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 amounts of chemical. 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 chemical saving rate high and influences to cut operational costs and improve profits is considerable and significant improvement in sustainability.

**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 the system fast, response condition and conventional slow, chemical saving rate is high and influence to cut operational costs and improve profits is considerable and significant improvement in sustainability.

**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 filter retention. The total saving of retention chemicals in this mill case is 87%.

**Shaping technology to speed up bio-based business of clients**

Wetend TrumpJet Flash Mixing technology enables wide product portfolio and platform for new 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.

**In-Line PCC filler-fiber composite has strong mechanical bonding of these substances. Average PCC crystal size is very small, 0.8 μm**

**News from CEO’s desk**

Jussi Matula
CEO

Jussi Matula (left), Jouni Matula and Pekka Kotila shaking hands for future challenges.
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 to cut down chemical cost and improve sustainability in savings of water, energy and the chemicals.

Water saving through TrumpJet systems is minimum 1m³/t on per line. Water and energy saving is 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.

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 sieve 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 nanoparticles 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 45% 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 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.

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.

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

The developed technology mixes flocculated 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. NFC/pulp is exploited to develop new composite structures for board or paper and non-woven products.

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:

- TippaperCon 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. Tu 26th at 8:00 – 9:30 am “Dosing of Wet End Additives in premixed pairs and Groups in Flash Mixing Reactors Challenges Old Rules with Great Economical Benefits”, Jouni Matula.
- Weid 26th at 8:00–10:00 am “Fast Flash Mixing in Generation of Micro Air Bubbles for Foam Process Dynamics in foam forming”, Jouni Matula.

Meet our experts also at:
- Zellstoffmesse, July 4–6, 2017, Frankfurt, Germany
- + more events to be announced later

Look forward to meeting you!

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

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 semi-axial impeller and TIP pump case design can treat normal and extra-long fibers without generating spins andumps. 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.

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 agressively 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.

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