OSIsoft

SUMMARY

CEMEX

Industry

Cement, Ready-mix Concrete, Aggregates,

Business Value

- Validated data
- Mass balance
- Fuel & energy consumption
- Equipment downtime
- Plant to plant comparisons and benchmarking

PI System™ Components

- PI Server™
  - Asset Framework (AF)
  - High Availability
- AF SDK
- Enterprise Agreement

Other Components

- SAP PP
- SAP PM
- SAP MM

Decision Support Platform for Managing Manufacturing

Headquartered in Monterey, Mexico, CEMEX is a global manufacturer of building materials including cement, ready-mix concrete, and aggregates. As part of its commitment to becoming the most efficient and innovative building materials company in the world, CEMEX continually evaluates and evolves its systems and processes. One example of this commitment to evolution is CEMEX's use of the PI System™.

CEMEX first installed the PI System in 1995 and has been evolving the scope, breadth, and application of the PI System ever since. At the 2014 OSIsoft Users Conference in San Francisco, Raul Roel presented CEMEX's latest advancement, the Cement Production Model (CPM) to improve quality, energy utilization, emissions, and reduce failures.

While still in development, once complete, CPM will provide a robust, corporate-wide, platform for managing all aspects of cement manufacturing. "[CPM's] main purpose is to incorporate [a] real-time decision making solution within all the hierarchies/levels of the company," says Raul Roel, Processes Center of Excellence Advisor for CEMEX. CPM consists of five modules which leverage data from CEMEX's ERP Systems, BI Systems, and the PI System:

Quality Management | Production Data Validation | Energy Management | Emissions Management | Condition Base Maintenance

Mr. Roel's talk primarily focused on the project's initial standardization efforts and the Production Data Validation (DVM) module.

Prior to CPM, plant personnel manually managed a lot of data and there was no standard criteria applied to production or process. The first step in the CPM project was to define a corporate-wide standard for production and process. "We established the common names and common references to define the same meanings for all the information across the plants," says Roel. "This allows us to make comparisons and benchmarks among our plants." This new standard relies heavily on the Asset Framework (AF) functionality of the PI Server to add context and consistency.

As new plants are added to CPM, administrators define, via drag and drop in DVM, the equipment and sequence of operation for the production line, materials for each piece of equipment, and the products produced by the equipment. This information is sent to

AF where the AF model and corresponding data feeds are automatically created. The AF model and data feeds in place, plants begin using CPM for data validation.

DVM leverages production data from the PI System and capacity per hour information, equipment schedule time, and partial inventory data from SAP to create verified and corrected data. CEMEX validates data using a four step process:
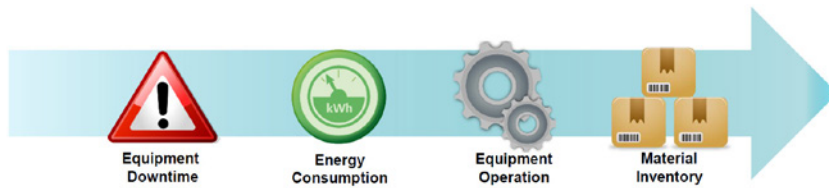
During the Equipment Downtime step, uptime is calculated using run time and capacity data, downtime conditions are classified, and the results are used to calculate performance KPIs, uptime, energy consumption, and fuel consumption and to trigger scheduled maintenance and future downtime events. During the Energy Consumption step, daily, monthly, and end-of-month electricity consumption is validated, energy consumption is assigned to each material produced, and CEMEX asses actual consumption versus suspected consumption. At the Equipment Operation step CEMEX assesses if equipment operated according to established rules or if there were deviations. Lastly, during the Material Inventory step theoretical materials levels are compared to actual material levels (which are measured daily in the silos) and CEMEX performs a final check to see if the now verified data is complete and correct. If validation is complete, the data is sent to SAP. Otherwise it goes back through the process to be corrected. At the end of validation, DVM sends production and consumption data, kilowatts consumption, low heat value, and completed inventory data to SAP PP and SAP MM.

With the beginnings of the CPM solution in place, CEMEX has seen many benefits. CEMEX administrators can now easily manage users, countries, plants, material families, etc. to ensure consistency of all master data and maintain data integrity. The new solution is providing reliable, validated, information for real-time decision making while "standardization enables personnel to work the same way in all company sites so future inventory corrections are avoided," says Roel. This data is being fed to standardized reports and KPIs which provide equipment operation, fuel consumption, KWH consumption, and inventory information to the company. These reports are used by the plants each morning to review daily results and determine action items for the plant. Implementing CPM has also helped CEMEX reduce obsolete and high maintenance tools throughout its operations which is lowering its total cost of ownership. "[With CPM] we have a complete landscape of solutions for cement production and a very good tool to validate data from the shop floor (...)" says Roel.

At the time of Mr. Roel's presentation, the Quality Management and Production Data Validation modules of the CPM solution were complete and being used at nearly 60 plants throughout Mexico and South America. CEMEX plans to continue deploying CPM to plants in the U.S.A. and Europe while developing the remaining three modules.

> **"The PI System infrastructure [is] the source of real-time data [and] the base to make several calculations and configuration of events and other important data for the process."**
>
> – Raul Roel
> *Processes Center of Excellence Advisor*

Roel, Raul. *Data Validation Module Supports Real-time Decision-Making Process*. OSIsoft.com. 25 March 2014. Web. 18 May 2015. <http://www.osisoft.com/Templates/item-abstract.aspx?id=11045>.