

TrumpJet® Flash Mixing Reactor challenges old practices Simultaneous mixing of starch and polymer brings significant cost savings

Exceptionally fast flash injection mixing of wet end additives questions old practices and opens possibilities to develop cost efficiency and sheet characteristics. Chaos type of immediate flash mixing of additives into stock flow of board, paper, tissue or non-woven line enables exploiting the additive efficiency with a maximal manner.

The technology makes it possible to mix a wide range of reactive additive and chemical component pairs efficiently. As an example, mixing of strength starch and retention aid polymer simultaneously shows remarkable improvements.

Premixing and practically simultaneous injection of starch and cationic retention aid polymer into stock flow increases reactivity of the additives. The same sheet strength and retention level can be achieved with much smaller chemical dosages. Typically much lower use of flocculation additives results to better sheet formation. The both chemicals are mixed just prior to the headbox. Fast response time speeds up grade changes.



MILL CASES

Fine paper line A, Europe

Cationic polymer (CPAM) and bentonite were added practically simultaneously just one after the other before headbox. Starch and ASA were flash mixed simultaneously before retention aid flash mixing stations. Before, starch and ASA were added to thick stock and CPAM before the screen and bentonite immediately after the screen

Results:

- Good sheet quality, good runnability
- CPAM saving at first 60%, later CPAM line was closed, saving 100%
- ASA saving 15%
- Starch saving 15%
- Additional conclusion: Once strength starch is brought to close reach of headbox, starch also operates as retention aid and replaces the more expensive CPAM completely.

Large Fine paper line B, Europe

Strength starch and cationic polymer are premixed and injected simultaneously. Bentonite and micropolymer are premixed in a separate mixing station close by. The cationic and anionic mixing stations are located close to headbox feed manifold.

Results:

- Starch saving 47%
- CPAM saving 10...15%
- Micropolymer saving 23%
- Fresh water usage eliminated in the application

The fast flash mixing reactor opens the opportunity to bring new and conventional wet end additives close to headbox and forming section. This makes the system fast, responsive and efficient, chemical saving rate is high and influence to cut operational costs and improve profits is considerable and significant improvement in sustainability.

TrumpJet Flash Mixing Reactor with two mixing stations (for 2...5 different additives) in tandem position. Simultaneous mixing of strength starch and cationic retention aid brings the biggest savings.

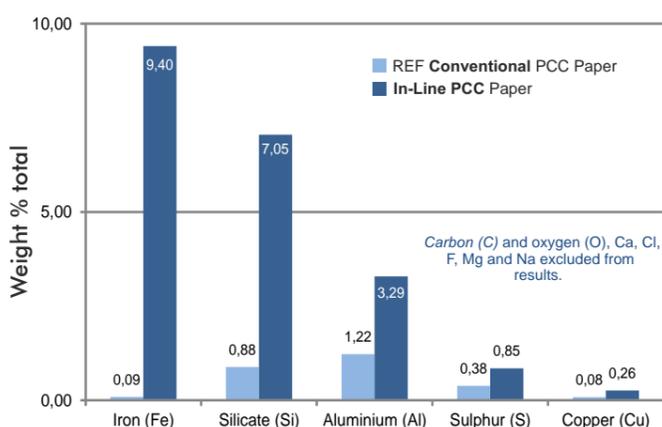
In-Line PCC™ with TrumpJet Flash Mixing technology cleans up process waters

With TrumpJet Flash Mixing technology, gaseous carbon dioxide and milk of lime slurry are dissolved instantly into process water, resulting in extremely fast PCC crystallization onto stock particles. PCC crystallization is completed in vertical flow through pipe reactor within one second.

Recent results from medium size fine paper machine in Europe producing high quality special grades, have proved that high speed PCC crystallization reaction binds effectively fine particles as well as dissolved and colloidal material from process water.

This material is fixed to paper web resulting in cleaner process with excellent runnability and high optical paper qualities. The comparison between satellite unit produced conventional scalenohedral PCC and In-Line PCC show that in laboratory burned paper ash color of In-Line PCC is brown compared to paper of conventional standard PCC. Despite the brown color of paper ash with In-Line PCC the whiteness and optical properties of paper sheet remain same compared to paper with conventional PCC.

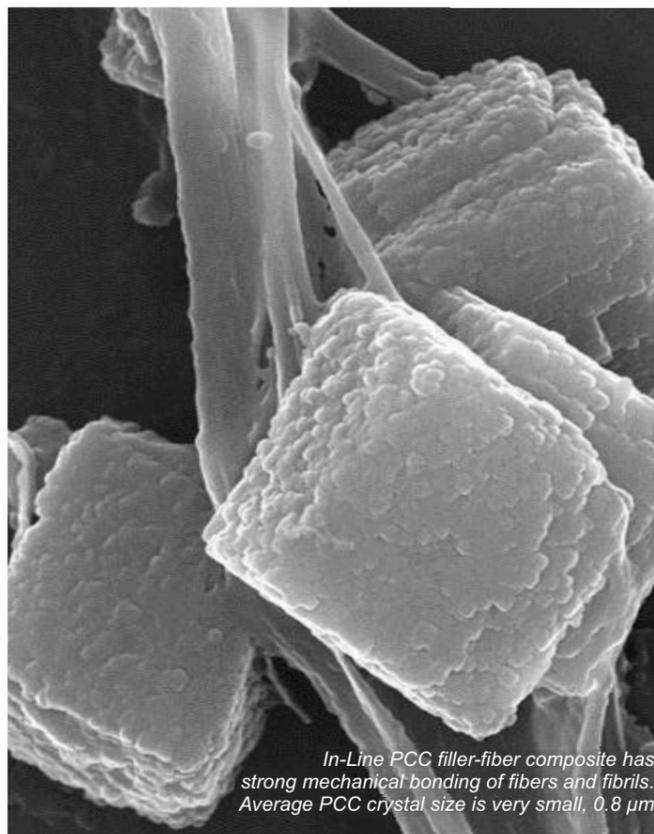
Reduction rate of dissolved metals in process water (%)



Relative amount of different elements in paper ash: In-Line PCC compared to standard scalenohedral PCC. In-Line PCC binds metals from process water resulting in cleaner process and maintaining high paper quality.

Elemental EDS analysis of burned paper ash samples showed significant differences between the two samples. In-Line PCC paper ash contains much higher amounts of different metals. Especially very high adhesion of iron to In-Line PCC crystals causes the change in ash color.

All these dissolved process water compounds together with colloidal and fine particle material are attached to paper web resulting in cleaner water circulation with better machine runnability and longer life time of machine fabrics due to extremely the high filler retention. The total saving of retention chemicals in this mill case is 87 %.



In-Line PCC filler-fiber composite has strong mechanical bonding of fibers and fibrils. Average PCC crystal size is very small, 0,8 µm



News
from
CEO's
desk

Shaping technology to speed up bio-based business of clients

Wetend TrumpJet Flash Mixing technology enables wide product portfolio and platform for next generation paper and board and tissue and non-woven production lines. Wetend has developed consistently core business to flash mix effectively additives into the process. Improved mixing reveals repeatedly new opportunities and applications to work with. The outcome without exceptions support the work of our clients to introduce new or improved bio based forest products to consumers and industries.

Consistent work together with customers and research organizations has resulted into several innovations that support the objectives. These are e.g. Micro Bubbled Foam Generation technology for foam forming process (for board, paper, tissue and non-woven products); mixing technology for extra-long bio based or synthetic fibers; the unique and novel mixing technology for nano and micro fibers and also In-Line PCC reactor and process to produce calcium carbonate crystals loaded on fibers. Four installations have been supplied for In-Line PCC filler production. The developed technologies can be also applied effectively to other industries e.g. for water treatment processes of mining industry.

Development and change in Wetend corporate ownership

While the new technology shapes processes and industry, also our company faces changes and new challenges. Mr. Pekka Kotila and Mr. Jouni Matula established the company at 2001. Mr. Kotila is one of the skillful pioneers of the business and he owns more than 50 years' valuable experience and knowledge in the industry. His retirement took place early 2017. To replace Pekka's valued input Wetend ownership and board of directors has been updated to support the further growth, launch of new technologies and success of the company globally. Company is also looking forward to accept possible funding investments with new shareholders.

Jouni Matula
CEO



Jussi Matula Director of Operations (left), a new company shareholder, shaking hands for future challenges with Pekka Kotila (right) together with Jouni Matula CEO and Chairman of the Board of the company.

New Sun Paper testliner machines in China collect savings and efficiency with Flash Mixing of additives

Sun Paper, one of the leading paper and board makers in China, successfully started up its two new testliner paperboard machines with an annual capacity of 800,000 metric tons at Zoucheng in China. The whole investment included two new production lines PM31 and PM32.

The PM31 is equipped with three ply former. The design speed is 1200m/min, basic weight 110-250g/m². The main product is Linerboard. PM32 is equipped with a two layer headbox. The production is mainly corrugated medium and kraftliner - the range of 90-140g/m². The design speed is also 1200m/min.

With support from Wetend and other suppliers the project enables Sun Paper to achieve high production efficiency, significant cost savings. Wetend Technologies Ltd supplied total the (10) TrumpJet stations installed for the both production lines. Main goal of the mill to exploit TrumpJet Flash Mixing Reactor Technology was to cut down chemical cost and improve sustainability in savings of water, energy and the chemicals.

Water saving through TrumpJet systems is minimum 1 m³/ton per line. Water and energy saving in a project like this makes investment for TrumpJet Flash Mixing Reactor systems alone already profitable. Significant chemical savings are a great bonus for everything.



Above: Happy Ms. Zhang Min, (General Manager of Wetend Tech. operations in China) after successful start-up at the mill.

Left: TrumpJet Flash Mixing Reactor installation for polymer and bentonite.



PM 31 and 32 side by side: Two new testliner paperboard machines of Sun Paper at Zoucheng site.

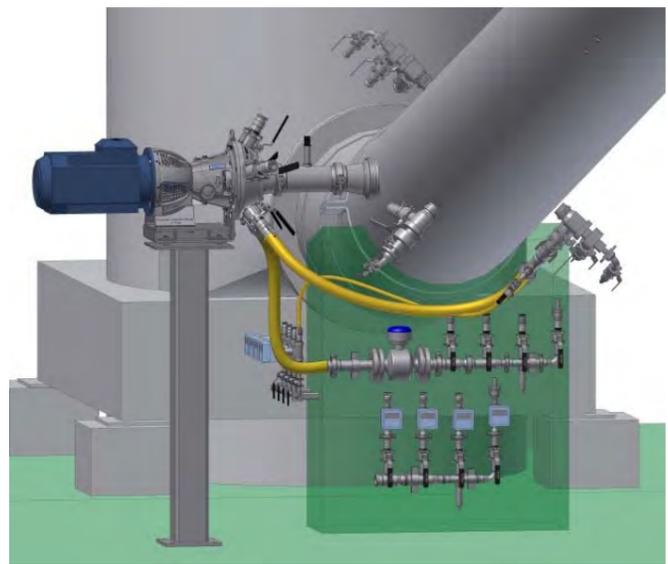
Simple is beautiful Great results with a single TrumpJet station

A fine paper line 230 000 tons/a in North America installed a single TrumpJet Flash Mixing station on a headbox feed pipe on a pipe section between screen and the headbox feed manifold. The distance to the slice opening is only three (3) seconds as an average. This time is needed in practice to prepare the fiber furnish and chemicals for initial sheet formation process when the mixing is completed in a flash, practically initial mixing time is less than one (1) second only.

Older injection system was removed from the line and at the moment TrumpJet mixing station mixes retention aid polymer and silica nanoparticle simultaneously into the stock flow.

After the installation

- Polymer consumption dropped approximately 40%
- Nanoparticle approximately 60% still with a bit higher retention
- Starch volume of ASA sizing emulsion came down by 15%
- Fresh water use for post chemical dilution was completely eliminated
- Sheet formation improved greatly
- Response of the process to the TrumpJet flash mixing was immediate and after the above adjustments process stabilized with expected results



Wetend investments support development of new biobased forest products

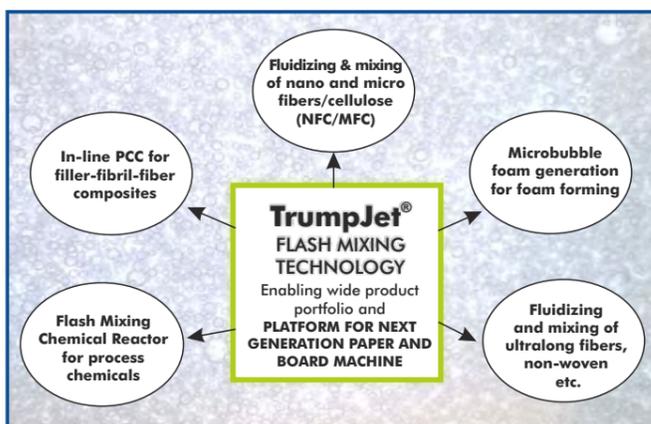
TrumpJet Flash mixing technology of Wetend enables wide product portfolio and platform for next generation paper, board, tissue and non-woven production lines. Wetend has developed consistently its core business to flash mix effectively additives into the process. Improved mixing reveals repeatedly new opportunities and applications to work with. The outcome without exceptions support the work of our clients to introduce new or improved bio based forest products to consumers and industries.

possible to fluidize and mix long bio based or synthetic fibers very close to paper/board machine headbox or a non-woven production line. The system opens opportunity to develop and generate new composite structures for board or paper and non-woven products.

Flash Mixing Reactor for Paper and Board Composite Structures; Nano and micro fibers/pulp.

The developed Injection technology enables fluidizing nano and micro pulp and efficiently mix it very close to paper/board machine headbox and guiding 90% of the flow directly to web formed by the process. MFC or NFC pulp is exploited to develop new and better quality characteristics for the paperboard end product.

Flash Mixing Reactor for Micro Bubbled Foam Generation for foam forming process for board, paper, tissue and non-woven products. Wetend has developed a TrumpJet mixing method to generate micro gas bubbles from air or gas and inject the gas flow into high volume liquid process flow. The process generates billions of micro gas bubbles in size 20...50 µm. Foam based production can give excellent formation, bulk and works well with extra long fibers.



Flash Mixing Reactor for Paper and Board Composite Structures; Extra long bio based or synthetic fibers. The new Wetend-Sulzer TIP injection pump innovation makes it

on fibers. Four installations have been supplied for In-Line PCC filler

TrumpJet Injection Pump by Sulzer and Wetend has a new motor from ABB

Wetend and Sulzer Pumps Finland have developed a new centrifugal pump for TrumpJet injection stock pumping applications. The latest pump update assembly has integrated ABB synchronous reluctance motor with a frequency controller.

Normal centrifugal pumps easily generate fiber-spin deposits. The unique patented impeller and TIP pump case design can treat normal and extra-long fibers without generating spins and lumps. The pump interior parts are designed to stay clean in all normal conditions. The pump is very light and can easily be located on top of a column next to process pipe. This minimizes connecting pipe lines and then secures maximum cleanliness also in piping.

Wetend has supplied already more than 70 TIP pumps to various TrumpJet applications.



Compact TrumpJet injection pump (TIP) with ABB high output SynRM motor-drive package is easy-to-maintain.

Wetend acquires Anti-scaling technology

Wetend Technologies Ltd. has purchased Anti-scaling technology with product ownership and knowhow from Ceresto Ltd – a technology company in Finland.

The acquired technology is used to prevent calcium carbonate scaling of In-Line PCC Reactor as well as for several other types of scaling deposits generated on the inner wall of a process pipe, caused by aggressively reacting or chemicals.

The system can be used for many scaling sensitive additives to safe guard cleanliness, runnability and efficiency. Ceresto has been one of the few developers and suppliers of a full scale In-Line Reactor anti-scaling system for paper/board and process industry. The newly signed contract includes also laboratory and pilot testing equipment and gives opportunity to run trials at paper/board mill in relevant process conditions.

The agreement secures the availability of anti-scaling technology for customers of Wetend in the future and unites knowledge and expertise of the companies for long term customer support.

The technology is already in use in commercial In-Line PCC™ installations with excellent results.

Welcome to meet us in exhibitions and seminars around the world

In 2017 Wetend Technologies will be present in:

Tappi PaperCon 2017, April 23–26, Minneapolis, Minnesota, USA. During the exhibition you can find us at booth 414.

In addition to the expo, Wetend will be presenting its newest technologies in two presentations.

- Tue 25th At 3:30–5:00 pm Dosing of Wet End Additives in premixed pairs and Groups in Flash Mixing Reactor Challenges Old Rules with Great Economical Benefits", Jouni Matula
- Wed 26th at 8:00–10:00 am "Fast Flash Mixing in Generation of Micro Air Bubbles for Foam an Process Dynamics in foam forming", Jussi Matula

China International Paper Technology Exhibition (CIPTe), September 13–15, Shenzhen, China. Welcome to meet our experts at booth A3507.

Meet our experts also at:

- ZellCheming, July 4–6, 2017, Frankfurt, Germany
- +more events to be announced later

Look forward to meeting you!



Wetend Technologies Ltd.
Kaartilantie 7
57230 Savonlinna
Tel. +358 10 836 0100

Chief Editor
Teija Pesonen

www.wetend.com