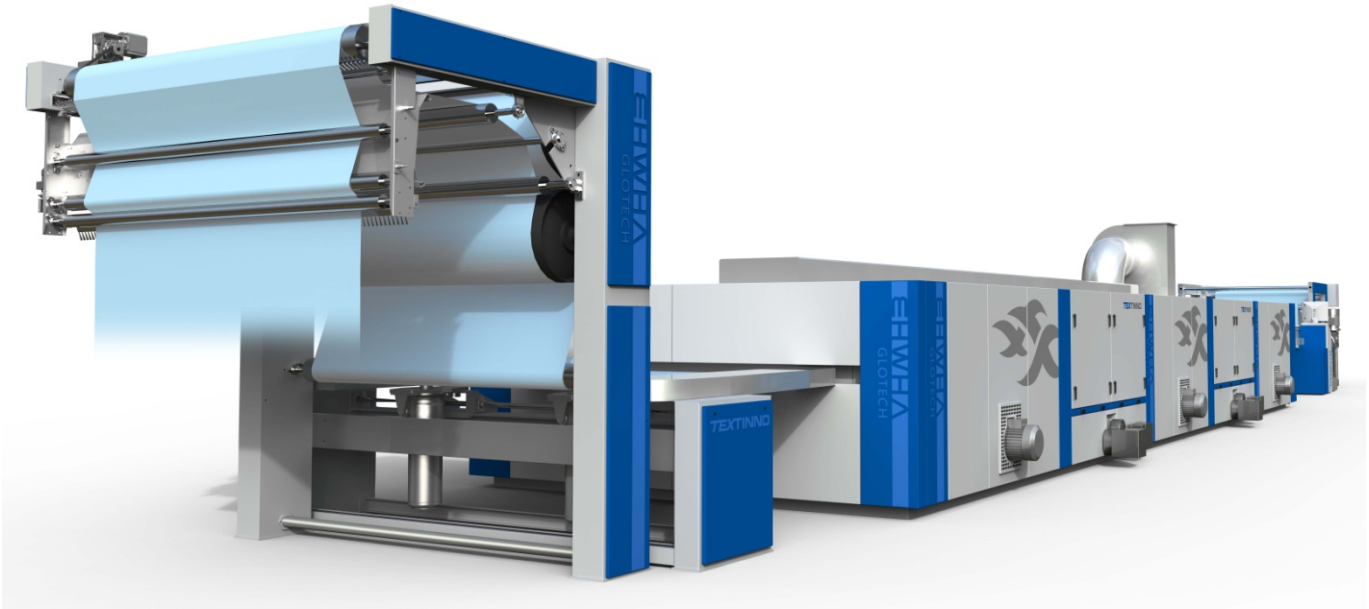
Drying & Heat Setting Stenter

TEXTINNO

- ***The Lower Energy Consumption by 20 % ~ 35 % for Cutting Down Production Costs.***
- ***Increased Productivity by 10 ~ 15 %***
- ***Upgraded Automotive Function***

Machine Specification

Description		6 chambers	7 chambers	8 chambers	9 chambers	10 chambers
Total Length of Machine (mm)		35,525	38,525	41,525	44,525	47,525
Length of Chamber (mm)		18,000	21,000	24,000	27,000	30,000
Electricity Consumption (kw)	Machine Width (1800~2800 mm)	155	170	185	200	215
	Machine Width (3000~3600 mm)	185	205	225	240	260



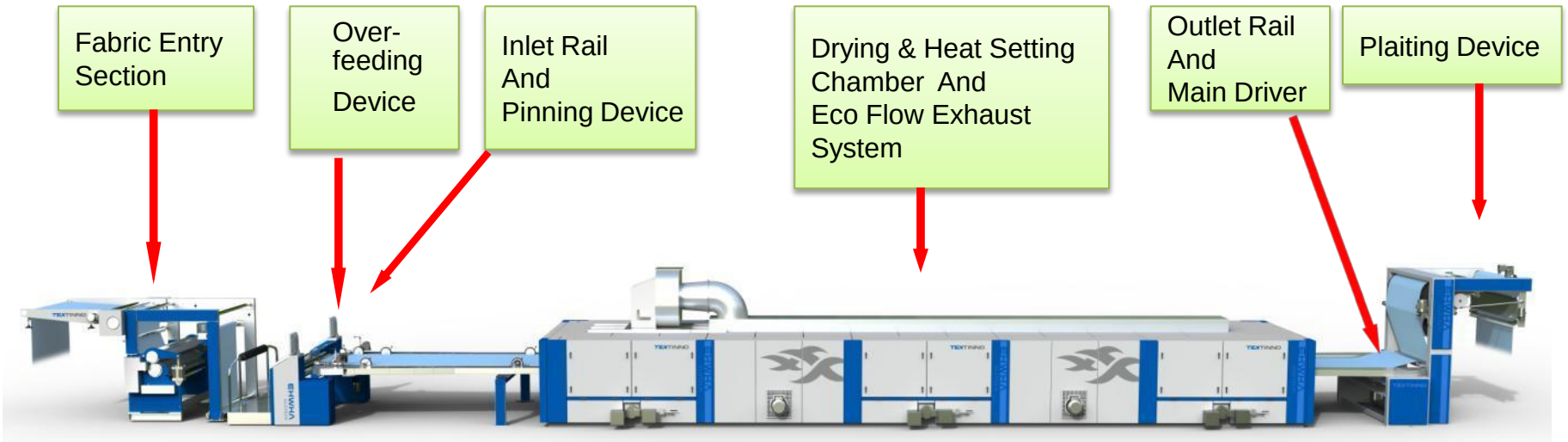
Machine Specification

Description	Specification	
Hot air circulation	15 kw Turbo fan 1 set / chamber	Maximum 40,000㎥ / hr. chamber
Exhaust	7.5 kw Turbo fan 1 set (Eco Flow Exhaust)	Maximum 24,000㎥ / hr. Stenter
Gas pressure	below 3600mm. aq	0.1~0.36 bar
Heating source	Gas	1 burner / chamber
	Oil or Steam	1 radiator / chamber
Fabric speed	Cotton (Knit, fabric)	maximum 70m / min.
	Synthetic Fabric	maximum 120m / min.

Schematic Of EHWHA Stenter

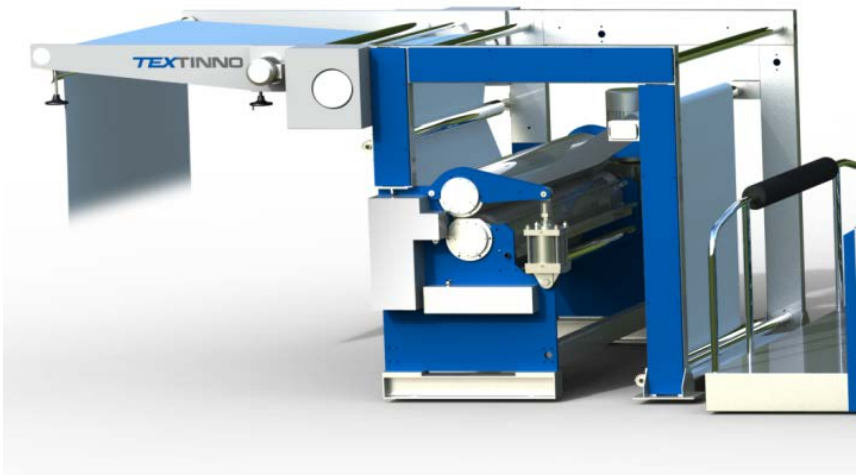
Applications of Stenter

Stabilizing of fabric form :	Heat setting of fabric
Drying of fabric :	Implemented after the washing and dyeing process
Fixation of dye :	Color development processing etc.
Curing of fabric :	Implemented after resin treatment processing for stiffening the fabric

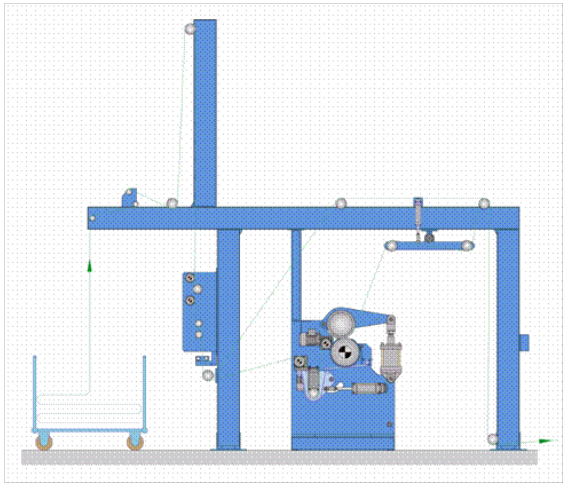


Fabric Entry Section

Major function of fabric entry combination is to perform fabric spreading, centering, proper tensioning, and chemical & washing treatment.
The Fabric Entry Section is composed of a Textar guider, a Padder mangle, and a Speed compensator.



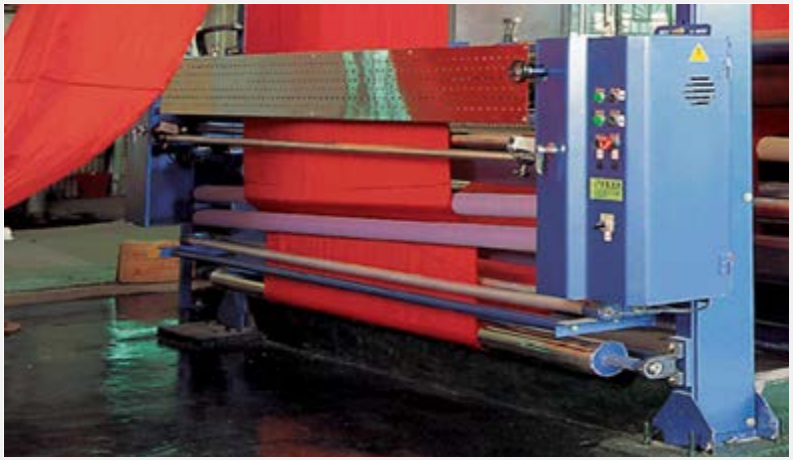
- Dogal



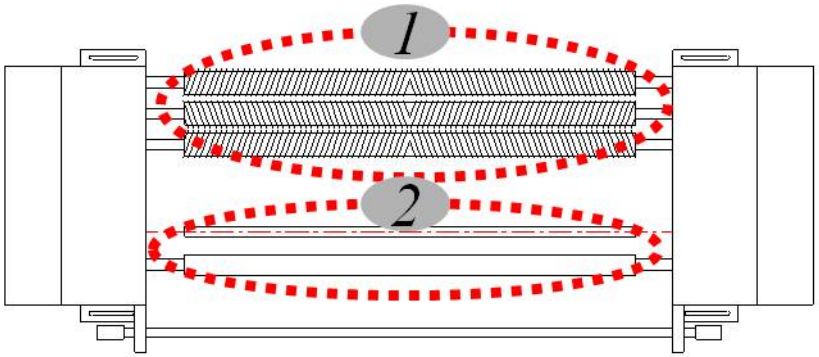
- The Textar Guider is for spreading and centering of the fabric.

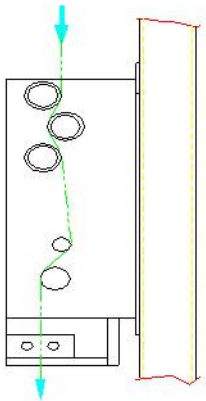
Fabric Entry Section

Textar Guider



- Screw expander roller spreads and stretches selvedge of the fabric.
- It consists of three S.S. screw expanding rollers for the spreading and two pneumatic controlled guide rollers for centering by means of non-contact photoelectric sensing unit.





Fabric Entry Section

Squeezing Padder Mangle

Padder mangle uses rubber of different hardness based on the types of fabric (natural, synthetic, and blended) to maximize the efficiency of Stenter by highly efficient dehydration rate and uniform chemical padding effect.

The mangle device is classified as 2-bowl or 3-bowl device in term of squeezing roller.

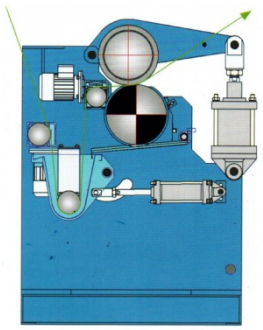
- Screw expander roller or bowed roller can be chosen according to the padding operation depending on the type of fabric.

- Use of pneumatic cylinders ensured application of uniform pressure along the entire width of the fabric.

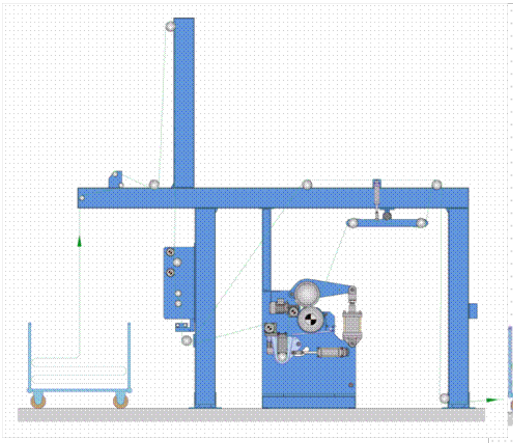
Fabric Entry Section

Speed Compensator

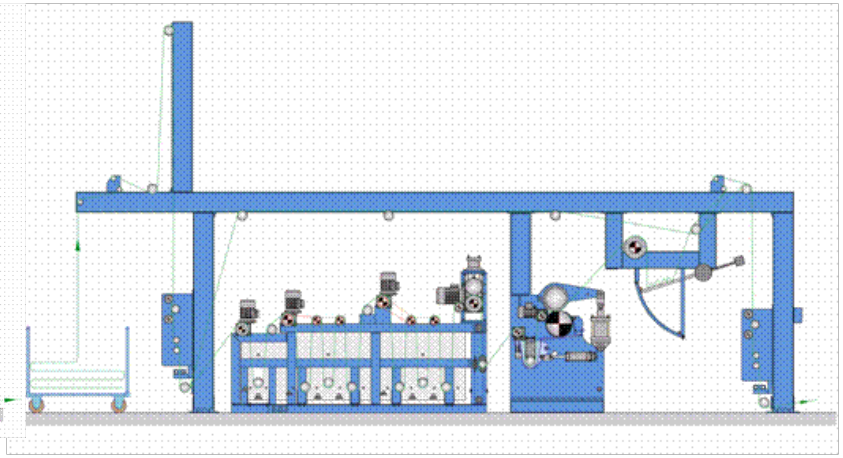
2-Bowl Padding and Squeeze



2-Swing type (standard)



J-box type (0ption)

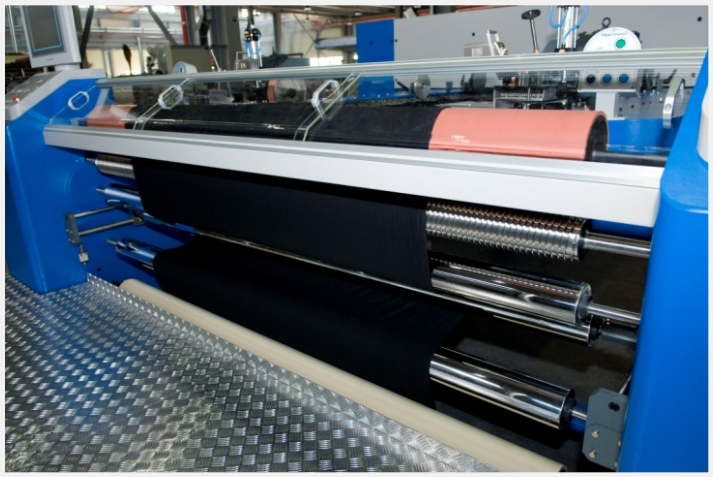


Overfeeding Device

- Overfeeding works an important role in maintaining the dimensions of fabric ie length and width.
- Overfeeding device is composed of following rollers: lower expander, tension roller, skew weft straightener, upper expander and overfeeding roller.
- IPM motor and controller are applied to the overfeeding and tension rollers to ensure precise controlled overfeeding system.

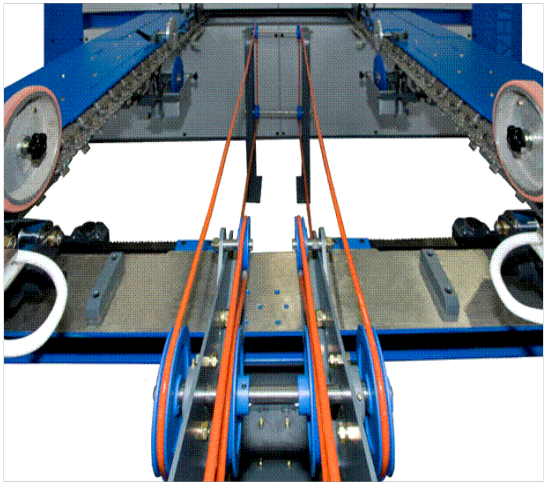
Range of Working Speed

- Upper overfeed roller –10% ~ +80% is possible.
- Bottom overfeed roller –10% ~ +10% is possible.
- Pinning roller –10% ~ +20% is possible.
- Skew control roller (stroke 700 mm)

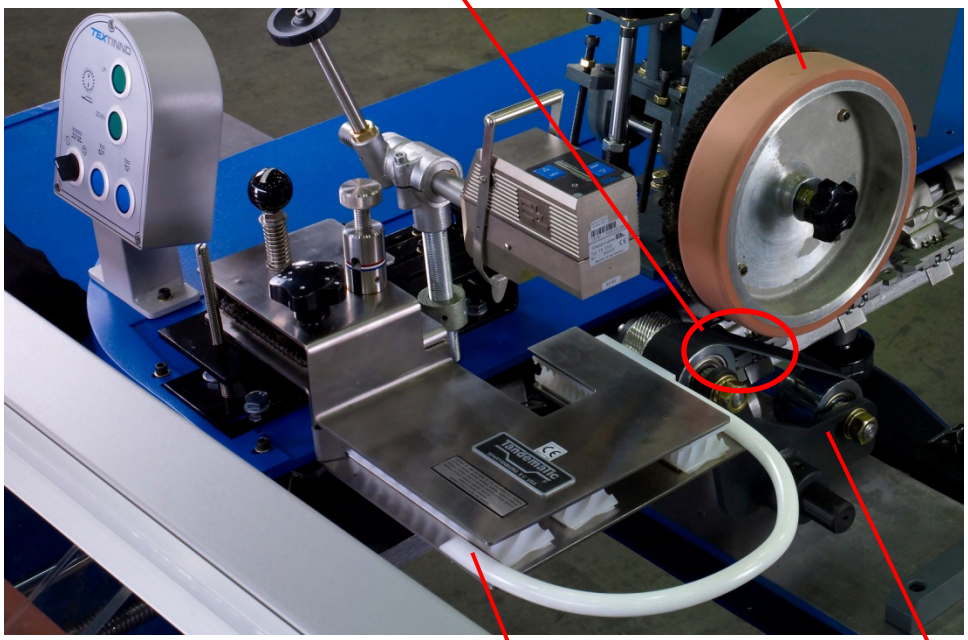


Pinning Device

- The fabric drawn from the over feeding roller is transported to the pinning roller via selvedge uncurler and feeler. Pinning process can be carried out effectively with the help of loading / unloading type synthetic rubber coated pinning device. This roller presses the fabric against the needle/pin bed.
- Pinning wheel speed can be adjusted -10% ~ +20% with respect to the overfeeding roller speed with the help of IPM (Interior Permanent Magnet) Motor.
- Pneumatic loading/unloading system is applied to the pinning roller. The spring roller and 3-finger uncurler are mounted as a bottom support roller and a selvedge expander respectively as a standard specification; a belt type support roller and a Tendamatic uncurler can be selectively applied according to the type of the processed fabric.



Pinning Device



Pinning device consists of 3 parts as Uncurler, Pinning Roller and Pinning supporting device.

- Generally, above 3 parts can cover normal pinning processing in type of woven fabric which shows no curling on selvedge.

- However, After width adjustment, the selvedge rolling up condition shall occur. In case of cotton knit (single, single span), curling shall occur again in front of pinning roller("A" marks on left photo) after being uncurled by Tandematic Uncurler device.

- Therefore, it causes selvedge loss after processing and incorrect pinning.

Mini Uncurler

- EHWHA's Mini Uncurler minimizes selvedge loss and makes correct pinning in terms of reducing selvedge curling between main uncurler(Tandematic uncurler) and Pinning roller.

- Pinning roller mark and the puckering phenomenon are removed by minimizing the fabric transfer tension and the slip of the pinning roller, which ensures the quality of the fabric.

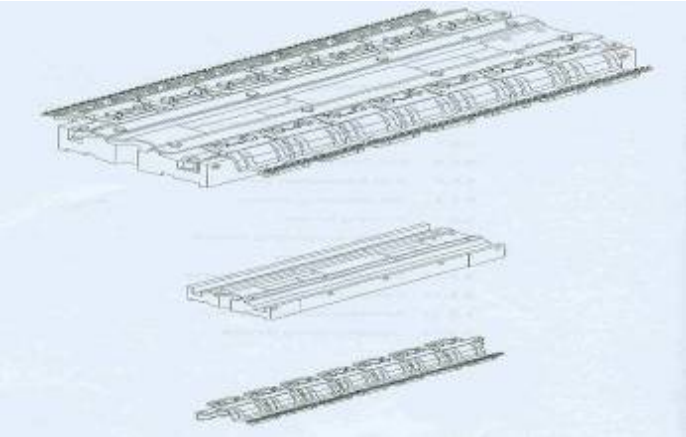
Rail Guiding System

- The direct activation of innovative sliding rollers and special controller can minimize the loss of fabric selvedge by precise pining even at fast speed with quick response feature without back lash.

- This precision is possible with the help of pair of photoelectric touch bar type edge position sensors (=feelers) and D.C. motor controlling rail guiding equipment.

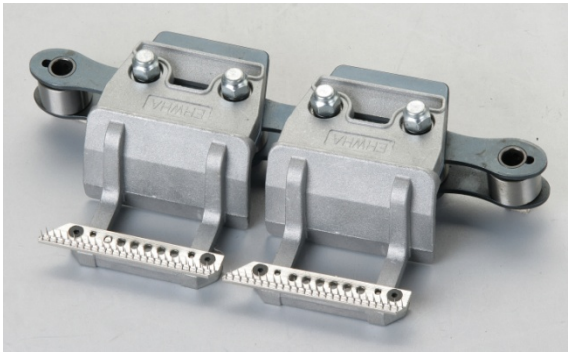
- The feedback from the feeler sensing selvedge of the fabric is given to the DC motor which precisely changes the speed of the roller rolling on the rail as shown.

Conveyor Chain



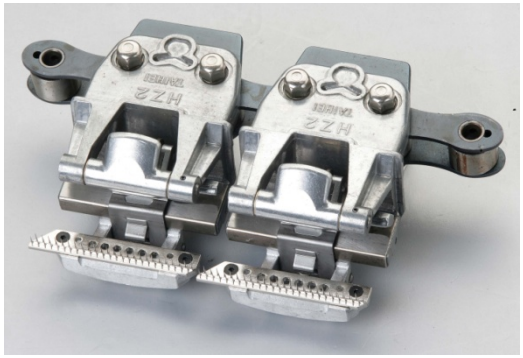
Cast iron rail is used to prevent distortion at high temperature and speed, and high density steel lining fitted on the chain sliding surface is extremely strong for abrasion with chain roller, which are utilized to enhance the durable time.

- Also the U-Turn part is designed in curved shape so as to minimize the abrasion impact and noise.
- Conveyer chain uses aluminum alloy 4 inch pin chain as the standard, and both the clip chain and the pin/clip compatible chain are interchangeable depending on type and purpose of the fabric.



Lubricated Pin Chain

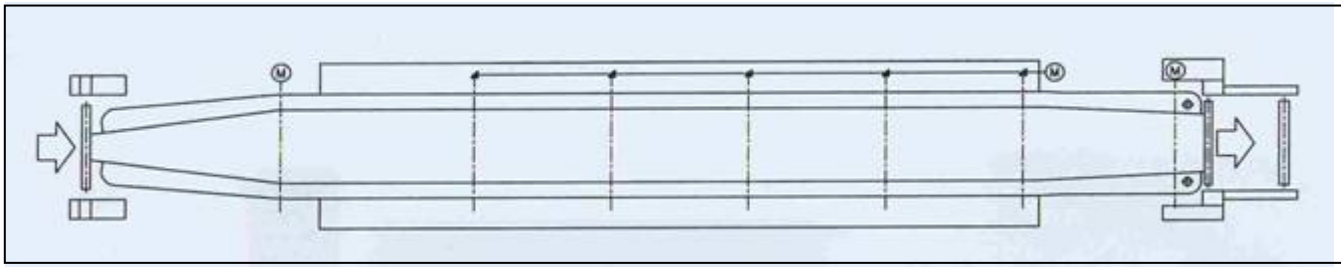
Pin Locking Alternative Chain



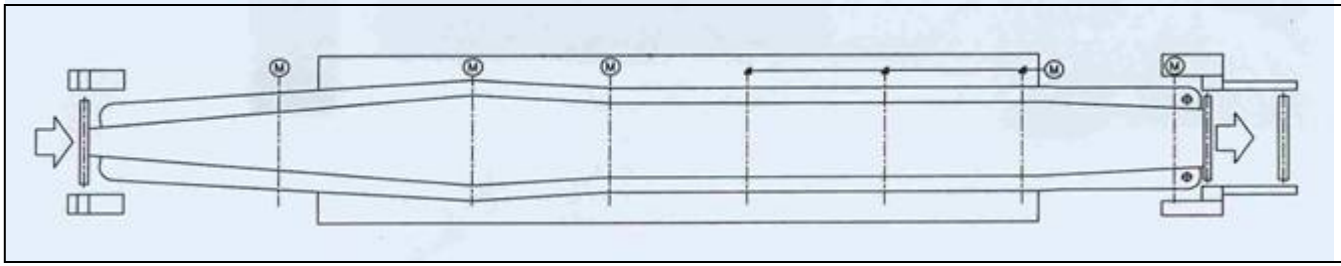
Pin & Clip Chain

Width Control Device

This device can adjust the rail width with separate control.
It is ideal for processing napped fabric and curtain fabric requiring strong tension in the width direction and the fabric of PK, PQ and LYCRA for reducing the width. In particular, when the seagull phenomenon occurs, the width can be selectively controlled by each motor at 1st, 2nd and 3rd chamber.



Standard Device

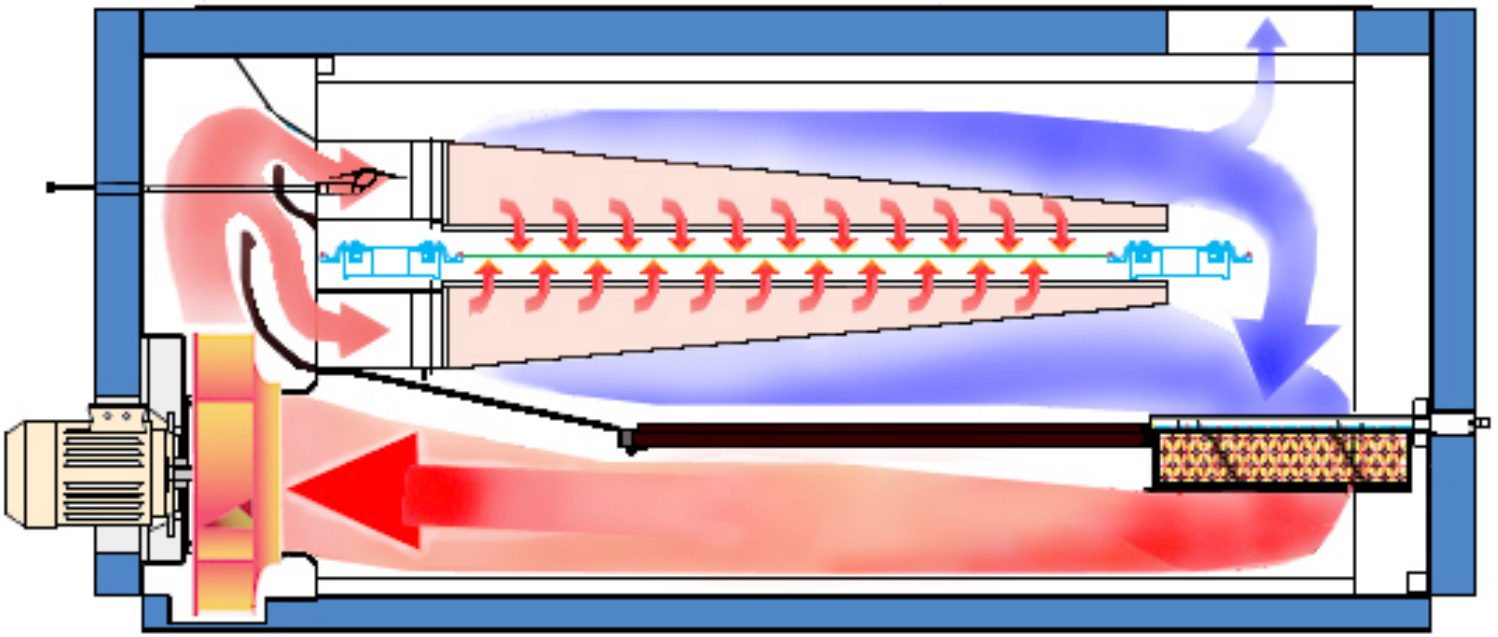


Optional Device

Drying & Heat Setting Chamber

20% added thickness of Micro Rock wool is able to cut down energy loss by 20%

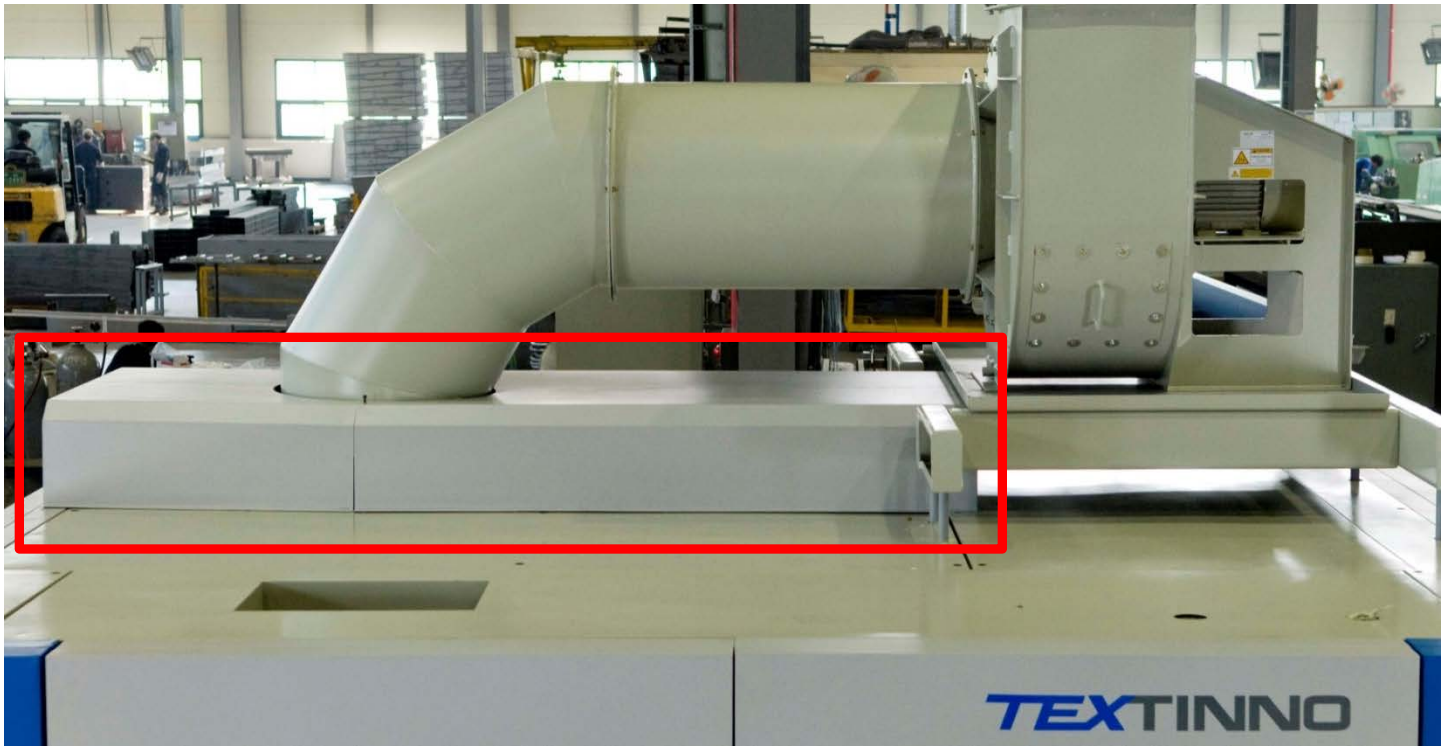
- ► The gap between each heat insulating panel has been reduced from ½ inches to ¼ inch.
- ► Heat insulating materials has been changed from Glass wool to Micro Rock wool.
- ► The thickness of heat insulating materials has been reinforced from 125mm to 150mm.



Drying & Heat Setting Chamber

Achieved improvements for duct in technology

- ► Exhaust duct has been inserted in the chambers in order to reduce energy loss.
- ► Uniformity of temperature in the duct has been ensured.

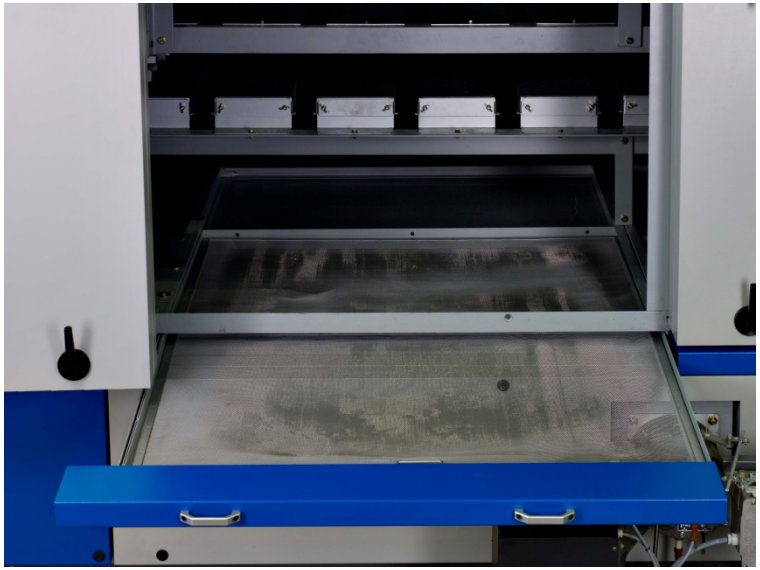


Drying & Heat Setting Chamber

Easy Maintenance in the Chamber
► 2 Doors open widely.
► The gap of separating panel has been removed.

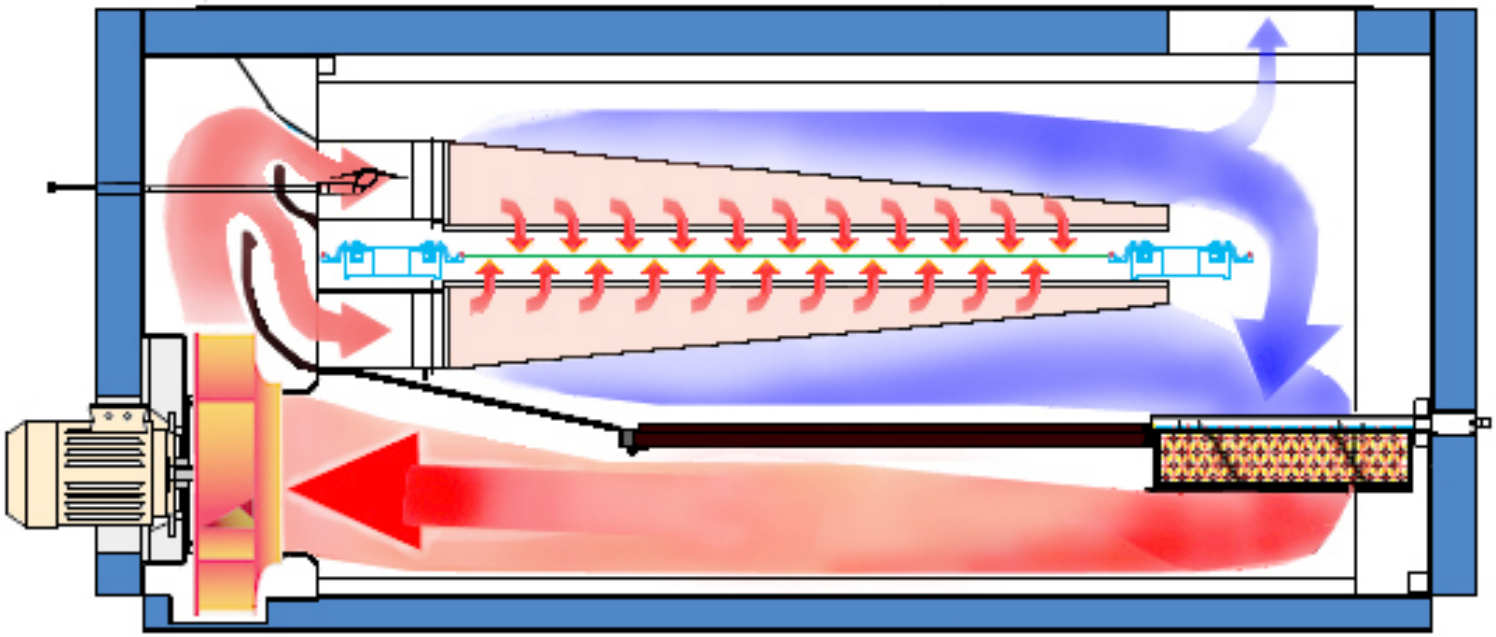
Drying & Heat Setting Chamber

Cleaning the dust screen is available while operating.



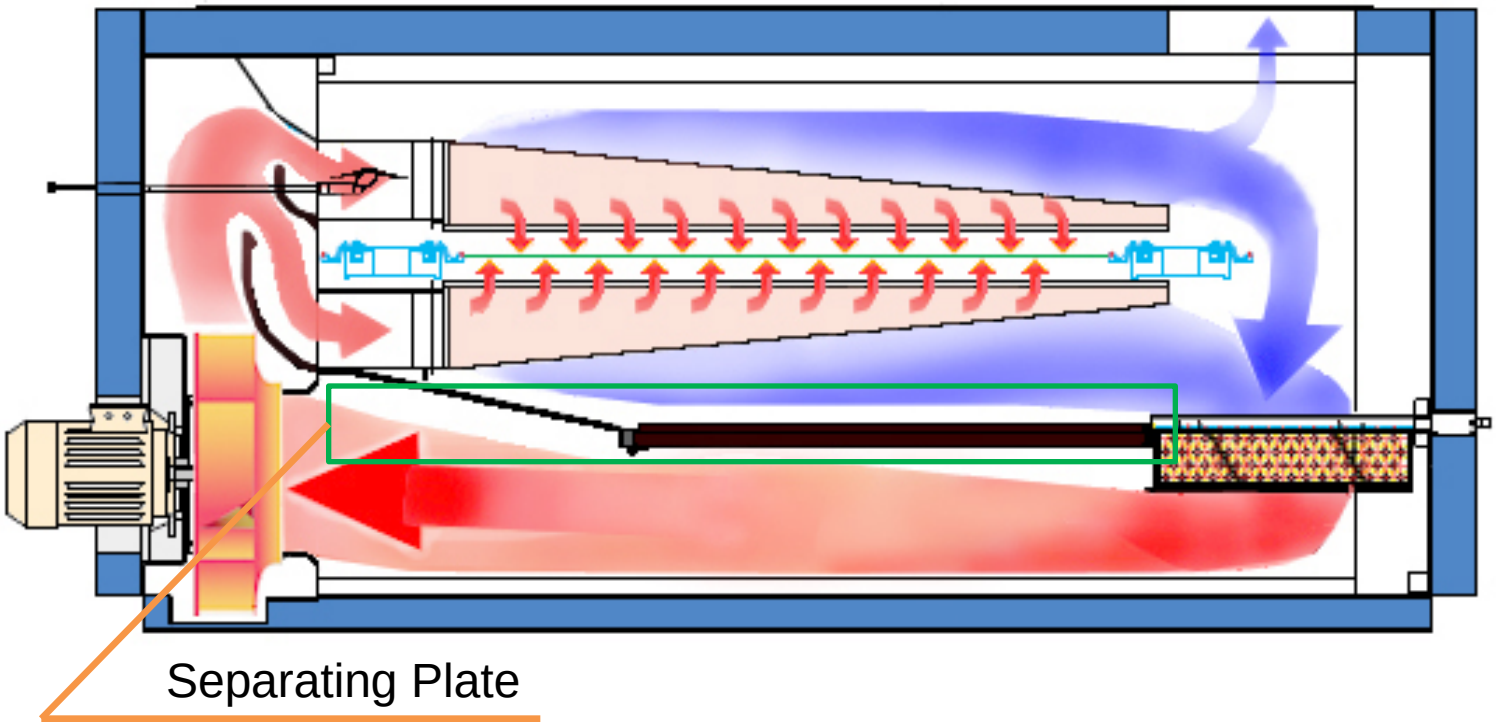
Drying & Heat Setting Chamber

Low Air Tension: The air tension generated by the circulation pressure at the top center of the fabric facing bottom while circulating the hot air from the nozzle is very low so that the center stretching of the fabric is prevented and the production quality is improved.



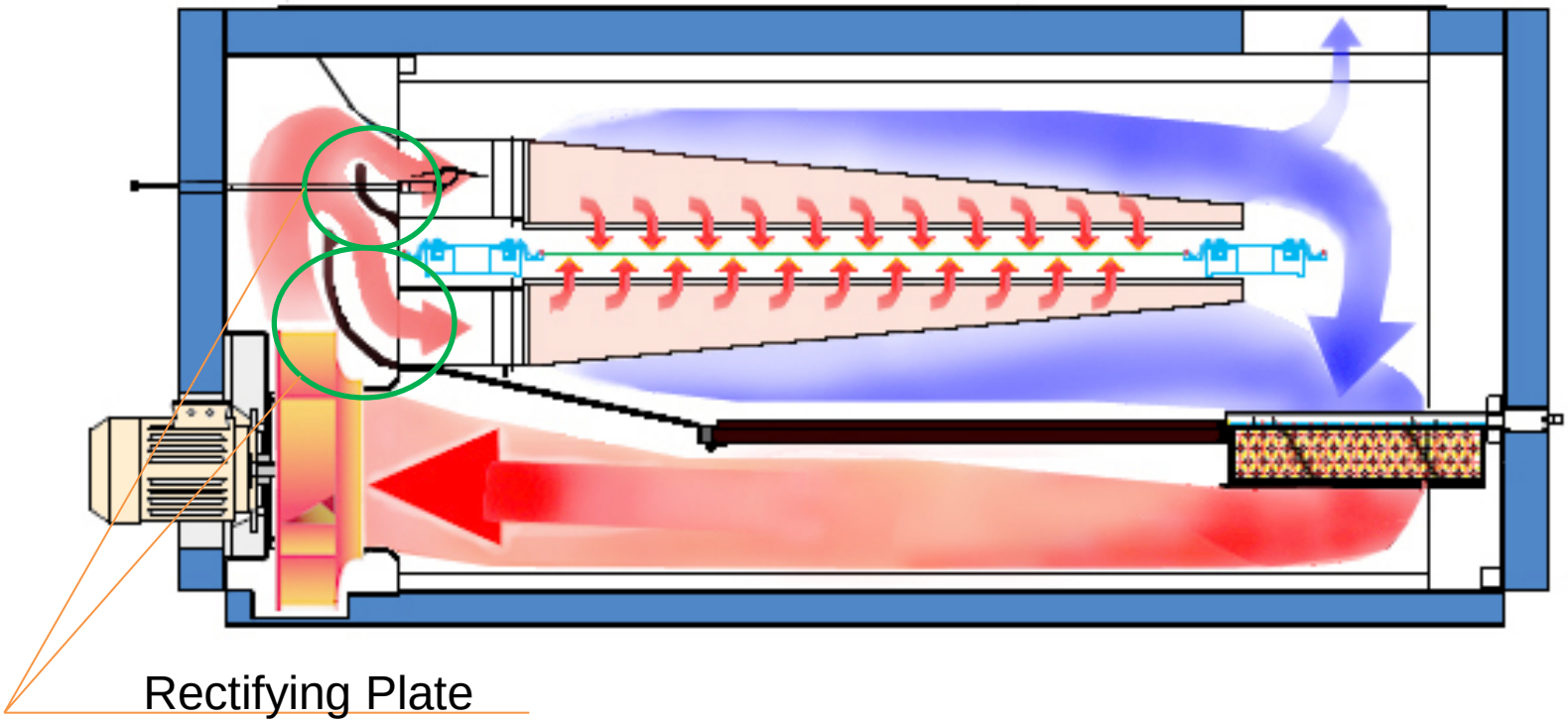
Drying & Heat Setting Chamber

Balance in Temperature inside the Chamber: The product has been designed to maintain a balanced temperature by completely cutting off radiant heat by the installation of a plate at the bottom of the hot air nozzle, thus separating the hot air compartment from the circulating air compartment.



Drying & Heat Setting Chamber

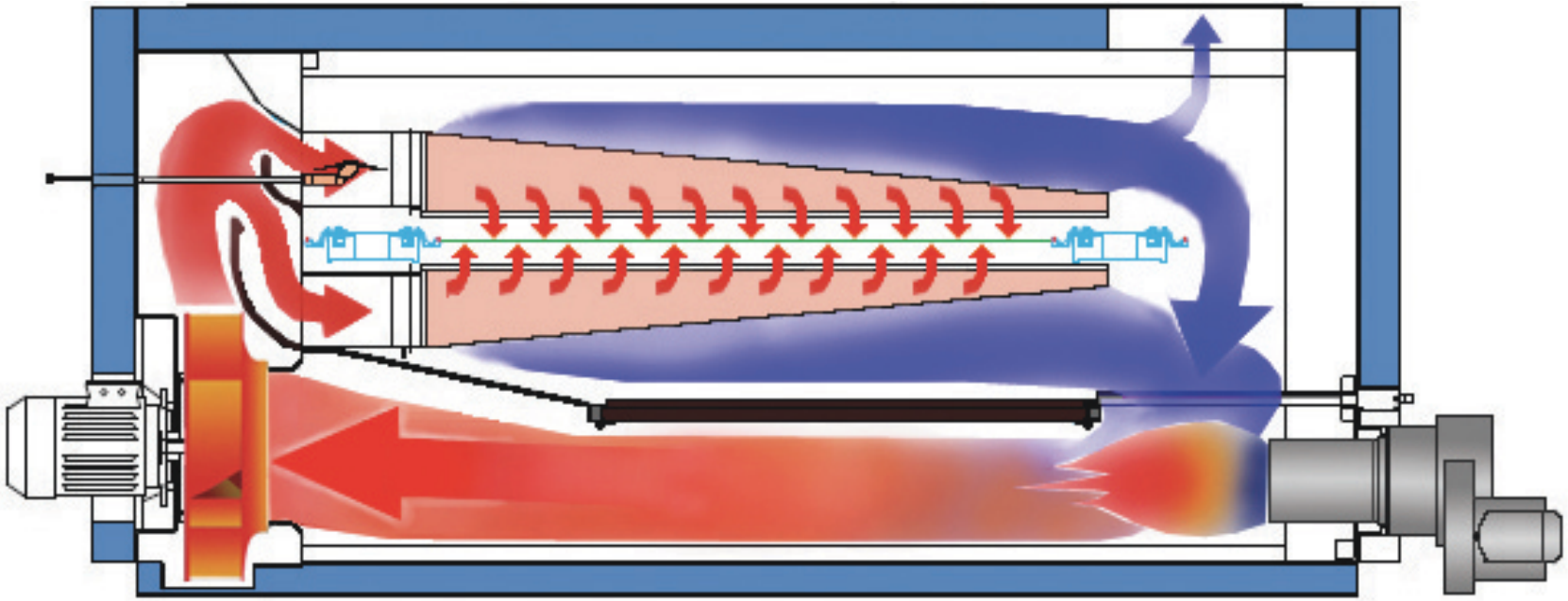
Optimization of Balanced Wind Speed: The inconsistency of wind velocity due to the occurrence of a whirlpool at the nozzle entrance has been resolved by the installation of a rectifying plate within the mixing duct. In addition, the wind distribution between the upper and lower nozzles can be freely adjusted through a simple wind control damper.



Drying & Heat Setting Chamber

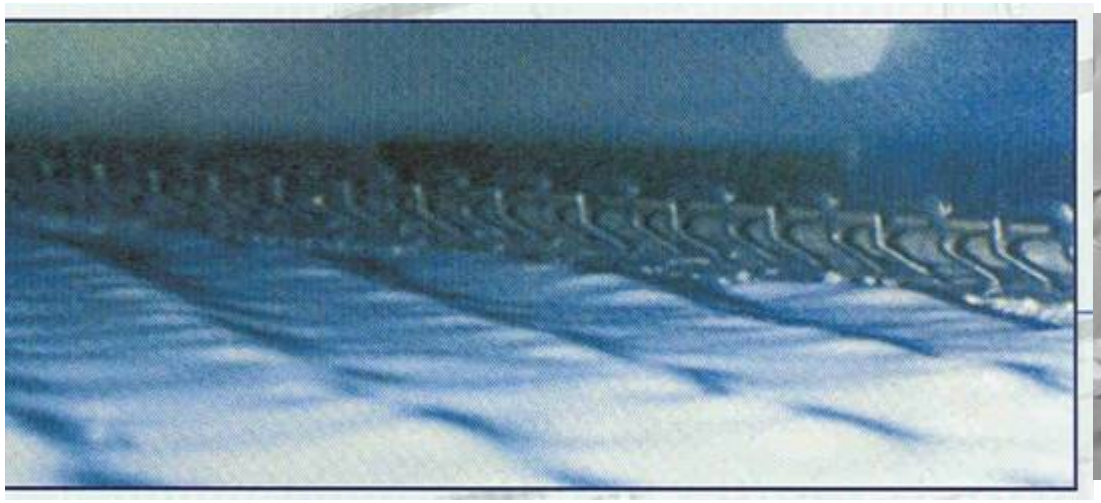
Prevention of Nozzle marks(optional): Nozzle marks caused by emergency stops can be prevented according to the optional devices.

High Turndown Rate(for Gas Burners): The heating power of the gas burner can be drastically adjusted, enabling excellent control of temperature deviation and thereby allowing the processing of high quality fabric.



Drying & Heat Setting Chamber

An Oval Punching Air Floating (OPAF) nozzle with embossing has been developed based on numerous successful experiments.
- The nozzle vertically distributes the hot air to the fabric surface, which does not create density or weight deviation by the air tension and maintains the fabric floating and relaxing state without contacting any parts inside the chamber.



Floating fabric by air from OPAF Nozzles

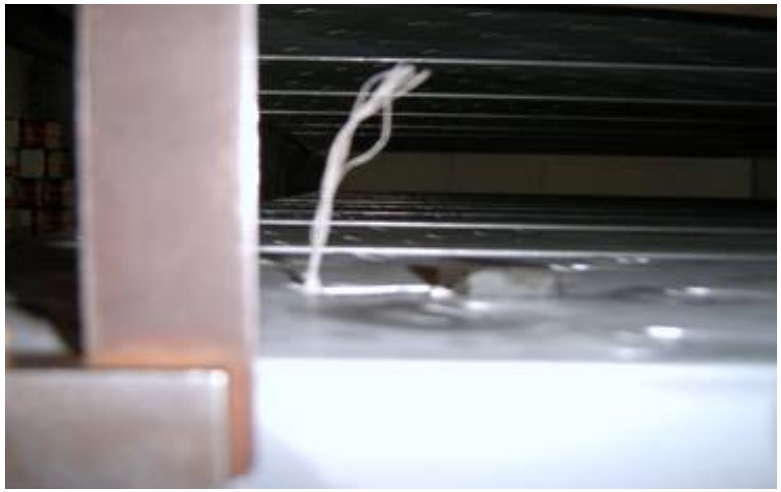
Nozzle shape

Drying & Heat Setting Chamber

Excellent vertical spray feature: The hot air spray direction is maintained perpendicularly to the fabric surface.

Specially designed embossing nozzle: The air is impinged on fabric at slant direction, minimizing stresses in the fabric.

Ordinary Nozzles in Stenter



Embossing mold Nozzles in Textinno

Embossing Nozzle

Nozzle structure that is optimized for the fabric: We have designed a peak-type nozzle that is applied excellently to cotton knit, a flat-type nozzle used for synthetic fabric and general fabrics, and a slot-type nozzle used for fabrics with fur such as napped fabrics and pile fabrics.

Optimized fabric quality: Hot air volume has more influence on cotton processing than air velocity, and air velocity has more influence on synthetic fabric processing than air volume; these characteristics are taken into account and accordingly optimized.

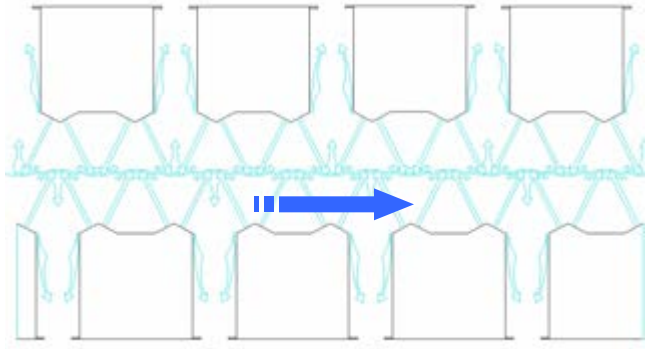
Peak-type

Flat-type

Slot-type

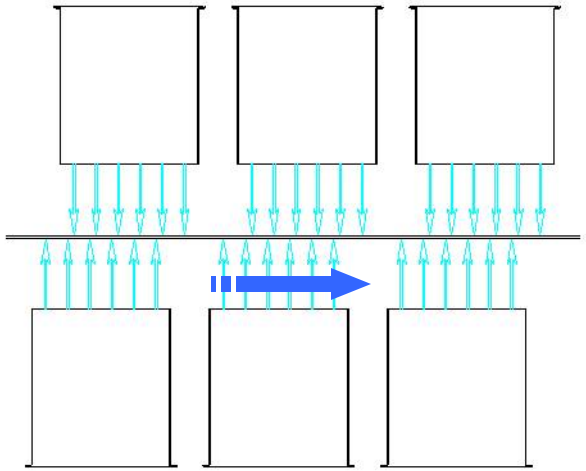
Drying & Heat Setting Chamber

Peak-type Nozzle: Optimized for cotton knit and cotton fabrics



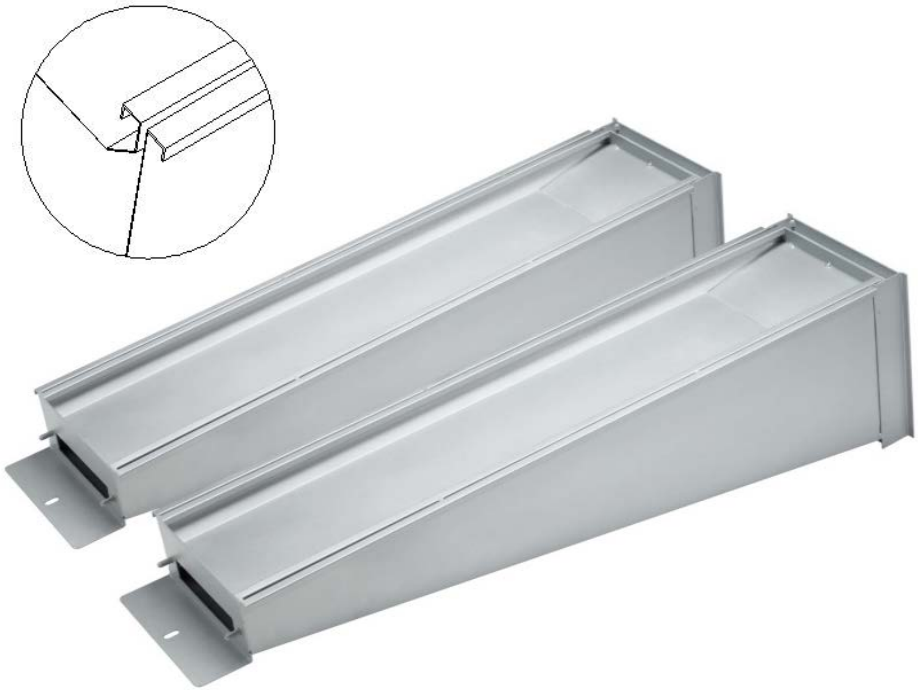
Drying & Heat Setting Chamber

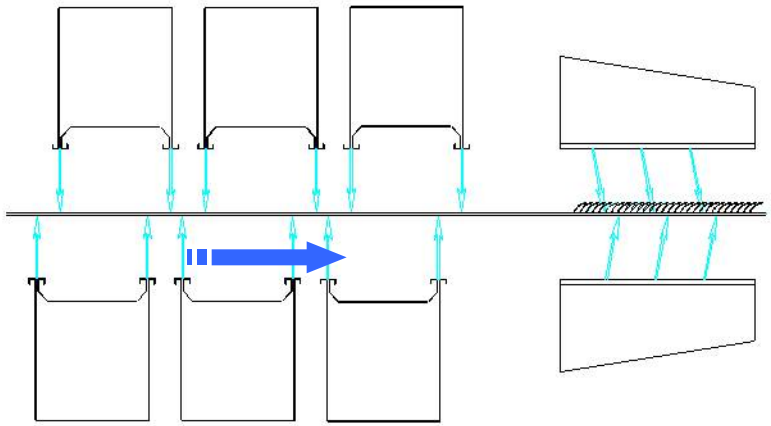
Flat-type Nozzle: Optimized for synthetic and mixed fabrics



Drying & Heat Setting Chamber

Slot-type Nozzle: Optimized for napped fabrics, velvet, and pile fabrics

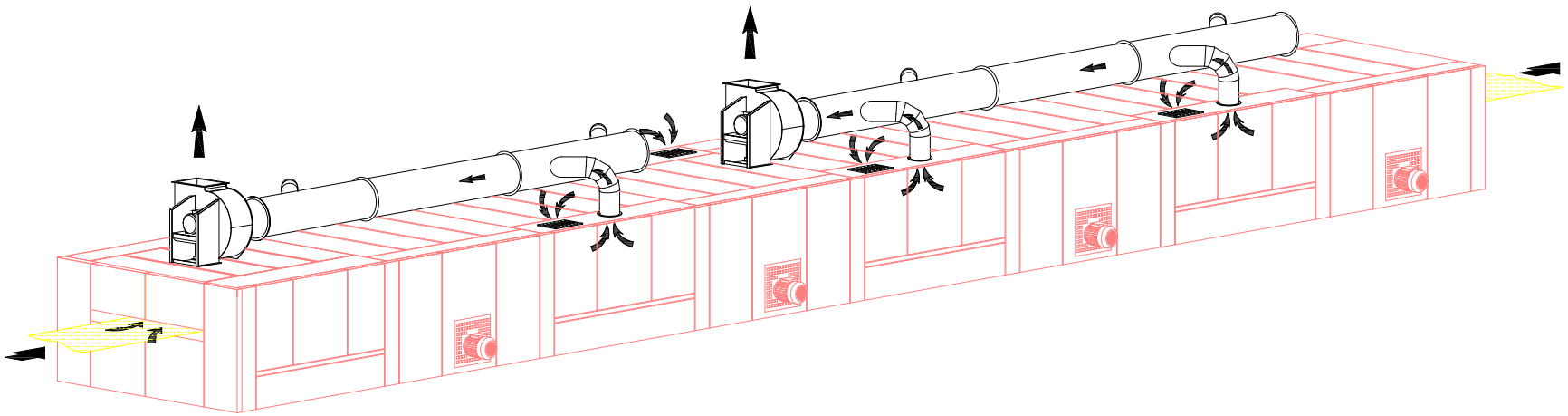




Drying & Heat Setting Chamber

Parallel flow

The most of stenter makers adopt the exhaust system which has separated exhaust from each chamber with controlling the volume of exhaust. Therefore, controlling the volume of exhaust shall be required compulsorily from each chamber.(Picture “A”)

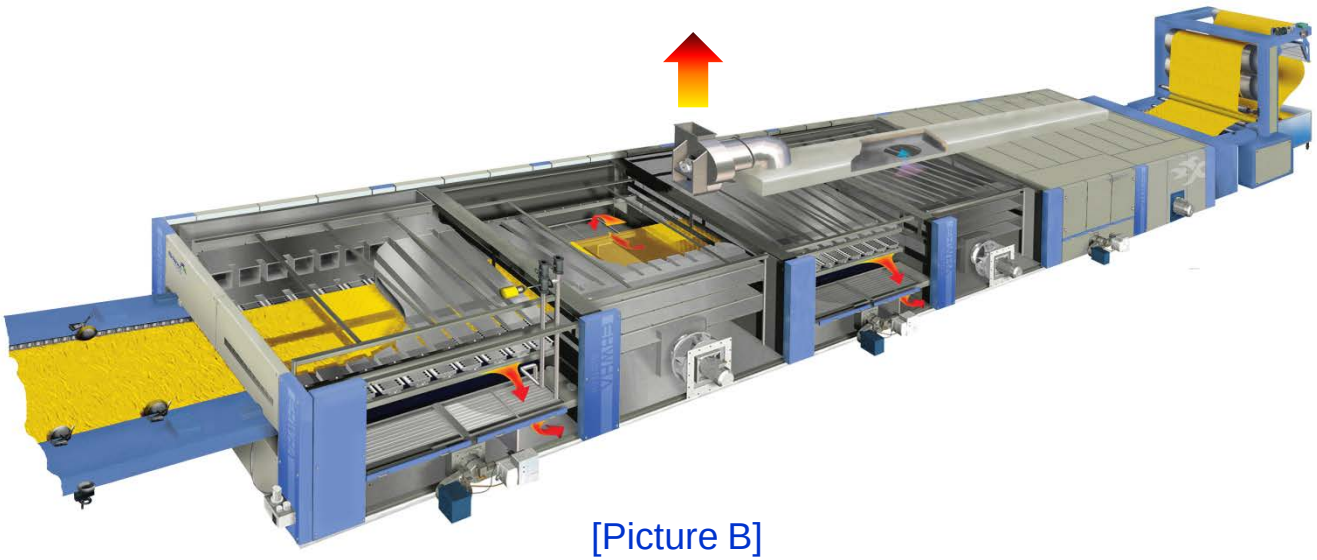


[Picture A]

Drying & Heat Setting Chamber

Parallel flow

However, Ehwha's parallel system has unique system as you see in the Picture "B" where 30% of circulated heating air in the chamber is transferred to the next chamber through special duct between chambers. This special duct in chamber is Ehwha's special design. Finally, the rear part of stenter shall integrate the volume of heated air (around Half of chamber). Therefore, Ehwha's parallel flow exhaust shall reduce the volume of exhausting air toward outside.

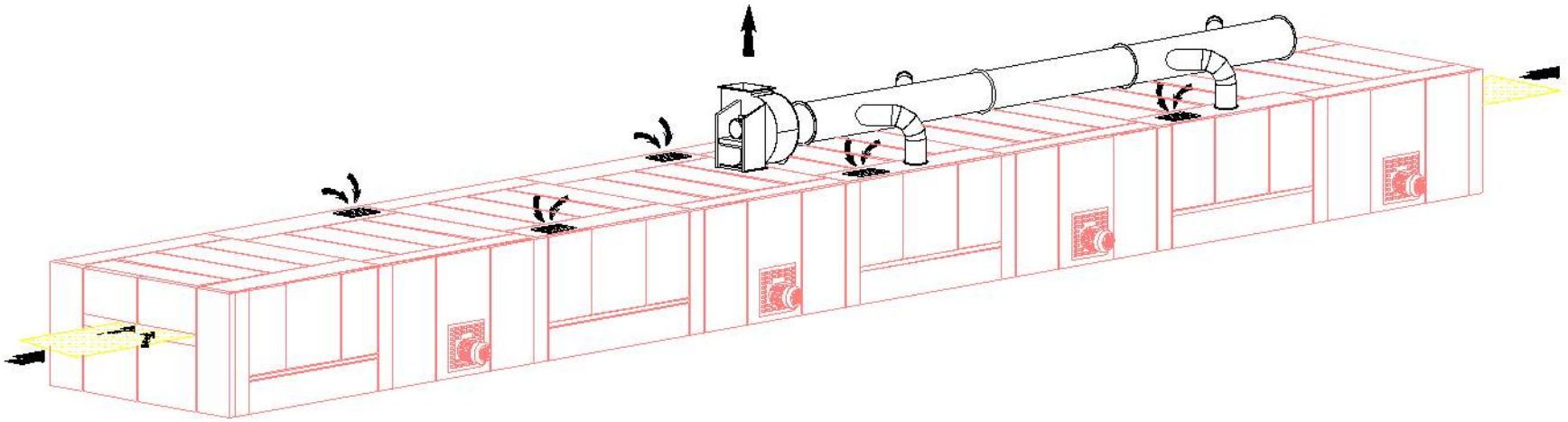


[Picture B]

Drying & Heat Setting Chamber

Parallel flow

Fresh air from outside to the each chamber shall be supplied by fresh air window on the chamber's roof except the first chamber and the last chamber as you see in the Picture "C". This system gives you advantages as recycling heated air and controlling the over exhaust so that you can reduce the loss of heating energy. It means you can get the energy saving from Ehwha's parallel flow exhaust system economically.



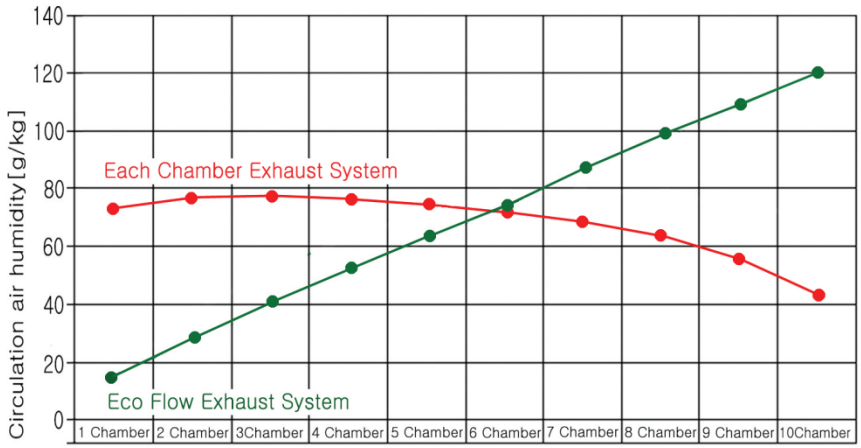
[Picture C]

Drying & Heat Setting Chamber

Parallel flow

Eco flow exhaust is one of the most important energy saving system in the EHWHA stenter. In case of regular stenter with exhaust duct installed in each chamber, 60~70% of supplied heat energy is lost to the atmosphere.

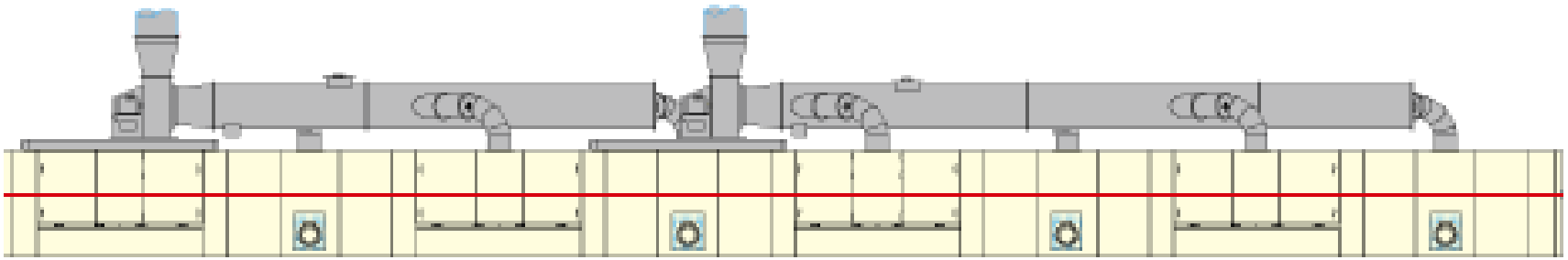
- Eco Flow Exhaust system maximizes the use of heat energy by re-circulating a part of circulating air to the next chamber, and creates effective energy saving up to 15~35% by discharging exhaust air from only last half number of chambers that are contaminated by dyestuff or chemical sublimation.
- Also it is an environmentally friendly system that minimizes the air pollution by reducing significantly the volume of exhaust air.



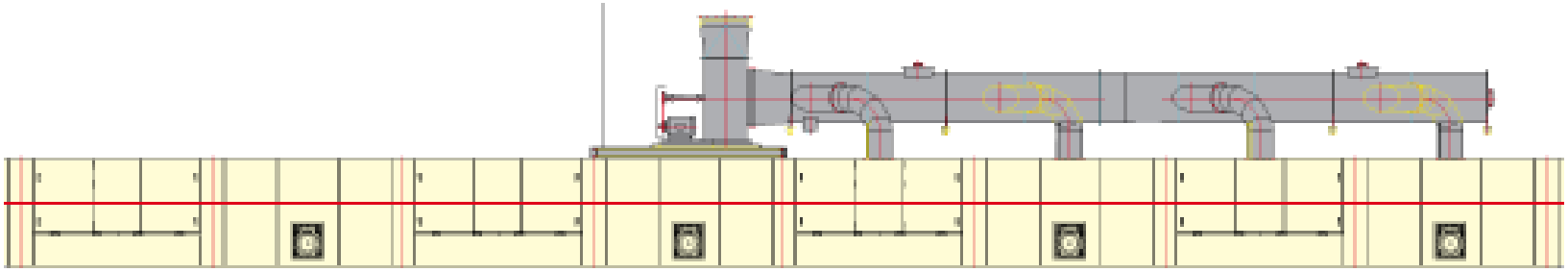
Drying & Heat Setting Chamber

Parallel flow

Parallel flow exhaust needs only one dust collector: It can reduce the cost for construction and maintenance of dust collector.



Each chamber exhaust

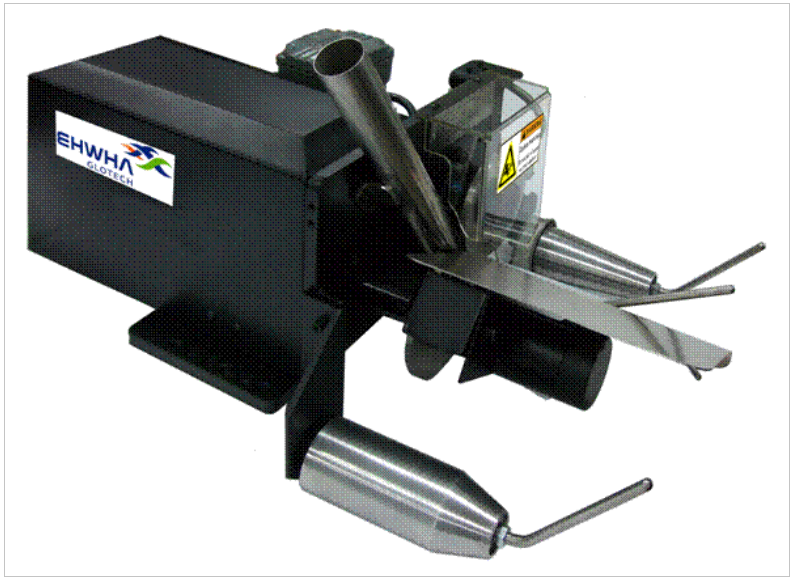


Parallel flow exhaust

Air Cooling Device

- A powerful air jet of room temperature air cooling system is provided for quick stabilization of the fabric characteristics by means of 5.5 kw AC motor driven turbo blower and cooling air blowing nozzles. Cooling air volume can be adjusted by the damper provided at each side.
- Air cooling device is provided with 2 sets of Oval Punching Air Floating type nozzles at the bottom and top sides.

Cutting devices & Gumming



- This is optional device which was selected from each customer. Cutting device has designed for inclined cutting on fabric surface with De-pinning roller and cutting wheel. Therefore, it gives advantages to the customer that reduce selvedge trimming loss compare to other makers.

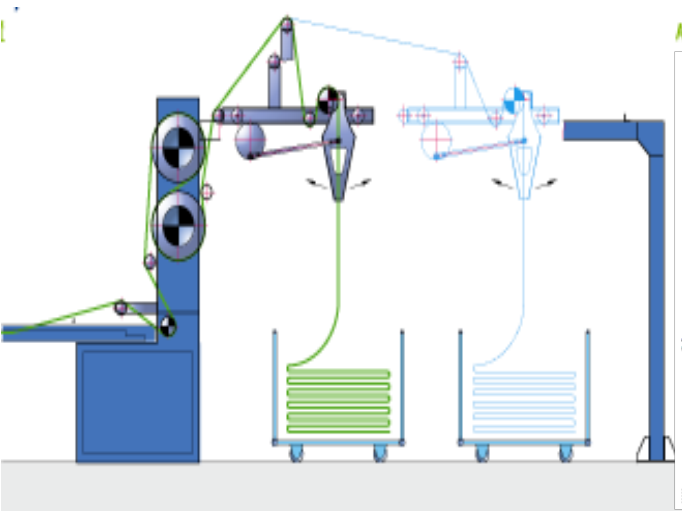
- This is optional device for smooth cutting in terms of spreading glue on selvedge. It is attached at inlet rail in part of entry rail section.

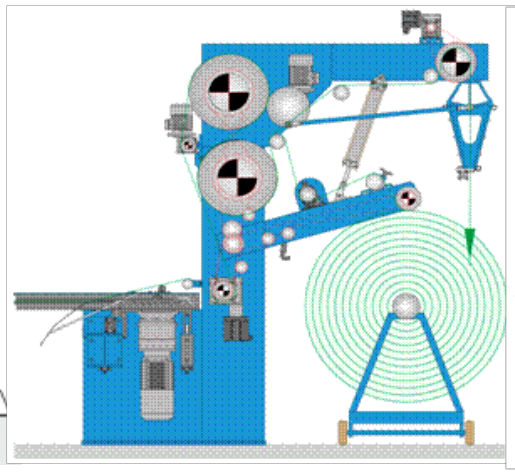
Plaiting Device

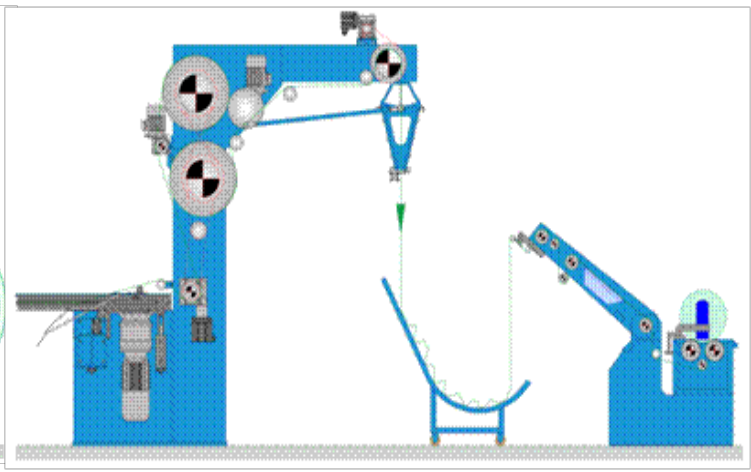
- Exit device consists of a pair of water cooling cylinders and plaiting device as standards.

- Static electricity removal device located in the end of the plaiting device.

- Batching and mobile plaiting device can be selected depending on the type and purpose of the fabric, and can be manufactured according to the customer's requirements in different types.







EHTEX Touch Screen system (Optional)

- Touch screen is installed at the operator's position in order to have better ease and effectiveness in the operation of stenter.
- In order to eliminate language barrier, user-friendly icons are placed in the software instead of text.

From the above discussions, following advantage can be listed :

1. More ease in operation and control of various functional parameters of stenter.
2. Icon based touch screen makes user more friendly.
3. Larger capacity of program storage.
4. More speedy control of the parameters.
5. Requires less skilled labor.

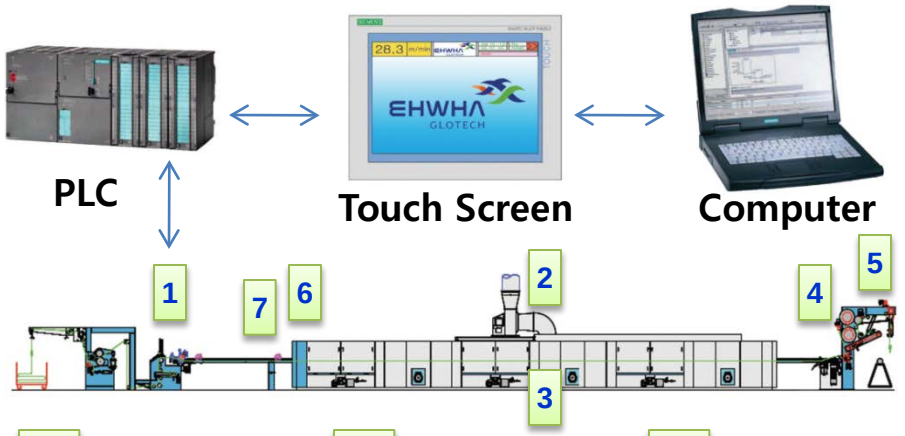
EHTEX Touch Screen system (Optional)

Automated system in Ehwha's Stenter consists of EHTEX-Touch screen system. Ehwha's automated system is also providing with the operating system.
User-friendly icons are placed in the software.

- Setting of the speed of the chain conveyor (selection of minimum speed enabled)
- Setting of overfeed proportional control (up to 80%)
- Setting of fan speed for exhaust and hot air(total setting function)
- Operation of PID precision control program for chamber temperature (total setting function)
- Automatic control for rail width
- Malfunction diagnosis (location and detail of malfunction and measures)
- Storage of processing data (recipe function)
- Management of operating condition
- Measurements for determining fabric temperature, Residual moisture, exhaust humidity and density(OPTIONAL)
- Language support

EHTEX Touch Screen system (Optional)

Touch Screen Flow Diagram

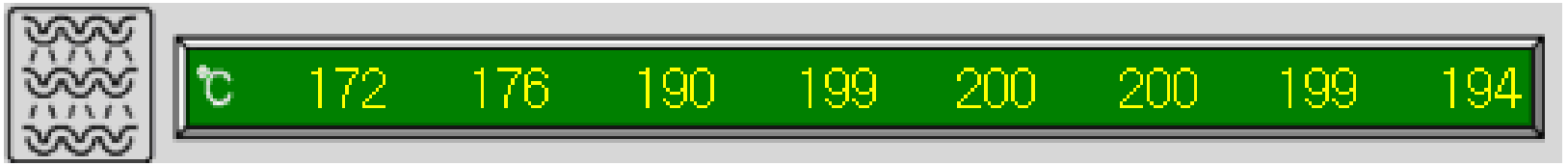


No.	Steps
1	Main Drive/Overfeed Control
2	Exhaust Humidity Control
3	Fabric Temperature Control (Drying & Setting)
4	Residual Moisture Control
5	Air Circulation Control
6	Temperature Control
7	Fabric Width Control

EHTEX Touch Screen system (Optional)

FABRIC TEMPERATURE DISPLAY

Fabric Temperature: Temperature of fabric surface is shown by touch screen in real time.



Tempeature inside chamber: Temperature in the chamber is shown by touch screen in real time.

Setting Data: Touch screen shows what operator has set.

Speed of process

Setting Temperature

Time for processing

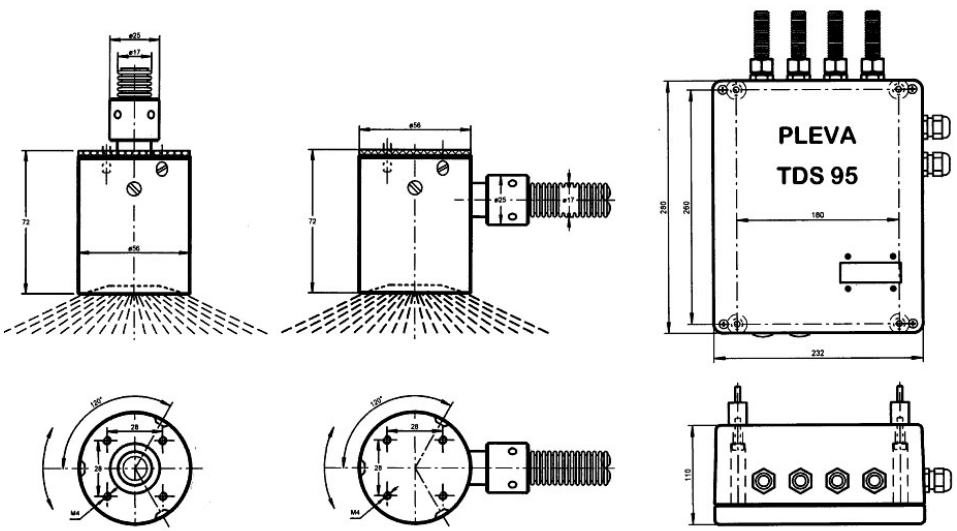
Time for processing

Distance for set temperature

EHTEX Touch Screen system

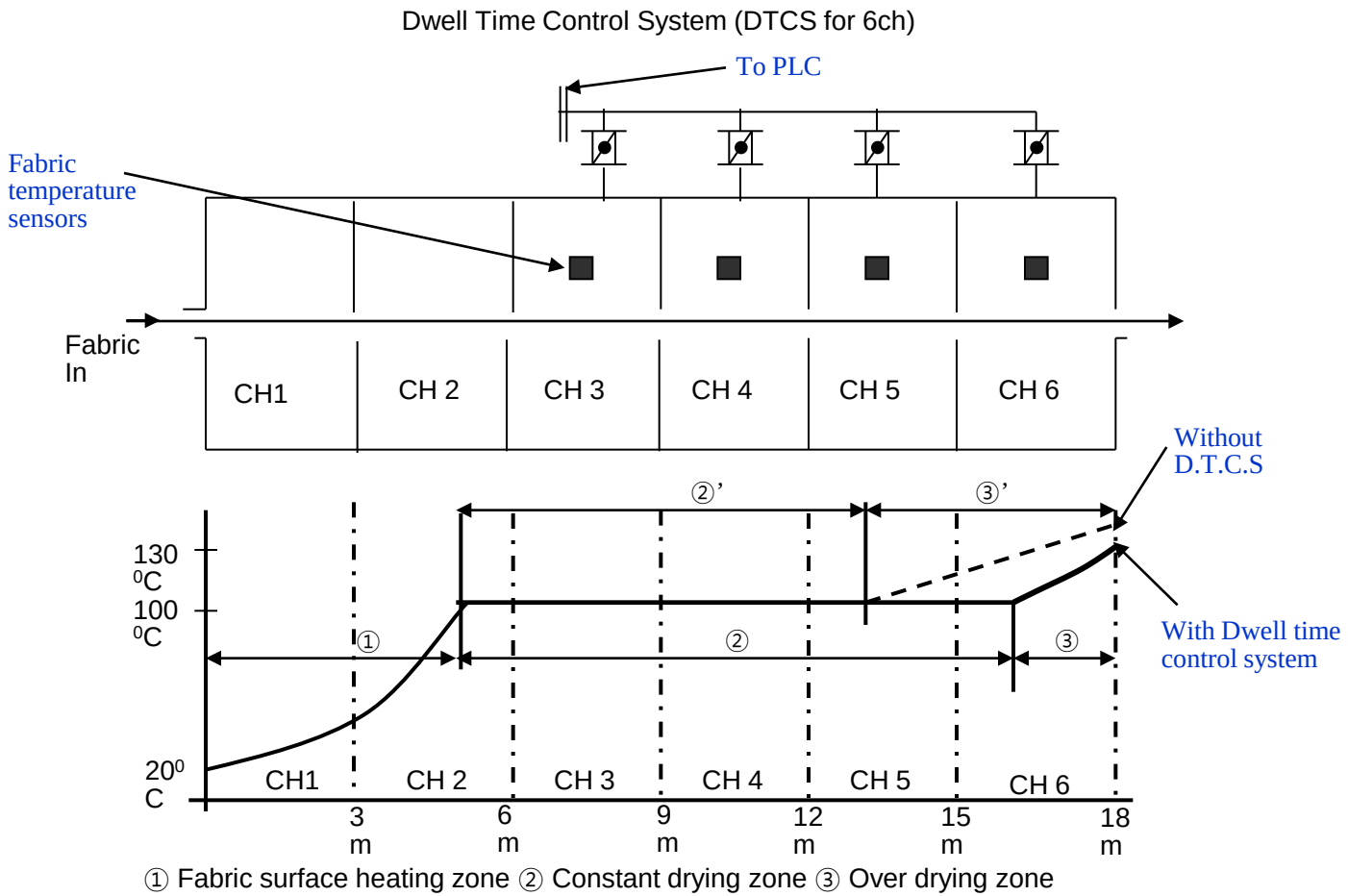
TDS 95-Fabric temperature measurement (Optional)-1

- TDS 95 is a non-contact type material temperature measuring device used in heating chambers up to temperatures of about 400^0c.
- The measuring principle is based on exchange of thermal radiation between the temperature of the fabric to be measured and the sensitive surface of the TDS-95.
- Up to 4 sensors can be connected to the one TDS-box, which is a intelligent measuring preamplifier with the microprocessor technology.
- This system controls the Stenter chain speed depending on the temperature at the surface of fabric and its staying time in order to conserve energy and to process superior quality products.



EHTEX Touch Screen system

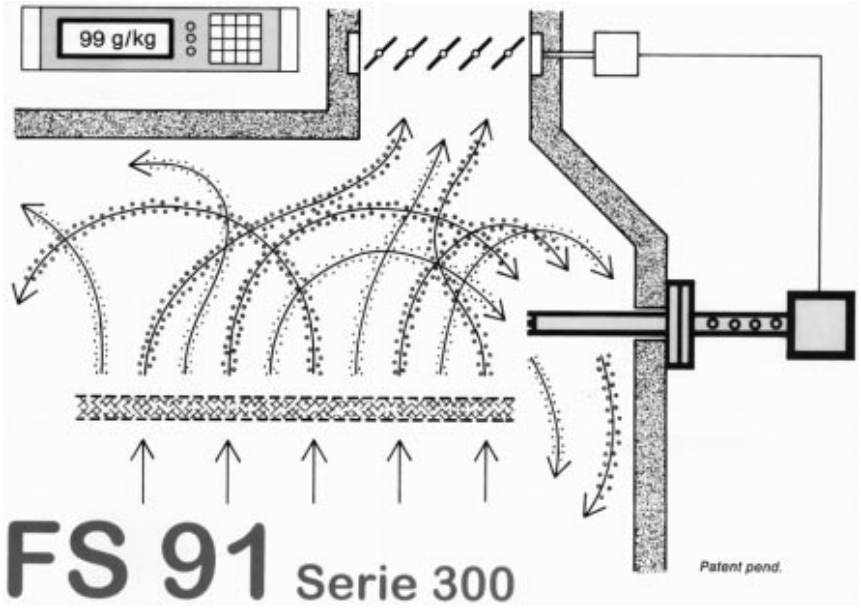
TDS 95-Fabric temperature measurement (Optional)-2

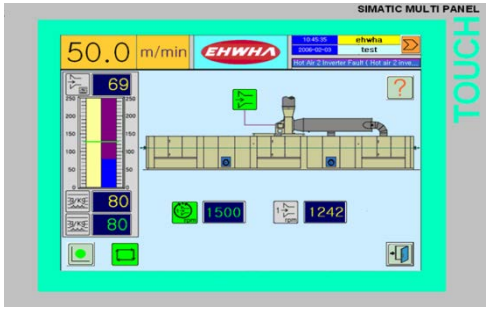


EHTEX Touch Screen system (Optional)

FS 91-Exhaust humidity measuring and controlling device

- In heating chamber, a large volume of precious heated air is used to remove the evaporated water/humidity. This volume of heated air is exhausted from the chamber, resulting in reduced efficiency of the system.
- The aim is therefore to charge the air to an optimum degree with humidity before exhausted to the atmosphere.
- FS 91 humidity measuring and controlling device has been installed to obtain optimum volume of exhaust air, saving energy up to 15 -30%.

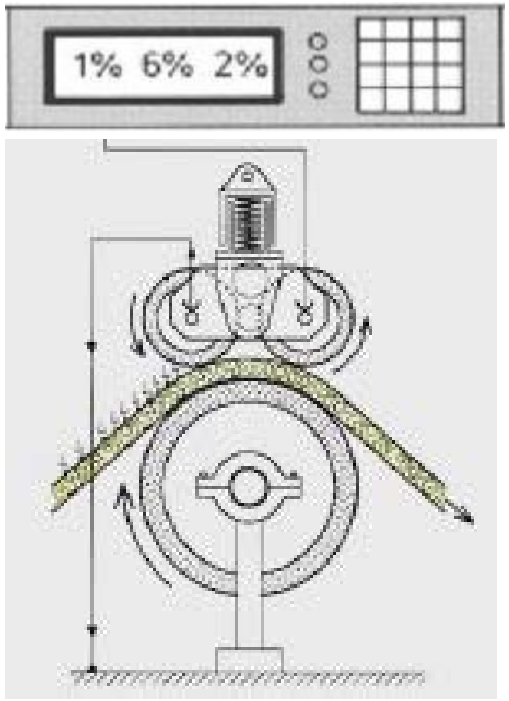


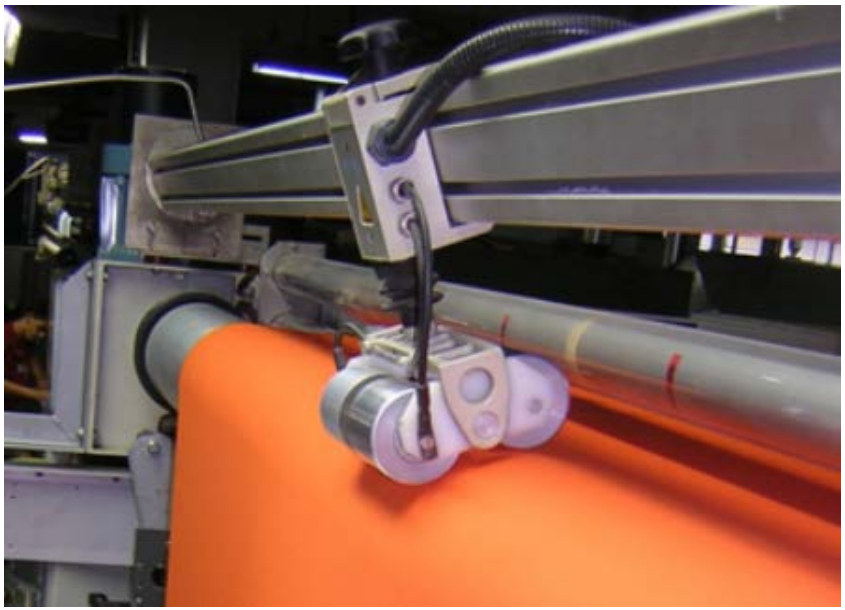


EHTEX Touch Screen system (Optional)

RR1 Serie 300 – Residual Moisture controlling device

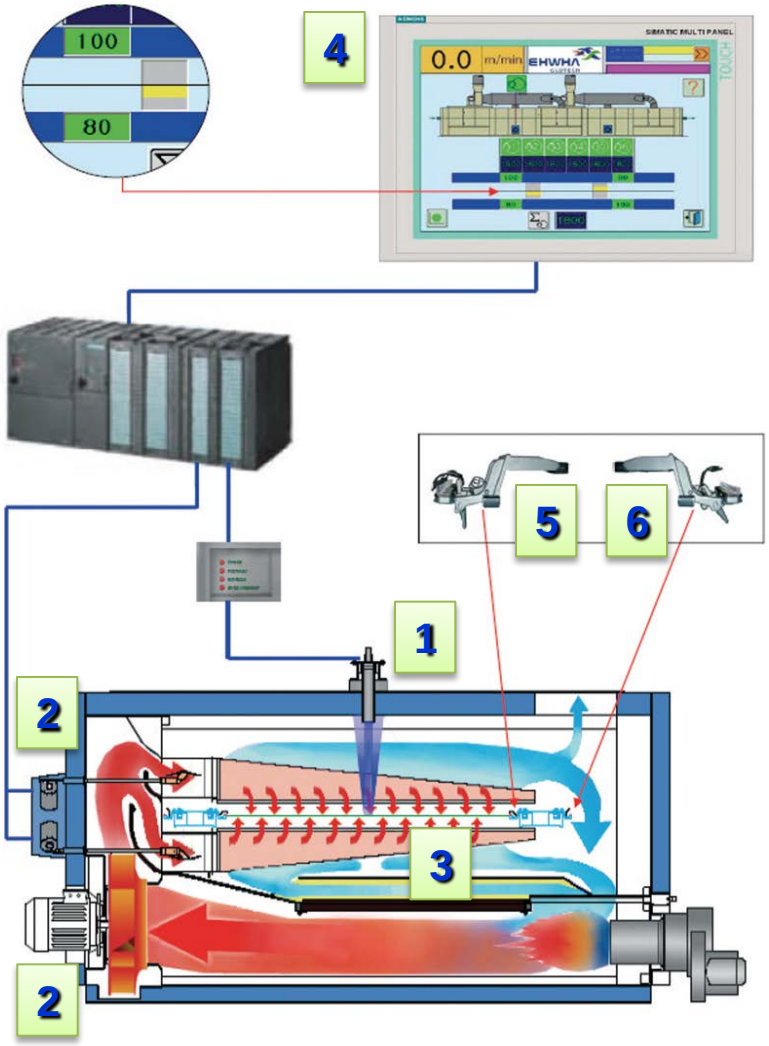
This system measures residual moisture of processed fabric and controls it.





EHTEX Touch Screen system (Optional)

Fabric Position sensor - 1



No.	Item
1	Sensor for Detecting the Position of the fabric
2	Automatic Damper Control Motor
3	Induction duct for the Prevention of Air-tension
4	Monitoring of the Position of the fabric
5	Pin Locking
6	Pin Unlocking

EHTEX Touch Screen system (Optional)

Fabric Position sensor - 2

Certain fabrics (Interlock Rib, Single jersey, PK, etc.) are easily stretched during the process of dyeing, slitting & opening.

Normally, overfeed is greatly increased so as to satisfy the standard weight of the elongated fabric. As overfeed is increased, occurrence of the de-pinning phenomenon in the fabric is easily observed.

When the air velocity of the upper nozzle is greatly increased to prevent the de-pinning problem, the fabric comes into contact with the lower nozzle, which causes the curvature phenomenon and a deviation in the weight of the fabric during its production. However, any attempt to decrease the RPM of the hot air circulation fan so as to prevent this problem will bring about a decrease on productivity.

To resolve such problems as curvature, weight deviation, and the reduction of productivity, optional features including an automatic damper control system, a sensor to detect the position of the fabric, a selvedge pin locking device, and an induction duct for the prevention of air-tension have been incorporated into this product.

Important Features of Textinno

- Oval Punching Air Floating (OPAF) type nozzle system provides relaxation of fabric especially to the knit during drying and heat setting process. This is the most important feature of the EHWHA Stenter.
- According to our customer's fabric condition, Ehwha can supply different nozzle system for different types of fabric.
- Patented - Parallel flow exhaust system regains 15-35% of heat energy lost to the atmosphere through exhaust gas.
- Eco flow exhaust system minimizes air pollution.
- Use of Eco flow system ensures proper moisture to be contained in the fabric, imparting very good finish and minimizing yellow marks.

Important Features of Textinno

- Use of pneumatic cylinders in Padding mangle device improved the flexibility and accuracy of pressure exerted on fabric.
- Use of Interior Permanent Magnet (IPM) motor for over feeding system improved the quantity and accuracy of the overfeed.
- Alternate (counter) position of hot air fan assembly in the heating chambers improved heating of fabric on both sides (up and down).
- Uniform pressure can be maintained in the upper and lower nozzle because of the unique design of the passage of circulating air in the chamber.
- EHWHA's Automation system (Optional) and self developed EHTEX software increased production output and decreased energy consumption.

Contact us

EHWHA GLOTECH CO., LTD.

- Address 17605 Fabrica Way, Suite I
  Cerritos, CA 90703
- Tel 714-224-1181
- Fax 714-224-1182
- E-mail ehwhausa@gmail.com
- Website www.ehwhaglotech.com