



*Filter papers for coffee pads are produced in the wet laid nonwovens process.*

Wet laid nonwovens technology is multilayer

## Paper production from the tea bag to roofing

**Regardless of whether it's tea bags or coffee pads, gasoline filters or air filters, roofing material or overlay paper for laminate floors – all these products are manufactured with the wet laid nonwovens process. The technology comes from paper manufacturing and is not only for manufacturing wet laid nonwovens material, but also for production of long-fiber special papers. Voith Paper offers systems for manufacturing the most varied wet laid nonwovens, among which is the HydroFormer sheet formation unit. In Düren, Germany, Voith Paper has a HydroFormer pilot line.**

Long fibers are used for the composition of wet laid nonwovens. The fibers can be up to 40 mm long and must be dispersible in water. For homogeneous formation of the fibers, a suspension with low stock consistency is necessary in which the long fibers can be well-distributed. The stock consistencies are from 0.1 to 0.8 g/l. For comparison with graphic papers, stock consistencies of 5 to 8 g/l are required.

The low stock consistencies require a large throughput quantity in the headbox. In the wet laid nonwoven process, an inclined wire as sheet formation unit is necessary in order to handle the large throughput quantities. For over 40 years, Voith Paper has been building inclined wire machines with the brand name HydroFormer, which is continuously being further developed and improved. In Düren, Voith Paper operates a HydroFormer pilot line that can be used for customer trials.

Along with single-layer HydroFormers, Voith Paper has also developed HydroFormers that can produce multi-layer products. With multi-layer headboxes, the suspensions of the separate layers are individually fed into the sheet formation space via headers and tube banks. Flexible lamellas separate the flows in the last headbox section as the suspensions enter the forming area.

The capacity of wet laid nonwovens facilities can be between 2000 tons per year for light products such as tea bags (12 g/m<sup>2</sup>) and 115,000 tons per year for glass fiber mat products (122 g/m<sup>2</sup>). Machine widths between

1 and 5.3 meters are common; the basis weight ranges are between 10 and 300 g/m<sup>2</sup>. Wet laid nonwovens facilities operate at production speeds between 50 and 550 m/min.

We present two exciting application examples from Voith Paper in the area of wet laid nonwovens technology.

*Typical HydroFormer of a 5 meter wide glass mat machine.*



#### Application example 1: Glass fiber mats

## The largest glass fiber mat machine in the world

**In the last few years, the demand for glass fiber mat in the US has noticeably increased - on the one hand, due to the booming construction industry, on the other hand, due to many hail storms and hurricanes that have destroyed residential roofs. One of the leading glass fiber mat manufacturer in the world responded to the growing market in 2007 with construction of the largest glass fiber mat machine in the world located in the United States. Voith Paper supplied the HydroFormer GV2, the binder impregnation section and the white water circulation system for this machine.**

*“The challenge of this project was to build a glass fiber mat machine for which there was no fan pump on the world market that was large enough.”*

*Dr. Klaus Afflerbach, Technical Sales Manager, Voith Paper*

*The three-layer glass mat was produced with the HydroFormer from Voith Paper.*

Glass fiber mats are used as the base material for floor coverings, asphalt shingles and asphalt rolls, among other products. There are older glass mat machines operating in the width ranges of 2 to 5 meters. But to achieve higher production capacities the latest installation is the largest glass mat machine in the world. The formation width of the new machine is 5,300 mm with production speeds of over 400 m/min.

For machines of such wide widths annual production capacities of over 100,000 tons of glass mat can be produced with typical glass mat basis weight ranges of 50 to 140 g/m<sup>2</sup>.

“The challenge of this project was to build a glass fiber mat machine for which there was no fan pump on the world market that was large enough,” explains Dr. Klaus Afflerbach, technical sales manager at Voith Paper. In manufacturing glass fiber mats for roofing, the stock in the headbox must have a very low consistency. Only in this way can the 25 - 40 mm long fibers form a uniform mat on the wire. The end product is then distinguished by high tear resistance. But the required white water circulation quantity of up to 500,000 l/min could not be attained with any available fan pump at the low pressure levels below 2 bar. The engineers of

Voith Paper developed a suitable design for the headbox and associated white water circulation system for the new forming section. The resulting system incorporates two fan pumps to achieve the high flow requirements. This arrangement also provides the possibility of producing two-layer glass fiber mats if desired. To accommodate the two fan pump flows the forming section must be equipped with a two-layer HydroFormer headbox.

The two conically parabolic headers of the headbox are arranged counter to one another. Feeding is done with one header from the drive side, and



## HydroFormer

### Worldwide unique technology for production of three-layer wet laid nonwovens

Voith Paper is the world market leader in wet laid nonwovens facilities and offers with the HydroFormer a unique technology for production of one-, two- and even three-layer wet laid nonwovens. The flexibility makes it possible to produce wet laid nonwovens for special applications such as filter, overlay and filter papers for coffee pads. The Voith HydroFormer is used in the most high-power wet laid nonwovens machines worldwide with production speeds up to 550 m/min and production widths up to 5,300 mm.

the other header from the tender side. Stock preparation and white water circulation system are also designed with two approach flow systems. Different fibers and fiber mixtures can thus be used in both lines of the stock preparation and the white water circulation system.

“Preliminary results from two layer glass mat production evaluations have shown that the quality of the glass fiber mats is noticeably better than on comparable older machines. Both the formation as well as the profiles of the glass fiber mats show clear improvements,” reports Dr. Klaus Afflerbach.



## Application example 2: Wallpaper base paper

## New headbox ensures market leadership

**The Neenah Lahnstein paper plant produces wet laid nonwovens for wall coverings. Particularly wallpapers that are dry peelable, also called dimensionally stable papers, are currently much in demand. The company reacted to the growing market with a conversion of the existing PM 6 paper machine. In only 14 days, Voith Paper equipped the PM 6 with a new closed HydroFormer headbox and modified the white water circulation system. The result speaks for itself: since then, the production capacity is 20 percent higher.**

“In order to be able to survive as market leader in wet laid nonwovens for wall coverings, an expansion of our capacities was urgently necessary,” Deflef Stoltefaut, manager of Neenah Lahnstein, reports about the reason for the conversion. Previously, there was a bottleneck between the open HydroFormer headbox, the fan pump with white water and extraction tank. Voith Paper met this challenge with a new closed headbox. In addition, the white water

circulation system was modified in order to adapt the dewatering capacity to the increased speed.

The rebuild itself took only 14 days. In the process, not only the new HydroFormer headbox was installed, but other areas of the paper machine were also optimized. “Up to 80 employees of different companies and in-house technicians from Neenah Lahnstein were working around the clock for

this,” says Bernd Rudolf, technical director at Neenah Lahnstein. The rebuild was finished within the scheduled time.

“From the very beginning, the quality of the specialty papers and the capacity of the machine met what Voith Paper had promised,” says Rudolf. “The good team work between Neenah Lahnstein, Voith Paper and the assembly personnel achieved the success in this project.”



*The trailer delivers the top part of the white water tank and the expansion of the extraction tank for the PM 6 at Neenah Lahnstein.*



Customers have the opportunity to carry out trials on the HydroFormer pilot line in Düren.

## HydroFormer pilot line in Düren, Germany

# Less risk through trials

**When considering modifications to a wet laid nonwovens machine or investing in a new machine, there are ways to minimize risk. Voith Paper offers the possibility of running trials on the HydroFormer pilot line in Düren in order to test the technology. Voith Paper also uses the machine for development testing.**

The headbox of the HydroFormer pilot line can be operated as one-, two- or three-layer. Fibers up to a length of 40 mm can be used.

The pilot line consists of a pulper, three machine chests, a closed white water tank, a 3-layer HydroFormer headbox, an inclined wire section (10° to 20°), a pickup and a press section.

“The core of our machine is the three-layer HydroFormer headbox,” explains Egon Friesenhahn, R & D engineer for special machines at Voith Paper in Düren. The wire angle and the apron board angle of

the headbox can be changed.

It is thus possible to find the best setting of the headbox and the wire section for each grade. Hand sheets can be taken from the wet rolls for further analysis.

### Contact



**Dr. Klaus Afflerbach**  
[klaus.afflerbach@voith.com](mailto:klaus.afflerbach@voith.com)

### Technical specifications

#### HydroFormer pilot line in Düren

Formation width: 0.5 m

Design speed: 1,000 m/min

Working speed: 10 - 600 m/min

Basis-related weight range:  
 10 g/m<sup>2</sup> to 700 g/m<sup>2</sup>

Consistency in the headbox: 0.01% to 0.3%

Max. headbox throughput: 24,000 l/min

### Brief cultural history:

#### Tea bags

There are tea bags in all variations: square, round, pyramid-shaped, with string, stapled or knotted.

Even the ways of using the specialty filter papers filled with tea differ from country to country. While people do without tea bags altogether in China, in Great Britain they prefer flat, round bags without string that are put on the bottom of the cup. The Germans favor the square tea bags with string and staple.

The tea bag was invented over 100 years ago, accidentally, as it were. A tea merchant from the US wanted to avoid unnecessary weight when shipping his tea samples and put the tea in small, space-saving silk bags. The recipients immersed the entire bag in the water when preparing the tea, assuming that this was so intended. A few years later, tea bags were made from paper.

Today, tea bag paper is manufactured on inclined wire machines (e.g., Voith Paper HydroFormers).