

HARMONY MODELING FOR IMPROVED PROCESS EFFICIENCY AND STABILITY

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ABSTRACT

OBJECTIVE: Statistical process control has been in use for almost a century now. The basic tools in the field have provided a great deal of support in the field of manufacturing to achieve good product quality and improved production efficiency. Pulp and paper production is a very demanding environment in this regard due to the biological nature of the key raw materials. Keeping the process in a stable condition while still aiming for continuous improvement is a challenging task.

Various kinds of novel analytical solutions have become more easily accessible even at the plant level. These kinds of solutions should be investigated in the pulp and paper industry to get an understanding of how analytical solutions can aid the plant personnel to achieve better productivity.

EXPERIMENTAL PROCEDURE: This research utilizes a case study approach, where a real-time digital tool based on harmony modeling concept is utilized by mill operators and engineers. The cases are conducted at multiple different sites, while the operators are also given extensive support for the tool usage to gain the full benefit of findings.

In the experiment we will concentrate on the usage of harmony modeling as the main analytics tool due to its simplicity, and on acceptance from plant operators. Harmony modeling supports process operators and engineers to identify, understand, and react early to any emerging deviations in their production. Ultimately, the goal is to increase process efficiency while maintaining stability in a sustainable manner.

MAIN RESULTS: We have identified multiple success stories from the case studies and in this paper, we will go through the various findings and how they were identified by the plant operators. With the help of harmony modeling analytics, it is possible to locate special causes of process variation that would otherwise remain hidden for greater periods of time. Interactions between the process online measurement tags can highlight discrepancies in the process performance even when the individual tag values remain within their normal operational windows. This gives considerably more time for plant personnel to interact with the process and bring the whole process into stable conditions.

Analytics can also provide support for conducting continuous improvement. Since the analytics provide a new view into the production process, it is possible to easily notice where various changes have implications at the plant level.

CONCLUSIONS: Harmony modeling and Harmonizer real-time monitoring tool provide a new way for operators to achieve higher production efficiency at the mill level. Unique calculation principles find previously unknown interactions and determine their level of impact for process runnability.

Keywords: advanced analytics, process control, automated machine learning, papermaking, process efficiency