BRAND NEW DEVELOPMENT IN DOSING TECHNOLOGY Enhances Quality and Reduces Costs

ACAT strengthens its competence in dosing technology with the expertise of ecowirl

It is an unresolved and annoying problem that especially polymer solutions with higher viscosity cannot be added homogeneously. To achieve the best possible homogeneity large amounts of dilution water must be added and the stock and sludge lines are furnished with lances or other structures. There are various approaches to solve this problem, but for larger tube diameters the insertion of mechanical elements seems to be unavoidable.

In continuous operation they often cause deposits and the attendant well-known problems. Even if you accept these problems usually the polymers cannot be mixed in completely homogeneous, which leads to yield losses. Due to their large chain lengths polymers must be treated by the shear forces as gently as possible to be fully effective.

Therefore a metering station mounted before sifters or pumps leads to a satisfactory mixing, but as polymer chains are shortened, efficiency is lost and a higher dosage is necessary.
It is always a compromise between dosing before the last shear point with the consequence to obtain optimal mixing and accept higher dosages, or dosing after the last shear point with lower dosages and the risk of a problematic inhomogeneous mixing in larger pipe diameters. I stress – it was a compromise, because with the new ecowirl technology it is now a thing of the past.

Without any mechanical parts in the pipes single-acting nozzles, which are easily maintained, swirl the polymer solution gentle and absolutely homogeneous through the whole pipe. The result is a uniform distribution with almost 100% polymer efficiency.

The ecowirl, which is based on a high sophisticated unique high-tech dosing technology, has already achieved remarkable successes in many operations in practice.

Users report significant technical improvements in the cross-sections, better runnability and various quality improvements combined with a reduction of polymer consumption of up to 25%.

We are very pleased that we have found the ecowirl, and that we are allowed to offer this revolutionary technology to our customers and to integrate it into our numerous projects.

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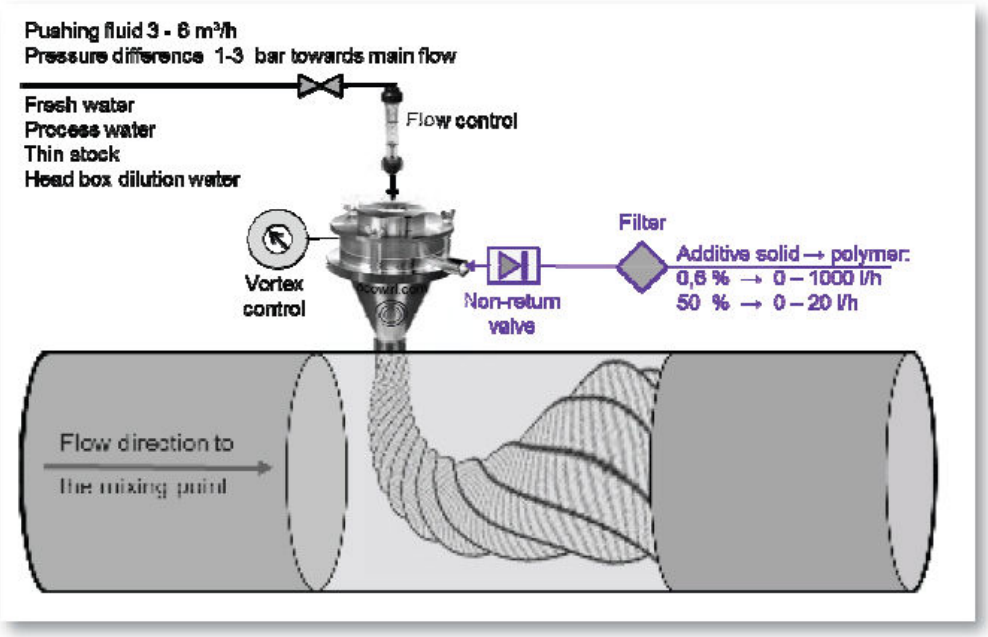
A REVOLUTIONARY WHIRL IN DOSING TECHNOLOGY

The picture (beside) shows multidimensional condensation vortex fields produced by a plane, which create impressive spacious effects. One sees that the rotary axes of the main vortexes are perpendicular to the micro vertexes.

The new mixing system, ecowirl m produces a similar vortex field to blend additives efficiently into large volume flows.
The whirl generated at the exit looks like a twisted rope. It is the combination of a large vortex motion with many small microvortices

Example for multi-dimensional vortex fields



Flow sheet for the multi-dimensional rotary mixer

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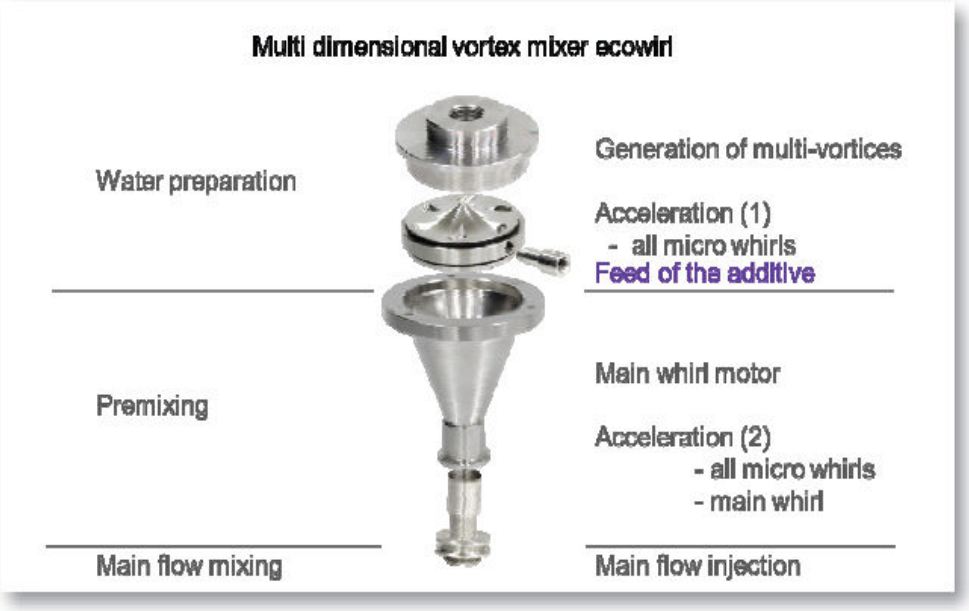
(= the twisted rope with braids) perpendicular to them. This process is initiated by a motive fluid with a speed of 6 m³/h and about 3 kg/h polyelectrolyte can be added. For larger quantities various complete solutions are available.

The real innovation of ecowirl is that additives with a high solid content can be added directly. Usually, mixing operations with a mixing ratio of more than 1:500 cannot be carried out in one step. With ecowirl mixing operations with a mixing ratio of 1:100.000
can be carried out in a single step with a high uniformity. Therefore, reactions with the predilution water that tend to reduce the effectiveness of the additive can be excluded.



Functions of the multi-dimensional rotary mixer

Moreover, it reduces the required equipment.

The ecowirl m essentially consists of four main components, which are firmly clamped together: injector, engine, turbo and diffusor. The rotary motion is carried out by the fluid only. The four components separate the preparation area, the premixing area and the main flow mixing area from each other. In the preparation area the specific surface area of the process water is increased and vortexforces are generated. In the premixing area the additive is injected counter currently, the microvortices rub against each other that causes extremely high contact rates. Also an important factor for chemical reactions is tem-

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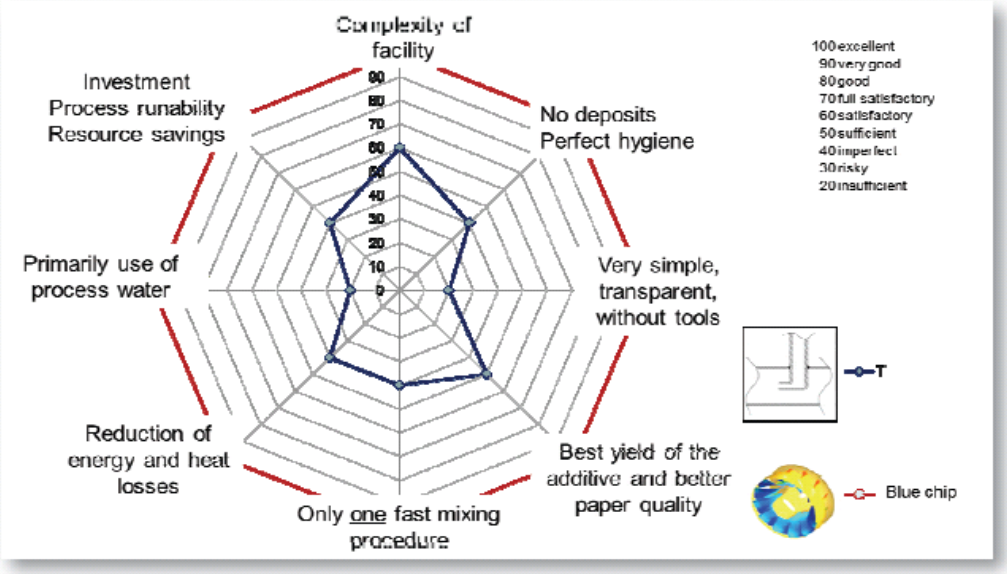
perature; therefore normally warm process water is used. The ecowirl m has already



Requirement profile and overall assessment

proven highly efficient and easily meets requirements which currently available systems do not meet. How is that possible?
This diagram shows the usual requirements of an operator for a dosing unit. The complete system, from the commercial product up to the injection into the main flow, should be the perfect system, here termed as "Bluechip". The following parameters are essential for performance and reliability: low effort, cleanliness in dosing, easy operation, cost-effective yield of additive, only one mixing process, loss of energy, recycling und payback. The ecowirl meets the "Bluechip" requirements to a large extent and sets new standards in handling, economy and ecology.

Future applications

Ecowirl technology has proved in tests that it is able to add sophisticated additives like retention agents (after sorting and ahead of the head box of the paper machine) without problems. The successes already achieved are an incentive to revolutionize with this system step-by-step a variety of dosing units. With this mixing technology, mixing rates up to 1:100.000, with a solid content up to 50% in 500 milliseconds can be achieved.

This reactivity matches the modern process technology. The ecowirl m can be operated

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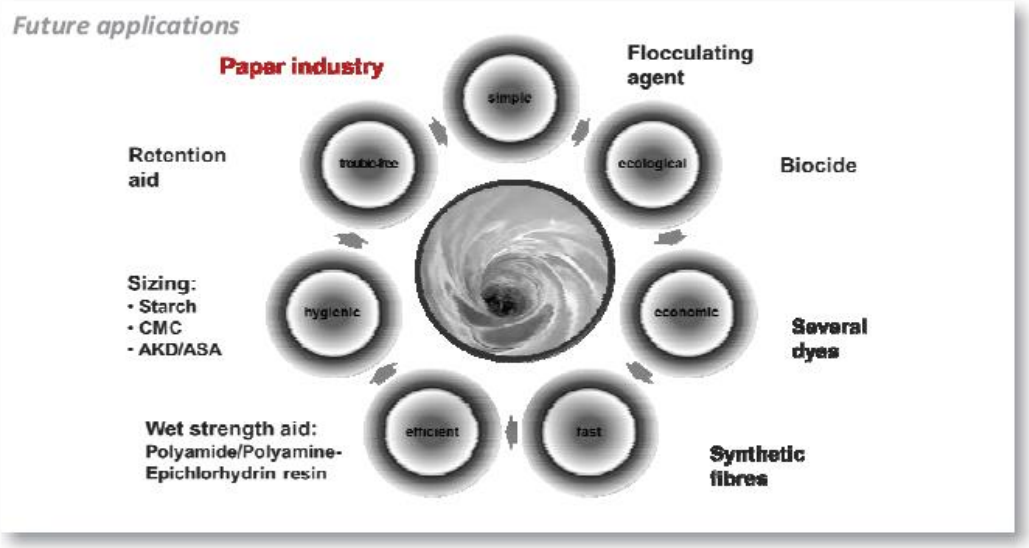
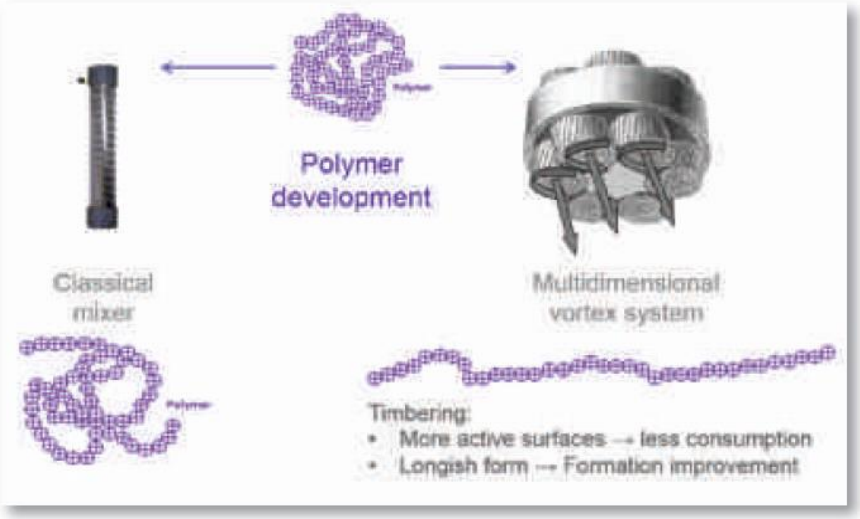
with thin stock, head stock dilution water, clear and fresh water.

Usually process water is used to avoid heat losses in the production, to raise the circuit temperature of the white water and to support the mixing process by the supply of heat. Further applications on the paper production line have to be checked; the fresh-and waste water treatment in the production area remain interesting.





Attempt to explain the improved additive performance

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In 1983 Daan Waubert de Puiseau obtained a diploma on the TU-Darmstadt. Since for over 30 years he has worked for the European paper industry. His main task was to prepare facilities and employees of companies, to ensure competitiveness in media term.
For five years he has been working independently. Currently working on recurrent challenges in the development of systems for dosing and aeration of liquids with multi-dimensional vortex fields.

His product development, trade name ecowirl, is an innovative process mixing technology.

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