



IX® Case Study

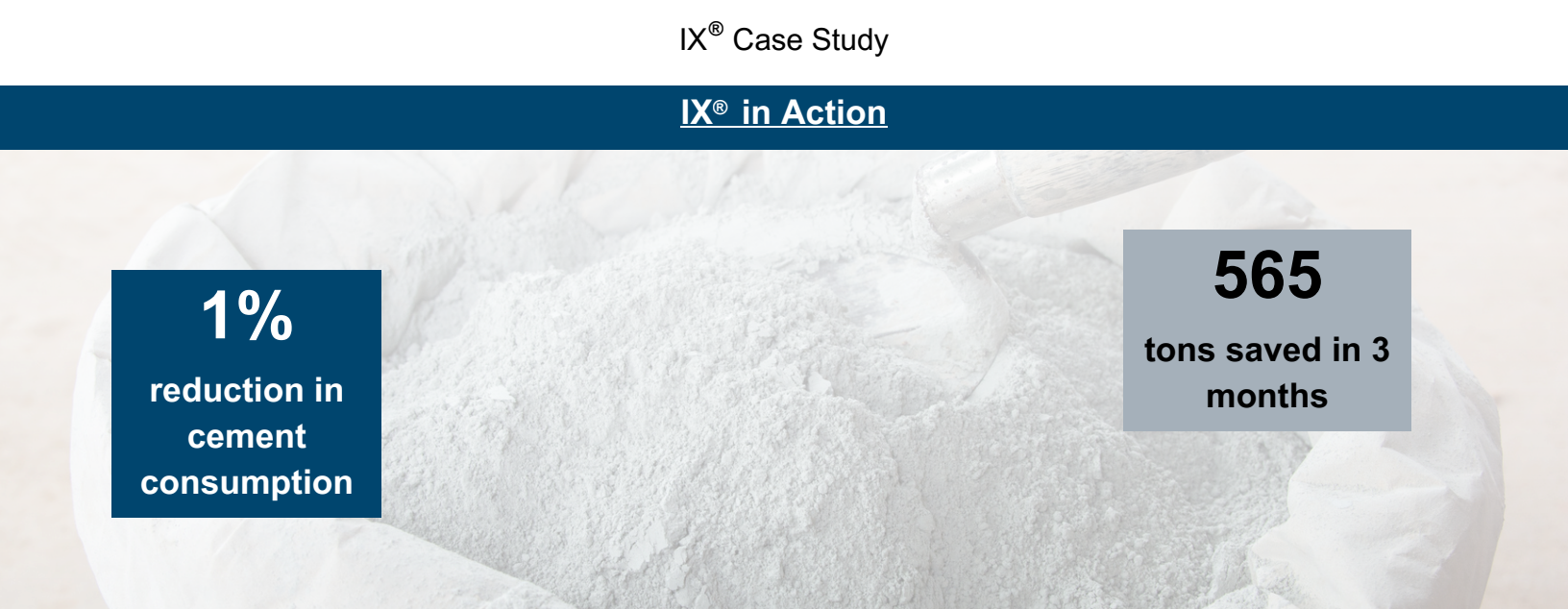
AI-Driven Precision Dosing for Cement Production



VOOBAN



**IMPLEMENTATION
ENGINEERS®**
BEYOND CONSULTING

**1%****reduction in
cement
consumption****565****tons saved in 3
months**

Cement and concrete production require absolute precision.

Small deviations in material dosing can significantly impact product quality, structural performance, and cost. Cement, the most critical and expensive input, must be controlled with extreme accuracy while operating in highly variable plant conditions.

Across modern cement operations, batching systems are already automated, but variability remains constant. Changes in material humidity, temperature, equipment behavior, and storage conditions introduce instability into the dosing process. As a result, producers are forced to balance speed, precision, and equipment durability often sacrificing one to achieve the others.

The Challenge

Despite existing control systems, plants struggled to consistently hit precise material targets. Traditional batching methods relied on a two-step approach:

- Deliver ~95% of the target volume
- Pulse material gates in short intervals to “top off” the remaining quantity

This created systemic issues:

- Inconsistent dosing accuracy due to real-time variability
- Increased cycle times, slowing production throughput
- Excessive mechanical wear from repeated gate actuation
- Material overuse, especially cement, driving unnecessary cost and emissions

Operators were compensating for variability rather than eliminating it. The core problem was clear: the system could not predict the optimal moment to stop material flow under changing conditions.

AI Implementation

Implementation Engineers and Vooban deployed an AI-driven dosing optimization solution directly integrated into plant control systems.

The solution leveraged real-time operational data to dynamically control material flow, replacing static rules with predictive intelligence.

What was implemented:

AI-driven gate closure optimization

- Machine learning models predict the exact moment to close material gates based on real-time conditions

Multi-variable process modeling

- Inputs include material humidity, temperature, pressure, equipment behavior, and bin levels

Real-time decision engine (Batch AI)

- Continuously analyzes plant data and adjusts dosing in milliseconds during production

Closed-loop control integration

- AI outputs are embedded directly into existing batching software, requiring no disruption to operations

Scalable deployment across plants

- Model adapts to different production environments, enabling standardization across sites

This shifted the process from: reactive correction → predictive control

Instead of “chasing the target,” the system now hits it on the first pass.

Results

The impact was immediate and measurable across cost, performance, and sustainability.

- 1% reduction in cement consumption
- 565 tons of cement saved in 3 months
- 480 tons of CO₂ emissions avoided (equivalent to removing 400+ cars from the road)

Beyond the quantified metrics, operations saw:

- Improved dosing precision and consistency across batches
- Faster production cycles with reduced reliance on pulsing
- Lower equipment wear and maintenance requirements
- Increased operational stability across varying conditions

This Applies Anywhere That...

This approach applies anywhere precise material dosing, flow control, or batching directly impacts cost, quality, and throughput.

- Cement and concrete production (batching, mixing, aggregate dosing)
- Chemicals and process manufacturing (liquid and bulk material dosing)
- Food and beverage (ingredient batching, blending, formulation control)
- Mining and metals (ore blending, reagent dosing, slurry control)
- Pharmaceuticals (active ingredient precision and formulation consistency)

Any operation where variability in material behavior affects outcomes can benefit from AI-driven, real-time control.

Let's Turn Your Vision Into Results

Implementation Engineers and Vooban deliver together — turning strategy into operational reality through AI-enabled execution.

Our proven **Align-Design-Execute** framework ensures your strategy doesn't stall at planning. From aligning leadership around priorities, to designing AI-driven operating models, to executing change inside your operations, we work side-by-side to deliver results that scale.

Ready to Get Started?

Let's explore how we deliver together. Contact us today to schedule a conversation. Together, we'll chart the path from vision to execution.

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