PROCESS SOLUTIONS
Partnerships in Cement

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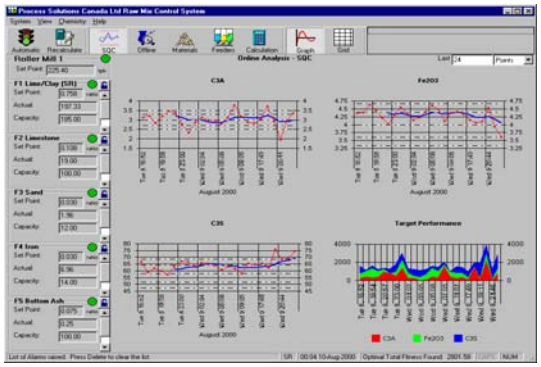
Cement Distribution Solutions
Quality Environmental Solutions
Plant Automation Services
Comprehensive Customer Care

Raw Mix Control System (RMCS)

Comprehensive Raw Mix Quality Control

Cement plants have utilized computer support programs in various forms for many years. Mostly, such stand-alone utilities operate on programmable desktop calculators or spreadsheets designed to perform a specific task, like calculating correction factors for material feeders, tracking raw mill mix ratios, or providing an interface to an x-ray spectrometer. The UNISON® Raw Mix Control System (RMCS) integrates computer based historical data storage, quality & process value monitoring, constraint rule application, and raw feeder control.

RMCS provides an interface to the raw mix process with current feeder status; as well as, Trend and Statistical Quality Control (SQC) displays available for online chemistry, raw material chemistry, feeder settings, and control algorithm calculations. The user interface of the RMCS effectively shows important aspects of the process, to allow staff to monitor the raw mix at a glance.



Dual Loop Control

The Raw Mix Control System (RMCS) algorithm provides dual control loops. The inner loop adjusts feeder settings based on frequent input analyses, to ensure that the control values fall within an acceptable range of base values. The outer loop typically obtains analysis from scheduled sample analysis, which occurs less frequently. This outer loop provides drift correction for the inner loop. When the outer loop produces a new analyses, a new set of drift correction values for the inner loop are calculated.

A dual loop control algorithm provides many benefits. The inner loop provides frequent adjustments, ensuring a more consistent raw mix, while the outer loop corrects for drift. The outer loop also provides a redundant data set. Should the inner loop data become unavailable the outer loop's data will be used for control.

Fundamental Analysis and Control

An essential aspect of the Raw Mix Control System (RMCS) is automatic analysis import. Two types of analyses, direct and indirect, can be used to continuously monitor the composition of the raw mix.

Direct analysis, normally supplied from an online analyzer, indicates frequent small changes to the control feeders. Periodically, an online analyzer collects and analyzes a sample; then sends the results of the elemental analyses to the Raw Mix Control System (RMCS). The online results are used to calculate theoretical elemental values and used in the dual loop algorithm. Once calculated, the control values are verified and, as necessary, changes to the feeders are recommended to the dual loop algorithm. These changes can be automatically or manually applied to the process.

Indirect analysis, typically provided by a laboratory XRF analyzer, verifies the results of the online analyzer. Two types of direct import analyses are used by the RMCS. The first type analyzes the raw materials contained in each feeder, which represent the raw material chemistry. These analyses are used as starting values by the dual loop control algorithm when estimating variability and determining the required feeder changes. Additionally, the findings of the indirect analysis can reset the feeder controls to a base level.

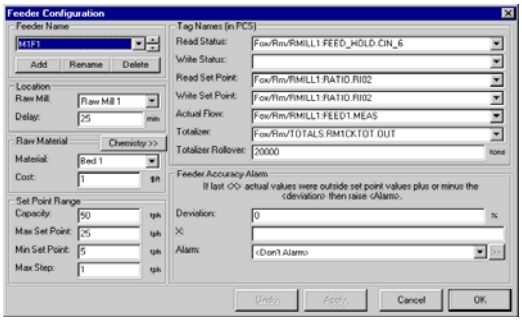
The second type analyzes the composition of the raw mix. This scheduled analysis resets the base settings for the feeders. By resetting the base values, other control parameters can balance the conformity and variability of the raw materials against the actual chemical properties of the raw mix. The RMCS can interface with the XRF and obtain results directly, using automatic data capture, or laboratory analysts can manually input analysis results.

Customized Control

The RMCS can operate with direct analysis only, indirect analysis only, or both types of analyses to supply a more comprehensive solution. The RMCS may also run in automatic mode to implement the feeder changes, or manually with an analyst's assistance. Regardless of the running mode used, the process is continually monitored and displayed, using Statistical Quality Control (SQC) and Trend Graphs.

Process Control System Interface

To properly track trends with the raw mix feeders, the Raw Mix Control System (RMCS) must be interfaced to the plant process control systems. RMCS integrates easily with most modern control systems. The control system integration provides automated capture of current feeder rates, total mix tonnage rates, and various alarm points like feeder starvation and mill run status. Interface to a control system also provides the automatic setting of feeder rates.



RMCS Feeder Configuration

Customer Assurance and Support

Process Solutions' background is the Cement Industry. This is important, as it means that we understand the needs, issues and working environment of the industry.

We work with you to design and/or customize your solution, and to install, implement and maintain the necessary hardware and software. This process typically includes on site time to survey the site and confirm requirements before detailed planning and implementation start.

We offer a full 12-month warranty on all of our solutions, and provide customized ongoing maintenance and support agreements. Our Customer Care group carries out on-site installations, and provides full-time Help Desk support.

Most importantly, we aim to establish client partnerships for the long term. We develop an on-going working relationship that will enable you to get the most from your existing solution(s), and at the same time help us to further develop our portfolio by understanding and satisfying your needs.

We are continually updating and improving our core technologies. Relying on user feedback makes our software better suited to the cement industry, and all of our software is tailored to your individual requirements.

System Requirements

The RMCS runs with Microsoft® 32-bit Windows™ environments.* Typical installations of the RMCS meet the minimum specification for the operating system.

PSCL Windows applications are tested with current versions of Windows at time of release; however, we do not guarantee full functional compatibility with all Windows versions.

Cost and Delivery

The Raw Mix Control System (RMCS) requires a single license for each control application, with any number of users accessing the data stored and produced. Limitations may exist based on third party software license requirements such as process control system interfaces.

The RMCS can be supplied as a purchased licensed system or on a lease basis. Regardless of the purchase method, the price includes configuration to site-specific requirements, commissioning, and training. The leased software includes a support and maintenance agreement for the term of the lease.

The purchased license for a RMCS package includes our standard maintenance and support agreement for the first year. The maintenance and support agreement can be extended annually at a cost of 10% of the original system license cost.

Summary

RMCS delivers a powerful process quality assurance tool that analyzes and controls a raw feed system to aid in producing a uniform raw mix. It is a complete turnkey system configured to your specific plant. Process Solutions' experience in the cement industry has provided a system that is effective and cost competitive.

If you have an opportunity to discuss this comprehensive raw mix quality control solution with us, please contact our Quality & Environmental Solutions Manager:

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