The Wet End Measurement Concept
Valmet Wet End Analyzer & Valmet Retention Measurement
Papermakers’ three prevailing objectives are quality, runnability and overall efficiency. To meet them, it is vital to stabilize consistency, ash content, charge and chemistry at start-ups, during normal runs and after grade changes. It’s best done by measuring, analyzing, controlling and managing the wet end as comprehensively as possible. Valmet is proud to present the Valmet wet end measurements concept. The concept provides, for the first time ever, tools to move the process management focus from individual measurements to more extensive process analysis in a simple manner.

Easy Steps to Wet End Stability

Wet end measurements have been typically measured at mill laboratory from individual samples. Based on results of those samples analysis of process has been done and certain actions to control process has been made.
But the frequency of laboratory testing is too late for equalizing process disturbances. Laboratory sample represents a snapshot of process status and analyzed value can be in different level after 10 minutes. To make things worse analyzed results are usually available for process controllers only after several hours. Action based on that maybe totally in wrong direction. Process must be stable before laboratory tests can be used for process quality optimization. This is very fundamental point to understand. Process is stabilized by active closed loop control and optimized by choosing proper setpoint for the controlled variable.

Experience in a unique package

The Valmet Wet End Analyzer (Valmet WEM) and Valmet Retention Measurement (Valmet RM3) include the experience of over 2,000 Valmet analyzer installations in wet end processes and the latest technology, in order to meet the growing versatility of the paper, board, and tissue makers’ needs.

Valmet WEM wet end analyzer combines in a unique way all the relevant wet end variables for the total wet end management. It measures simultaneously from up to six sample points. The measured variables include charge, chemistry (pH, temperature, conductivity and redox), total and ash consistency, total and ash retention, ash content and turbidity. We can say that Valmet WEM is only of its kind.

Valmet RM3 wet end sensor fits the applications where the continuous, single line measurements of total and true ash consistencies are adequate for building the solution for process monitoring and control. It is based on 30 years of experience in optical consistency measurements and represents the third generation of industry-standard Valmet technology. Valmet RM3 is the one and only measurement on the market capable of measuring both total and true ash consistencies from a continuous process sample flow.

Valmet WEM analyzer and Valmet RM3 online sensor complement Valmet’s offering for wet end management.

The triangle of wet end interactions

Wet end chemistry’s contribution to the three wet end interactions is significant: dewatering, retention and formation.

The effects of these interactions on many paper quality properties and on paper machine runnability are widely recognized.

By stabilizing and optimizing wet end chemistry, papermakers can simultaneously achieve uniform and optimized drainage, retention, and runnability, in addition to the best possible paper quality. By managing the wet end interactions, papermakers are, in fact, able to ensure effective and economical paper production.

Valmet WEM highlights

- The only analyzer for P&P makers that can measure both charge and consistency
- More measuring solutions and capacity from a single unit
- Includes 4 modules in any combination
  - charge
  - consistency
  - chemistry (pH, temperature, conductivity and redox)
  - turbidity
- Up to six sample lines
- Manual samples for charge measurement
- Modularity, flexibility
- Low service frequency
- Versatile connections
- For all paper machine types and sizes
- No equivalent solution available on the market

Valmet RM3 highlights

- Total and true ash consistency measurement from continuous process flow
- Proven basic construction
- Optional modules available for trouble free installation
- Advanced design of optical module
  - latest LED technology
  - durable measurement cell – saphire class windows in light path.
- Easy calibration
- All paper machine types and sizes targeting continuous monitoring or control solutions
- Low service frequency
- The only measurement for both total and true ash consistency in the market
The Valmet WEM™ multi-analyzer features a modular structure with modules for charge, chemistry, consistency, and turbidity.

There are six sample points from which Valmet WEM provides online wet end measurements. Each analyzer is equipped with the measurements needed in a particular customer process. Since all the measurement modules are in one cabinet, the installation costs are lower compared to the cases where the same measurements are provided as separate units.

The Valmet RM3, on the other hand, continues the development path the previous models of online single point retention sensors have paved for the unique and mill standard total and ash retention controls. This stand-alone sensor designed with the latest technology extends the idea of simple and straightforward basic wet end management. The very same technology is included as a measurement module in Valmet WEM when a wider scope of the wet end management solution is needed.

Direct customer input and recommendations have been the drivers behind the wet end analyzer’s concept development. The concept development was carried out in close cooperation with papermakers, targeting a systematic solution for wet end measurements.

**Online charge – cationic or anionic demand**

The Valmet WEM charge module features white water charge measurement and control for cationic/anionic demand. The best solution for stabilizing charge is to measure cationic demand from thick stock, white wa-
The analyzer features six sample lines and a lab sampling pocket. The online charge measurement is based on Valmet’s industry proven technology. It includes online automatic cationic/anionic demand measurement for mill environments and standard streaming current titration. Thanks to its robust design with automatic washing and diagnostics tools, the maintenance need is kept to a minimum.

**Total and ash consistency**

The retention module measures online total and true ash consistency. This multiple wavelength optical measurement can handle even the most complex furnish conditions from headbox, white water, and dilution line. The same consistency module is featured in the Valmet RM3 sensor, too. This stand-alone device performs continuous measurements from one sample line. Valmet RM3 is your ideal and cost-effective choice for applications that require continuous consistency measurement and automatic control.

**Chemistry: pH, temperature, conductivity and redox**

In the chemistry module, Valmet WEM incorporates the most important chemistry measurements. It measures temperature and pH, the upsets of which are the single most important sources of runnability problems in a machine. Conductivity describes the sum effect of all ions and explains the amount of organic matter in the system. Decreased redox indicates rising biological activity in the process.

**Turbidity**

Turbidity is measured from thick stock filtrates, and it indicates the relative amount of fines and suspended materials. It also widens the view to wet end stability, especially when measured together with charge.
Wet End Measurements – the Key to High Productivity

The best way to achieve the required wet end stability is to perform continuous measurements and provide automated control over all key wet end variables. This is the main idea behind Valmet’s total wet end management concept.

Valmet has long practical experience in analyzing the dynamic interactions of the relevant wet end factors. We are the original developer of wet end controls and the acknowledged innovator of numerous firsts in wet end products. Over the past decades, we have supplied more than 2,000 wet end analyzers to various kinds of pulp and paper processes around the world. Over 1,000 various kinds of pulp, paper, tissue, and board making processes around the world are controlled by Valmet solutions.

The ambitious RTD work, long experience, Valmet’s process and automation know how, in addition to our capability for integrating all that in analyzer engineering is a matchless combination. This is the secret and the core substance behind the world’s best wet end products – such as the Valmet WEM analyzer and Valmet RM3 sensor.

Valmet WEM and Valmet RM3 boost efficiency in many ways

The products, and the solutions behind, provide papermakers with tangible benefits, such as uniform quality and improved runnability. Uniform paper quality contributes to customer satisfaction and better price. Improved runnability, in turn, stands for fewer breaks, more production hours, faster grade changes and start-ups, faster speeds, and a cleaner system with less washing. And all these together boost overall performance.

Comprehensive wet end management also has a positive effect on process economy, thanks to optimized use of raw materials (fibers, additives, steam, water and energy).

High availability

High product uptime is one of key product features, and we aim to fulfill the expectations of even the most demanding customers. The excellent measurement availability is built on the results and experience from thorough and systematic product development. Our Failure Mode and Effect Analysis (FMEA) feature has been used to chart the reliability of each component, to simulate possible failure mechanisms and to develop and to structure the most efficient
and cost-effective maintenance and service programs for all of our analyzers. Accuracy and repeatability is reached by efficient automatic chemical cleaning and washing.

WEM modular structure offers 8 measurements from 6 lines, up to 150 charge measurements per day. Continuous consistency and chemistry measurements from active sample line. Line change takes less than one minute.

Performance through effective controls
The benefits of wet end controls in today’s processes are indisputable, and Valmet has long practical experience in developing and implementing all of the current control solutions. The retention control stabilizes white water consistency by controlling the retention chemical flow. The ash control effectively eliminates furnish ash content variations caused by broke quality and flow changes or the furnish ash variations caused by saveall systems. Charge monitoring and control are important in creating the optimum conditions in the wet end chemistry. The correct charge level also ensures proper retention and web formation. Together with retention control, charge control maximizes process efficiency. When these controls are optimized together, productivity reaches a level that is not possible with individual controls.

pH affects all chemical reactions in the wet end, especially the charge level and performance efficiency of additives and chemicals. Sudden changes may cause paper machine runnability problems. Redox measurements are used to follow micro-organisms in pulp circulation, in addition to adjusting realtime dosing of biocides. The basic chemistry measurements combined with charge, retention and ash measurements ensure a more comprehensive understanding of the wet end interactions. The wet end controls can be applied to all types of paper or board making processes.

Part of Valmet’s wet end solutions
The Valmet analyzers complement Valmet’s offerings for wet end and paper quality management and integrates with such renowned solutions as Valmet IQ quality measurements and the IQ MD Controls quality control.

IQ MD Controls is a true multivariable model predictive controller, which utilizes Valmet WEM and Valmet RM3 for white water consistency, headbox ash and thick stock ash, and Valmet MCA thick stock consistency measurement together with paper weight, ash and moisture measurements.
Valmet’s professionals around the world work close to our customers and are committed to moving our customers’ performance forward – every day.

Over 9,000 analyzers and tens of thousands measurements delivered all over the world.