

THE NEW GENERATION IN WEB STABILIZATION: *PrimeRun Evo* technology to regulate runability and save energy

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Drying section: Good runability and energy-saving potential

ANDRITZ has launched a new generation of web stabilization systems – *PrimeRun Evo* – to control and improve the runability of the paper web while saving energy in single-tier drying sections by gradually reducing the vacuum from the opening nip. The runability of a paper machine mainly depends on the efficiency of paper web transfer through the drying section. The bottleneck preventing good runability in a single-tier drying section is the forces that hold the wet web on the cylinder (Figure 1) and prevent smooth transition of the paper from the cylinder to the bottom vacuum roll. In order to resolve runability problems in single-tier drying sections, the dryer pocket should be kept under vacuum. This is where runability components are used. Those devices create a vacuum from the other side of the fabric that is sufficient to neutralize the negative forces and allows the web to be transferred more easily.

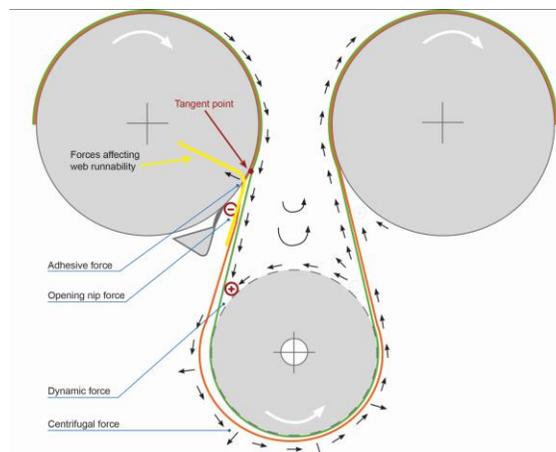


Figure 1: Single-tier drying sections – forces that affect the web runability

In the past, not a lot of attention was paid to the impact that a machine's runability in the drying section had on energy savings. Suppliers tried more or less entirely to provide a "box" to provide runability on a paper machine, without optimization and taking energy consumption into consideration. The energy demand in this part of the paper machine was considered insignificant compared to the overall energy demand of the production process. As a result, many paper machines worldwide have been equipped with runability solutions that are very energy-intensive. Now as the machine speed is no longer a decisive factor, optimization of the existing runability solution, as well as the resulting energy saving potential, have gained major importance.

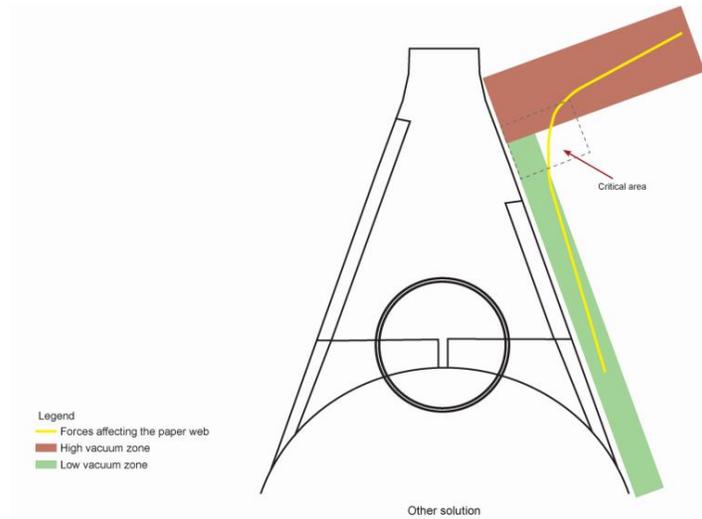
Step-by-step is the key to success

The principle of the new design of paper web stabilization – *PrimeRun Evo* – is to gradually reduce the vacuum after the open nip to stabilize the web in the free draw.

What does this actually mean? Customers are facing several problems with efficiency and energy losses at the paper machine, both of which are attributed to runability and web stabilization. These issues can be divided into two main areas: The first relates to mechanical problems with the runability devices and the second to energy-intensive runability solutions. As there is little research available on web behavior in paper machine dryers and what forces may have a negative influence on web transfer from the dryer to the fabric, many questions are arising as to what kind of runability solutions are available today on the market and what their real benefits are.

Customer feedback and the results of ANDRITZ service runability audits show that the problems are fluttering, paper breaks, high draw levels, poor tail threading, mechanical damage to the seals, fabric damage, paper machine speed bottlenecks and high energy consumption. At the moment, there are two principal methods of creating a vacuum in the dryer pocket. (Figure 2) The first is to remove air directly from the control zones with a suction fan. The second one uses the principle of blowing high-speed air from the specially designed nozzles around the curved surface, known as the "Coanda effect", to create a vacuum. The second method involves greater energy consumption.

The most widely used runability concepts from different suppliers for higher performance paper machines are based on controlling the web after it leaves the dryer by including two main zones (Figure 2), which are separated by a seal. The zone with a high vacuum (zone 1) for controlling the web after leaving the dryer and a zone with low vacuum (zone 2) for controlling the web in the free draw between two cylinders are used to control web runability in single-tier drying sections.



*Figure 2: The runnability concept of today (two zones controlling web stabilization:
1) high underpressure zone and 2 low underpressure zone)*

The large pressure difference between the zones can cause fabric bending and mechanical damage to the seal between the zones with different vacuum levels. Mechanical damage to the seal makes it more difficult to control the stability of the web on the fabric and causes energy consumption to rise.

ANDRITZ has considered both principles in the light of customer feedback and tried to offer customers an optimized solution that can provide good runability together with low energy consumption. The new ANDRITZ runability solution, *PrimeRun Evo* (Figure 3), uses the operating principle of gradually reducing the vacuum applied in order to stabilize the web in the dryer pocket.

The main principle of the new *PrimeRun Evo* runability solution is to divide the vacuum into three different zones depending on the vacuum needed to neutralize the forces and stabilize the web. The negative forces on runability decrease in line with the distance between web and cylinder. By gradually eliminating negative forces where they are weakest and restricting them to the zones of high vacuum, moderate vacuum and low vacuum, web stability can be better controlled and energy can be saved (Figure 03). With the principle of gradually reducing the vacuum, it is possible to support the web fully in the drying pocket and achieve a good paper machine runability with less vacuum and lower consumption of air and energy.

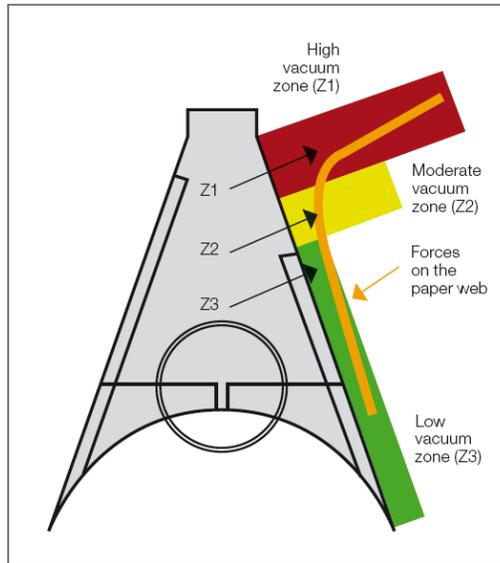


Figure 3: Andritz solution: PrimeRun Evo, three different zones, depending on the vacuum needed, neutralize the forces and stabilize the web.

Successful upgrade of a conventional system

In 2015 ANDRITZ successfully started the upgraded web stabilization system, gradually reduces the vacuum from the paper release of the drying cylinder to the bottom vacuum roll- It is especially designed for the high-speed machines and thus perfectly fitting to the PM11 of the Gratkorn mill. The system controls and improves the runnability of the paper web while saving energy.

The results from industrial applications show that consumption of energy and air can be reduced by around 50%. (Figure 4).

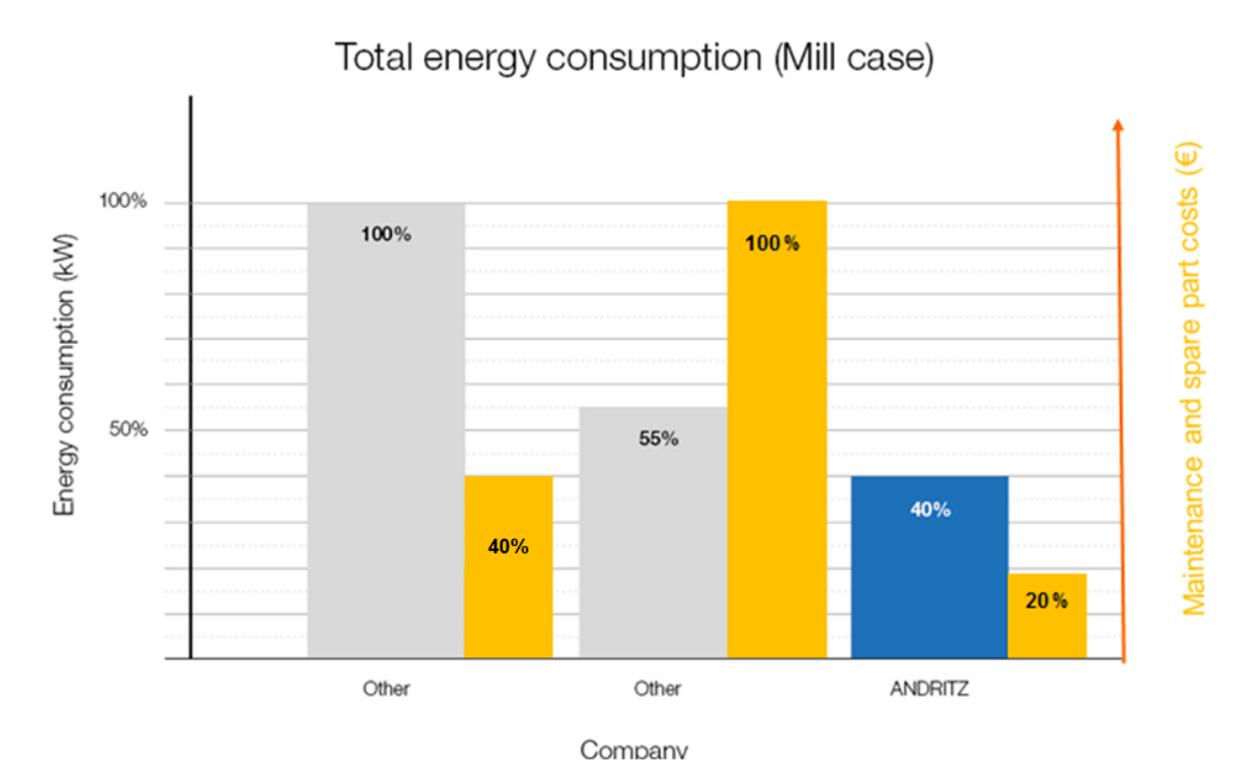


Figure 4: Comparison of air and energy consumption between different suppliers

Mr. Erich Zeyringer Technical Manager Production Line 4, Sappi Europe, Gratkorn mill said: “Due to PrimeRun Evo the new web stabilization systems of ANDRITZ, underpressure is reduced step by step and even run of four PM11 is enabled.”

ANDRITZ has launched the *PrimeRun Evo* concept successfully; the first references are operating with excellent runability and low energy consumption. Some of the benefits are shown below:

One reference paper machine is supplied by ANDRITZ to an Austrian customer:

- Speed increase achieved: +3,5%; potential to reach +5%
- Draw reduction from press to dryer section: -10% (at higher speed)
- Time reduction for tail threading: mostly successful at first attempt
- Trend of down-time: no increase at higher speed
- Shorter time of grade change: -20%
- Fabric lifetime: unchanged

The successful upgrade of the PM11 in 2015, with the PrimeRun Evo web stabilization system, has one more confirmed the solution oriented service ability of ANDRITZ and its technological leadership.

Conclusions

With the new generation of *PrimeRun* Evo runability devices that are using gradual reduction of vacuum, new possibilities are emerging for good web control hand in hand with a reduction of energy consumption in paper machines. The *PrimeRun* Evo concept has been designed for universal use in new machines, for the rebuild concepts offered by ANDRITZ and also for all other machines on the market. In some cases, the rebuild solution can have a return on investment of less than 12 months. The ANDRITZ runability team can offer solutions for the rebuild of every runability concept existing on the market and the ANDRITZ service team can help optimize paper machine operations.