

Partnership of Valmet and Wetend creates new value for Customers

Valmet Technologies Inc and Wetend Technologies Ltd have entered into a partnership agreement. Valmet will exploit novel TrumpJet Flash Mixing technology in delivery projects for new and modernized paper and board making lines.

Petri Paukkunen, VP, Sales and Marketing from Valmet states: We want to bring to our customers world class mixing technology and also new future solutions. We want that in the future there are new innovations for the wet end part of paper and board machines and products that will revolutionize concepts and applications. We trust and count on strength of R&D work and pilot plants of our own and our associates, especially when they are closely used by Valmet and our partners.

For us the co-operation with Valmet has opened a new marketing channel and technology development field, says the CEO Jouni Matula from Wetend Technologies. We can introduce new radical developed

technologies to our customers globally in a wider and more efficient manner. Although Wetend has systematically conducted research and development work with the paper and board making cluster and with leading paper and board making companies, partnership with Valmet opens new window and platform for innovative development work.



Petri Paukkunen, V.P. Sales and Marketing at Valmet Technologies (left) and Jouni Matula, CEO, Wetend Technologies Ltd, following test runs at Valmet Rautpohja pilot plant.

Foam forming and foam generation technology First commercial test production plant in operation

“Valmet, Wetend, Sulzer Pumps and VTT work together to develop a foam forming process for board and paper production. The first commercial test production plant has been supplied. In addition, Wetend has supplied five pilot machine foam generation plants. Numerous pilot production tests support the development.

Micro gas bubbles are needed for foam generation but also for mixing gases like carbon dioxide (CO₂) for In-Line PCC production or oxygen (O₂) for white liquor oxidation. Shear forces in TrumpJet Forte G gas mixer cut and disperse the high volume gas flow in a flash into tiny gas bubbles. Hundreds of billions of tiny bubbles –from <10 µm to 100 µm in size– are generated and mixed evenly into process flow to headbox. The foam mixture looks like milk.

Foam generation and forming in controlled conditions gives excellent formation and new sheet characters including e.g. potential to increase bulk.

Coated fine paper production line in USA gains savings with TrumpJet® Flash Mixing Reactor technology

A novel reactor innovation of Wetend –reactor mixing process with fast chaos mixing pattern– applied to a headbox feed pipe surprisingly enables mixing various additives effectively, practically simultaneously into the process flow. Traditionally anionic and cationic retention aid additives and e.g. strength starch are mixed in a long distance from thick stock chest to headbox screen area.

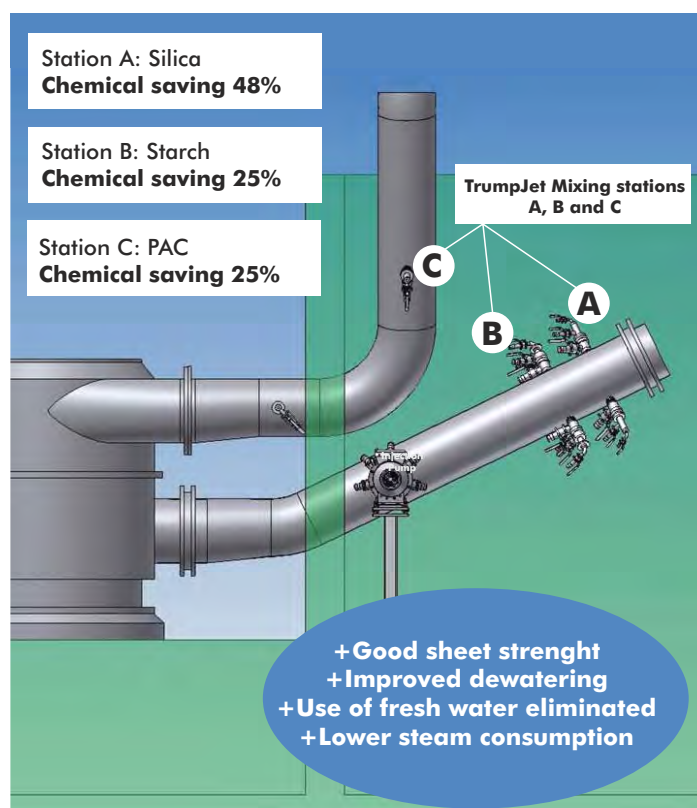
In TrumpJet Flash Mixing Reactor mixing takes place simultaneously within a second in chaos type of mixing process very close to headbox and forming part of paper or board machine.

A fine paper mill in USA, producing coated printing paper, installed the above described process to the production line. Before strength starch and PAC fixing agent were added to thick stock line of the process, silica was added after the machine screen. After the TrumpJet installation, PAC is mixed before the screen, starch and anionic silica are mixed very close to each other in two close by, but in separate mixing stations according to the patented Flash Mixing Reactor concept.

Results

- Saving of PAC 25%
- Saving of Cationic Starch for strength 10...30%, in average 25%
- Saving of Anionic Nanoparticle (Silica) 48%
- Good formation
- Good retention levels and system runnability

Based on the savings Wetend was awarded with an extra performance bonus by the satisfied customer



TrumpJet Flash Mixing Reactor installation and results of a coated fine paper production line



News
from
CEO's
desk

Wetend provides true Cleantech technology – 15 years and moving forward

Traditionally wet end additives are dosed and mixed in various stages and locations. Usually the delaytimes between the locations are long. The process is considered complicated and difficult to manage and follow. This is how the mixing was done also in the first year of Wetend 15 years ago. That was the way it was always done!

The experience and research work started to teach and educate Wetend staff and conscious results oriented customers. Gradually mixing point was moved closer and closer to headbox and forming. Additive consumption went down and savings increased, more additives were brought to flash mixing zone – the latest: strength starch. The results excited, sometimes even surprised and have always led to new developments and even better results.

Once the TrumpJet technology development originally was started, the target was to reduce retention aid polymer consumption, improve sheet quality and eliminate totally use of fresh water in the application. The task was successful.

Wetend is today 15 years old company. Applications have expanded. Close to 500 TrumpJet systems have been supplied. There are more than hundred international patents supporting new developed technologies.

Wetend is one of the first Cleantech companies in Finland and probably in the world too. The core innovation for the TrumpJet technology was developed in Savonlinna Finland starting year 1997 in a major technology project initiated by Ahlstrom Machinery and University of Lappeenranta. The name Cleantech was developed and given to the project – describing project objectives – and in practice Wetend Technologies Ltd is a spin-off company from the project. The owners of the company acquired at 2001 their early patents from the Cleantech project and established the company.

Recently Wetend joined the national Cleantech Finland marketing organization to promote sustainable values. www.cleantechfinland.com

Jouni Matula
CEO



Picture: Ahlstrom magazine "Me kaikki" 4/1997 in which Jouni Matula and Jutta Nuortila-Jokinen describe the Cleantech project..

More with Less TrumpJet® Flash Mixing System for MFC and NFC

“More with less” is a common result with TrumpJet systems supplied by Wetend. This is a given fact when the new reactor technology is applied very close to headbox.

Fluidizing effect is strongly developed at very short period shear area of a TrumpJet mixer unit. That is due to the high flow volume and high speed of injection liquid and high shear. Additive is precipitated instantly in filaments, ligaments and finally into drops and droplets inside the fast moving injection stream and mixed in a flash into the main process flow.

Micro and nano fibers: The effect is exploited also for a liquid gel e.g. made from either micro fibrillated cellulose (MFC) or nano fibrillated cellulose (NFC). Once the hard-to-mix-gel enters the “injection high velocity and short, shear influenced zone” it is fluidized and the gel behaves like

low viscose liquid. The fluidizing enables mixing of the MFC or NFC material effectively into stock. This is preferably made just before headbox together with wet end chemicals to bring most of the material into the formation zone. This way the material loss is minimized. MFC and NFC materials can provide new sheet composite characteristics. This is used to produce e.g. board or paper with improved properties such as increased strength and reduced weight.

The first commercial production plant in Finland has been in operation since 2014 for liquid packing board product. The concept makes the product as light as possible and e.g. stiffness and internal strength are maintained. Naturally if weight is maintained, strength and stiffness properties can be increased.



TrumpJet mixers at Stora Enso Varkaus go for containerboard production

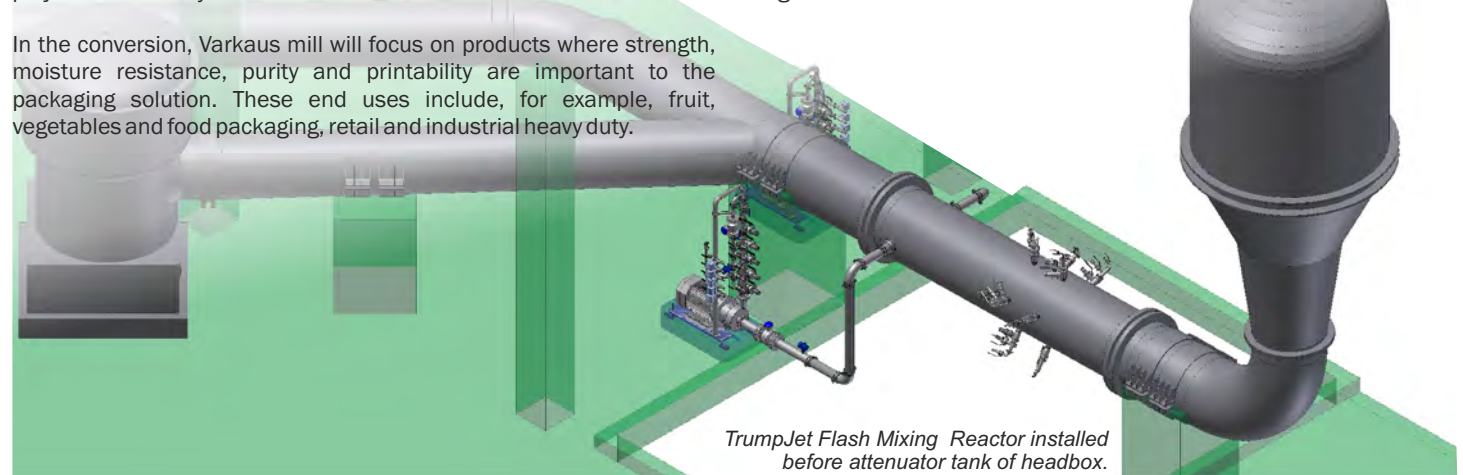
Stora Enso Varkaus Mill in Finland is stepping into a new, dynamic era with the conversion of paper machine to produce container board. TrumpJet Mixers are staying onboard.

Varkaus in Finland is a town with a long industrial history. The area received from Stora Enso a significant investments to Varkaus Mill. During 2015, Stora Enso's Varkaus Mill converted its fine paper machine to produce high quality virgin-fibre-based containerboard - kraftliner. Varkaus was an ideal mill for this kind of conversion. It had an integrated pulp mill, a power plant and a suitable paper machine. In addition, the mill is well located from a raw material supply point of view and it had the necessary infrastructure and competence to run the project successfully.

In the conversion, Varkaus mill will focus on products where strength, moisture resistance, purity and printability are important to the packaging solution. These end uses include, for example, fruit, vegetables and food packaging, retail and industrial heavy duty.

Today more than 50% of TrumpJet Flash Mixing systems go for board production, applications are e.g. consumer products, food packaging and container boards.

In the Stora Enso Varkaus PM3 conversion project, the existing TrumpJet mixing stations of the fine paper line together with new mixers were modernized to TrumpJet Flash Mixing Reactor system for linerboard production. The new system flash mixes additives efficiently prior to the headbox without any fresh water. Anionic and cationic chemicals are mixed into headbox feed stock very close to each other following the new chemical reactor concept of Wetend. Consumption of additives is very low and process runnability is good.



TrumpJet Flash Mixing Reactor installed before attenuator tank of headbox.

In-Line PCC™ process installed on line producing 350 000 tons of SC paper annually

In-Line PCC™ Reactor was installed already in 2009 at SC-paper production line (750 tons/day) in Finland to produce precipitated calcium carbonate (PCC) loaded directly into fiber generating filler-fiber composite. The investment was completed after thorough mill trials. Results exceeded the originally set objectives and profitability target of the total capital investment. Recently the well running system has been relocated to a bigger SC paper production line of 1000 tons/day due to production rearrangements of the mill.

Profitability of the In-Line PCC is excellent. It is a cost effective new raw material generating composite structures with fibers. The cost savings are maximized by combining In-Line PCC™ and TrumpJet Flash Mixing technologies for wet end additives like strength starch, strength agents, sizing and retention aids additives.

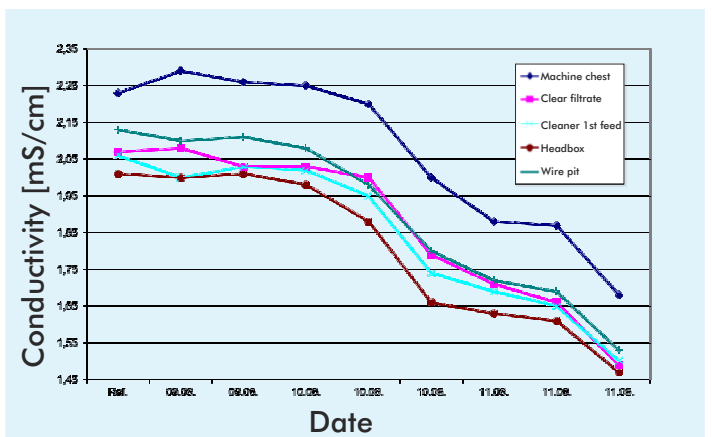
In-Line PCC™ carbonation process integrated into PM/BM wet end and headbox approach flow process is extremely fast. The average reaction time in PCC crystallization is less than one second. In conventional on-site PCC production the carbonation process takes tens of minutes, even hours.

The key for high precipitation reaction speed is fast mass transfer of reacting chemicals. This is achieved by TrumpJet® Flash Mixing technology. Injection technology with counter rotating vortex pairs of TrumpJet® chemical mixers, gives flash, chaos kind of immediate and efficient mixing for CO₂ gas and milk of lime slurry. The gas is precipitated into tiny, fast dissolving micro bubbles together with precipitated calcium hydroxide. The very high water volume of paper/board machine approach system stock flow enables rapid

dissolution of the reacting chemicals to water phase where instant PCC crystallization process occurs.

The latest development results of In-Line PCC™

The latest development result is patented innovation to add new additives simultaneously into the carbonation process with milk of lime and carbon dioxide. The additive can be e.g. micro or nano fibrillated cellulose that bring new strength and bulk/density characteristics to board or paper.



Improved net efficiency: In-Line PCC™ process binds colloidal substances decreasing conductivity in circulation waters. This leads to cleaner process and excellent runnability of the entire production line.

Flash Mixing Reactor technology awarded in France by ATIP



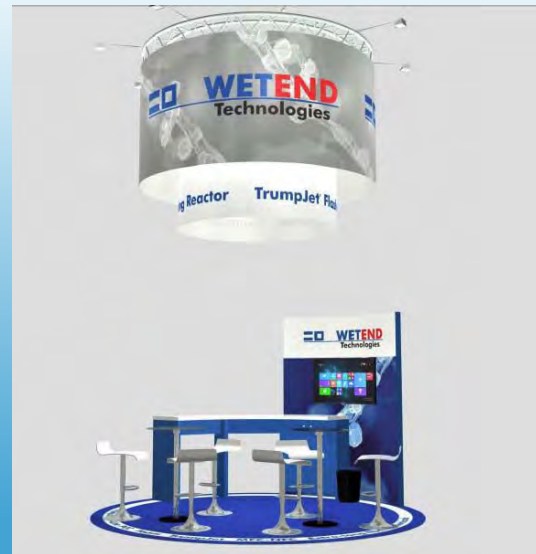
Wetend Technologies Ltd was awarded with a silver medal –'Palme d'Argent'– in an innovation competition of its new Flash Mixing Reactor Technology. The award was given by the French Paper Industry Technical Association (ATIP). Innovation Contest was organized in conjunction with the annual ATIP Conference and Exhibition in Grenoble, France on November 24–26, 2015.

Core of the awarded technology: Fast TrumpJet Flash Mixing Reactor with chaos-type-of-mixing phenomena. Result is a new revolutionary process to mix chemicals into the process. Chemical savings are surprisingly large. Cost savings can be 1 Million Euro per a single production line.

Technology enables also generating composite-type of paper or board structure. Also new type of fiber-based materials can be efficiently mixed close to headbox – such like synthetic long fibers, micro- and nanofibers and reactive additives. TrumpJet® Flash Mixing Reactors are already in commercial operation at several papermills.

The ATIP Innovation Award rewards innovative technologies and solutions for pulp and paper industry. The awards are highly regarded among the European pulp and paper industry.

Welcome to meet us in exhibitions and seminars around the world



In 2016 Wetend Technologies will be present in:

Tappi PaperCon 2016, May 15–18 in Cincinnati OH, USA. During the exhibition you can find us at booth 607. In addition to the expo, Wetend will be presenting its newest technologies in two presentations on Wednesday 18th.

- At 8–10:00 "Eye Opening Operating Results of Flash Mixing Reactor for Efficient Use of Wet End Additives", Jussi Matula
- At 10:30–12:00 "Non-Spinning, Fluidizing Flash Mixing Reactor for Synthetic Fibers, Nano- and Micro Fibers and Agressive Chemicals for Board, Paper and Tissue Production", Jouni Matula

International Wood Biorefining Week (IWB) 2016, May 24–26 May 2016 in Stockholm, Sweden. You can find us at Bioeconomy Innovation Forum -area.

Meet our experts also at:

- Paper&Biorefinery Conference, 11–12 May, Graz, Austria
- PTS Paper & Board Symposium, 6–7 September, Munich, Germany
- CIPTE 2016, October 11–13, Shanghai, China
- PapFor 2016, 25–28 October in Saint Petersburg, Russia etc.

Look forward to meeting you!



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

Chief Editor
Teija Pesonen

www.wetend.com

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