

# Cement

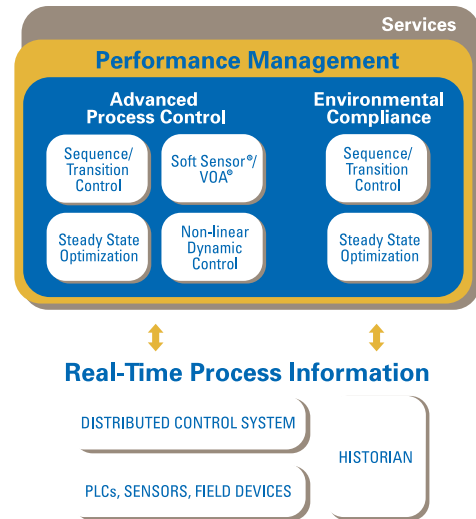
## What would it take...

To increase capacity without making expensive capital investments? Boost production while reducing off-spec product? Improve profitability while driving down energy costs? Maintain environmental compliance and leverage alternative fuels—while increasing efficiency, product quality, and operational reliability?

Pavilion Technologies provides integrated advanced process control and environmental compliance solutions that help the world's most successful cement companies easily increase production, improve quality, decrease costs, achieve environmental compliance, and accelerate profitability.

# Pavilion Solutions

Pavilion's innovative, patented advanced process control and environmental solutions help customers continuously monitor and improve plant performance, maximizing production and quality while reducing emissions and costs. Building on a foundation of innovation in advanced process control, our proven solutions deliver faster project execution, better results, and more sustained value year-over-year for our customers – guaranteed.



## Advanced Process Control Solutions

Pavilion's Advanced Process Control (APC) software solutions deliver unparalleled modeling, prediction, control, and optimization capabilities in one unified solution. Our superior data pre-processing, parameter formulation, modeling, and prediction techniques yield extremely accurate representations of even the most complex cement processes.

Our *multivariable predictive control solution* is the only one in the market capable of synthesizing all available information—process knowledge, first-principle equations, or empirical models—into a comprehensive model of the production process. Unlike traditional solutions that intermittently react to current conditions, Pavilion's software proactively controls process behavior based on predictions of future conditions. In addition, it provides fast, efficient execution to continuously improve the production process based on your unique business objectives.

Pavilion's advanced model-based controllers are easy to use, require far less maintenance, and exhibit higher uptime percentages than competitive solutions to deliver greater value over longer periods. Our predictive analysis capability provides minute-to-minute insight into key process parameters, reducing variability and the dependency on costly lab sampling.

Pavilion's engineering team offers deep expertise in delivering control applications to the cement industry. We understand the challenges our customers face and are highly adept at delivering solutions that meet their needs.

### Potential Applications:

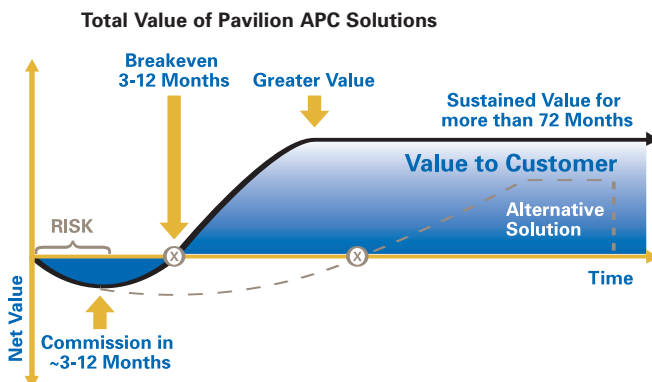
Leading cement manufacturers rely on Pavilion's APC solutions to optimize:

- Vertical Raw Mills
- Kilns (preheater, precaliciner, long)
- Clinker-Coolers
- Finish Mills

### Vertical Raw Mill:

Whether you are maximizing throughput or closely managing costs, operating the raw mill at peak efficiency is a difficult challenge due to quickly changing process dynamics. The model predictive control inherent in Pavilion's solutions helps our customers:

- Eliminate avoidable vibration trips
- Reduce fineness variation by as much as 50%



### Documented Customer Benefits:

- » 4% reduction in energy costs
- » 6-10% increase in feed rate
- » 99% controller uptime

## Advanced Process Control Solutions

### Kiln:

Kilns are inherently chaotic systems that are difficult to control even in stable business conditions. Add changing customer demand, strict environmental limits, and the use of alternative fuel sources, and cost-effective operation becomes difficult for an expert or fuzzy logic control system. Pavilion's APC solutions:

- Stabilize kiln operation
- Increase the percentage of lower-cost fuels while controlling temperatures within optimal bounds
- Optimize and control heat energy input
  - Reducing thermal energy costs
  - Reducing NOx at current production or increase production to current NOx levels while minimizing limit violations
- Reduce free-lime variability by as much as 50%
- Reduce excess O<sub>2</sub>
- Increase feed rate
- Reduce refractory usage
- Require minimal operator intervention
- Ensure deployment in 6-10 weeks from project kick-off

#### Documented Customer Benefits:

- » Up to 10% increase in clinker production
- » Up to 4% reduction in fuel consumption
- » Up to 4% reduction in specific energy use
- » 20% reduction in NOx emissions
- » 14% reduction in prime fuel versus alternative sources
- » Nearly 100% system uptime

### Clinker-Cooler:

Unlike traditional approaches that separate kiln and cooler control, Pavilion's APC solutions integrate the two components for even greater efficiencies that:

- Improve heat recovery
- Provide tighter temperature control of tertiary air and improve precalciner operation
- Improve quality, providing stable and optimal grinding

### Finish Mill:

Whether the objective is to improve production rate and product quality or to reduce energy costs, Pavilion's APC solutions provide the most comprehensive control available for finish mills. Leveraging Pavilion's patented Virtual Online Analyzer® (VOA®)— for superior Blaine measurement and feedback, our finish mill applications:

- Improve product consistency
- Increase production rate
- Improve grade transitions, minimizing off-spec production
- Virtually eliminate controller maintenance costs
- Ensure deployment in 3-5 weeks from project kick-off

#### Documented Customer Benefits:

- » 6-24% increase in production
- » 30% increase in product consistency
- » 4% decrease in energy costs

## Environmental Solutions

Pavilion's environmental compliance software solutions allow cement manufacturers to calculate, monitor, report and reduce emissions in real time.

In addition to our proven technology portfolio, Pavilion Technologies boasts an experienced team of environmental engineers with strong air quality regulatory backgrounds. The combination of this expertise and Pavilion's comprehensive environmental compliance solutions delivers faster project execution and higher recurring value for our customers.

### Emissions Monitoring and Record-keeping Applications:

Pavilion's *environmental performance management software* is a web-based solution that enables plants to extract data from multiple emissions sources, calculate regulatory metrics and limits, and issue an array of emissions regulatory reports in a matter of minutes.

“ In just a few short weeks, Pavilion’s solution allowed us to increase our production by more than 10%. The financial benefits we expect to realize encouraged us to extend the application throughout our facility. ”

– Max L. Frailey  
Vice President  
Capitol Cement

# Case Study



# Predicting Results.

## Perfecting Customer Performance.

Photo provided by Capitol Aggregates, Ltd.

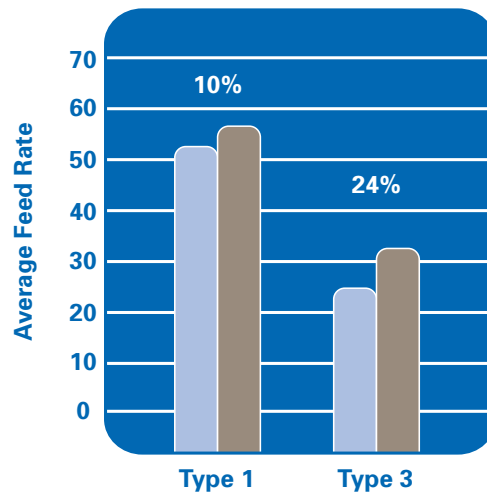
### Capitol Aggregates, Ltd.

- » **Company:** Capitol Aggregates, Ltd., (Capitol Cement) is a leading cement producer based in San Antonio, Texas, producing approximately 900,000 tons of cement each year.
- » **Site:** Capitol Cement's Finish Mill Six
- » **Customer Goals:** Eliminate the mill bottleneck, optimize production processes, improve product quality, and increase yield—all while reducing energy and operating costs.
- » **Pavilion Solution:** Capitol Cement implemented Pavilion's APC software solution in just four weeks and quickly realized significant benefits and ROI. The solution's predictive capabilities enable plant personnel to anticipate how the mill will perform in light of significant external process upsets and through normal product transitions. It continuously updates its predictions based on the internal models of future behavior, process interdependencies, and actual performance.

#### Results:

- » Increased production rate by 10%
- » Reduced specific power consumption by 4%
- » Increased product consistency by 30%
- » Decreased overall maintenance costs
- » Solved mill bottleneck without purchasing additional costly equipment

#### Results: Increased Production





### ValueFirst™

Each Pavilion project builds on the foundation of our ValueFirst™ customer engagement methodology. This unique process aligns every aspect of Pavilion's people, process, and product with customers' business needs to guarantee measurable value and lasting results. From a comprehensive value assessment to a uniform set of performance metrics to a focus on life-cycle cost reduction, Pavilion is dedicated to delivering the highest possible value to customers, faster and better than alternative solutions.

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**Pavilion Technologies is a leading provider of Advanced Process Control (APC) and environmental compliance solutions for global enterprises. Pavilion's solutions combine proven technology and deep industry expertise to deliver measurable benefits and recurring value to more than 350 companies worldwide, including BP, Capitol Aggregates, Fonterra, and Nestlé. A privately held company based in Austin, Texas, Pavilion Technologies serves every region of the world.**

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**For more information about Pavilion's APC and environmental solutions for the cement industry, call us at 1-800-880-5432.**

**[www.pavtech.com](http://www.pavtech.com)**