

BENNINGER



Treating Lines and technology for Conveyor Belts

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Benninger Zell in a few words

A division of the Benninger AG, Switzerland



Benninger Zell GmbH (Germany)



Head office: Benninger AG (Switzerland)

For already more than 150 years the Swiss company Benninger with its worldwide representative offices and service stations is one of the most important partners of the textile industry. Benninger Switzerland is designing and manufacturing machines and plants for textile finishing. Benninger Zell (Germany) is a division of the Benninger AG. For more than 60 years Benninger Zell is market leader for treating lines for Tire Cord and Conveyor Belts. Benninger Zell is globally operating and provides total solutions out of one hand including most advanced control systems.

Milestones Benninger Zell:

- 1898: Foundation of the “Maschinenfabrik Zell”
- 1939: Dispatch of the first Tire Cord Treating Line
- 1991: Takeover by Benninger AG

Experiences and process know-how:

- Treatment of Tire Cord – and Conveyor Belt fabric as well as Single End Cords
- Market leader in technology
- Guaranteed reliability
- Highest quality
- Worldwide operating sales- and service- network

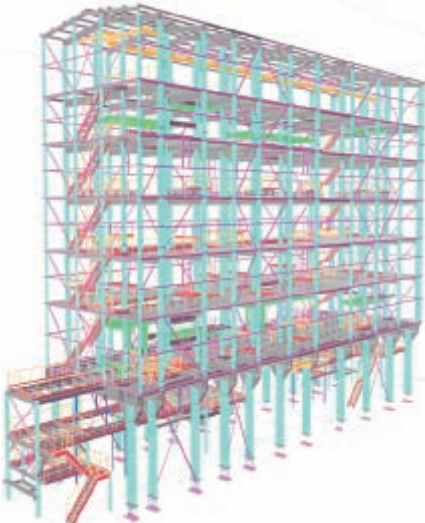
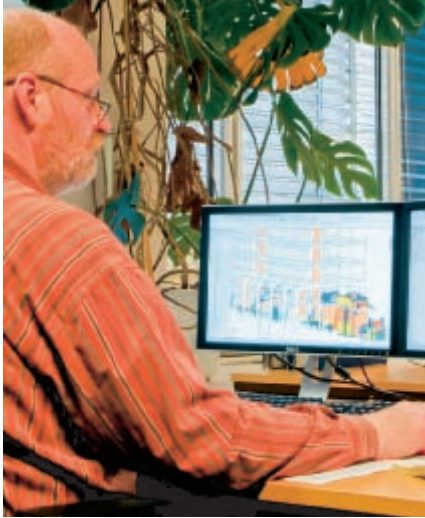
Customers’ side faces:

- Manufacturers of technical textiles
- Tyres Manufacturers
- Man-made fibre industry

Long term business relationships:

- Fenner-Dunlop (USA)
- Kordarna (Czech Republic)
- Far Eastern Textile (China)
- Polytex (China)
- Wuxi Taiji (China)





In Focus: Customer's Benefit

Your needs – Our solutions

The Customer's benefit always builds the hub of all efforts at Benninger. Due to long-term and successful business relationships we learned to understand what the importance for our customers is. For this reason we are able to provide you the adequate technology, the optimum plant as well as the best service at any time.

Constancy and Reliability in production:

- High level of automation of the entire treatment process
- Use of proven plants and control systems
- Long-term business relationships with leading Conveyor-Belt manufacturers
- Long lifetime through intelligent constructions
- Lowest maintenance and service efforts
- Trustable and reliable partnership

Reproducible Quality and Reliability:

- 60 years experiences in treatment of Tire Cord- and Conveyor Belt-Fabrics
- Long-term process know-how
- Reproducible fabric quality through recipe management
- Optimal reliability through process observation and capture of operating data
- Central software control of all machine equipment

Fastest profitability of your capital investment thru shortest project handling:

- The first produced roll is for sale
- Minimal waste
- Professional project management
- Intensive customer relationship with service and consultancy
- In house assembling and testing ensures a fast, sage and easy start-up at site

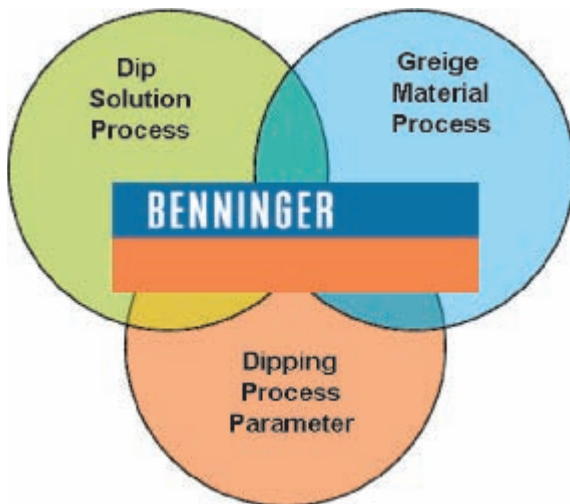
Long-term optimisation of your operating expenses

- Minimal operating expenses for a 24/7 operation
- 30% less exhaust air by operation of heating zones with exhaust air control system
- Energy retrieving by means of exhaust air treatment systems
- Minimal loss of heat by special heating zones isolation (100% tightness)
- Optimal and constant control of dip pick-up
- Full automatic preparation of dip solution according to customers' needs
- Optimisation of operating expenses by efficient software control
- Best efficiency of drives by feedback of dynamic brake power

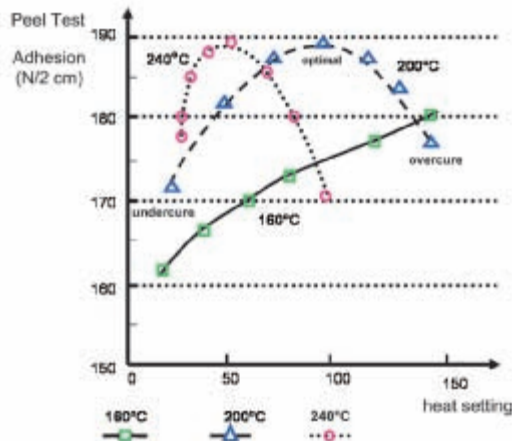


Technology Solutions without Compromises

- Consultation, companionship and realisation by an experienced team of experts
- Technological know-how and solutions within the range of raw material process dip solution process and dip process parameter
- Expertise for treated fabric, chemicals, twisting and weaving, process parameters, optimisation of recipes, quality control and process optimisation
- Large data base for many applications
- Comprehensive process know-how in the areas raw material, textiles and chemistry



As the leading manufacturer of treatment plants for Conveyor Belts Benninger Zell offers comprehensive experiences and know-how.





Thermal treatment (from page 8)

- Vertical air drier (DUAL RAM, AIR LOG)
- High performance stenter frame
- Infrared pre-drier
- Exhaust air control (ECO VAC)

Treatment (from page 14)

- Dip Station with automatic dip pick-up measurement (DIP MATIC)
- Squeezing Device (ECO PRESS)
- Increase of squeeze force (SQUEEZE BOOST)
- Dewebber System
- Cleaning system for dewebber lips (CLEAN FIX)

Tension generation (from page 17)

- Pull roll stands (GUS TEC)
- Rolls bearings
- Measuring rolls
- AC-drive

Fabric guiding systems (from page 19)

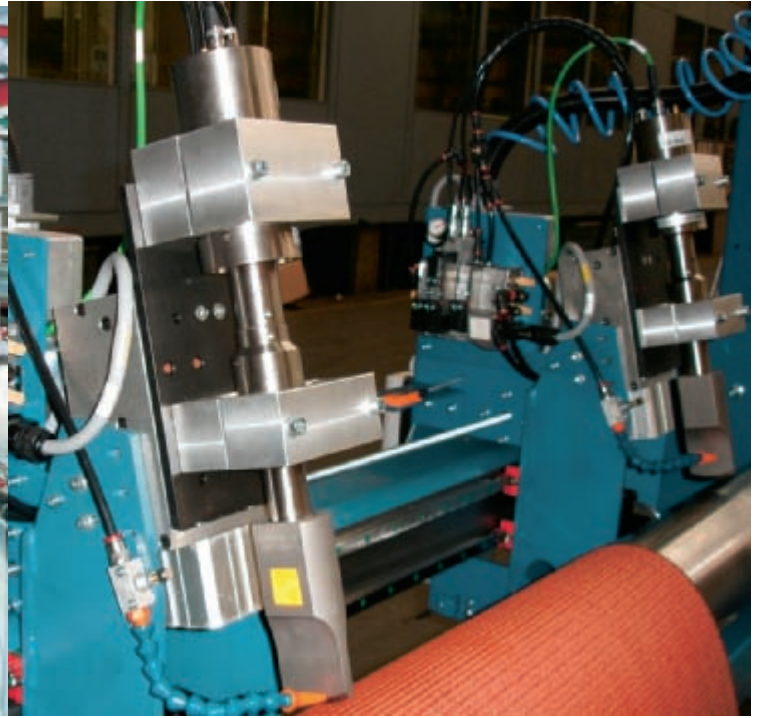
- Center Guide (OE)
- Full Width Spreader (OE)
- Trio Canter (OE)





Dip Mixing preparation station (from page 26)

- Reproducible preparation of Dip solution
- Automatic recipe management
- Integrated cleaning cycles
- Free programmable recipes



Ultrasonic welding- and cutting machine (from page 27)

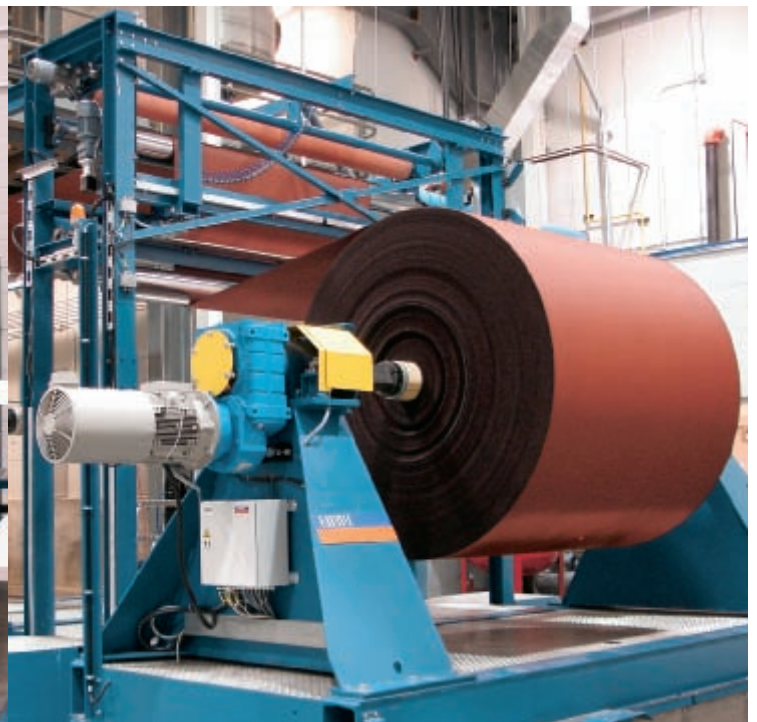
- Ultrasonic welding process
- Cutting process

Let-Off station (from page 22)

- Centre driven Let-Off
- Automatic roll centring
- AC-drive

Wind-Up station (from page 23)

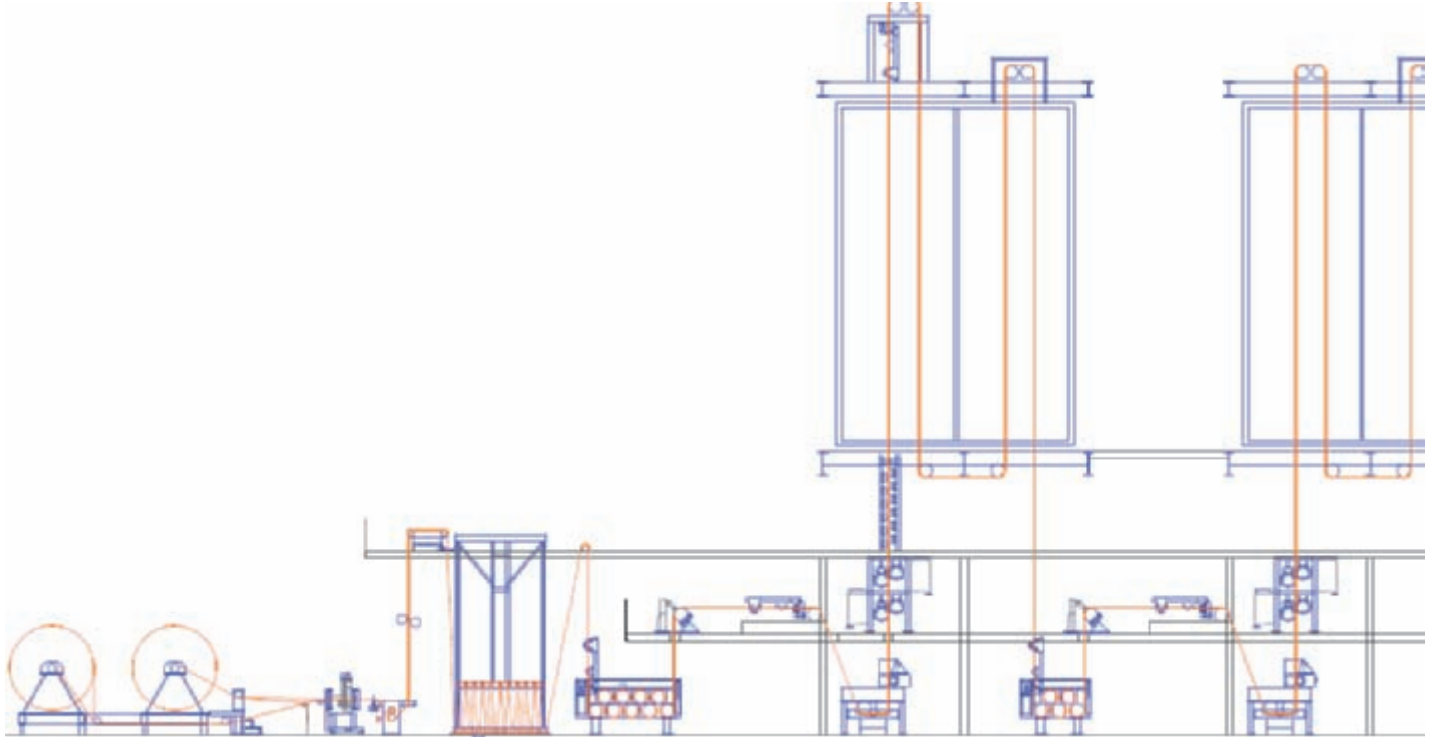
- Centre driven Wind-Up station
- Surface Winder
- Weighing and Wrapping unit (CORD WRAP)



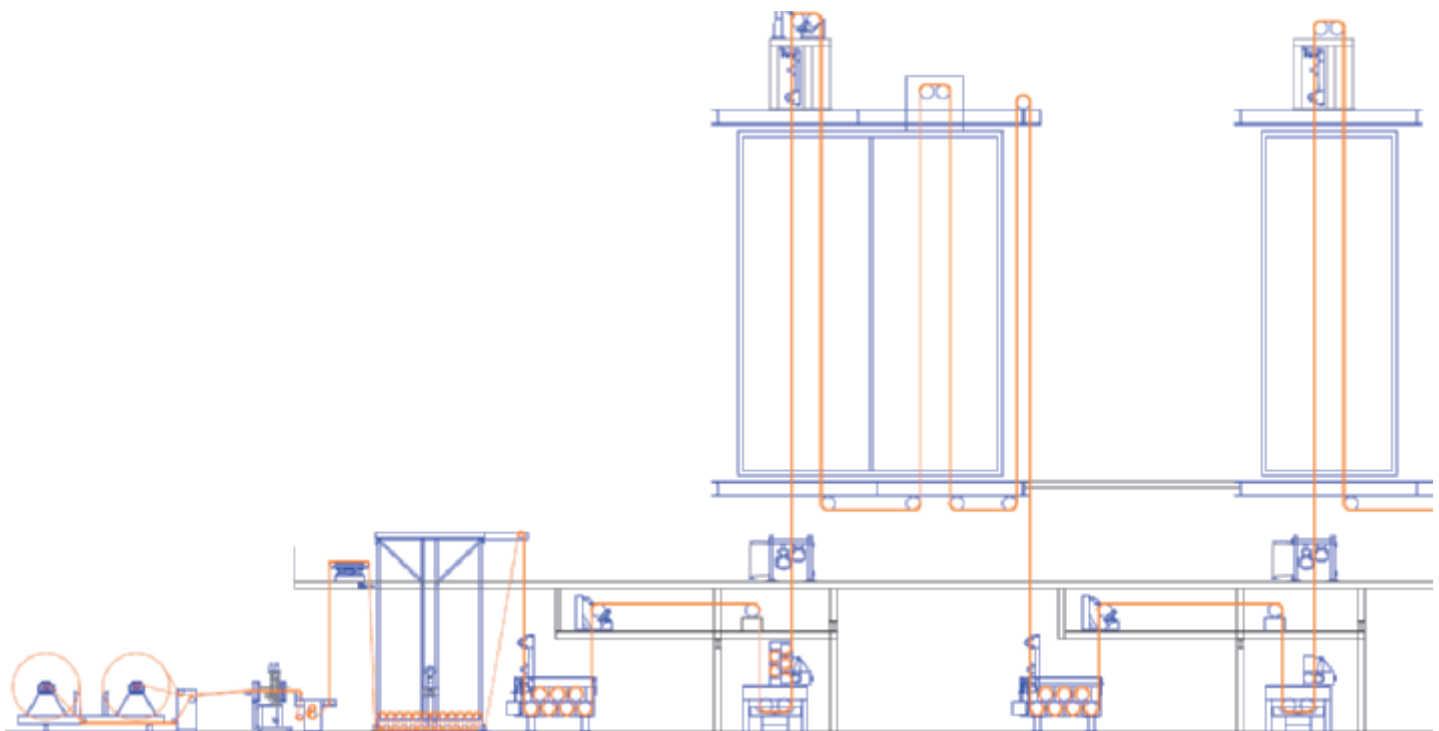
Conveyor Belt Treating Lines – At a glance

Flexibility for highest demands

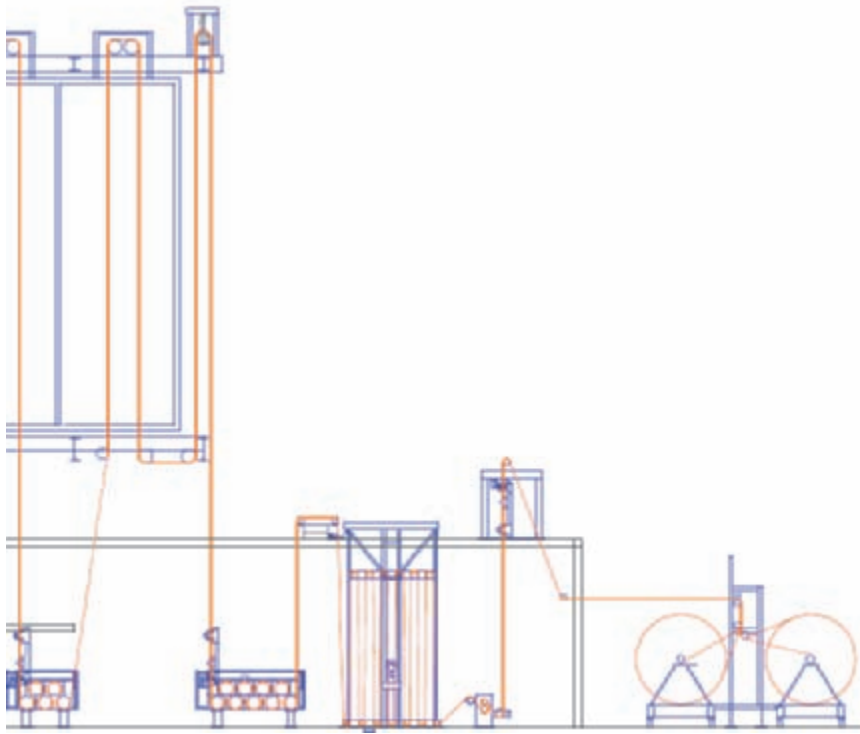
Benninger manufactures Conveyor Belt Treating Lines with a width up to 3200 mm. According to the customer's needs we deliver tailor made plants for heavy and / or light fabric.



Treating line for all kind of fabrics

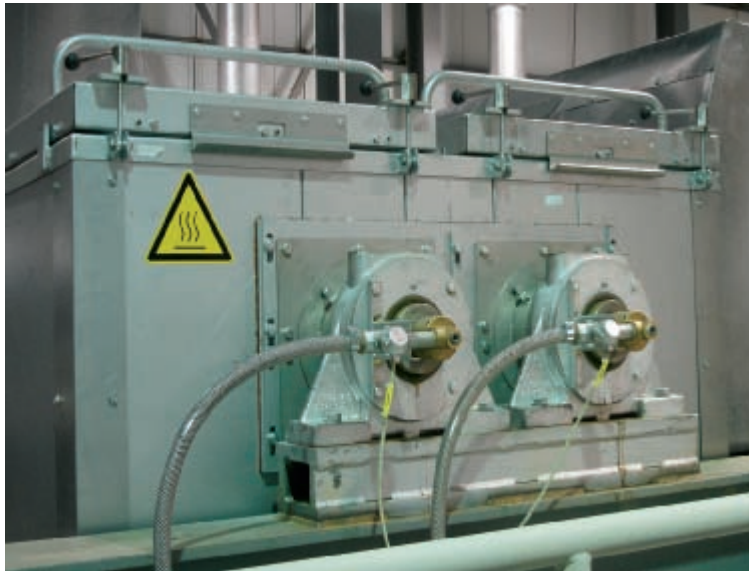


Treating Line for a preferable light fabric



Vertical air drier (convection)

Thermal treatment



Advanced heating zone – roll seals and roll chamber extraction



Jet lips with minimal manufacturing tolerance

In order to achieve the required quality parameters like adhesion, shrinkage or dimensional stability of fabric, technological values have to be transferred into the process systems. The result of these basic data has been realized within our heating zones. The complex relations of the thermal treatment have been disposed to the precise process automation.

Homogeneous thermal treatment process

- Constant heat input throughout the width and the height
- Economic operation for light and heavy fabric
- Well-directed leading of air by means of air deflectors inside the jet boxes

Two-sided air injection with individual temperature control DUAL RAM

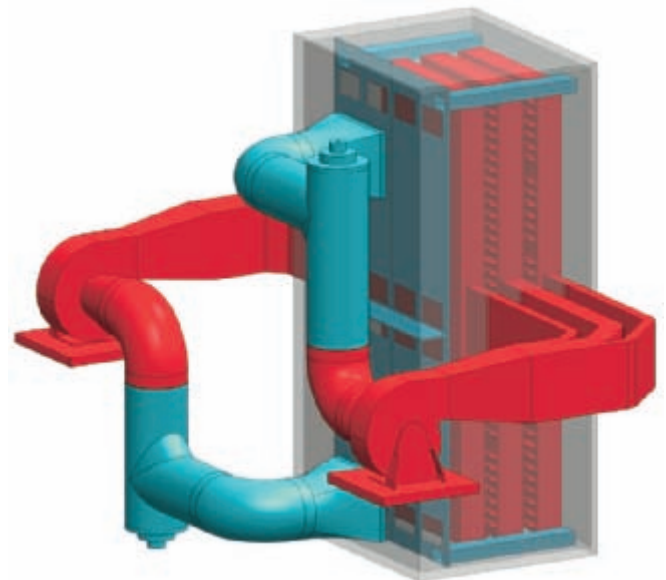
- Optimal heat treatment up to a fabric width of 3.000 mm
- Adjustable air flow for the optimisation of heat transfer on the fabric

Guided return air AIR BACK

- Calm run of fabric
- Avoiding of fabric vibration

Special jet lips for optimal air distribution

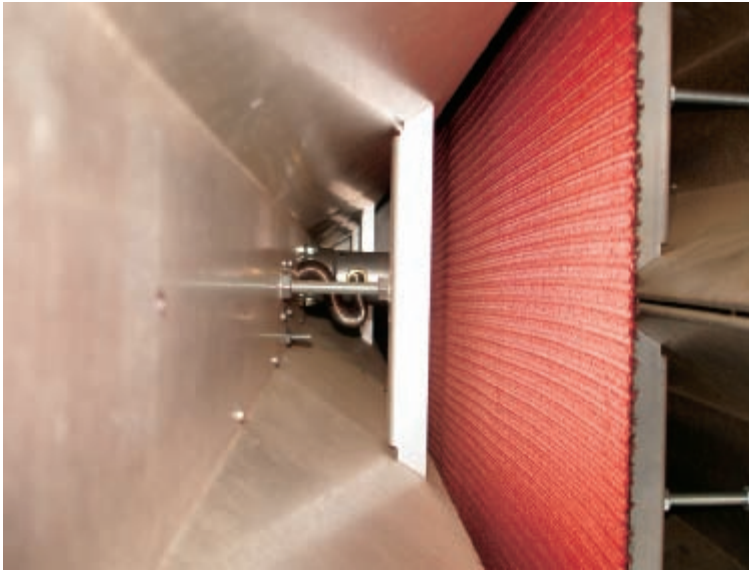
- High number of jet lips provides an increase of dryer efficiency
- Precise jet lips for constant air velocity across the fabric width



AIR BACK System

Heating zone Design

- Optimal heat insulation by means of tight welded isolation plates
- Avoidance of vapour emission
- Reduced risk of fire
- Advanced roll seals and targeted air extraction of the roll chambers



OPTI TEMP Sensor



AIR LOG Sensor

Fabric Temperature sensor - OPTI TEMP

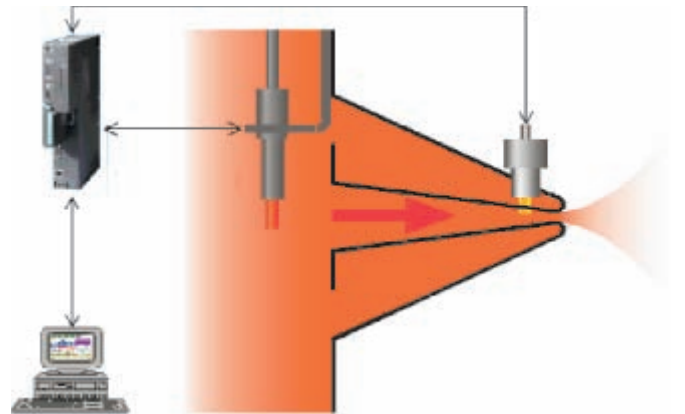
- Registration of actual fabric temperature
- Optimisation of drying process, process temperatures and exposure time

Heating zone control systems

- Optimal thermal treatment process by capturing and visualization of fabric temperature
- Best adjustment of zone temperatures by precise 4-line temperature feeler

Air Velocity sensor - AIR LOG

- Exact measurement of the air velocity at the jet lips
- Adaptation of optimal air velocity for light and heavy fabric
- Avoidance of fabric flagging



Heating zone control circuits



Tight welded heating zone

Benninger exclusivenesses:

- Burner system DUAL RAM
- Air velocity measuring sensor AIR LOG
- Return air guiding AIR BACK
- 100% tightness of heating zones
- Best heat transfer by a high number of jet lips

High performance stenter frame

Thermal treatment



Stenter frame with 7 sections



Stenter frame with central exhaust system

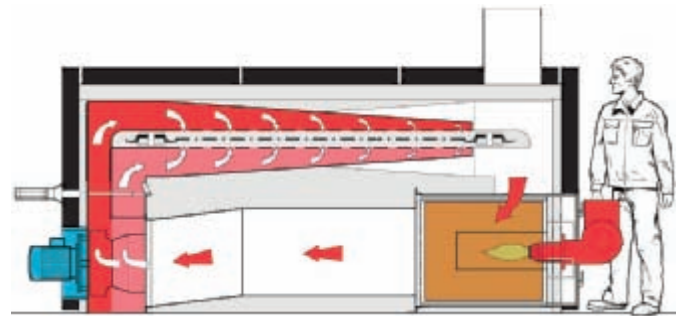
In order to fix the desired fabric width particularly at light fabrics usually a Stenter Frame is used. A special high performance Stenter Frame fulfils these high demands with regard to the fixation of the width. With this kind of Stenter frame it is even possible to clamp fabrics up to EP500 and to do a low-stress heat-setting in order to achieve the necessary “warp crimp”.

Treatment sections

- Optional with 5 up to 7 sections
- Optimal temperature control over the fabric width – with 2 burners per section
- Best heat transfer by conical jet boxes

High performance chain

- For a high shear force transfer up to 70 N/cm
- Automatic clamping at inlet section
- Chain and fabric protection by integrated measurement of shear force per each section
- Highest fabric width uniformity by optimal shear force control for each section
- Individual with adjustment for each section
- Automatic chain lubrication



Air heating and circulation system



Conical outlet of fabric



Automatic clamping at inlet

Special clamps for Conveyor Belt fabrics

- For a cross tension up to 70 N/cm
- Adjustable contact length of clamps
- Automatic adapted clamping force to the fabric
- No fabric damages thanks to special terminal strip

Stenter frame control integrated in central process control

- Individual adjustment of shear force with digital indicator for each segment
- Central visualisation and operation
- All treatment parameters set by the recipe management
- Plant data logging of all process parameters



Special clamps for Conveyor Belt fabrics

Benninger exclusivenesses:

- High performance Stenter frame for highest demands
- Maximal shear force transfer up to 70 N/cm
- High performance chain with special clamps
- Integrated protection of chain and fabric
- Control of Stenter frame integrated in central process control
- Safe and efficient operation

Infrared pre-drier Thermal Treatment



Infrared pre-drier inlet



Infrared radiator elements

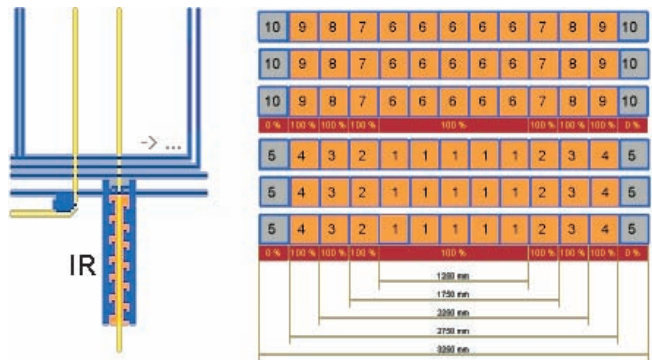
The infrared pre-drier enables an efficient pre-heating for evaporation of the water which has been absorbed with the dip solution. Thus the exposure time in the following heating zone can be reduced.

Pre-drying with fast reacting medium wave infrared radiators

- 50% reduction of exposure time in the heating zone by pre-heating of wet fabric
- Wavelength range specially adapted for the absorption range of water molecules
- Reduced costs
- Simple and modular cartridge design for fast access

Radiators with high radiation share

- Low latent heat in order to protect the fabric in case of machine stop
- Radiation width adjustable to the fabric width
- Intensity of radiation individually adjustable depending on fabric width and weight
- Individual exposure time by switching ON or OFF radiation elements
- Non-sensitive radiation elements



Infrared radiation elements

Control of infrared pre-drier

- High performance pyrometers capture the fabric temperature
- Exact performance control according to fabric, speed and product temperature

Benninger exclusivenesses:

- 50% reduction of exposure time in the heating zone
- Energy saving during air drying
- Universal setting
- Free selectable radiation area
- Lower investment costs for the building

ECO VAC Exhaust Air Control

Thermal Treatment



Exhauster



ECO VAC exhaust control

Process-related a lot of humidity and volatile substances are conducted out of the heating zones. To meet each production condition a certain vacuum is adjusted and controlled via the ECO VAC system in each heating zone whereas up to 30 % exhaust air can be saved. The lowest possible vacuum is achieved by differential measurement of the atmospheric external pressure and of the inside pressure of the heating zones.

ECO VAC exhaust air system for reduced energy consumption

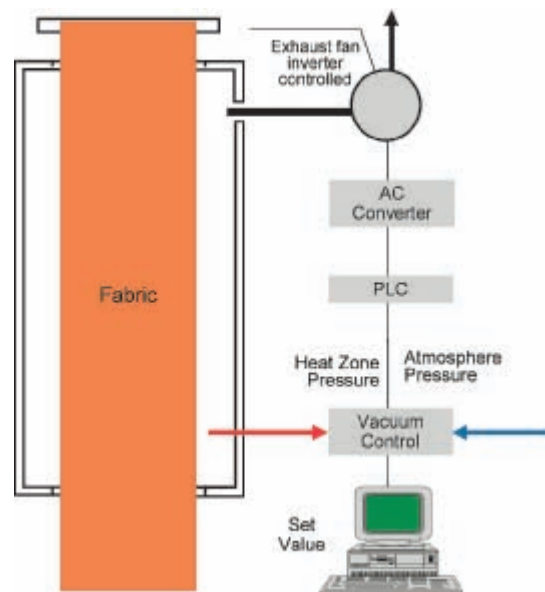
- High sensitive sensors for the measurement of external pressure and inside pressure of the heating zones
- Weather independent due to permanent external pressure measurements
- Precise control of differential pressure to 0,1 mbar
- Fully automatic logging and control of the vacuum

Fully automatic Control

- Automatic adjustment of production realises minimal amount of exhaust air
- Energy saving by inverter controlled exhaust fans

Reduction of volatile substances within the building

- Improved air conditions for the personnel
- Reduced cleaning of building
- Additional roll chamber exhaust extraction



ECO VAC close loop control

Benninger exclusiveness:

- 30% saving of exhaust air
- Fully automatic control of volume of exhaust air
- Reduction of volatile substances within the building

Dip Station Treatment



Dip Station DIP MATIC



Application of dip solution

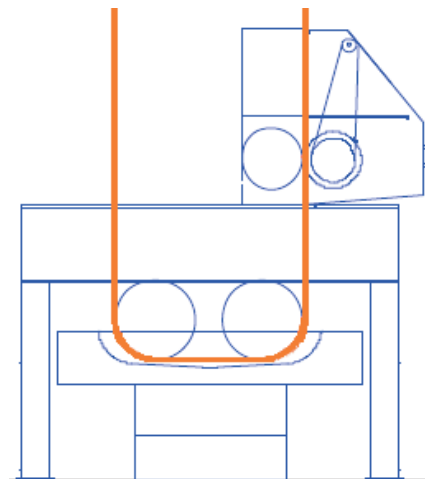
The treating process describes the dipping of Conveyor Belt fabric in specially prepared dip solutions. In order to achieve best adhesion between the fibres and the rubber compound the fabric is treated with an aqueous latex solution. A uniform dip pick-up across the fabric width and to reach a maximal adhesion with a minimum of dip pick-up are targets of this process. A special dip station ensures this uniform dip pick-up.

Dip Station with control of consumption and dip pick-up

- Online dip consumption measurement DIP MATIC
- Constant consumption of dip solution for reduced use of chemicals
- Automatic level control

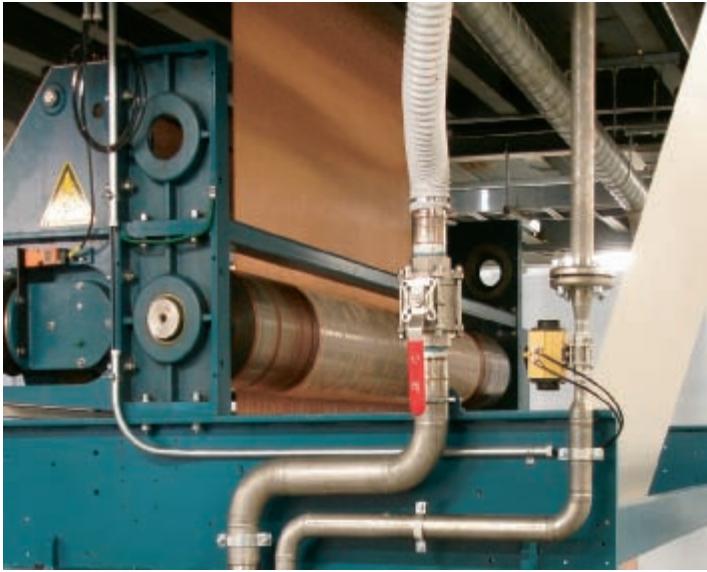
Progressive dip tank concept

- Minimal size for constantly fresh dip solution
- Prevention of sedimentations and waste
- Minimal cleaning efforts because of Teflon coating
- Integrated filter system for a constantly clean dip solution



DIP MATIC with control of consumption and dip pick-up

Squeezing Device Treatment



ECO PRESS squeezing device



Scraper for cleaning the squeeze roll

After the fabric has been treated the surplus dip solution on the fabric will be removed by means of the squeezing device. Hereby the ECO PRESS roll ensures a constant squeezing force over the width.

Squeeze unit ECO PRESS

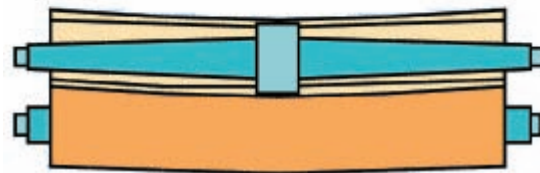
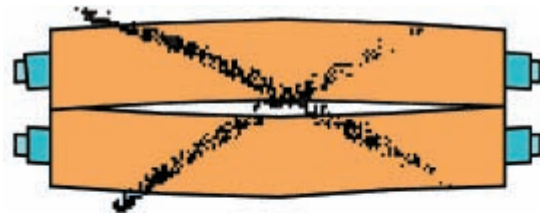
- Special roll that attaches to the bend of the counter roll
- Constant squeeze force over the entire fabric width
- Penetration of dip solution in the fabric in dependency of pressure force

Integrated cleaning system for squeezing roll

- Special scraper for the squeezing roll
- Avoiding of sedimentations and accumulation of dip solution
- Pneumatically adjustable

SQUEEZE BOOST system

- Free programmable squeeze pressure curves
- Extremely high flexibility up to 4 daN/cm
- Automatic splice detection system CORD SCAN activates the SQUEEZE BOOST function



ECO PRESS with special squeeze roll

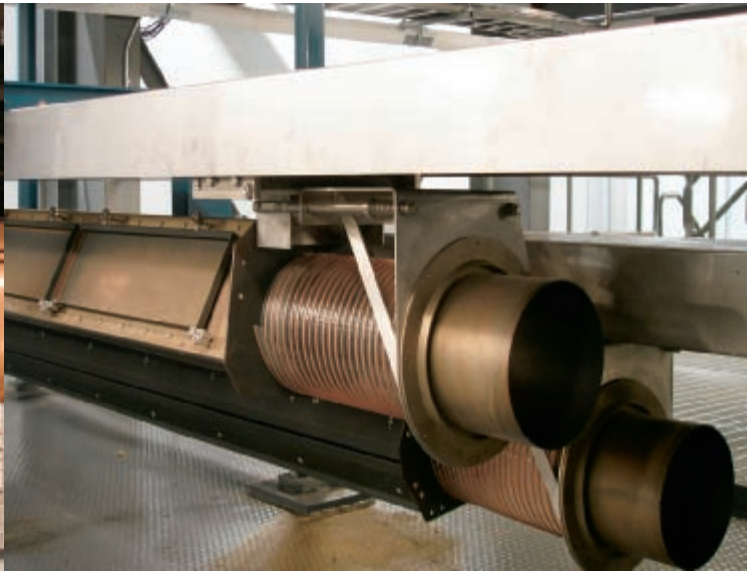
Benninger exclusivenesses:

- Online dip consumption measurement DIP MATIC
- Reduced use of chemicals
- Squeezing unit ECO PRESS with special squeeze roll
- Automatic splice detector system CORD SCAN
- SQUEEZE BOOST with splice detector system

Dewebber System Treatment



Dewebber System - model TWIN VAC



Automatic retractable dewebber heads

After the surplus dip solution has been squeezed out the fabric is passing the dewebber heads that assures an exactly defined dip pick-up. The constant aspiration can be adjusted across the entire fabric width (up to 3200 mm) and can be individually controlled for each fabric side. The dewebber heads are fully automatic laterally retractable.

Dewebber system for defined extracting across the width

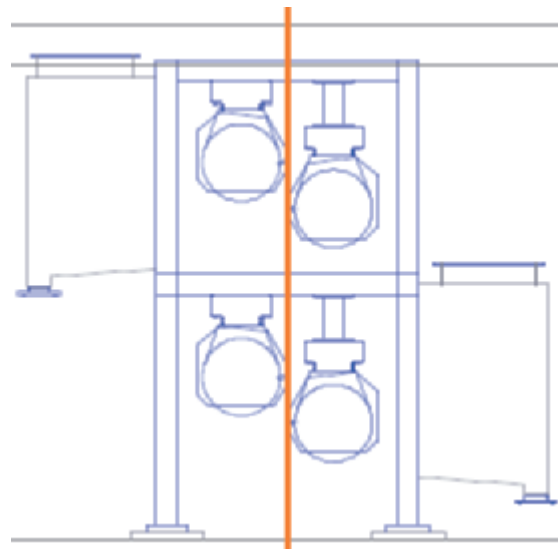
- Optimal construction of dewebber heads for a constant vacuum and thus uniform dip pick-up across the entire fabric width
- 4 dewebber heads (2 in operation / 2 in standby) for maximum flexibility, minimal loss of production and constantly high efficiency
- Individually adjustable vacuum for each head
- Control of set vacuum for constant dip pick-up
- Filter system for each pair of dewebber heads

Automatic moveable dewebber heads

- Continuous line operation
- Easy cleaning and servicing through Teflon coating inside
- Individually adjustable jet lips
- Individually adjustable dewebber heads

CLEAN FIX dewebber lips cleaning system

- Ensures constantly clean slots and thereby a uniform extraction
- Integrated in each head
- Free selectable cleaning cycle



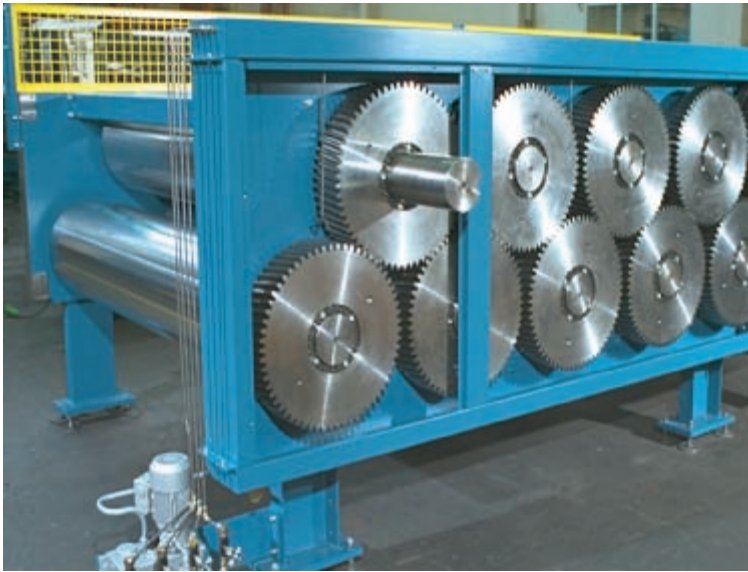
TWIN VAC Absaugkonzept

Benninger exclusivenesses:

- Constant extraction up to 3.200 mm
- Automatic retraction of dewebber heads
- Cleaning system CLEAN FIX for dewebber lips
- Pre-selectable cleaning width

Pull Roll Stands and Measuring Rolls

Tension Generation



Pull roll stand drive with automatic central lubrication



Hardened and ground helical gears

In order to build up the necessary process tensions and to transport the fabric through the entire machine pull roll stands are used. Optimal placed pull roll stands and measuring rolls enable a best fabric tension which is precisely controlled by the CORD TEC process control.

Pull roll stands GUS TEC for the generation of fabric tension

- Avoiding of fabric folding through minimal roll deflection
- Low maintenance AC-drives
- Modular design for fast change of bearings

Silent operation and high lifetime

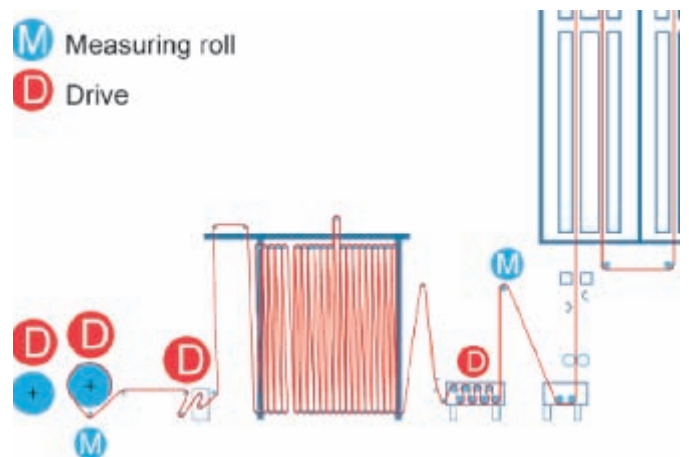
- Hardened, ground helical gears
- Automatic lubrication of gears
- Vibration-reducing cast iron blocks

Constant tension build-up across the width

- Rolls with precise geometric cylindrical form
- Gentle fabric leading

High-precision tension control

- Measuring rolls with highly sensitive load cells
- Digital signal processing



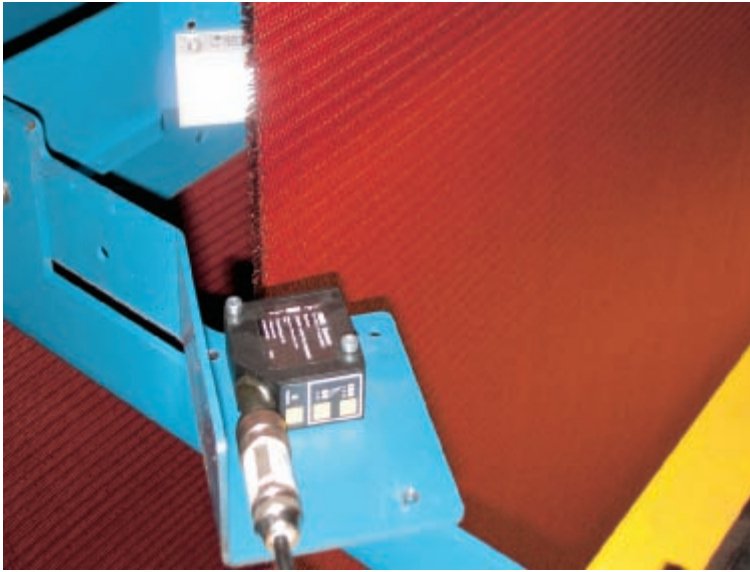
System for tension generation

Benninger exclusivenesses:

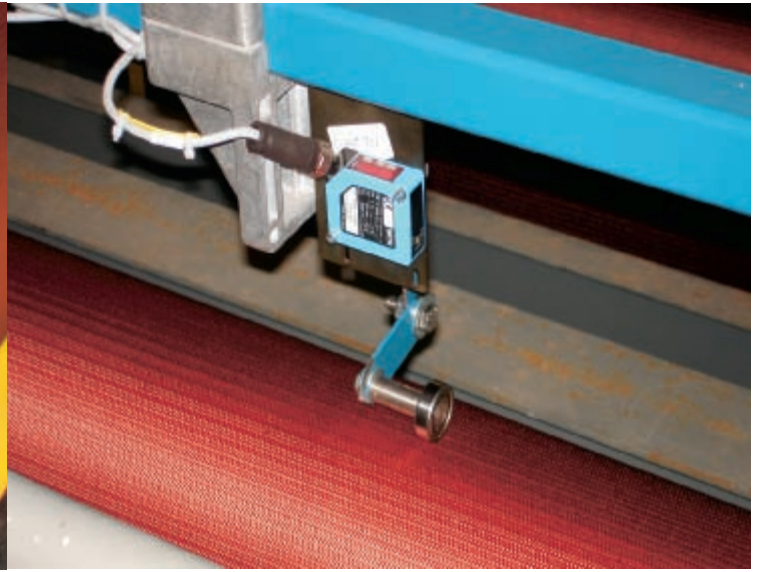
- Hardened, ground helical gears
- Silent operation and force transmission through helical gearing
- High-precision tension control
- Modular design

Fabric guiding devices

Safe Operation by Automatic Fabric Guiding Devices



Optical sensors for detecting fabric's edges



Integrated splice detection systems

In order to achieve best quality a wrinkle-free fabric run as well as a constant operation are essential. For this reason Benninger provides own-designed fabric guiding systems including OE technique: Centre Guide, Full Width Spreader and Trio Canter. An automatic adjustment according to the particular recipe and fabric width and weight enables shortest possible fabric style change.

Solutions through long-term experiences

- Proven in-house developments for fabric widths up to 3.000 mm
- Sturdy constructions and simple handling

Automatic adaptation to fabric width

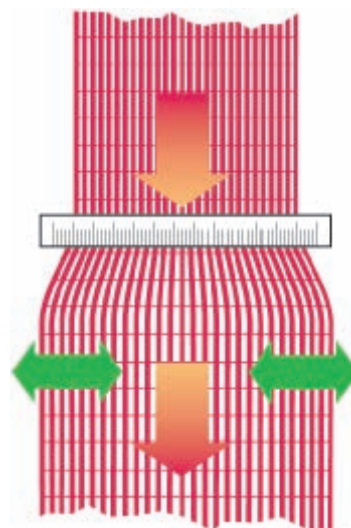
- Integration of all settings into the process recipe
- Central input of fabric width via HMI
- Continuous comparison of nominal and actual value
- Automatic adjustment of the fabric guiding devices after fabric style change and width

Use of newest OE technique

- High resolution optical edge detectors
- Efficient electric motors for width adjustment

Easiest and safest operation

- Local operator panel with indication for manual settings
- Adjustment of all control functions with edge sensor frame
- Pre-selected width locally adaptable



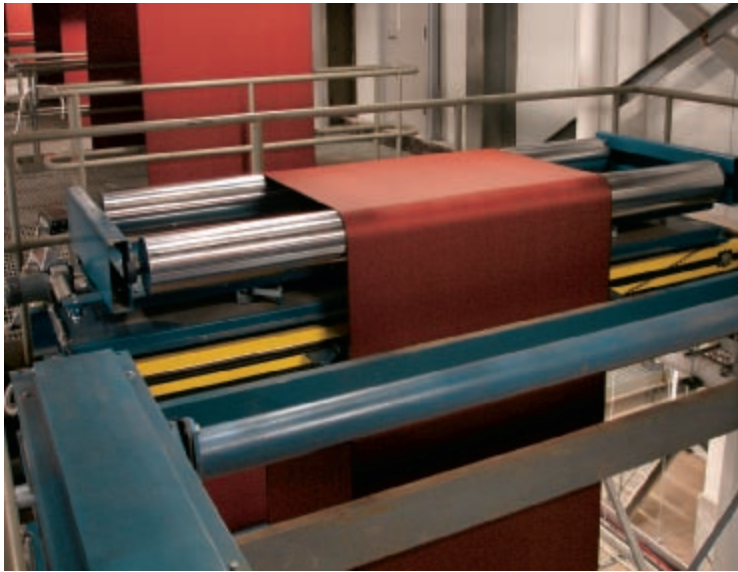
Principle of edge sensor frame

Fully automatic adaptation of devices at style change and width

- Integrated splice detection system enables the automatic adaptation of the fabric guiding devices to the width after fabric style change
- Increase of machine's efficiency
- Reduction of fabric style change time

Centre Guide

Fabric guiding devices



Centre guide with turning frame



Turning frame

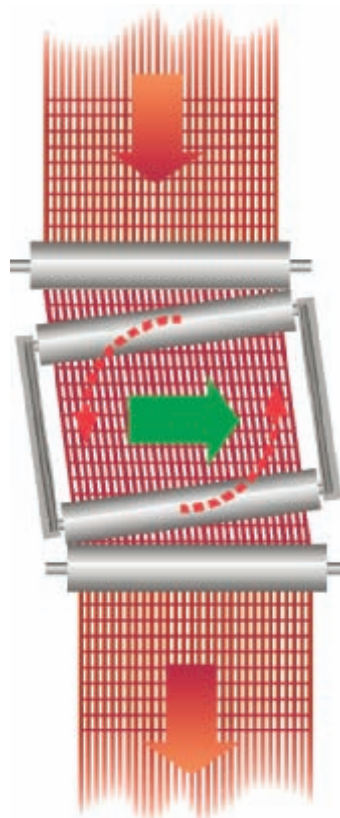
The Centre guide is used to keep the fabric safely in the middle of the machine. The fabric is centred by inclination of the turning frame. Thereby optical sensors detect the fabric edges.

Centre guide OE

- Avoiding of fabric folding through precisely reacting turning frame
- Sturdy construction – especially for heavy fabrics
- Electromotive AC-drive
- For centring optical edge sensors scan the edges of fabric path and regulate the position of turning frame
- High operating safety and easy operation
- Avoiding of fabric wrinkles
- No angular fabric runs on the rolls

Places of installation

- Important at the inlet and the outlet of the accumulators



Principle of center guide with turning frame

Full Width Spreader

Fabric guiding devices



Full Width Spreader with pull roll stand



Stand-alone unit

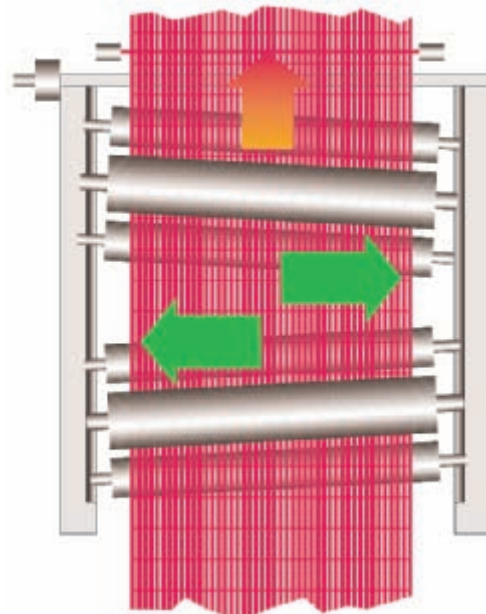
The Full Width Spreader is used to spread the fabric uniformly across the entire width at high tension in order to lead the fabric centre lined within the machine. By the angular adjustment and the alignment of the rolls to the fabric high shear forces are built up.

Full Width Spreader OE

- The Full Width Spreader consists of two roll sets. Each roll set consists of two fix rolls and one control roll.
- Autonomic control system per each roll set
- Roll with special ceramic coating increase the spreading effect
- Desired spreading is controlled by means of the retraction depth of the middle roll
- Additional centring of fabric by a special roll alignment
- Avoidance of fabric folding at high tension

Places of installation

- In front of pull roll stands and centre driven winders



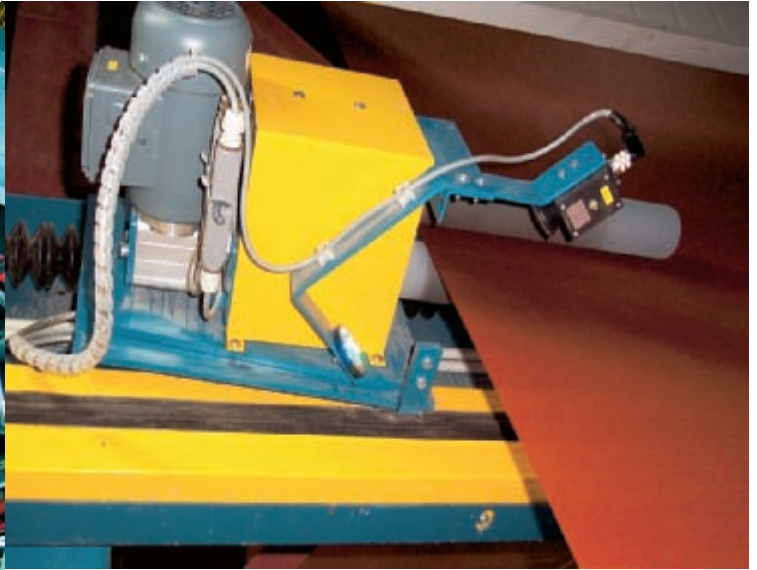
Principle of Full Width Spreader

Trio Canter

Fabric guiding devices



Edge guiding/spreading – Trio Canter



Edge detectors

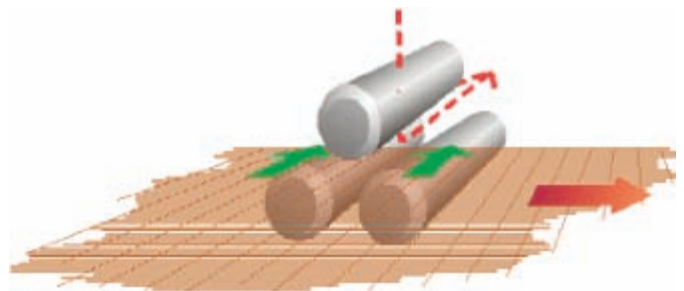
The Trio Canter is used to prevent fabric edge pinch and for a precise guiding of the fabric edge position in order to enable a proper roll built-up. Three rotating fingers grasp the fabric edges and spread them laterally.

Edge spreader / Trio Canter OE

- Three ceramic coated fingers take care of an exact fabric edges guiding
- Variable retraction depth for optimal fabric edge guiding
- Individually adjustable sensing heads
- Individual control system for each side

Places of installation

- In front of surface winders
- Especially for Tire Cord fabric and light Conveyor Belt fabric
- For perfect roll built-up



Principle of Trio Canter

Benninger exclusivenesses:

- Approved in-house-developments
- Unique adjustability of devices
- Fully automatic adjustment by recipe administration
- Integrated splice detector system
- Local operator panel with indication
- Single devices for stand-alone solution available for easy refitting

Centre driven Let-Off Station

Winding systems



Dual centre driven Let-Off station with automatic fabric centring



Dual centre driven Let-Off station with motorized drive

Two centre driven Let-Off stations ensure a correct fabric inlet under constant let off tension. The Let-Off stations are equipped with AC motors with integrated break. Both stations are automatically laterally moveable in order to achieve an optimal fabric centring.

Constant let-off tension

- Dynamic braking by AC drive system
- Minimal costs for maintenance through wear less operation
- Feeding back of braking energy (energy saving)
- Precisely controlled let-off tension by measuring roll

Self-centring let-off stations for telescopic rolls

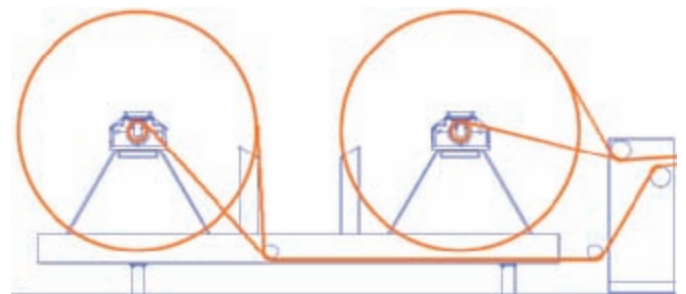
- Optical measurements for fabric centring
- Centring by laterally moveable let-off station
- Optimal fabric centring at the inlet

Transport system for greige fabric / Sewing machine inlet

- Easiest operation
- Fastest and safest roll change

Safety chucks

- Pneumatically closing safety chucks
- Automatic recognition of shell position



Principle Dual centre driven Let-Off station

Integrated measurement of roll diameter

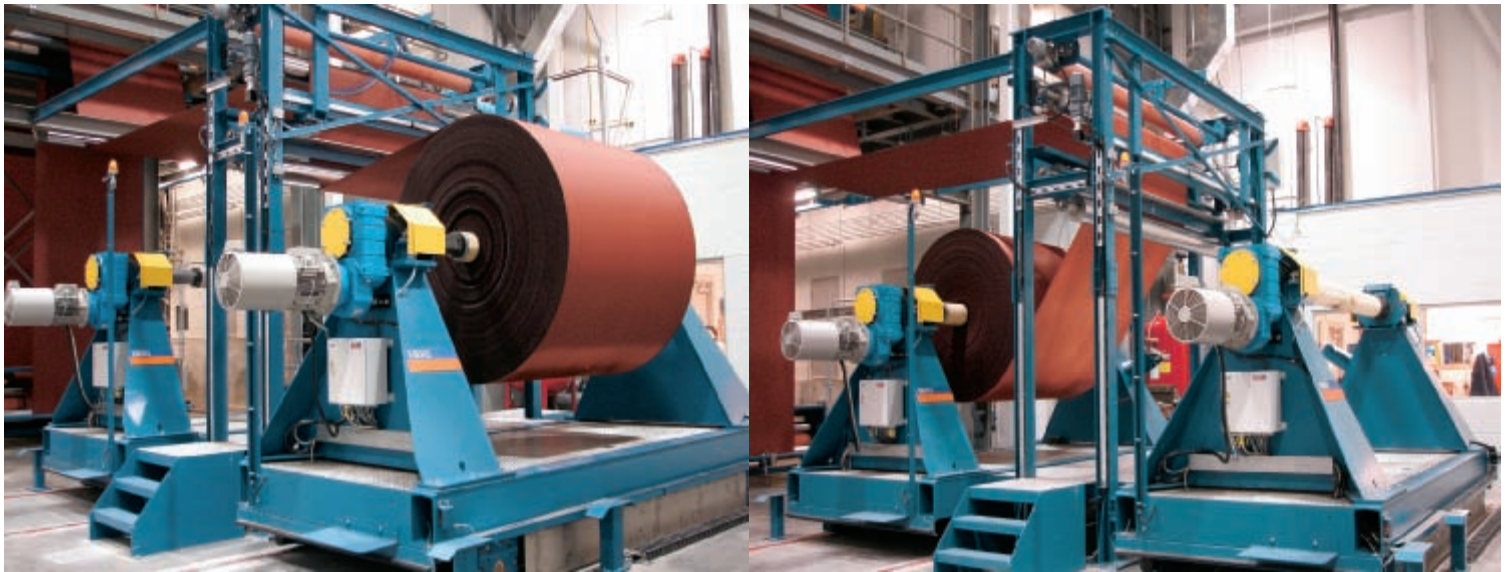
- Constant and most optimal let-off tension
- Precise tension control in dependence of roll diameter

Benninger exclusivenesses:

- Reduced energy costs through motor braking
- Laterally moveability
- Automatic centring of the Let-Off stations
- Integrated roll diameter measurement

Centre driven Wind-Up station

Winding systems



Dual centre driven Wind-Up station (front side)

Dual centre driven Wind-Up station (backside)

Center driven winders are used to wind up the dipped conveyor belt fabrics in a uniform manner and with straight edges. The two laterally moveable winders ensure a safe unloading of rolls which can have a weight of up to 11 tons, a width of 2.700 mm and a diameter of 2.500 mm.

Centre driven Wind-Up station for heavy rolls

- Central insert of the fabric from top
- Precisely build-up of edges
- Individual laterally moveable winder
- Fast roll change through loading position aside
- Individual adjustments for different fabric styles

Safety chucks

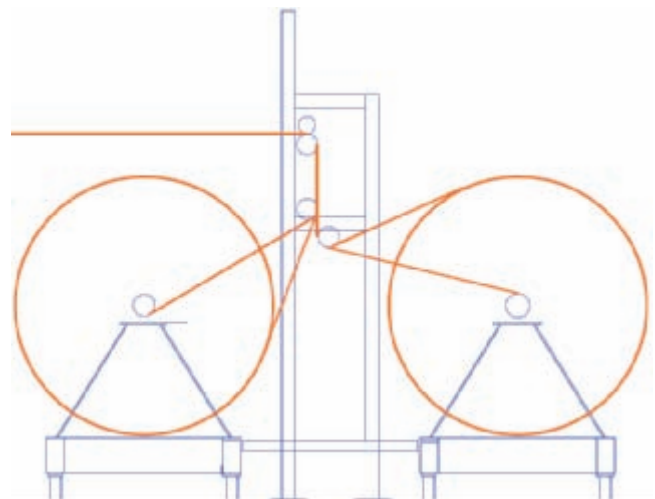
- Pneumatically closing safety chucks
- Automatic recognition of position

Operation terminal

- Touch screen for the input of all winding parameters
- Easy handling

Integrated cross cutting system BELT CUT

- Automatic fabric cutting on defined length
- Cutting function "sampling"



Principe centre driven dual Wind-Up station

Benninger exclusivenesses:

- Winding system for heavy rolls up to 11 tons
- Dual winder system
- Individual laterally moveable
- Sampling function

Surface Winder

Winding systems



Surface Winder



Straight edged winding-up

The surface winder is used to wind up the dipped conveyor belt fabrics in a uniform manner and with straight edges. By means of two rubberized rolls the fabric is wound to a roll of up to 2.000 mm diameter. The vertical press and release force (winding force) is automatically controlled by the winders pressure control system and individually considers the roll weight and fabric style.

Surface winder for a precise roll build-up

- Automatically controlled press and release force through the winders pressure control
- Straight edge build-up
- Individual winder adjustments for different fabric styles

Automatic kick-out system

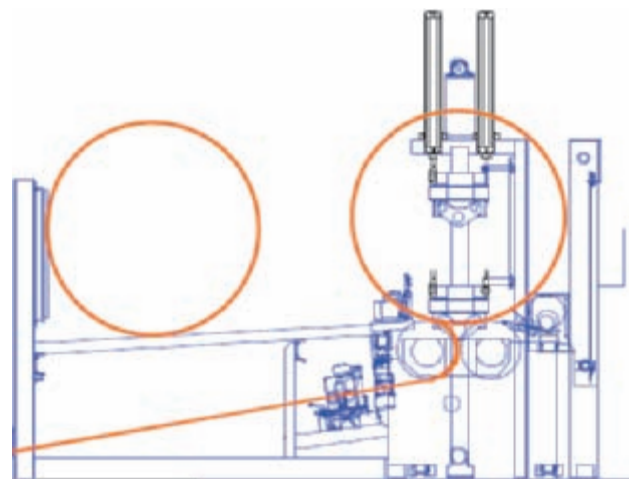
- Improved handling
- Shortest roll changing time

Shell preparing system

- Simplified preparation of the shell
- Quicker roll change because of laterally shell loading position
- Automatic positioning of safety chucks

Integrated cross cutting system BELT CUT

- Automatic fabric cutting at defined length
- Automatic winding stop through splice detector
- Minimal waste



Principe Surface winder

Benninger exclusivenesses:

- Winding-up of rolls with best edge build-up
- Individual winding adjustments for different fabric styles
- Shell preparing system

Weighing and Wrapping Unit

Winding systems



Weighing and Wrapping unit BELT WRAP



Conveyor Belt rolls ready for dispatch

The exact weight of a dipped fabric roll is determined by the BELT WRAP weighing and wrapping unit which also wraps the roll into special films for UV and humidity protection. In order to identify each single roll and for a complete quality assessment the process control fully automatically generates a corresponding self-adhesive barcode label.

Weighing and Wrapping unit BELT WRAP

- Complete process data allocation for each single roll via barcode
- Integrated online weighing
- Automatic generation of labels via central process control
- Reliable identification of product and quality via barcode

Roll weight up to 11 tons

- Basic version: up to 4 tons per roll
- Special versions for rolls up to 11 tons, up to 2.500 mm in diameter and up to 2.700 mm in



Automatic generation of barcode labels



Operator panel (for each Let-Off and Wind-Up station)

Benninger exclusivenesses:

- Complete process data allocation for roll via barcode
- Special solutions for rolls with a weight up to 11 tons

Dip Mixing preparation station

Fully automatic preparation of dip solution



Chemical tanks



Pumping and piping system

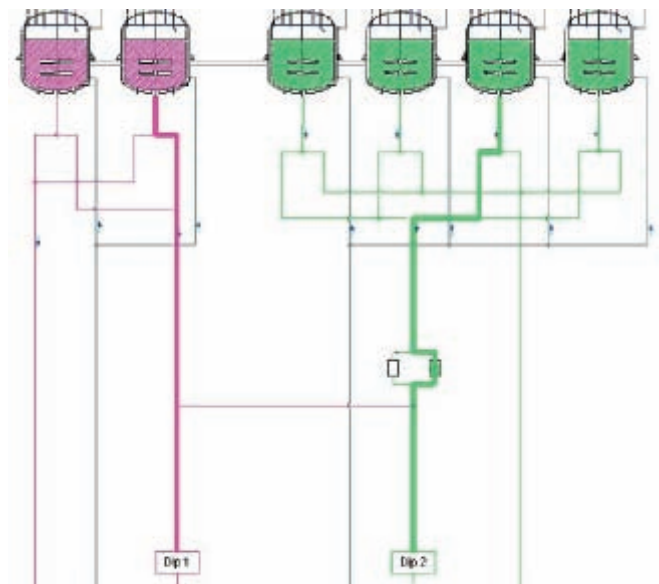
The Dip Mixing Preparation Station controls the automatic preparation of dip solutions. By the software controlled recipe management all dip solutions are 100% reproducible. The same time the input of chemicals is reduced to a minimum.

Dip Mixing Preparation Station AUTO-MIX

- According to requirements up to 25 tanks
- Capacity of tanks from 500 to 25.000 litres
- The process automatically controls dosage, composition and maturation of dip solutions

Tailored preparation of dip solution

- Automatic preparation of pre-dip and RFL dip solution
- Precise preparation of single batches from 2 to 5.000 litres
- Preparation tolerances approx. 1 to 1,5 %
- Significant potential of chemical savings
- Integrated cleaning cycles for tanks and piping
- Lowest amount of waste water



Dip solution holding tanks

Automatic operation

- Free programmable mixing procedure
- 100% reproducibility of dip recipes
- Almost no operation faults

Benninger exclusivenesses:

- 100% reproducibility of dip recipes
- Reduction of chemicals through tailored preparation
- Capture of production data and filing

Ultrasonic welding and cutting machine

Fabric severing



Cutting machine with 3 heads and automatic adjustment



Ultrasonic Welding- and Cutting process

This unit alternatively serves greige fabric or treated Conveyor Belt fabric in almost any desired width. The cut fabric edges of the up to 2,8 m wide fabric are welded automatically during cutting in order to prevent frizzling.

Ultrasonic welding heads

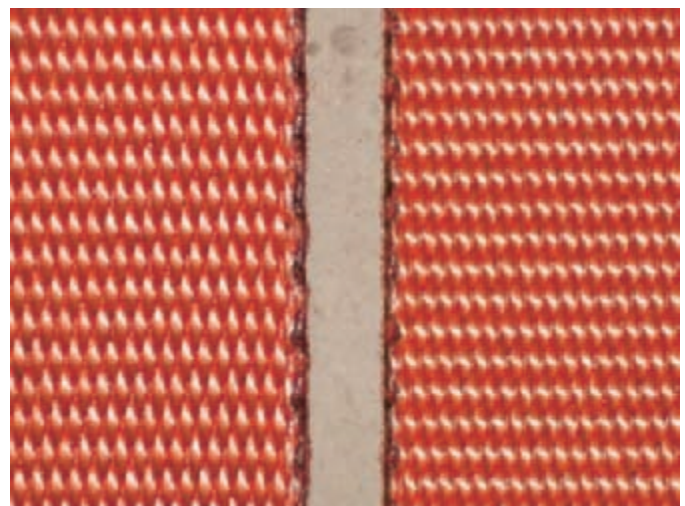
- Sealing of edges by heating during cutting
- Frazzle free fabric edges
- High welding velocity possible

Automated cutting heads

- Stepless, individual and automatic positioning of heads
- Easy handling
- Use of up to 4 cutting heads possible

Flexible use

- Offline as “stand alone” unit
- Online – integrated within the Conveyor Belt Treating Line
- Cutting and rewinding of different fabric widths
- Synchronous as well as asynchronous rewinding on 2 separate winders



Optimal fabric cut without frizzles

Benninger exclusiveness:

- Welding and cutting with high speeds
- Automatic positioning of cutting heads
- Synchronous as well as asynchronous winding

Process Control CORD TEC

Control of the Conveyor Belt Treating Line



Inverter (State-of-the-Art)



Central process control system

The Benninger CORD TEC system is a modern, software based control system which guarantees best quality and indispensable safety. 15 years of experiences with leading Tire Cord and Tyre manufactures enable us providing you our own and worldwide well proven and absolutely reliable in-house developed control system.

Hardware

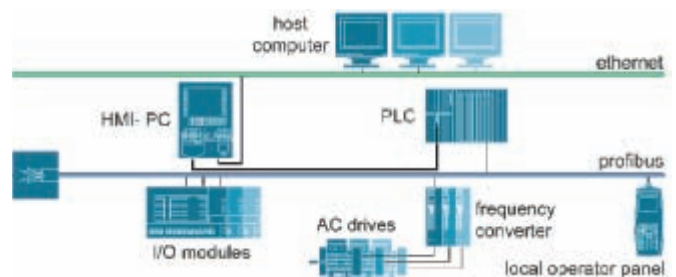
- 2 HMI PCs for line operation with Ethernet connection
- 1 PLC control for the execution of the inputs
- 1 High-speed profibus system with local I/O structure
- Simple connection to host computers with internet access
- Local operator panel with touch screen
- Multiple drive system of newest generation
- Remote diagnostic system TELE LINK

Standby server system

- Redundancy
- High operating reliability

High precision drive system

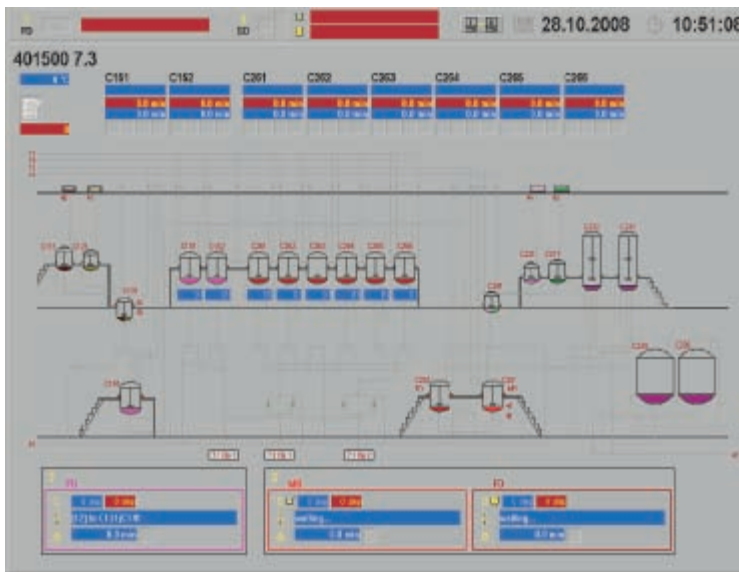
- Energy consumption via DC-bus connection at regenerative operation (energy saving)
- Highest adjustability accuracy of fabric tension



Bus System

Adjustable air flow at the heating zones

- Integrated software control loops
- Tailor made control system for temperature (burners) and fans (air velocity, air distribution)
- High precision of air- and temperature distribution



HMI Dip Mixing



HMI – Conveyor Belt Treating Line

User friendly and structured operator interface

- Dynamic real time visualisation of all actual values
- Clear graphical display of relevant process conditions via graphics
- Graphical display of errors and alarm signals
- Alarm list with help function (trouble shooting)
- Graphical tracing of splice positions

Recipe management for reproducible results

- Processing, handling and storage of recipes
- Dynamic modification of nominal values and recipes
- Highest reproducibility

Archiving of all process parameters

- Long-term storage
- Preparation of process data and output in all usual formats
- Traceability of treated products
- Output of process data with product related function graphs

Trouble-Shooting

- HMI trouble shooting with diagnostic software and proposals for actions
- Electronic diagnosis of drives and hardware
- Access to inverters, PLC and PCs via phone (modem) or Internet (VPN)
- Observation and storage of warnings and error messages
- Remote diagnostic system TELE LINK

Benninger exclusiveness:

- 15 years of experiences with well proven inhouse software
- Exclusive supplier of tailor made control systems for Conveyor Belt- and Tire Cord Treating Lines
- High precision drive system
- 100% reproducible process data
- Software for diagnostics and trouble shooting
- Easy operation and lowest maintenance efforts

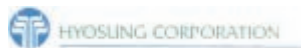
References / Contact

It would be a pleasure for us advising you

We would like to thank our customers:

Conveyor Belt Treating Lines

Tire Cord – and Single End Cord Treating Lines



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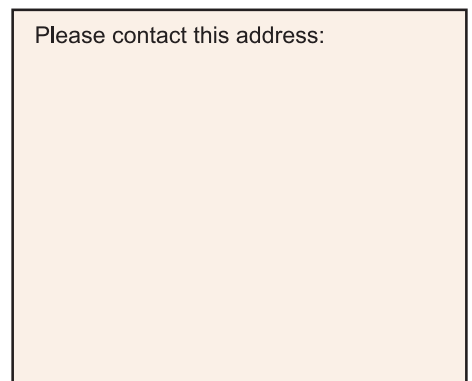
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