



**HELA VÄGEN\***  
PROCESS OPTIMISATION WITH A  
HOLISTIC APPROACH

# PROCESS OPTIMISATION WITH A HOLISTIC APPROACH



**Is my production line fully optimised in terms of costs, energy and quality?  
Can we get more value from our raw materials?  
Can I increase the speed through that bottleneck without any problems?**

In a complex process industry such as the pulp and paper industry, there is always a need to change and develop processes. Sometimes major investments are required, but more often it involves modernisation, maintenance and bottlenecks that have to be resolved. Regardless of whether a major investment project has to be implemented or an urgent problem solved, it has to be done with a holistic approach to the process. By this we mean that every measure must be undertaken and every analysis interpreted with the basic premise that all parts of the process affect one another. Otherwise new problems can be caused in your own process or even at the end customer.

When your own resources are not enough, or when external expertise and technical resources are required, MoRe Research is a practical, competent and neutral partner. Hela vägen® (All the way) has been our work method for many years, in which all steps of the process from wood to paper can be studied and optimised, either in sequence or separately. This method is also an attitude that permeates our work, with a holistic approach and an awareness that sub-processes affect one another and the end product.

## MAXIMISING THE VALUE OF THE RAW MATERIAL



Our viewpoint is that it is both possible and necessary to utilise the raw material better in order to achieve increased profitability. This can take place by optimising existing processes and production lines, utilising some of the process's ancillary streams for new products or gradually becoming a complete biorefinery.

Regardless of which strategy is chosen, the main process must function optimally and be profitable, and utilisation of the streams in the ancillary processes must take place in such a way that the main process is not disturbed. As a consequence of this, the whole process becomes increasingly complex and a holistic approach becomes even more important.

The path towards getting more value out of the wood starts with knowing your own process when it is running well. A detailed fingerprint of the process line, from wood to finished pulp, paper or biorefinery product is an important starting point. Using our Perform-



ance Index and Product Suitability Test concepts, various test runs can then be performed of the different sub-stages in the process using our pilot equipments. The pilot equipments have an optimal size relationship which means that all trials can be conducted on the same scale and in a realistic, mill oriented way.

We have a systematic, structured way of working in close collaboration with the customer, and our employees have both long experience and good personal knowledge of the industry's processes. Our projects are characterised by familiarity with the mill and an understanding of the process as a whole. We consider our most important task to be to contribute towards our customers improving their profitability, regardless of whether it involves projects to develop new products and processes or solving urgent problems.



# WITH OUR PILOT MACHINES WE OPTIMISE YOUR PROFITABILITY IN A COST-EFFICIENT WAY, ALL THE WAY – “HELA VÄGEN”

Along each step of Hela vägen® we can conduct comprehensive analyses of wood, pulp, paper and process liquids using our advanced analytical resources.



**WOOD**



**DIGESTER**

The flexible pilot digester, which is unique in the world, offers tremendous opportunities for both pulp cooking and biorefinery studies.



**ULTRAFILTRATION**

Using various kinds of membranes, valuable components are filtered out of process liquids and effluents.



**OXYGEN DELIGNIFICATION AND BLEACHING**

All stages from oxygen delignification to final bleaching can be performed in our bleaching pilot plant.



**VISCOSE PILOT PLANT**

All manufacturing stages from dried special cellulose to finished viscose solution can be simulated.



**CHEMICAL ANALYSIS**



**PHYSICAL ANALYSIS**



**GRAPHIC ANALYSIS**



**TROUBLESHOOTING**



**DYNAMIC SHEET FORMER**

Our dynamic sheet former, the Formette, can be used to manufacture paper from 30 gsm to cardboard in several layers up to 280 gsm with the product properties achieved on a large paper machine.



**XPM**

A unique paper machine that can produce paper in grammages between 30 and 200 gsm. Fitted with a Yankee cylinder for tissue production, with a lowest grammage limit of 15 gsm.



**COATER**

For conventional coating and surface sizing.



**PRODUCT**



## PERFORMANCE INDEX, AN ELEMENT OF HELA VÄGEN®



Torbjörn Sjölund

“Our Performance Index (PI) methodology is ideal when a customer wants to make changes in their pulp line without disrupting production,” explains Torbjörn Sjölund, Project Manager at MoRe Research.

“Our PI methodology separates the effects of raw materials, chemicals and mechanical equipment. Starting with the same wood chips, the pulp is cooked, delignified and bleached in the customer’s line and samples are taken with time delays. Wood chips from the same batch are cooked, delignified and bleached in our pilot plants and reference

samples are taken. By comparing reference samples with mill samples from the same process position, PI values are obtained for a number of properties. These are used to identify deficiencies in each process stage and for ongoing optimisation work.

“One example is a customer who has a softwood line with two oxygen stages and wants to increase production. Instead of cooking to a kappa number of 30, they want to know whether oxygen delignification can manage a higher starting kappa number with the kappa number maintained after the oxygen stage. It is also a requirement that the optical and physical properties of the pulp must be unchanged.

“We take wood chip, pulp and process liquors from each process step under existing process conditions. We then produce pulp in our corresponding pilot plant under the same conditions as those at our customer’s process. The properties of the mill pulp are compared with those of the laboratory pulp, providing us with PI values, which become references between the mill’s production line and our corresponding pilot plant.

“In the next phase we produce a

pilot pulp, in which cooking takes place to a higher kappa number and oxygen delignification to the same level as before, followed by final bleaching. The results in the form of chemical consumption, temperatures, etc. can then be transferred to the customer’s own process line to form the basis of a full-scale run. We follow-up the full scale trial with measurements at all stages to verify and make minor adjustments to the customer’s process.

“Of course we apply the same work method in terms of parts of a pulp line. With this method we can perform competitor comparisons in several ways. These can involve both pulps and chemicals, and we also perform comparisons with the aid of our PI numbers database. Whether an investigation relates to a whole process line or individual process stages, we look at the whole picture and the consequences that can arise, both before and after the process,” concludes Torbjörn Sjölund.

## PRODUCT SUITABILITY TEST TO DEVELOP PAPER PRODUCTS



Maria Hännström

When a paper mill wants to evaluate or develop its specific product, traditional analyses are insufficient. The end product is paper, which means that a paper must be produced and analysed in order to obtain a relevant answer. This is where our Product Suitability Test (PST) comes into the picture with our paper pilot equipments, from beating to our paper machine.

“One example might be a customer who for cost reasons wants to reduce the proportion of long fibre and increase the proportion of short fibre while maintaining the strength of the paper,” explains Maria Hännström, Project Man-

ager for paper pilot equipments at MoRe Research. “To succeed in this, different beating strategies for pulp must be evaluated.”

“It’s very important that pilot trials are performed under conditions that are as close as possible to those in the paper mill, so that beating and formation take place under conditions that correspond to the customer’s own process. We therefore start with unbeaten samples of the pulp, as well as samples of white water and relevant chemicals.

“The samples are beaten in an Escher Wyss conical refiner, after which paper products are produced in the form of tissue paper, paper or board, either on our experimental paper machine or in our Formette.”

In the Formette the same grammage and anisotropy are set as on the customer’s own paper machine. This means that the properties of the paper samples can be compared with the paper produced at the customer’s premises. In the Formette, which is a dynamic sheet former, paper can be manufactured in grammages between 30 and 280 gsm, in up to five layers.

“The pilot products are dried

either free or under tension, depending on the customer’s process, and tested in terms of optical properties and strength. On the basis of these results, and in consultation with the customer, new pilot runs are undertaken. Comparing these results with the pilot run’s reference results reveals how different pulp mixes and beating strategies affect the paper properties. On the basis of our recommendations, the mill can change both pulp blend and beating strategy in order to achieve the goal of manufacturing paper with unchanged or improved strength properties, but with a cheaper fibre mix.

“Our pilot equipments are used to perform cost-efficient studies without disrupting ongoing paper production. The Formette can be used when it’s important to evaluate anisotropy. When other properties are important, our experimental paper machine is useful. Our PST method is also often used when customers want to predict how changes in the fibre line can affect the paper’s properties in accordance with our Hela vägen® concept,” concludes Maria Hännström.

MoRe Research Örnköldsvik AB  
Hörneborgsvägen 12  
SE-891 80 Örnköldsvik, Sweden  
Tel: +46 (0)660 751 00  
Fax: +46 (0)660 759 81  
[www.more.se](http://www.more.se)

