

How to optimize paper machine performance by upgrading your wire section

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INTRODUCTION:

Until now, Fourdrinier wire tables were designed for one main paper grade. At this grade, the activity of the fiber suspension as well as the dewatering performance of the equipment was in an optimum range. When producing products which were much different to the design grade, the activity level as well as the dewatering behavior could have been much different too. There were only limited adjustment possibilities to compensate these negative influences. This article describes a solution to be able to adjust the settings for all paper grades of a wide product range to an optimum.

These days the Pulp and Paper market is expecting a high flexibility from operators as well as paper machines. Many mills need to produce a big product range to fulfill the needs of their customers. Up to more than 100 different paper grades, all produced on the same wire table, are not uncommon. This leads to big differences in production parameters. Machine speed or basis weight are only two parameters which can be different by more than double.

These changed parameters of course do also influence the behavior of the suspension on the wire table. The activity level can change from totally flat to stock jumping, affecting the paper quality significantly.

Röchling Industrial Oepping recognized this challenge for papermakers early on and has been working on finding a solution for years. The advancing digitization and extensive automation came at just the right time. The company used its potential to develop the new Robasmart product family. The naming consists of "Roba", which stands for the company's affiliation with its roots - all product groups from this company start with this name - and "Smart", which stands for the intelligence of this product family. A part of Robasmart is the SmartTable. It defines the intelligent wire section solution for optimized paper grade production by configuring the dewatering elements, vacuum and dry content values.

The SmartTable solution allows to optimize every paper grade of a wide product portfolio with the highest efficiency and the best properties.

The SmartTable consists of individual components – Smart Foils, Smart Vacuum Valves and Smart Consistency Sensors. Each of them can be adjusted individually but also used as a complete solution package, which ensures a much better paper machine performance with increased efficiency. Figures like the following confirm the successful implementations at customers mills.

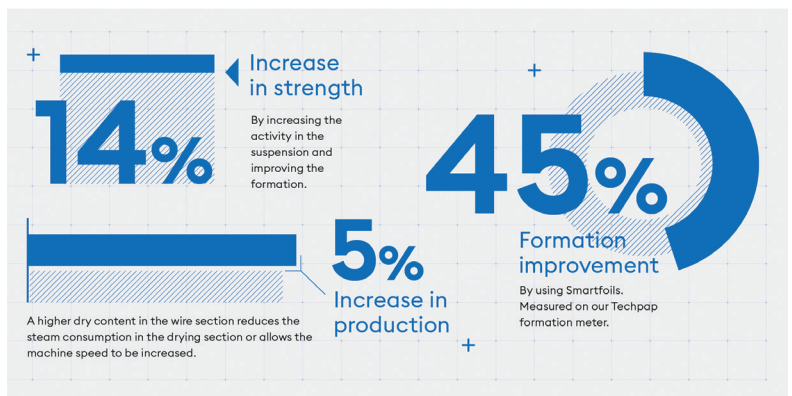


Figure 2: Improvements using a SmartTable.

Due to individual settings on the wire table, following improvements are possible:

1. Formation and paper strength improvement
2. Increased drainage capacity
3. Reduced energy costs

Let's get in detail.

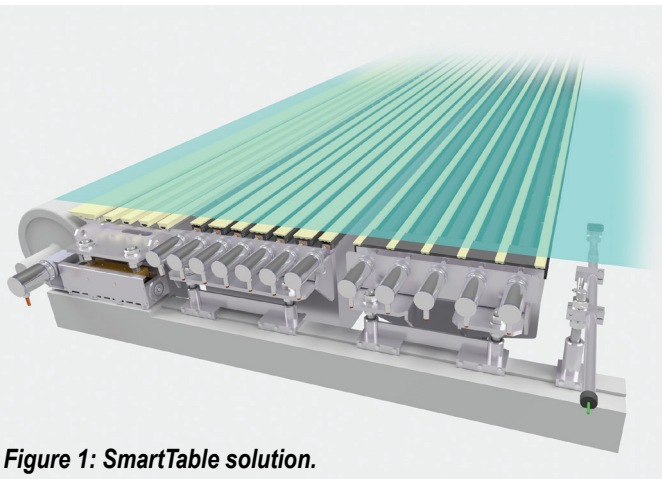


Figure 1: SmartTable solution.

1. Formation and paper strength improvement

SmartFoil significantly improve the quality of all paper types. The possibility to individually adjust the foil angle and height increases the drainage capacity and optimizes the activity level in the sheet forming zone of the wire table where the fiber mobility takes place.

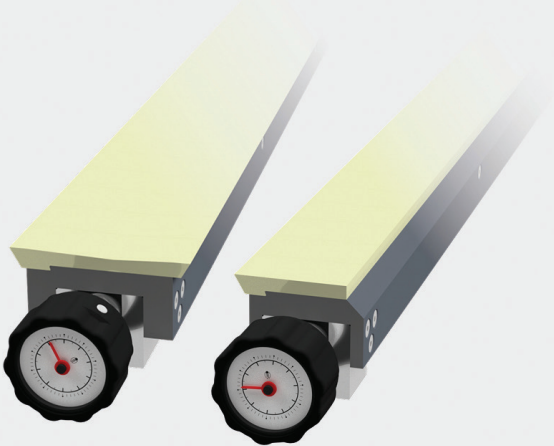


Figure 3: Smart ActivityFoil and HydroFoil.

Using the continuously adjustable elements, the foil angle (in case of HydroFoil) and the foil height (in case of ActivityFoil and FormationFoil) can be adjusted. This leads to an optimal activity level of the suspension. Subsequently the formation can be improved significantly.

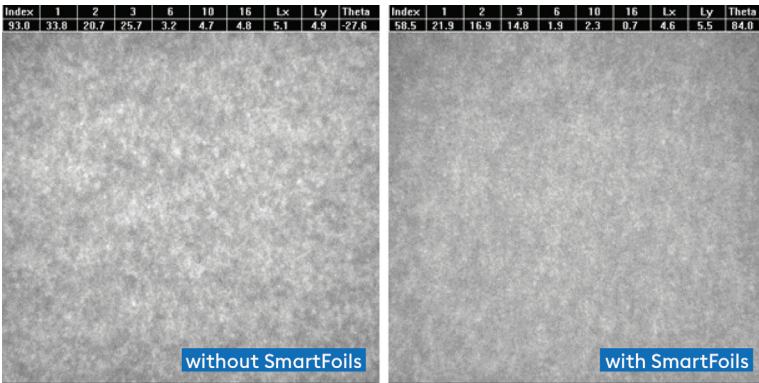


Figure 4: Comparison of not using SmartFoil and using SmartFoil | Formation value was measured with optical formation measurement laboratory device (Techpap 2D lab). The lower the value, the better the formation.

A better formation leads to higher strength properties, followed by a better paper quality, or the possibility to reduce costs for expensive raw materials like softwood or strength improvement additives.

Figure 6: Smart Consistency Sensor.

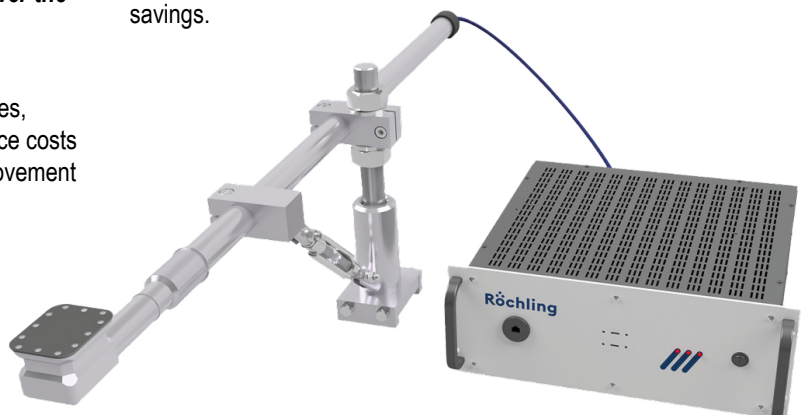


Figure 5: SmartValves: Low-Vacuum and High-Vacuum Valve.

2. Increased drainage capacity

The vacuum is also just as important for the paper properties as the SmartFoil, and decisive for an optimal drainage efficiency. Incorrect vacuum settings and non-existent actual vacuum values very often lead to inefficient operation of the suction boxes, means high energy consumption and expensive operation costs.

Electronically controlled vacuum valves are an important part to individually control, both the low-vacuum area and the high-vacuum area of the wire table, and thus increase the paper quality and the dewatering performance through optimally applied vacuums.

Due to integrated vacuum sensors, operators have an overview of the existing vacuum in the suction boxes and are able to adjust it individually, if necessary. The vacuum control gives operators the safety to know what's happening inside the boxes as well as the possibility to easily reduce costs by minimizing the vacuum. The Röchling Smart Vacuum Valves are highly reliable due to their integrated cleaning mechanisms and maintenance-free because to their intelligent construction.

3. Reduced energy costs

“The more the better” is a common rule for the vacuum levels in a paper machine. But these unnecessary high vacuum levels often do not improve the dewatering. Quite the contrary, they lead to a high friction between dewatering elements and forming fabric. This friction causes several problems, for example:

- Higher wear of dewatering element and forming fabric
- High driving power
- Higher energy costs

With the combination of SmartValves for controlling the vacuums and the Smart Consistency Sensors, the vacuum can be reduced without losing dewatering efficiency. Unnecessary high vacuum levels are a thing of the past and therefore the driving power is reduced. Reduced vacuums also mean that less air flow needs to be provided. These two advantages can lead to significant energy savings.

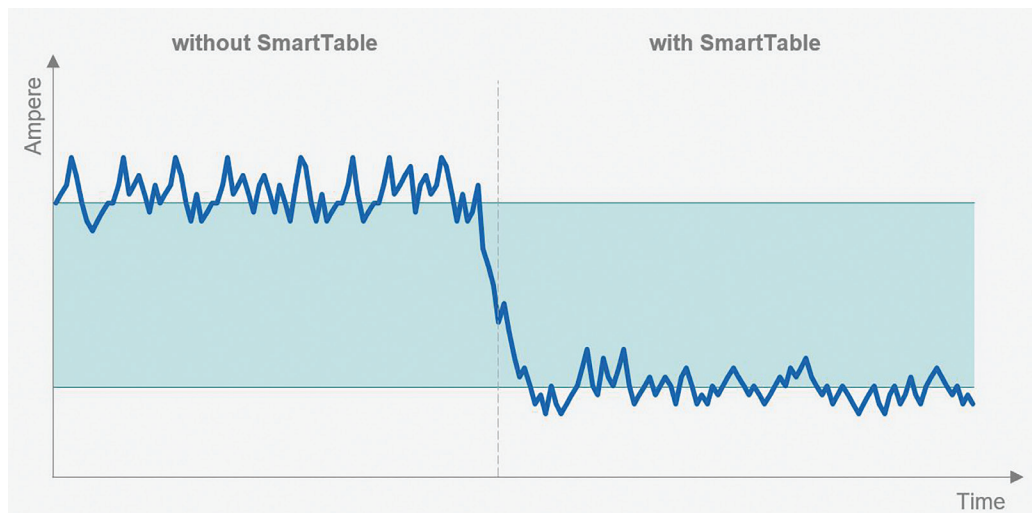


Figure 7: example for couch roll amps reduction.

Case study

A very successful packaging paper producer in the center of Mexico, who is now part of Americas biggest packaging paper producers, recently realized a fully automated SmartTable rebuild with Röchling Industrial Oepping. The scope of supply contained the complete SmartTable package:

- An adjustable forming board box, which can be adjusted 100 mm in machine direction during operation
- New steel boxes equipped with Smart HydroFoil and Smart ActivityFoil
- New Low-Vac box with height adjustable Smart FormationFoil
- A trivac suction box
- The Smart Consistency measurement
- Smart Vacuum Valves
- SmartTable software

The complete rebuild could be carried out in only 1,5 working days through the skilled Robaserv technicians from Röchling Industrial Oepping. Directly after the start-up, it took only two jumbo rolls to stabilize production until the improvements were visible. With the help of Röchling start-up engineers, the CMT value could be increased by more than +20% on all main grades with identical or also improved RCT values.

Furthermore, the dryness at the end of the wire table could be increased by +1%. This leads to a possible steam consumption reduction of 510 MWh per year.

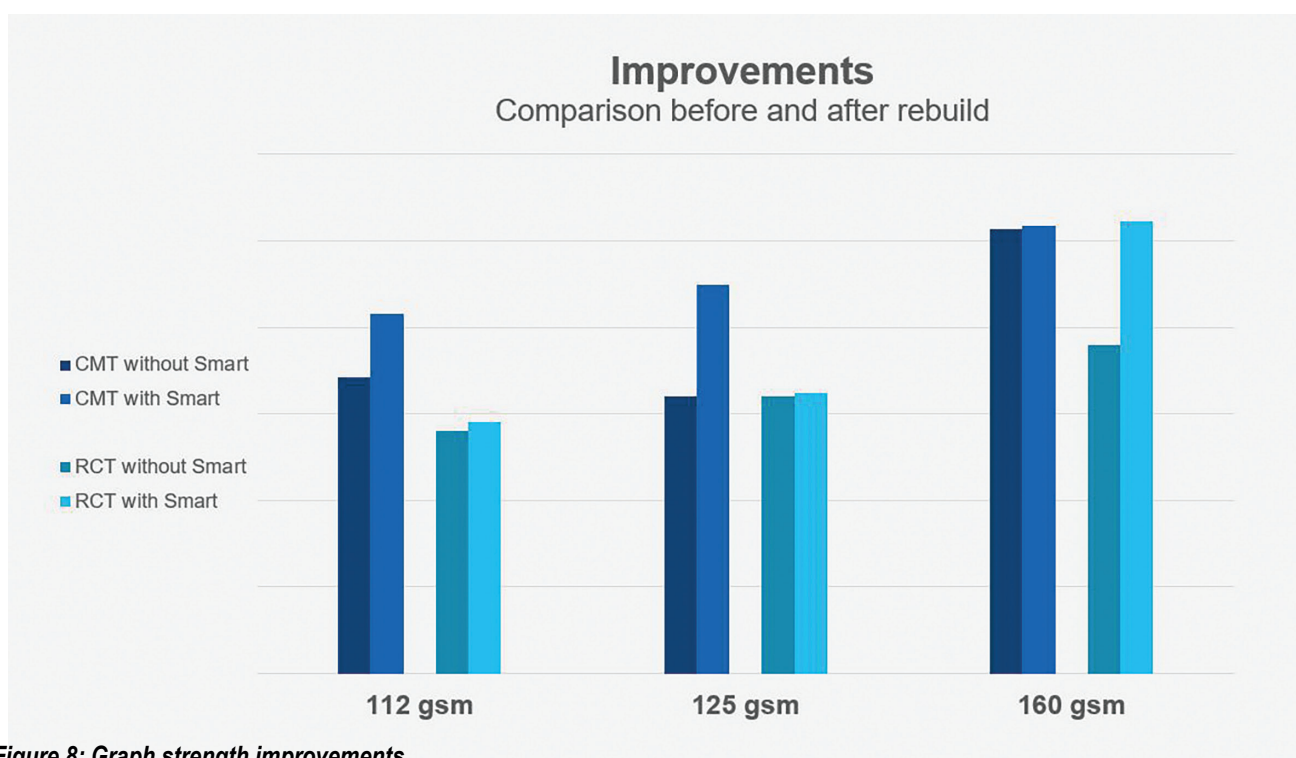
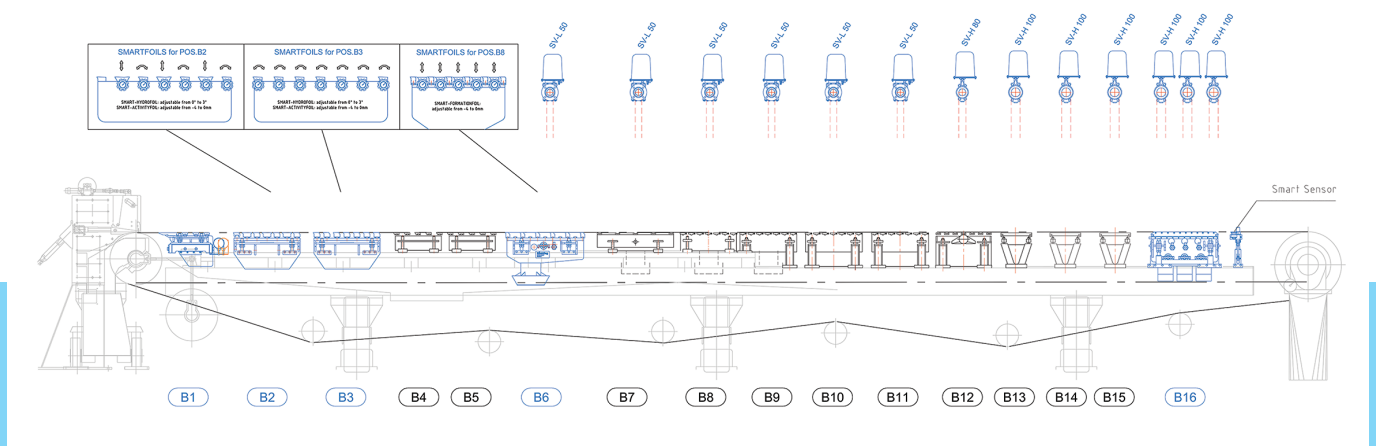


Figure 8: Graph strength improvements.



Figure 9: New wire table with SmartTable solution in Mexico.

Figure 10: Scope of supply.



About Röchling

In 1993, LERIPA joined the international plastic producing group Röchling and developed to a global player. To strengthen the force of the group, the company name LERIPA got renewed to Röchling Industrial Oepping. New name, but still the same expertise and product competence.

For more than 300 years now, Röchling Industrial Oepping has shown one more time that its pioneering force for innovative solutions works successfully. Röchling is more than only a spare part supplier. Röchling provides solutions and full packages with the goal of increasing paper machine performances, saving costs and keeping our environment healthy. SmartTable only is one product group Röchling has developed so far. But digital and sustainable values are the driving powers for ongoing projects.



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