.

Color line inspection application
EL-Color Line Inspection is installed immediately after the color application.

Ink bottle positioning function
A tread material is given a color code for clear identification of the batch.
The ink bottle positioning EL-PAPS can apply this color code to the tread material. In addition, one ink bottle is mounted on each of the desired number of crossbeams (max. 7).
The operator can position the ink bottle manually using a handwheel. However, there is also the option of positioning the ink bottles using a motor, according to the recipe.
In combination with EL-CLI (S55), the ink bottle can be readjusted by motor.

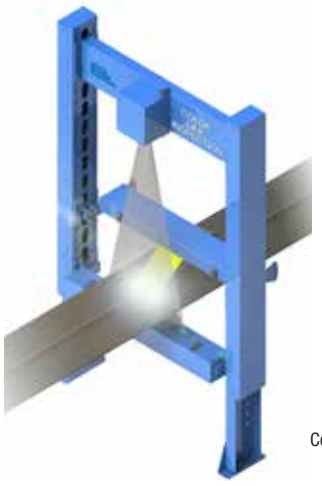
Area of use ink bottle positioning
Extrusion – Tread-Line

Application ink bottle positioning
EL-PAPS is installed in the hot area of the extrusion line.



Legend

AB	Operating width (profile width)	1	Guide roller	5	Tread
NB	Nominal width	2	Conveyor belt	6	Ventilation
		3	Color line camera	7	Housing
		4	LED light transmitter	8	LED background lighting

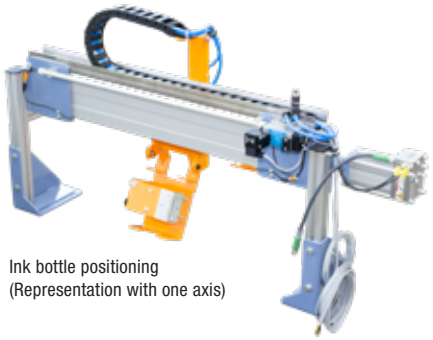


Color line inspection

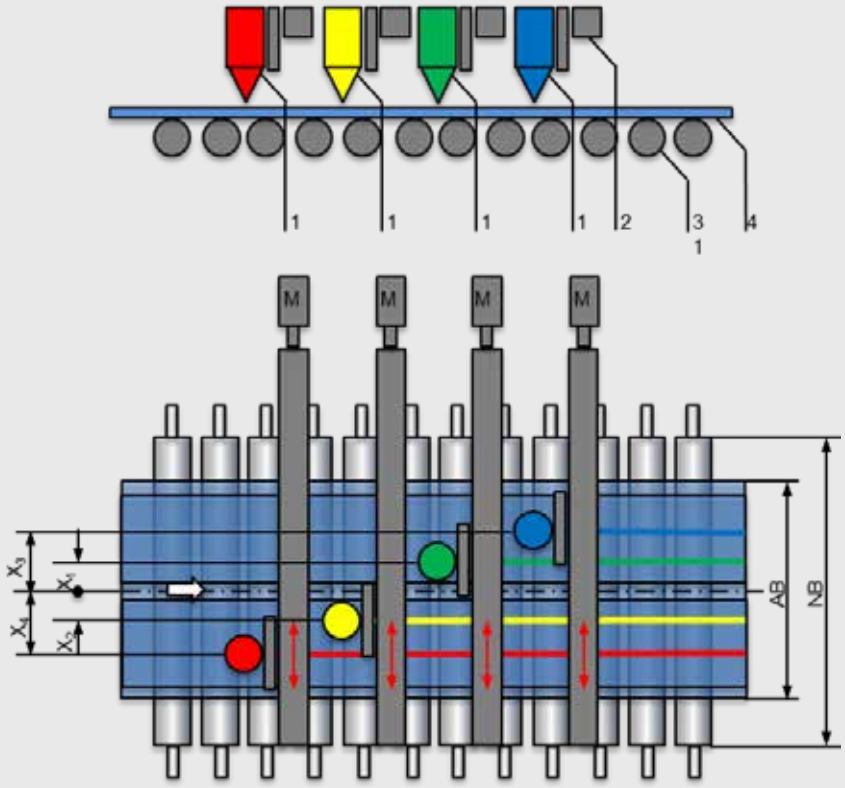
EL-Color Line Inspection / EL-PAPS

Product description

+ Measurement system for monitoring the color lines on the tread:
  - Presence
  - Number of lines
  - Position of lines
  - Color code
  - Profile width
+ Reliable color line recognition with CCD color line scan camera
+ Integrated LED light source for incident light illumination
+ Integrated air purge system to prevent build up of sulfur vapors



Ink bottle positioning
(Representation with one axis)



Legend

AB	= Operating width	1	= Ink container
NB	= Nominal width	2	= Support beam
X_1	= Distance color 1 (green)	3	= Guide roller
X_2	= Distance color 2 (yellow)	4	= Tread
X_3	= Distance color 3 (blue)		
X_4	= Distance color 4 (red)		

Technical data

Measuring range	450 mm
Resolution	~0.15 mm (depending on the final measuring range and the lens selection)
Camera	RGB line scan camera with 3 x 4080 pixels
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net
Relative humidity	15–95%, non-condensing
Ambient temperature	+10 to + 50°C
Control voltage (only applies to PC)	115 – 230 V 50 / 60 Hz
Current consumption	Open
Operating voltage (applies to fan)	3 x 400 V 50 / 60 Hz
Protection class	IP 54

Online weight per meter measurement

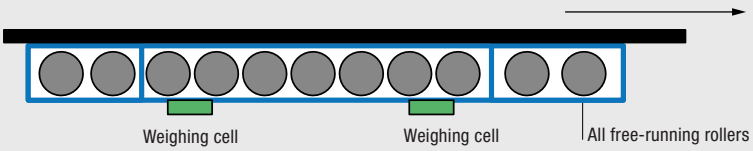
Function
The weight per meter scales (optional half-meter scales) allow the weight of rubber strands to be measured in the continuous process. The precise weighing cells are matched to the product mass.

Area of use
The online weight per meter measurement is used in extrusion systems, e.g. for weighing treads.

Application
Weight per meter measurements can be used for quality control and documentation of the material usage and the measured values are used for extrusion control.

EL-WEIGHT (weight per meter)

Product description
+ Weighing of unlimited length material
+ Robust, long-life weighing cells
+ Rapid recording of the measured values
+ Weighing terminal
+ Also available as half-meter scales



Technical data

Scale length	Weight per meter scales or weight per half-meter scales
Scale width	Customer-specific
Product length	unlimited
Product width	<1000 mm
Weighing cells	Class C6 (optional C3)
Resolution	Typ. 1 g
Static accuracy	Typ. ± 2 g (depending on max. weight, weighing cells, etc.)
Product weight	Customer-specific
Protection class	IP54
Temperature range	-10°-40°
Operating voltage	230/400 V 50/60 Hz
Power consumption	Typ. 200 W
PLC interface	Ethernet TCP/IP

Online weight per piece measurement

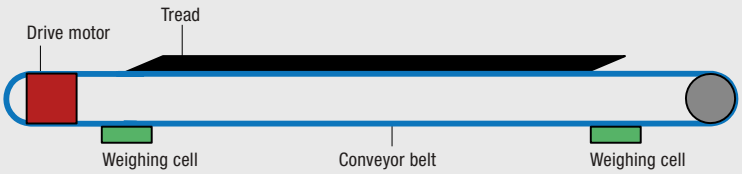
Function
The weight per piece scales allows dynamic measurement of the weight of tread or sidewall strips. The precise weighing cells are matched to the product mass, length and required accuracy.

Area of use
The online weight per piece measurement is used in production systems, e.g. for weighing treads.

Application
Weight per piece measurements can be used for quality control and documentation of the material usage.

EL-WEIGHT (weight per piece)

Product description
+ Weighing of treads or sidewalls
+ Robust, long-life weighing cells
+ Rapid recording of the measured values
+ Incl. weighing terminal



Technical data

Scale length	Customer-specific
Scale width	Customer-specific
Product length	<4000 mm
Product width	<1000 mm
Weighing cells	Class C6 (optional C3)
Resolution	Typ. 10 g
Static accuracy	Typ. ± 10 g (depending on max. weight, weighing cells, etc.)
Dynamic accuracy	Typ. ± 20 g (depending on max. weight, weighing cells, etc.)
Product weight	Customer-specific
Protection class	IP54
Temperature range	-10°-40°
Operating voltage	230/400 V 50/60 Hz
Power consumption	Typ. 200 W (appropriately higher with motor drive)
PLC interface	Ethernet TCP/IP

Thickness measurement – Differential measurement

Function

One or more sensors measure the product thickness in one or more locations via differential measurements. Here, there are many different ways in which this system can be used: Fixed measurement points or manually/automatically positionable measurement points.

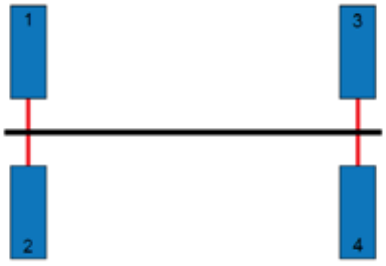
Area of use

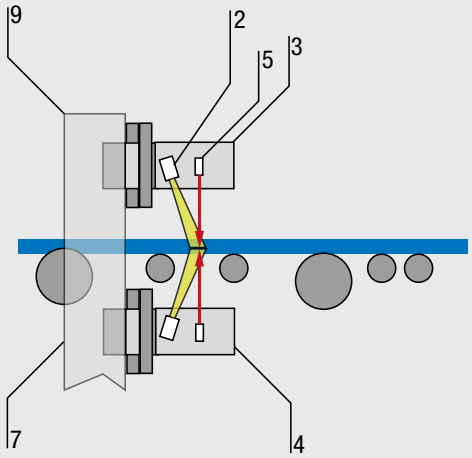
Thickness measurement systems are mostly used in calender lines or roller head calenders and after calendering in order to check the thickness and adjust the calender gap.

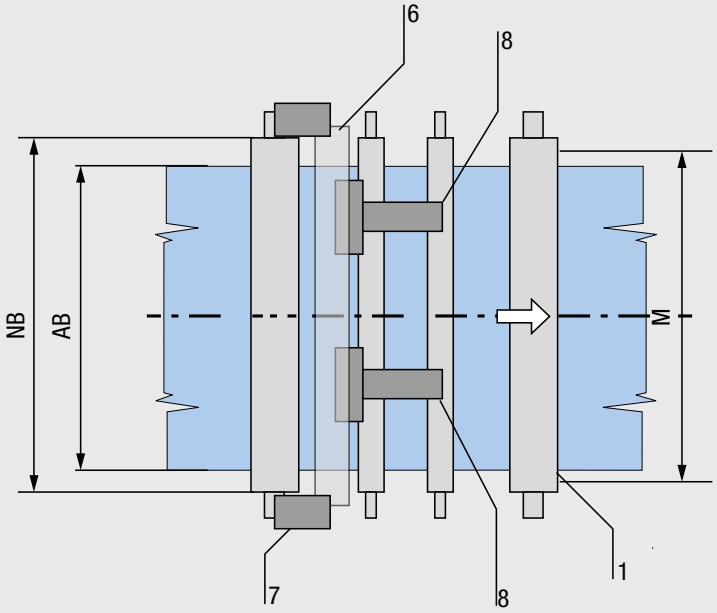
Application

Thickness measurement systems can be installed in almost any position in roller head lines, calender lines and extrusion lines.

Function – differential measurement







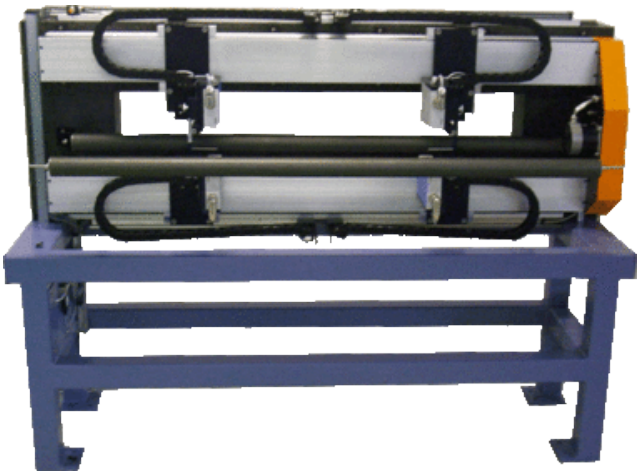
Legend

M	Measuring range	3	Laser sensor (top)	8	Positionable sensors
AB	Operating width	4	Laser sensor (bottom)	9	Differential measurement system
NB	Nominal width	5	Laser diode		
1	Guide roller	6	Positioning unit		
2	CCD sensor	7	Granite frame		

EL-THICKNESS O-frame

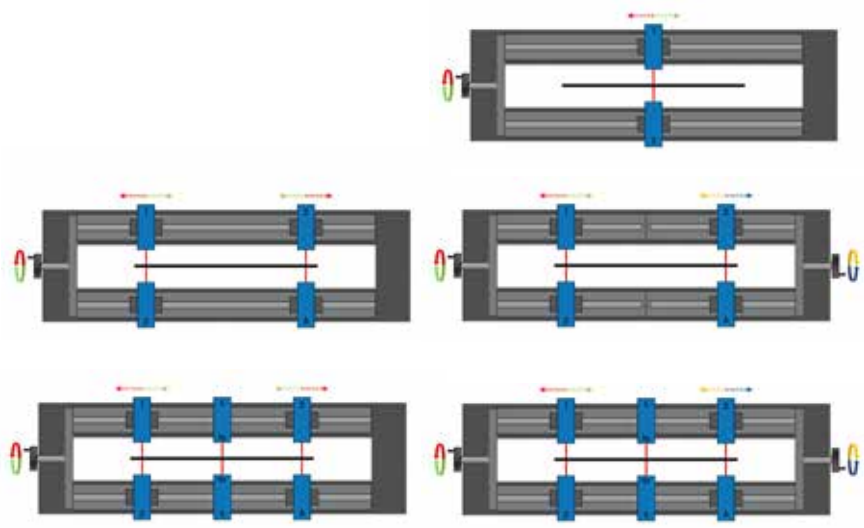
Product description

+ Contactless online thickness measurement for rubber webs
+ Precise detection of the web thickness based on laser triangulation technology
+ Between 1 and 3 measurement points can be selected
+ Reduction in rejects and maximum quality assurance
+ Minimized thermal expansion and susceptibility to vibration through the use of a granite frame
+ Manual or motorized positioning of sensors is possible



Option: Positioning in opposite directions

Option: Individual positioning



Technical data

Material width	450 - 2000 mm		
Web speed	Max. 100 m/min		
Profile thickness	Up to 8 mm	Up to 28 mm	Up to 68 mm
Measuring gap	56 mm	115 mm	225 mm
Positioning width	Material width + 50 mm		
Laser sensor	Point sensor		
Scan frequency	< 4 kHz		
Laser class	2 (no designated laser safety officer required)		
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net		
Relative humidity	15–95%, non-condensing		
Ambient temperature	+10 to +50°C		
Operating voltage	115 – 230 V 50 / 60 Hz		
Current consumption	~1.5 kW (version-dependent)	Protection class	IP 54

Thickness measurement – Reference measurement

Function

One or more sensors measure the product thickness in one or more locations via reference measurements. Here, there are many different ways in which this system can be used: Fixed measurement points or manually/ automatically approachable measurement points.

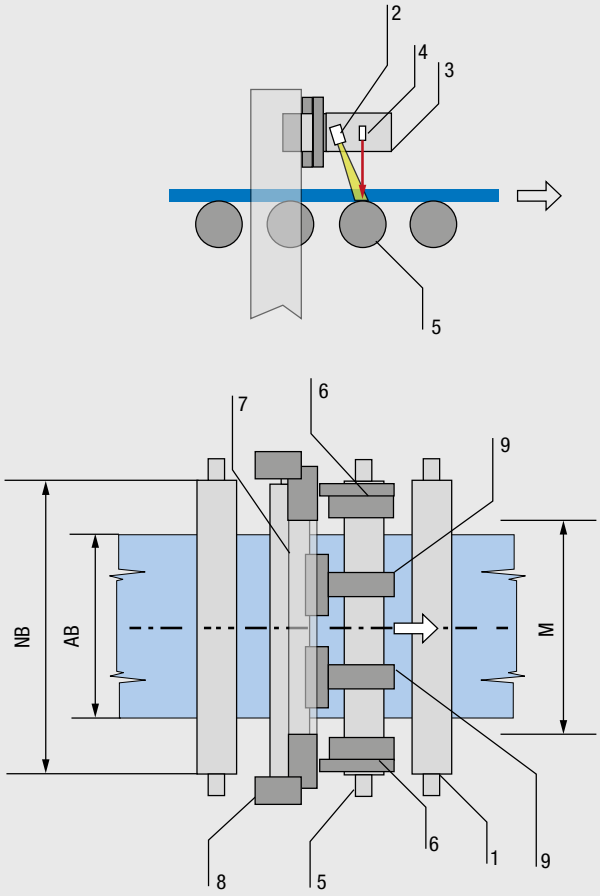
Area of use

Thickness measurement systems are mostly used in calender lines or roller head calenders and after calendering in order to check the thickness and adjust the calender gap.

Application

Thickness measurement systems can be installed in almost any position in roller head lines, calender lines and extrusion lines.

Function – reference measurement



Legend

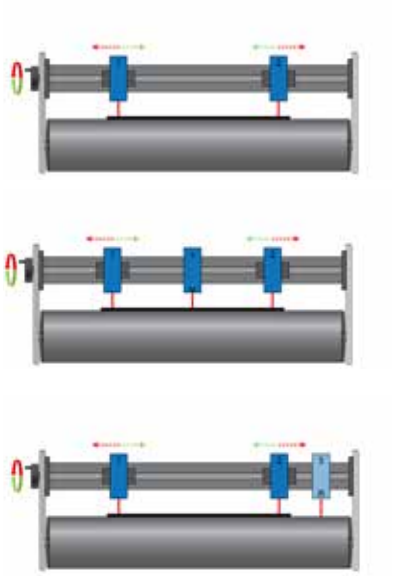
M	Measuring range	3	Laser sensor	8	Frame
AB	Operating width	4	Point laser	9	Measuring sensors
NB	Nominal width	5	Reference roller		
1	Guide roller	6	Reference laser, optional		
2	CCD sensor	7	Positioning unit		

EL-THICKNESS

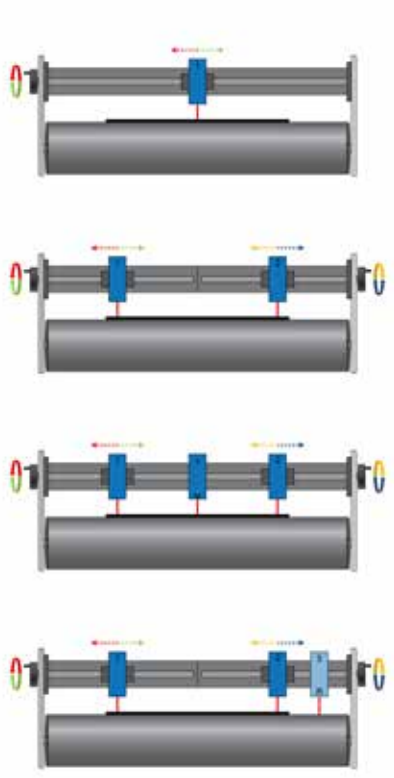
Product description

+ Contactless online thickness measurement for rubber webs
+ Precise detection of the web thickness based on laser triangulation technology
+ Between 1 and 5 measurement points can be selected
+ Reduction in rejects and maximum quality assurance
+ Manual or motorized positioning of sensors is possible

Option: Positioning in opposite directions



Option: Individual positioning

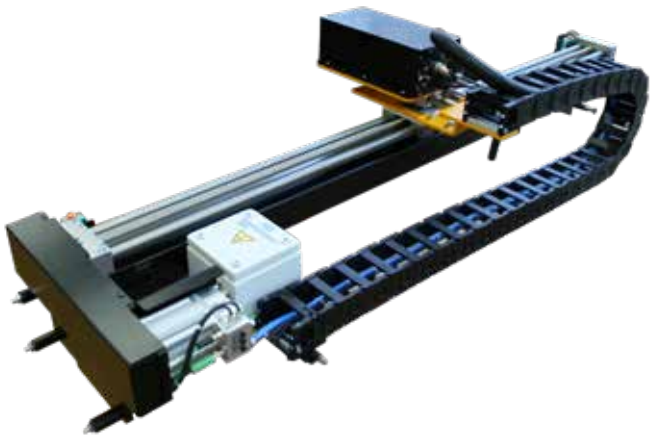


Technical data

Material width	450 - 2000 mm	
Web speed	Max. 100 m/min	
Profile thickness	Up to 8 mm	Up to 28 mm
Measuring gap	56 mm	115 mm
Positioning width	Material width + 50 mm	
Laser sensor	Point sensor	
Scan frequency	< 4 kHz	
Laser class	2 (no designated laser safety officer required)	
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net	
Relative humidity	15–95%, non-condensing	
Ambient temperature	+10 to +50°C	
Operating voltage	115 – 230 V 50 / 60 Hz	
Protection class	IP 54	

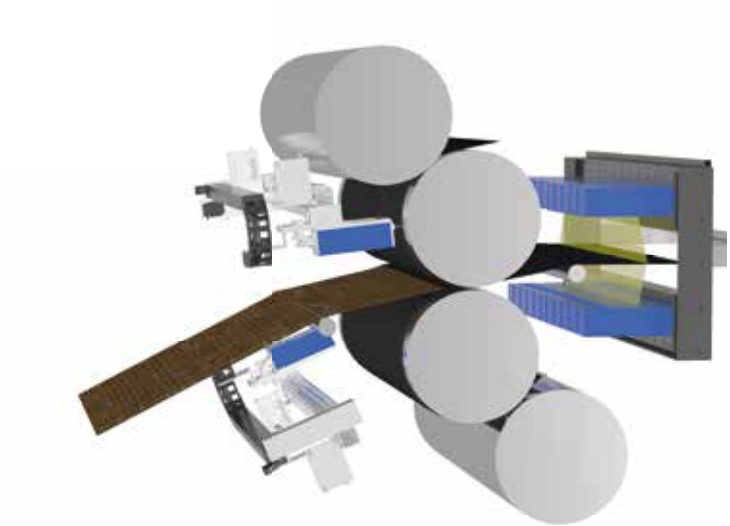
EL-THICKNESS calender

Function
The measuring head, consisting of the triangulation sensor (which measures the distance to the material) and the eddy current sensor (which measures the distance to the roller through the material), traverses over the material surrounding the calender roller and continuously measures the thickness.



Area of use
The calender thickness measurement is typically used in calender lines, directly on rollers 2 and 3, for high-accuracy thickness measurements.

Application
The customer can use the determined thickness measurement values for calender gap or cross axis control. Optionally, the system can also automatically calculate the control values and transmit the corresponding control signals to the calender PLC.



Thickness measurement with triangulation and eddy current sensor
- + Contactless thickness measurement system with point laser triangulation and eddy current sensor
- + Measurement against calender roller
- + Real-time measurement
- + Incl. communication with customer PLC
- + Provision of data for customer-side control of calender gap

EL-THICKNESS final

Function

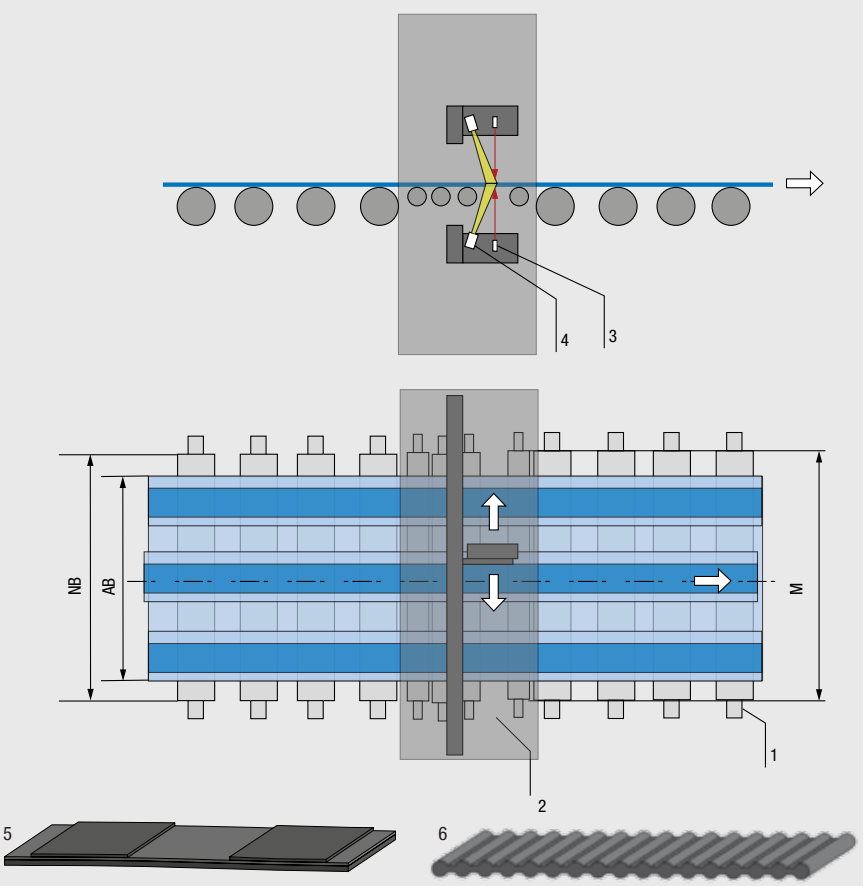
2 opposing triangulation sensors traverse over the moving product in synchronized form (inner liner, rubberized steel cord/textile cord, rubber/PVC webs) and each measure the distances to the material. The difference between the top and bottom sensor value, calculated with the calibration value, produces the material thickness. The granite frame on which the precise linear guides are mounted ensures highly accurate thickness measurements thanks to its high temperature stability and reduced vibrations.

Area of use

The high-accuracy thickness measurement is primarily used in calender systems for the inspection of inner lines, rubberized steel cord/textile cord or generally running rubber/PVC webs. In hot areas, it is used for process checking, in order to detect deviations from the specification early on, or to forward control signals to the calender controller for direct control of the calender gap. In cold areas, the system is used for quality control and documentation.

Application

EL-TRISCAN final is installed in the calender line directly after the calender and, together with the DS 2162 sensors, forms a complete unit, in order to control the calender gap. The system can also be used as a stand-alone system in warm and cold areas.



Legend

M	Measuring range	1	Guide roller	5	Inner liners and other rubber/PVC webs
AB	Operating width (profile width)	2	Profile measurement	6	Rubberized steel/textile cord
NB	Nominal width	3	Point laser		
		4	CCD sensor		

Contactless online thickness measurement of inner liner, rubberized steel/textile cord or general rubber/PVC webs

+ Comparison of nominal and actual thickness
+ Precise detection of the thickness based on laser triangulation technology
+ Secure recording with automatic intensity control for matt and glossy surfaces
+ Temperature-stable, vibration-resistant O frame made of granite
+ Minimized thermal expansion and susceptibility to vibration
+ through the use of a granite frame
+ Reduction in rejects and maximum quality assurance

For technical data, see EL-TRISCAN TR Page 47

EL-THICKNESS C-Frame

Function
2 opposing triangulation sensors each measure the distances to the material. After calculation with the calibration value, the differential signal produces the material thickness.

Area of use
The C frame thickness measurement is primarily used in calender lines for high-accuracy spot thickness measurement.

Application
Thickness measurements are used at the end of the production line for quality control and documentation. The calender gap can be controlled at the start of the line using the thickness value.

Contactless thickness measurement in difference procedure

+ Contactless online thickness measurement for rubber webs
+ Precise detection of the web thickness based on laser triangulation technology
+ Between 1 and 3 measurement points can be selected
+ Reduction in rejects and maximum quality assurance
+ Minimized thermal expansion and susceptibility to vibration through the use of a granite frame
+ Maximum accuracy through interval-dependent in-situ calibration
+ Manual or motorized positioning of sensors is possible

Technical data

Material width	450 - 2000 mm
Web speed	Max. 100 m/min
Profile thickness	Up to 8 mm
Laser sensor	Point sensor
Scan frequency	< 4 kHz
Laser class	2 (no designated laser safety officer required)
Repeat accuracy thickness for reference measurement	±0.005 mm
Measuring thickness for reference measurement	±0.010 mm
Interface	EtherNet/IP / Profibus / Profinet / CC Link / Device net
Relative humidity	15–95%, non-condensing
Ambient temperature	+10 to +50°C
Operating voltage	115 – 230 V 50 / 60 Hz
Power consumption	~1.5 kW (version-dependent)
Protection class	IP 54

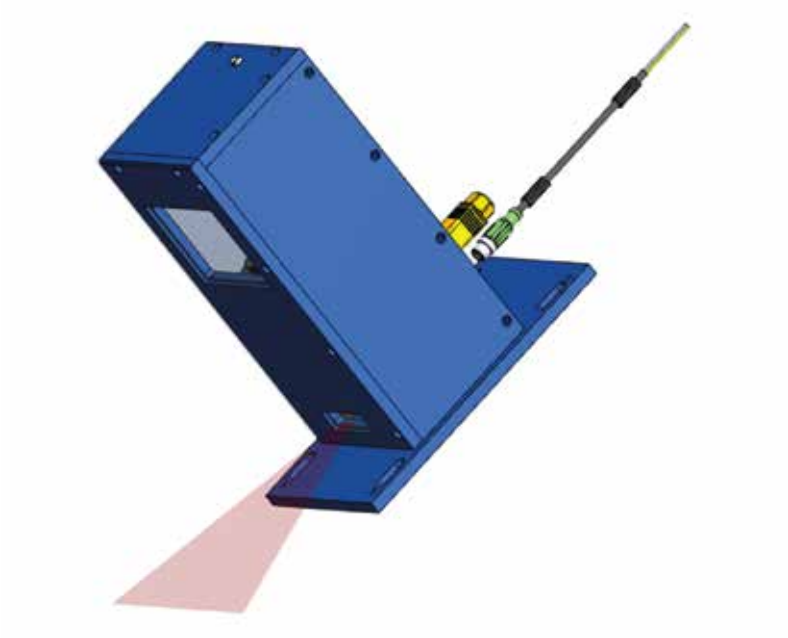
SMART TRIANGULATION SENSOR SL 1162

Function

The triangulation sensor consists of a laser line and a camera and evaluates the 2D-height profile with up to 8Hz at the positon of the laser line. Together with a second sensor mounted from the opposite direction, a complete 2D profile measurement can be realized.

Application

Laser Triangulation sensor for profile measurement and monitoring of various features on moving webs. Can be used for thickness and width measurement ->2D-profiling



Product data

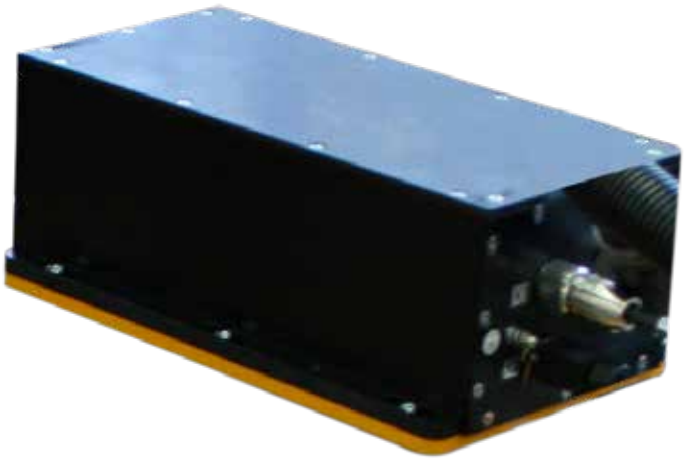
+ Data processing directly in the camera
+ Digital sensor
+ Safe laser class

Technical data

Measuring range	X direction (width) Z direction (thickness)	170 mm 60 mm
Measuring distance (to center of measuring range):		200 mm
Resolution	X direction (width) Z direction (thickness)	0.1 mm 0.001 mm
Measuring accuracy	X direction (width) Z direction (thickness)	± 0.25 mm ± 0.05 mm
Max. measuring frequency:		40 Hz
Laser class		Class 2
Laser wavelength		660 nm
Interfaces		Power pack: M12.8 pole RJ45 (PushPull) Gigabit Ethernet (GigE)
Weight		8 kg
Protection class		IP 54
Ambient temperature		+10 to +40 °C
Dimensions (sensor)		300 x 257 x 150 mm
Operating voltage		24 V DC
Power consumption		18 W

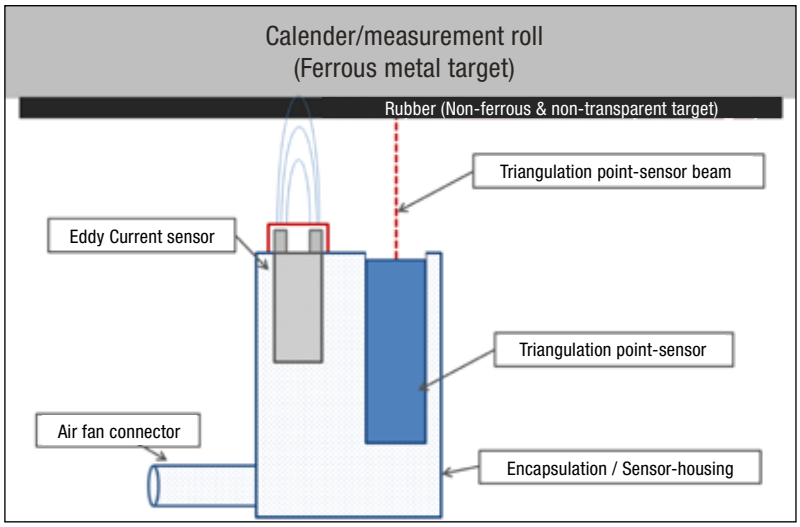
SMART DISTANCE SENSOR DS 2162

+ Eddy-Current & Triangulation Combo Sensor for the thickness and/or distance acquisition of moving webs against calender or measurement rollers.
+ Data processing and thermal compensation within the Sensor



Funktion

The Eddy-Current & Triangulation Combo Sensor, with one Eddy-Current Sensor coupled with one point laser beam, determines the thickness and/or distance of non-conductive objects placed on conductive rollers.

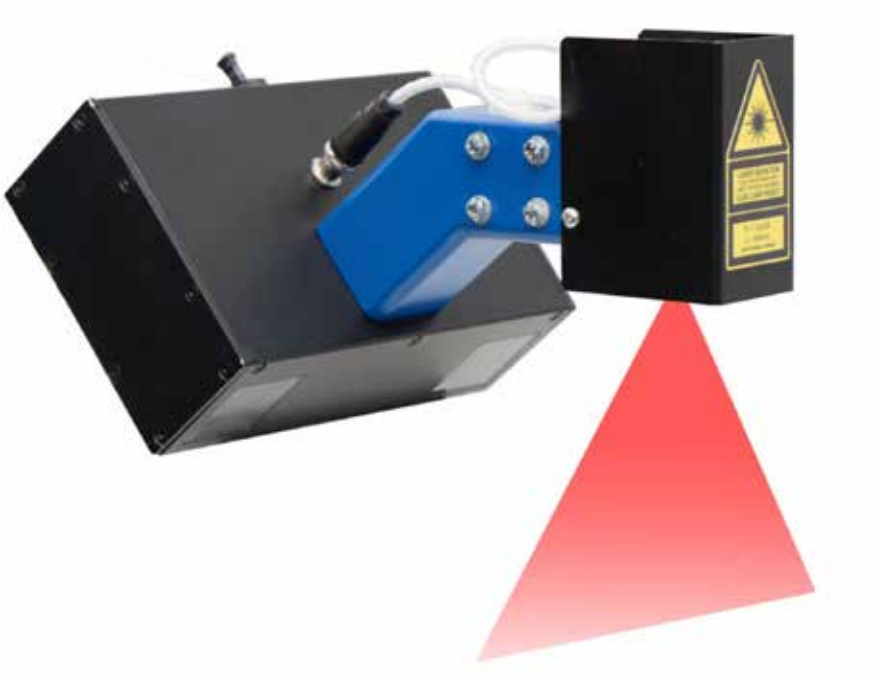


Technical data

Max. distance (Sensor stand off to roller)	Z-direction (Thickness)	10 mm
Corresponding max. Material Thickness	Z-direction (Thickness)	8 mm (optional 10mm)
Resolution	Z-direction (Thickness)	0.001 mm
Laser class		Class 2
Laser wavelength		660nm
Interfaces		M23, 16-pol (Power supply) RJ45 (PushPull) Gigabit Ethernet (GigE)
Weight		10 kg
Dimensions (Sensor)		338 x 198 x 120 mm
Operating voltage Nominal value		24 V DC

SMART TRIANGULATION SENSOR SL 2362/2462

+ Triangulation Sensor with dual camera for the acquisition of various criteria on moving webs. Can be used for position acquisition, web guiding, material detection, final check and width measurement.
+ Complete data processing within the camera

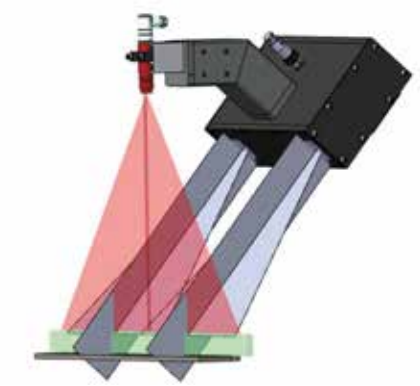


Function

The triangulation sensor, with one line laser beam and two cameras, determines the distance of all objects within sensors measuring range by evaluation of the projected laser line. The position of the laser line is tracked by a matrix camera and provides real 2D coordinates with up to 40Hz for each position.

Technical data

	SL 2362	SL2462
Measuring range x-direction (width) z-direction (thickness)	 350 mm 30 mm	 450 mm 30 mm
Measuring distance (to mid of measuring range)	335 mm	
Resolution x-direction (width) z-direction (thickness)	 0,1 mm 0,001 mm	 0,15 mm 0,001 mm
Measuring accuracy x-direction (width) z-direction (thickness)	 +/- 0,2 mm +/- 0,1 mm	
Max. scan rate	40 Hz	
Laser class	Class 2	
Laser wavelength	660nm	
Interfaces:	Power supply: M12, 8-pol Cable specification: E+L mat. no. 387328 or comparable Gigabit ethernet: RJ45 (IP54) Cable specification: E+L mat. no. 390889 or comparable	
Weight	9 kg	
Protection class	IP 54	
Ambient temperature	+10 bis +40 °C	
Dimensions (Sensor)	265 x 160 x 85 mm	
Operating voltage Nominal value	24 V DC	
Power consumption	18 W	



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