NONWOVEN

WETLAID TECHNOLOGY FOR GLASS FIBERS

MARKET, TECHNOLOGY AND IMPROVEMENTS

NOVEMBER 2019

ANDRITZ

ENGINEERED SUCCESS

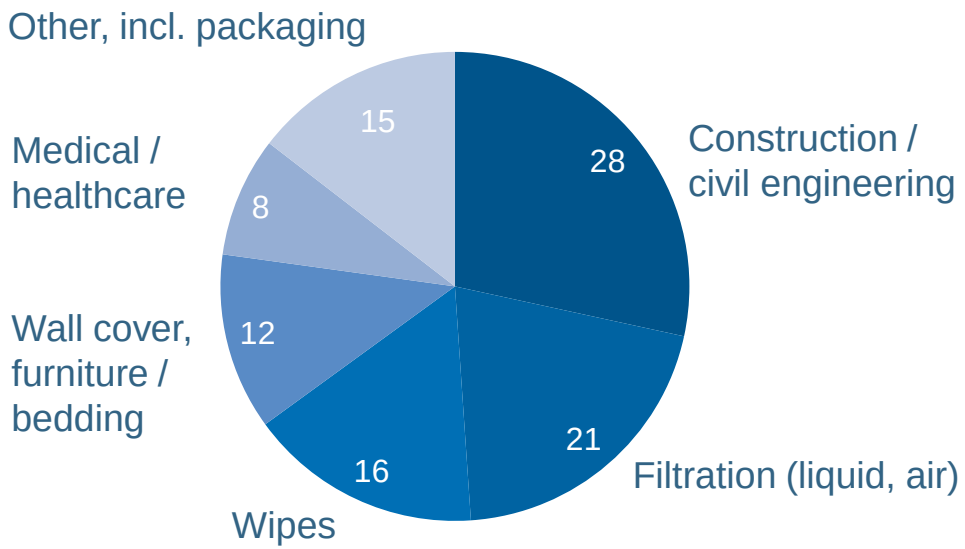
CHAPTER OVERVIEW

MARKET DRIVERS AND TRENDS

- Increasing amount of construction and civil engineering worldwide
- Thinner products with good physical properties as tensile strength
- Products with paper-like visual properties but the strength and porosity of glass

MARKETS AND TRENDS

Key applications of wetlaid



- Construction materials make the largest part of wetlaid production. It includes glass mats and insulation in particular.
- Filtration is the second largest category with ca. 20% share followed by wipes (16%) and wall-cover/furniture/bed (12%)
- Top four segments account for nearly 80% of total wetlaid production

Source: Interviews ANDRITZ; Results in percent, average values based on a panel of experts

Construction, filtration, wipes and wall-cover account for nearly 80% of total wetlaid production!

GLASS FIBERS NONWOVENS

A wide range of applications

- Ceiling tiles (facers)
- Cushion vinyl flooring (reinforcement)
- Carpet tile (reinforcement)
- Glass reinforced polymer surfacing (base for panels or pipes)
- Insulation (glass wool facer)
- Walls (printed or unprinted, substitute for wall papers)
- Geotextile (sometimes mixed with polymer fibers.
- Batteries (separator)
- Gypsum (facer, substitute for paper)
- PolyIso (facer for foam board)
- Filters
- Bituminous roofing (reinforcement)






GLASS FIBER NONWOVENS

Features and characteristics

Noise reduction

Improvement of performances

Low electrical resistance

Low elongation

Hot tensile and thermal stability

Robust

Hardly inflammable

Anti-cracking performance

Durability

High purity

High strength performance

Reinforcing and protecting

Reliable

UV resistance

Insulating

Water repellency

MARKET PLAYERS

CHAPTER OVERVIEW

PRODUCTION LINE FOR GLASS FIBER MATS

Stock preparation

- Creates a homogeneous fiber and water dispersion during transportation to the forming unit

Forming unit

- Core component of the line. Fibers are laid on an inclined wire to create the web
- Controlled water and fiber flow

Binder application

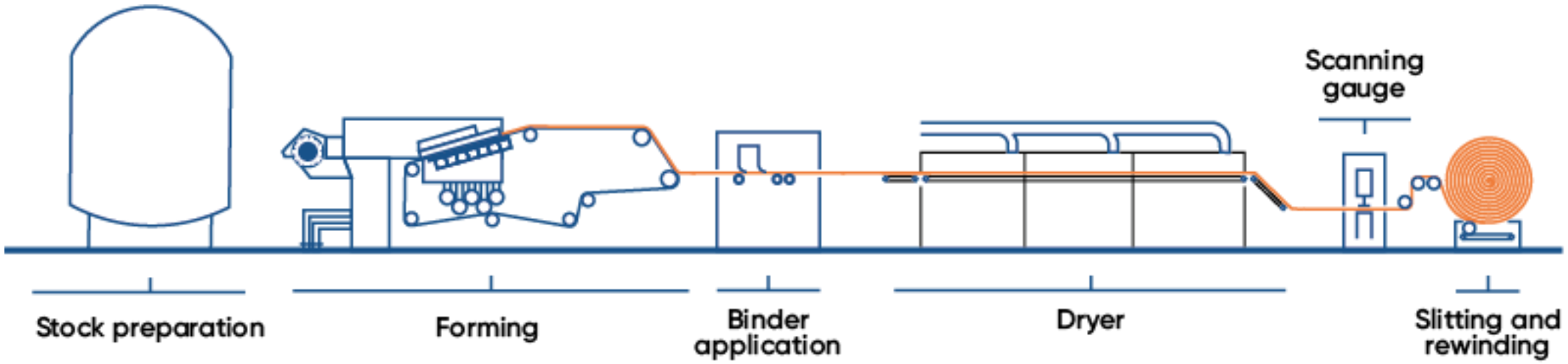
- Even distribution of binder in machine direction and cross machine direction

End of line

- Drying, quality control, winding, re-winding and slitting

PRODUCTION LINE FOR GLASS FIBER MATS

Line layout



Features

- Capacity: up to 100,000 t/a
- Line width: from 1.5 to 5.5 m
- Speed: up to 700 m/min

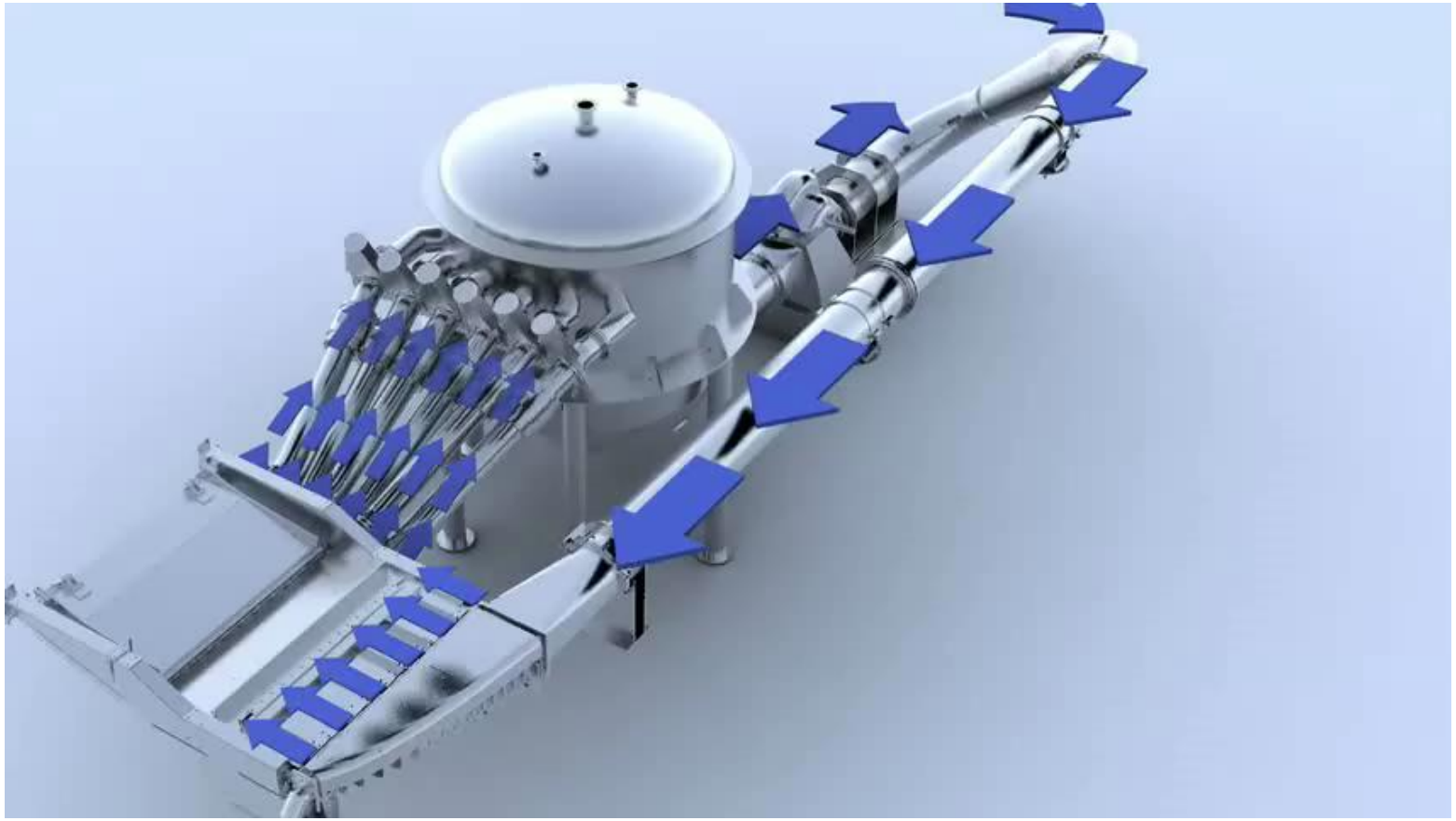
PRODUCTION LINE FOR GLASS FIBER MATS

Different line types in comparison

	Roofing mat line	Specialty line
Production capacities	Large volumes	Various products in relative small volumes
Typical run time of a product	1 day - 1 week	2 hours - 2 days
Production speed	250 - 700 m/min	50 - 250 m/min
Line width	4 - 5,5 m	1,5 - 4,2 m
Operating efficiency	92 - 98%%,	80% - 90%
First time right yield	90% - 98%	80% - 95%
Fibers and binders	Wet Used Chopped Strands (WUCS) 18 – 36 mm long glass, typical binders Urea-Formaldehyde (UF) resin, mixed with Acrylic Polymer	Wet Used Chopped Strands (WUCS) glass with various binders as Starch, Urea-Formaldehyde (UF) resin, Acrylic Polymer, Polyvinyl Alcohol (PVA)
Additional		Base veil is sometimes in- or off-line coated or impregnated

PRODUCTION LINE FOR GLASS FIBER MATS

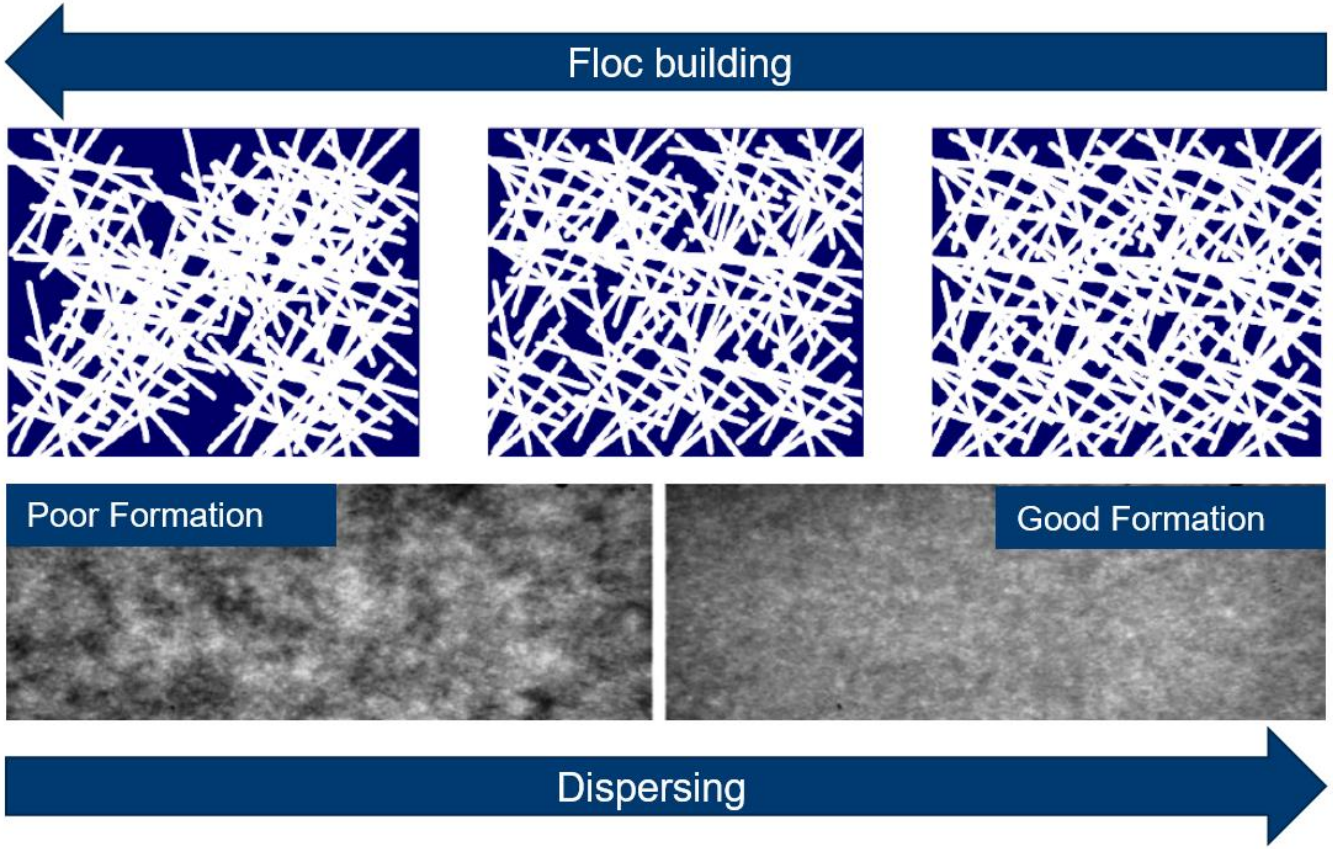
White water circle - best process efficiency



CHAPTER OVERVIEW

WETLAID FORMING

What is good formation?



- Most fibers in water have a tendency to agglomerate and build up flocs
- Small flocs are necessary to form a sheet on the wire
- Larger flocs appears as clouds in the formed web

How good the formation highly depends on the product requirements

+

Quality Level should not fluctuate

WETLAID FORMING

How can formation be influenced?

Three design points are essential

1. Give the fibers enough room to move freely around in the water-fiber suspension
2. Bring enough turbulence in the water-fiber suspension. Keep the fibers moving.
3. Lay the fibers in the best fiber orientation and good distributed on the wire

Chemicals can be added to slow down the floc building

- Viscosity modifiers: more resistance from the fluid and slow down agglomeration to flocs
  => Consequence: More dispersing energy is needed
- Surfactants: Reduction of force by which the fibers agglomerate
  => Consequence: To be minimized due to associated foam formation!

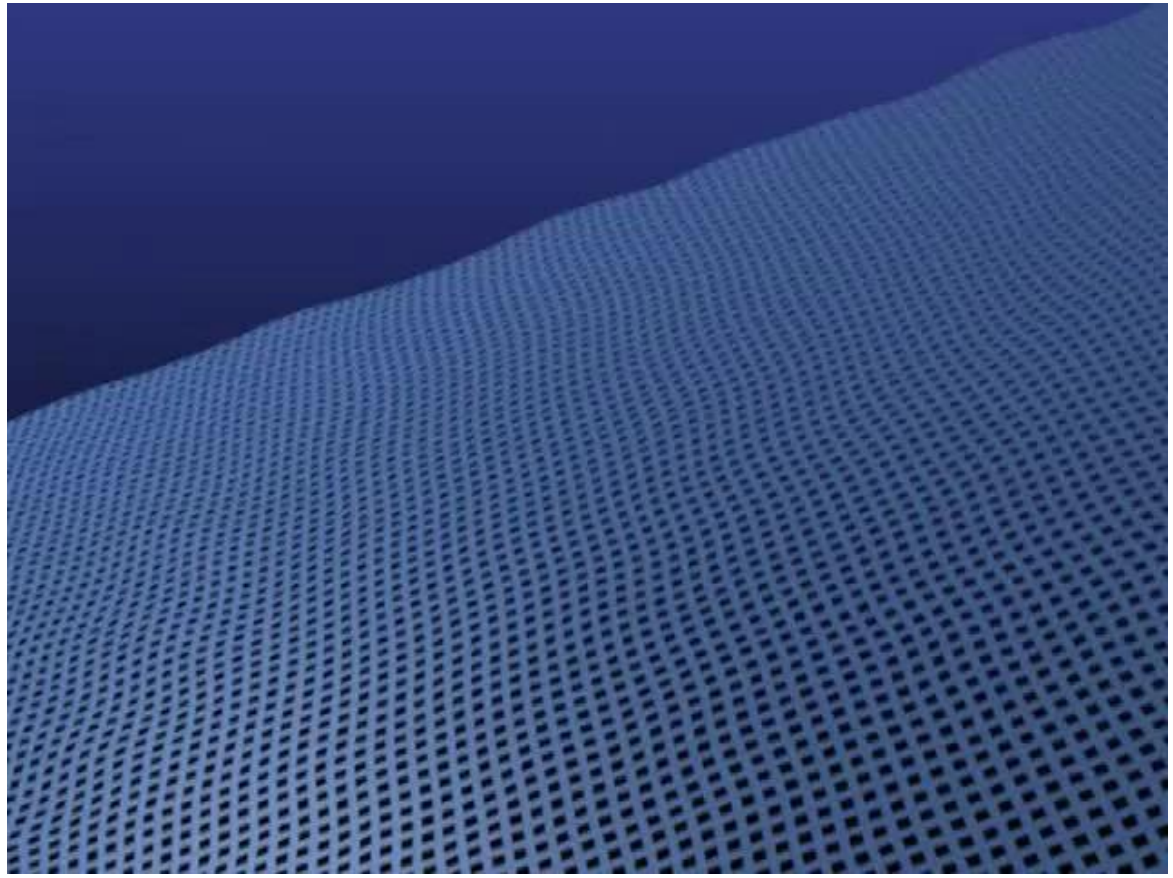
Wet end design of a fiber glass mat wetlaid line has a significant impact on the forming process.
Applying best design can limit the dependency on white water viscosity and surfactant chemicals.

WETLAID FORMING

Get control of fiber formation and porosity

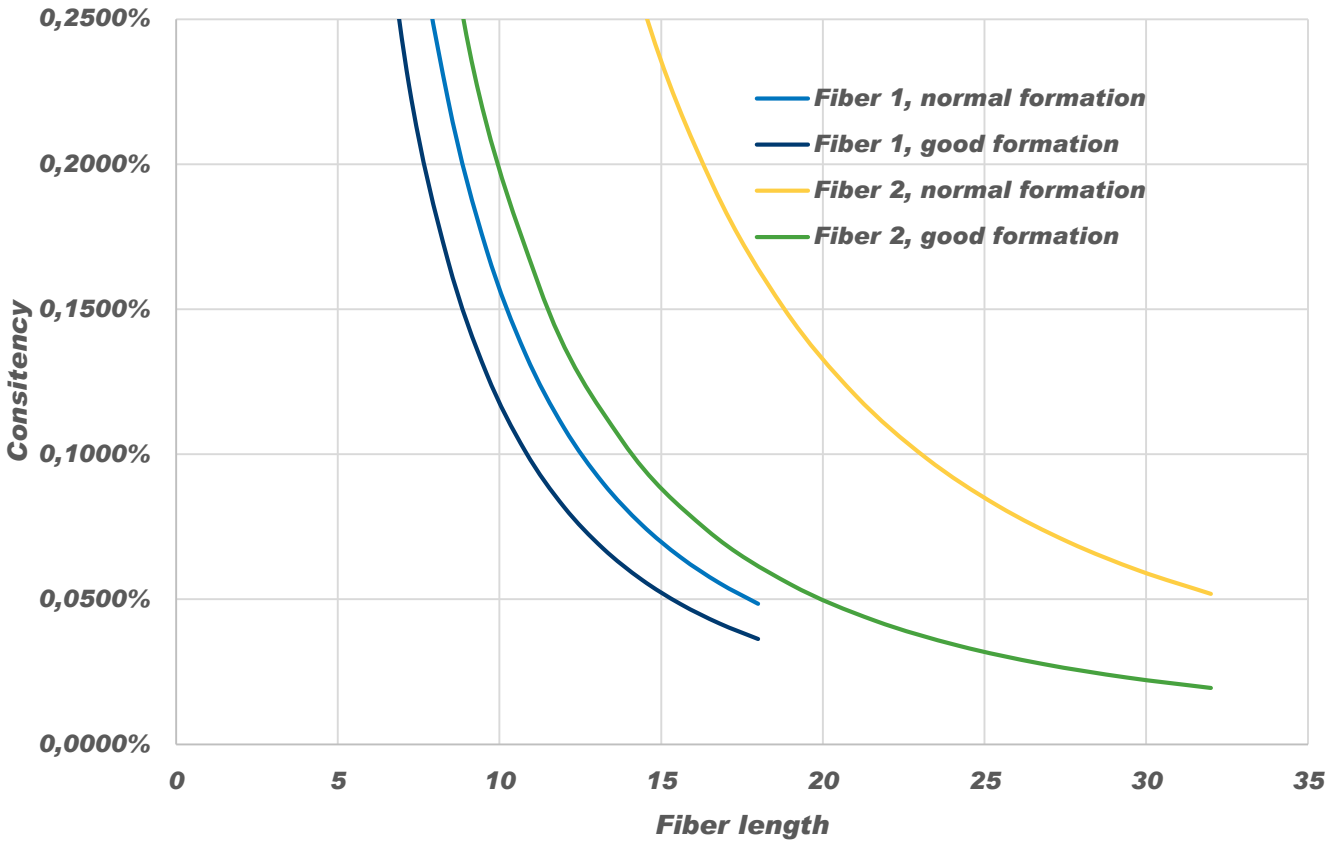
- For the production of wetlaid nonwovens with controlled porosity, the formation route must be inclined, so that the fibers can settle consecutively
- Fibers of up to 1.5” (38mm) length can be used
- In order to achieve a homogeneous web structure the fiber consistency has to be low. Depending on the fiber length, the range is from 0.1 to 0.5 g per liter water

High dilution and homogeneity are key!



GIVE THE FIBERS ROOM - CONSISTENCY

The required flow defines the former design and fan pump choice

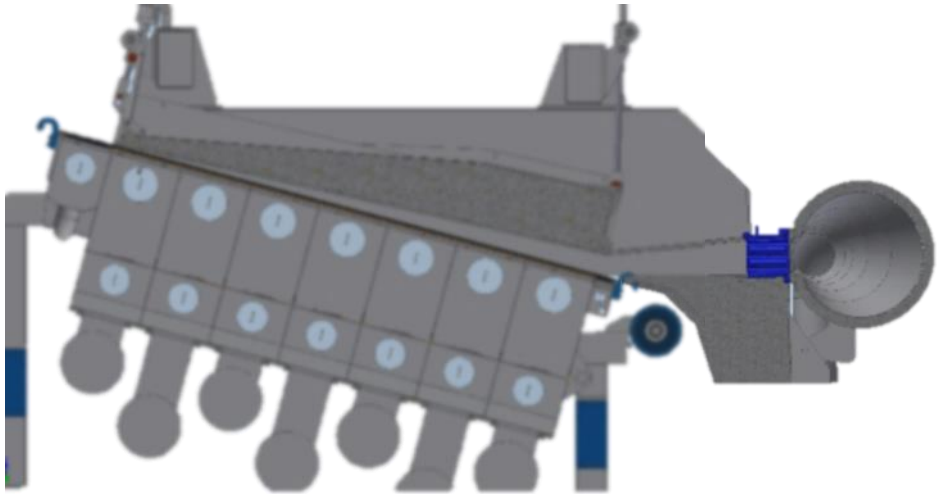


- Consistency = weight-% of solids in the fiber slurry, AKA “solids”
- The longer the fiber, the lower the consistency need to be
- The lower the consistency, the higher the flow in the white water loop at a constant line throughput
- The capacity of the former and fan pump will be defined by: consistency, line speed, base weight and forming width

The former & the fan pump should be able to handle the large flow!

WETLAID FORMING

Conventional concept – single diffusor – conical distribution manifold



PRO

- Allows fibers up to 1.5” (38mm) length
- Most cost effective design for standard and low demanding glass fiber mat applications

CONTRA

- Fiber distribution not optimal for high demanding applications
- With this former, glass fiber applications with high visual and/or fiber formation requires more white water chemicals as viscosity modifier and dispersant and shorter and thinner fibers

WETLAID FORMING

Market is demanding - Developments

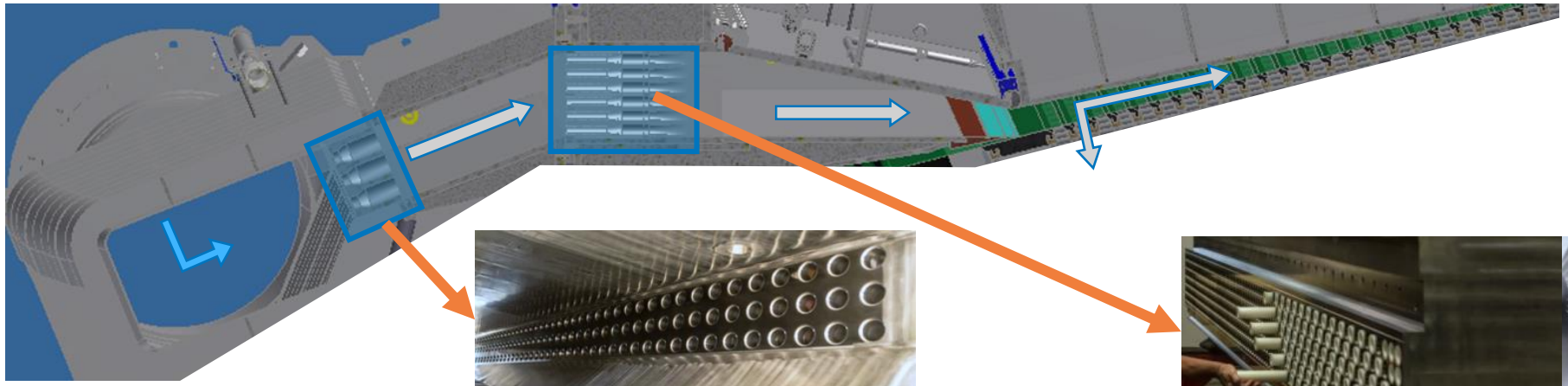
Market demands
- Thinner products but with good physical properties as tensile strength
- Products with paper-like visual properties but the strength and porosity of glass

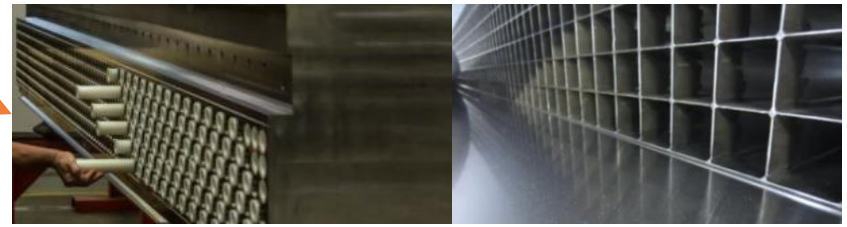
Traditional solution
- Use shorter and thinner fibers
- Improve fiber distribution and formation with chemicals as viscocity modifiers and dispersants.

Limits traditional solution
- The required properties are hard to reach, resulting in lower machine efficiencies for the demanding products
- The costs for short and thin fibers and the usage of white water chemicals become disproportional high

DISPERSING – KEEP THE FIBERS MOVING

Double diffusor - decoupling of functions





PRE DIFFUSOR

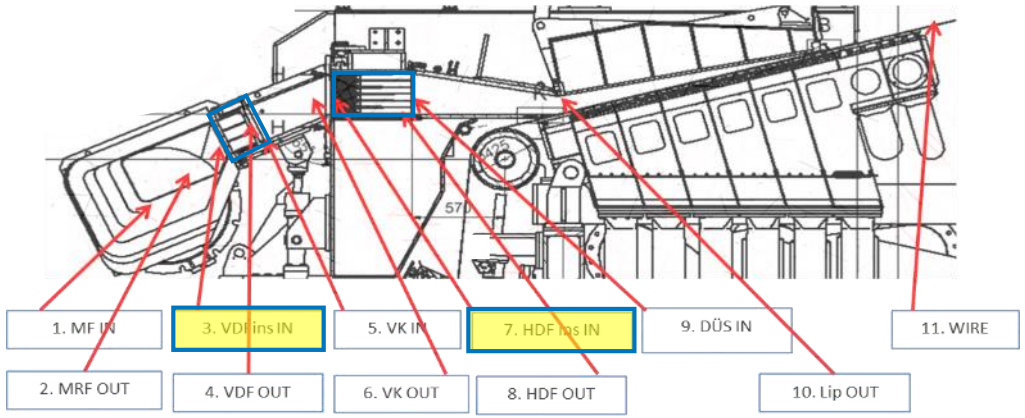
- Changes flow in header from cross machine direction in machine direction
- Tailor made, matching manifold design
- Optimal pressure drop function for the CD profile

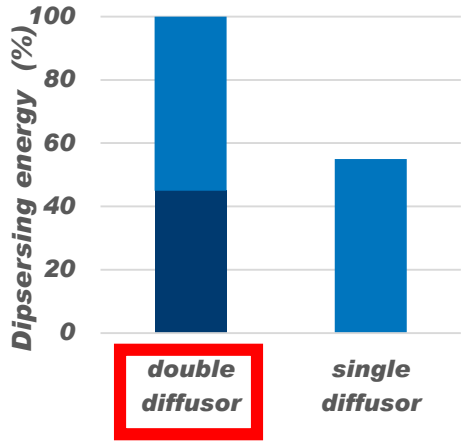
MAIN DIFFUSOR

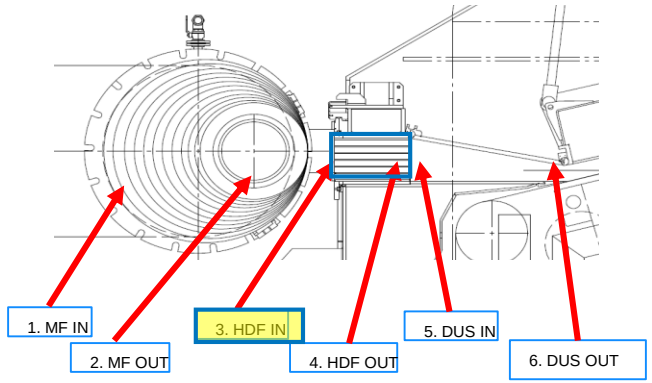
- Optimized for optimal turbulence: Defloccing
- Optimal dispersion at very high speeds
- Nearly 100% guided flow outlet (optimal forming, no undefined turbulences)
- Adjustable for alternative needs by changing inserts

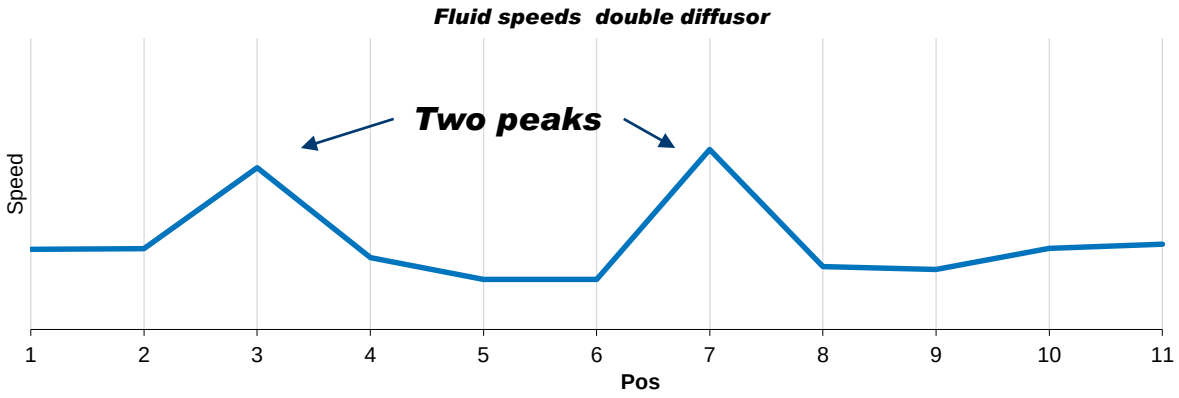
DISPERSING – KEEP THE FIBERS MOVING

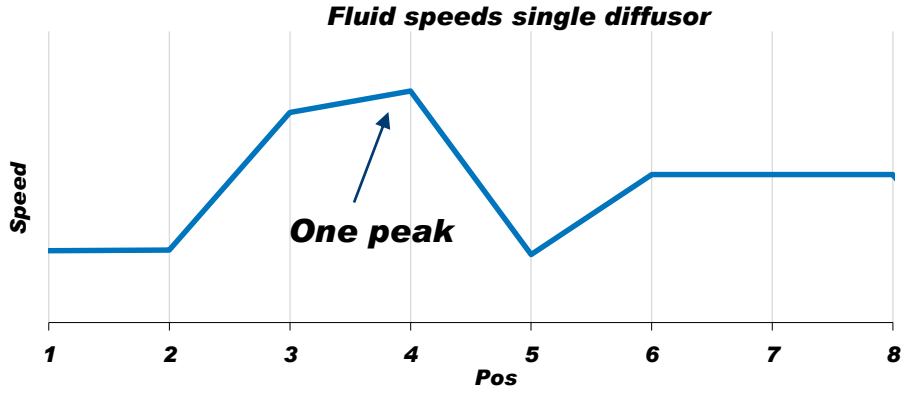
Double diffusor => More DISPERSING ENERGY











CHAPTER OVERVIEW

KEY TAKEAWAYS

- Glass fiber mats can be used for a very wide range of applications
- Growing market
- Different types of lines are available – from small to large capacities
- Important for a good formation of the web:
  - Give the fibers enough room to move freely
  - Bring enough turbulence in the water-fiber suspension
  - Lay the fibers in the best fiber orientation and good
- Double diffusor concept reduces the raw material costs
  - less demand for expensive chemicals and shorter fibers