

EFFICIENCY THROUGH COMPACT WET END

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ABSTRACT

During the years POM Technology has made remarkable product and process solution development work in order to obtain the most efficient wet end system for the paper making process. POM System stabilizes wet end operations, and provides close and fast-acting control during grade changes and start-ups. It employs short flow paths, to ensure the rapid return of material flows back to the process, and degasification, to assure system stability and cleanliness.

The POM System is stable and clean process with fast response. The heart of the system is the POMp Degasser which constitutes a simple and compact package for removing air entrained in the white water. The POM System has been adapted to various paper grades and paper machine types and sizes. Several POM installations have been successfully implemented also in specialty papers décor paper and coloured specialty papers with multiple grade changes.

The POM System results in lower investment and operational costs. The time efficiency of the paper machine improves remarkably same time as 25 to 30% energy demand and ~ 50% wet end chemical demand decreases. Further cost reductions have been possible through fresh water and material savings, thanks to hierarchical water distribution and clean system.

INTRODUCTION

The papermaking system has evolved by resolving problems, i.e. adding new solutions to the system. This has made the conventional system very complex and complicated to handle. Many of the problems in the traditional approach flow are generated by huge volumes, long dwelling times and slow flow speeds. Going to the origin of the problems and eliminating them, a more compact and simple system can be designed. The compact system is more stable and more agile than a traditional one. It is also cleaner and easier to operate. Furthermore the system gives savings in material waste, fresh water, chemicals and energy. It simply results in a more efficient system at lower operating and investment cost.

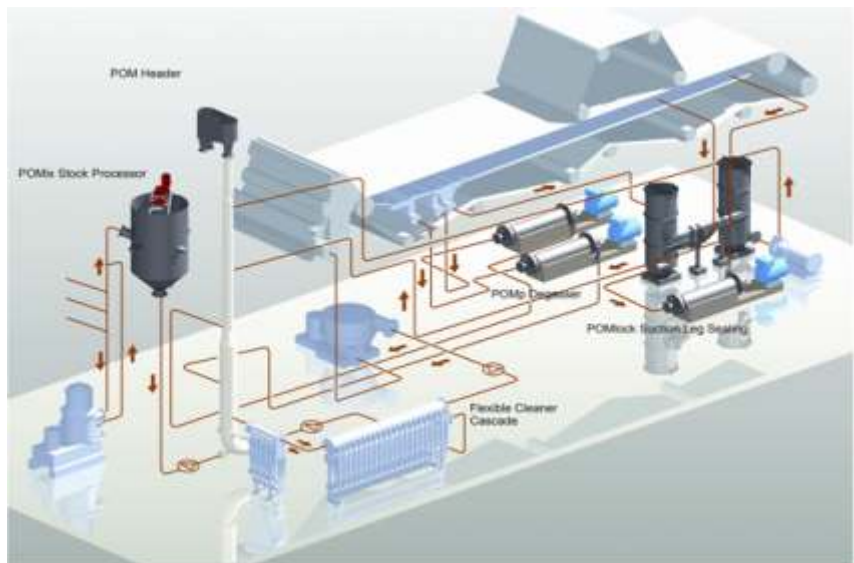
Practical results and the actions of current machine suppliers have proven that the compact wet end solution is the correct way to operate. POM Technology is pioneer supplier of compact wet end systems to the paper and board industry. The patented POM System is the most compact solution for an effective wet end process available today. It is easy to operate and fast to control during grade changes and start-ups. It has fewer sources for potential disturbances than the complex and large voluminous conventional system. Over 50 installations running have

proved the system to give an improved process stability and process cleanliness. The system itself can be applied as a complete POM System or POM products can be installed separately in order to solve a specific problem in the process. The heart of the system is the POMp Degasser which constitutes a simple and compact package for removing air entrained in the white water.

POMp DEGASSER

When the papermachine approach and

circulation system is designed as compact as possible the entrained air needs to be removed from the process immediately at its origin, i.e. where the white water exits the former. The process water contains huge amounts of entrained air and in some cases also carbon dioxide. These constitute boundary surfaces, of which there may be thousands of square metres in each cubic meter of the process water. These surfaces attract hydrophobic trash in the process. When the “trash” bubble is compressed and the gas dissolved, we may assume that the trash forms



POM System for wet end on a top former. The POM System can be installed as well to a gap former or any other kind of a former.

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agglomerates or a micro stickies, which deposits easily on the walls of process vessels and pipes than the original colloidal material would.

In POM System the degassing is accomplished by POMp degasser(s) which utilizes centrifugal forces for the gas removal. The high centrifugal g-force created by a rotating drum inside the POMp causes the lower density air bubble to migrate toward the empty vortex from which the air is removed axially through the POMp exhaust. Applying vacuum to the POMp enables also some of the dissolved air to be released and removed.

The POMp receives the water from an inlet vessel which can be integrated into the save all pans of the former. The level in the feeding vessel guides the flow to the POMp so that it automatically follows process changes. At the outlet, the POMp functions as a centrifugal pump providing stable flow towards the hydraulic distribution system, POMheader. The high impeller vane frequency guarantees that any pulsation is negligible and thus the POMp can feed the most demanding applications, such as the profile control dilution of the headbox.

POMix STOCK PROCESSOR

For the fastest possible response and also for avoiding imbalance in stock composition, the stock shall be composed as close to the papermachine as feasible. Modern gauges and digital controls enable the stabilization of the components before composing the thick stock which is then done by means of a POMix Stock Processor. The POMix has a holding time around one

minute and thus being able to filter fast and medium variations from the stock preparation and dosing system. The stock is fed to the papermachine by dry stock flow control where feed forward/feedback dry stock control is applied also for the stock components entering the POMix. The high outlet pipe gives ideal working conditions for the thick stock feeding pump.

COMPACT SYSTEM

In spite of the faster thick stock response, the grade change could still be far from optimum. Reducing the volume of the short circulation shortens the cycle time and similarly the time for stabilization after the change. In the hydraulically closed POM System this is done by shortening the pipelines and reducing the pipe size. Small system dimensions are a consequence of the need for fast circulation. In POM System the white water silo is replaced by the POMheader and the resulting higher flow velocities assure a self-cleaning system. Eliminating open surfaces also eliminates the need for level controls and the sources of foam and dirt.

The white water distributor, POM Header, is basically a pipe, receiving the various backwater fractions from the former in a hierarchical order, i.e. the richest backwater at the bottom and the leanest one in the upper part. A good wet end system shall have a good material balance, returning retention losses, secondary accepts and wet broke to the core process in the best possible way. The POMheader distributes the backwater according to solids content to the optimum points of use; the richest water is used closest to the headbox and only the very leanest

fraction, which is actually filtered through the consolidating web, leaves the system over an overflow. In this way the retention losses contained in the backwater can be recycled back to the headbox the fastest possible.

FLEXIBLE CASCADE

In POM System the accept collector pipes of the primary and secondary cleaner stages are joined and connected to the POMheader in the patented flexible cascade arrangement. This enables to dimension the cleaners for optimum cleaning and energy efficiency. In the flexible cascade the pump suction and the cleaner accept are in the same hydraulic system. The white water pressure gives a sufficient counter-pressure and the pumps can work only against the cleaner pressure drop, meaning further energy savings.

In the flexible cascade arrangement, the headbox first draws accept from the primary cleaners. If that is not sufficient, it takes the balance from the secondary ones. Even secondary dilution water will be taken from the POM Header. When the headbox flow decreases, it first reduces the dilution water. Then more and more of the secondary accept is turned to the primary cleaner feeding pump and at last even part of the primary accept is recirculated there.

POMlock SUCTION LEG SEALING

The traditional suction leg sealing is a source of dirt and consistency disturbances, as waters of different consistencies flow in undefined and slow patterns. Especially dirt needs to be totally eliminated in the compact wet end. POM Technology has created a compact POMlock solution to prevent these problems.

The most common POMlock type "C" is a closed suction leg sealing, which is a combination of a closed collector manifold and one or two CycloPipe vessels that enhances air removal. Water from the CycloPipe(s) is pumped to the top part of the POMheader.

RESULTS

The POM System results in lower investment and operational costs. The time efficiency of the paper machine improves remarkably same time as 25 to 30% energy demand and ~ 50% wet end chemical demand decreases. Further cost reductions have been possible through fresh water and material savings, thanks to hierarchical water distribution and clean system.



POMp730 centrifugal degasser