

ecowirl[®] af
paper industry



econovation[®]
the twirl behind your business

a process from
the paper industry. so far.



vortex technique in the paper industry

In the pulp and paper industry we move up to 5000 t water per hour in the primary water circuit for one production line, and 95 % of it will be used again directly. To recycle this water a slot- or hole-screening and the cyclonic separation are used in the primary circuit. The secondary circuit works with flotation and/or different filtration processes. For all other circuits, a diversity of mixing and separation techniques comes in use, depending on the requirements of the paper product. There are water and sewage treatment plants in almost every mill and the conventional vortex technique of the cyclonic separation uses water and air as medium for the separation of substances.

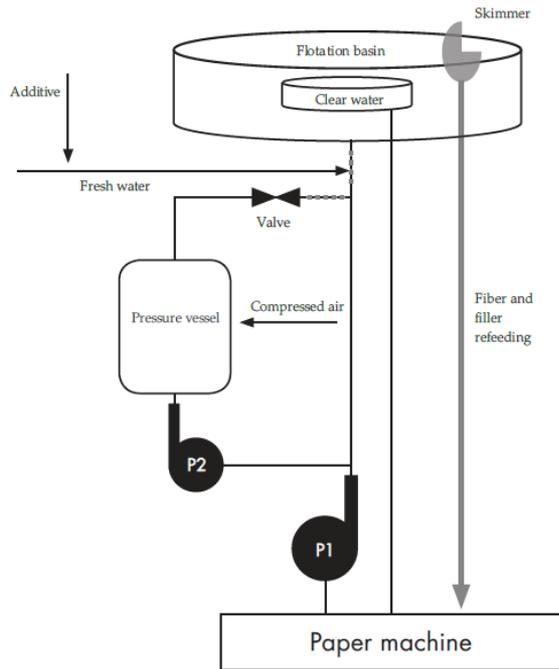
a process for
the paper industry. from us.



revolutionary vortex for the paper industry

The **ecowirl**® technology enables a new dimension of mixing and separating including new degasification and precipitation processes. The system has no moving parts and therefore guaranties a very high reliability. It is expected that the ecowirl® process will change many other industries and their processes.

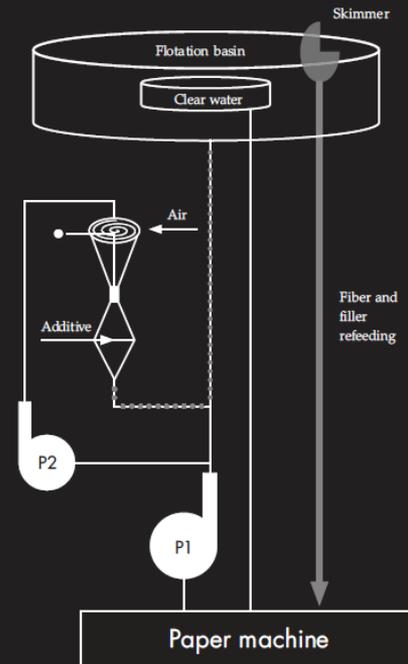
classical depressurizing aerator



difficult to control – the bubble size

The classical depressurizing aerator introduces gas bubbles in a fluid. That transports fiber and filler flocks to the surface of a flotation basin. So far, predominantly depressurizing systems are used for the creation of the finest bubbles: air is dissolved in pressurized water and then expanded. Important for this process is the bubble size distribution, which is difficult to control.

ecowirl® aerator



simply innovative – simply ecowirl®

For the flotation, the **ecowirl®** technology works directly with fluid decompression by the generation of a low pressure situation. It creates significantly smaller bubbles, so-called nanobubbles, which are collected to form microbubbles through aggregation. These bubbles have a lower tendency to dissolve again. Their amount and size can be varied through self-aspirated stripping gas.

ecowirl® af technology

ecowirl® - always a step ahead

Through uniform-sized gas bubbles, the **ecowirl®** af technology makes possible to elevate even finer particles and thereby to optimize the raw material recovery. The **ecowirl®** af does not need compressed air and therefore it saves 100 % of the energy from the generation of pressurized air for flotation.

The **ecowirl®** af guarantees 100 % process safety since no water can be dispersed into the air-pressure system when the pressure drops. Particularly an elimination of the so-called pressurized water system results in 30 % energy saving from the pump power. The **ecowirl®** af requires no vessel, which eliminates the quiet zones that provide suitable environments for bacteria, and thus meets high hygienic standards.

The **ecowirl®** af technology enables the direct dosing of various additives without the need of fresh water. Less water in the system leads to less heat loss in the circuit – and saves up to 20 kW of heat per m³/h.

The **ecowirl®** vortices stabilize the main stream intermixing and provide preservation of the uniform gas bubble distribution, good mixing quality of the additives, homogeneous intermixing of the partial flow as well as high quality of the distribution over the entire inflow width of the basin.



classical floating system

risks

The flotation system still belongs to processes that reach very high raw material recovery rates with a very small energetic effort. Still, the right setting of the parameters is complicated: flocculant addition, amount of air as well as its bubble size.

critical points for the operation of a flotation system:

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- > The available period of time for the particle transport to the surface is limited.
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- > The size of the air bubbles determines rate of flotation and transportable particle size – the smaller the bubbles, the finer the transportable substances in suspension.
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- > The gas dissolved in the water circuit and the newly injected amount of air, the kind of depressurization process as well as the available pressure difference determine the number and size of bubbles.
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- > The kind of flocculation depends on salinities in the circuit, the retention on the paper machine as well as the amount of additive used.
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- > A dissolving tank hosts bacteria due to low flow rate and available fresh air.
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- > The pumps belong to the failure-prone pumps in the machinery of a paper factory, because the high pressure range results in a higher rotation speeds with the corresponding cavitations.
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- > The supply of compressed air is usually associated to the factory-aeration-system. If the pressure drops due to high consumption, clear water can be pushed into the aeration system.
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- > Too much available air usually leads to very high flows in the flotation basin, which can destroy the flocks.
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- > The malfunction of the flotation system can result in the intrusion of solids into all clear water pipes or plugging the filter system.
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ecowirl®

benefits

Optimal production processes require flawless industrial manufacturing equipment, and this can be obtained with the patented **ecowirl®** technology in the flotation process. With the **ecowirl® af**, we provide you a highly efficient and compact flotation preparer. It stabilizes the operation, makes it more efficient and increases again the attractiveness of flotation as a separation system.

benefits of **ecowirl® af** compared to other flotation preparer

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- > There is no pressure vessel, hence a better hygiene.
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- > Depressurization is carried out in a negative pressure area. Gas is released and the precipitation of substances in process water is induced. This leads to an improvement of the hygiene in the entire water circuit system.
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- > The amount of the required transported gas is complemented by stripping.
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- > Due to the self-suction from the system, no compressed air supply is necessary.
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- > When there are high amounts of gas in the fluid, less gas is stripped automatically, thus the supply for flotation remains constant and stabilizes the process.
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- > The partial flow process pressure can be reduced by 30 %, which leads to an improved energy balance for the flotation process.
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- > The dosing of the flocculant succeeds without fresh water.
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- > The multidimensional vortex technique
 - > keeps a homogeneous air distribution in the suspension,
 - > ensures good chemical mixing,
 - > provides a homogeneous main flow mixing,
 - > improves the transverse distribution of the suspension in the system basin.
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- > Narrower gas bubble distribution allows a better utilization of the flotation basin capacity and leads to an increase in efficiency.
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ecowirl®

further systems

ecowirl® a

The **ecowirl®** aerator handles the creation and the mix in of fine air bubbles. This system was developed for flotation - **ecowirl®** af - and is also used for aeration or for stripping of fluids, e.g. oxygen supply of biological sewage treatment plants.

ecowirl® e

The **ecowirl®** emulsifier system allows the production of oil in water emulsions, such as wet strength agents. It allows the mix in of protective colloids at the same time.

ecowirl® m

The construction and all surfaces are self-cleaning. Directly introduced sterile additives with up to 50 % solid content are processed perfectly. The construction of this inflow is designed without low-flow areas. The **ecowirl®** m turbo-outflow leads to a flawless hygiene and mixing quality in the main pipe, as well. The entire **ecowirl®** m process meets the highest mixing and dosing demands: simple, compact, fast responding, hygienic and ecologic.

ecowirl® s

The **ecowirl®** separation improves the effectiveness of the cyclonic separation and enables a reduction of the cascade number at the same time. Thereby, system expenditure and energy are economized.

ecowirl® p

The **ecowirl®** precipitation system allows the precipitation and separation of solved substances in pure and process water. It is suited to prevent mineral deposits from hard water in water systems, such as heat exchangers, cooling towers, vacuum pumps with sealing water.

ecowirl®

references

tönnemann & vogel gmbh co.kg, special papers

“As the first paper factory, we are relying on the **ecowirl®** technology for already a year. In the area of flotation, **ecowirl®** a and **ecowirl®** m. The system **ecowirl®** a allowed us to reduce the compressed air consumption and to witness a narrower distribution of bubble size. We have a flotation system with really short retention times so we can not afford the generation of very fine bubbles. However the process is, in comparison with the traditional dissolved air flotation, better controlled. This has had an impact on the stability of the highly loaded flotation processes.”

Dipl. -Ing. Caspar Tönnemann, CEO

garda cartiere, wood-free coated paper

“We operate a dissolved air flotation in our PM 2 with 450 m³/h, and 220 m³/h of which were loaded with air. This air-solving stream line was replaced with the pilot installation I **ecowirl®** a for 100 m³/h. We could achieve the same results and, in addition, we dosed the flocculant in the **ecowirl®** a without fresh water. We have saved 30 % of the pumping energy in this experimental period, and we can do it absolutely without use of compressed air. The bubble formation is more uniform and finer. It can be easily combined with our requirements, to recover much ash and lots of fibers in dependence of the product mix. The operation was failure-free. We are already looking forward to the operation of an **ecowirl®** af 4x300 system of 200 m³/h with even better results.”

Gino Tonetta, head of production PM 2

feinpappenwerk gebr. schuster gmbh & co.kg, special cardboard

“We have a flotation system with a capacity of 200 m³/h for the white water of our board machine. We replaced our classic depressurizing system with an **ecowirl®** af 300 a month ago. The flotation results became better immediately, our flotation basin remained significantly cleaner, and we are achieving first savings in chemicals. Without comparison, the **ecowirl®** af is characterized by its flawless hygiene due to the compact construction. We are currently working with the **ecowirl®** af to increase the specific surface of bentonite by cavitation, in order to exploit it better.”

Peter Fendt, head of production

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