“Our decision was the right one: With SIPAPERcis Bleach we are constantly reducing costs while keeping quality at the same high level. After joint development and a smooth introduction, the module is today 100% integrated in our processes.”

Michael Hoch, Pulp Production Manager
Gebr. Lang GmbH Paper Plant, Ettringen, Germany

SIPAPERciscis Bleach is an advanced process control module (APC) of the SIPAPERciscis product family from Siemens, offering improved brightness control in the bleaching plant through cost-optimized dosage of all chemicals. By using a model-predictive controller (MPC), optimum quality of the bleached pulp can be achieved with varying quality of raw materials, such as different types of waste paper. The chemical dosage is calculated so that the targeted brightness can be achieved at minimum cost. Thanks to the integrated real-time adaptation function, SIPAPERciscis Bleach can react to short- and long-term changes in the process online, thereby providing substantial cost savings month after month.

The challenge
The paper industry today faces constantly increasing quality requirements, sustained cost pressure and quality variations of raw materials. Process optimization is of particular importance during pulping, enabling the plant to guarantee high pulp quality. As an example, in recycled fiber pulping, this means achieving high brightness while the quality of the raw material deteriorates.

Conventional control systems cannot meet these requirements in the bleaching plant. What’s needed are new, model-predictive controllers that are intelligently and robustly designed for the desired complex process correlations. Only in this way can a continuous optimization of the chemical dosage be achieved at every operating level.

Five good reasons for SIPAPERciscis Bleach
• Significant savings due to cost-optimized chemical dosage
• Decrease in quality variations and improvement of the pulp quality for paper and board production
• Attaining the targeted brightness after the bleaching stage without manual adjustments
• New flexibility in the process control of pulp production
• Reduced environmental impact
Our solution

SIPAPER® Bleach controls the chemical dosage in the bleaching stages for a targeted brightness after the bleaching. The mass flow rate and the quality values are measured at the current operating level before and after the bleaching stage. The filling level of the bleaching tower and the current chemical dosing are also recorded. On the basis of these values, SIPAPER® Bleach calculates and transfers specific set point values for the chemical controllers.

SIPAPER® Bleach integrates a number of components

The dead time model describes the behavior of the 3-phase suspension in the plant units across time. The calculated dead time is used as the basis for the adaptation of the bleaching model.

The bleaching model encompasses theory, practice and experience: the non-linear characteristic of bleaching is determined for the specific plant by means of selected trials and mathematically processed into a multi-dimensional model. This model calculates the increase in brightness for all possible combinations of chemical dosage within the preset limits. An adaptation is carried out in real-time on the basis of the measured bleaching results, taking into account the daily form of the plant as characterized by the quality of the raw materials and mechanical performance.

The optimization function selects the chemical dosage with which the targeted brightness can be achieved at the lowest cost from the available options using the SQP algorithm (Sequential Quadratic Programming). This algorithm has been proven in many industrial applications and makes use of the full potential of the non-linear bleaching model.

The individual modules are linked together in the model-predictive controller and specific set points derived from the partial results are transferred to the chemical dosage. The continuous transitions between the cost-optimized operating levels as well as the real-time adaptation process are integrated efficiently.

SIPAPER® Bleach has the potential to reduce the use of chemicals and ensures stable pulp quality right from the very start of operation. On-site integration of the plant-specific knowledge leads to continuous savings in the bleaching stage that typically increase over time.

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CIS = Completely Integrated Solutions

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