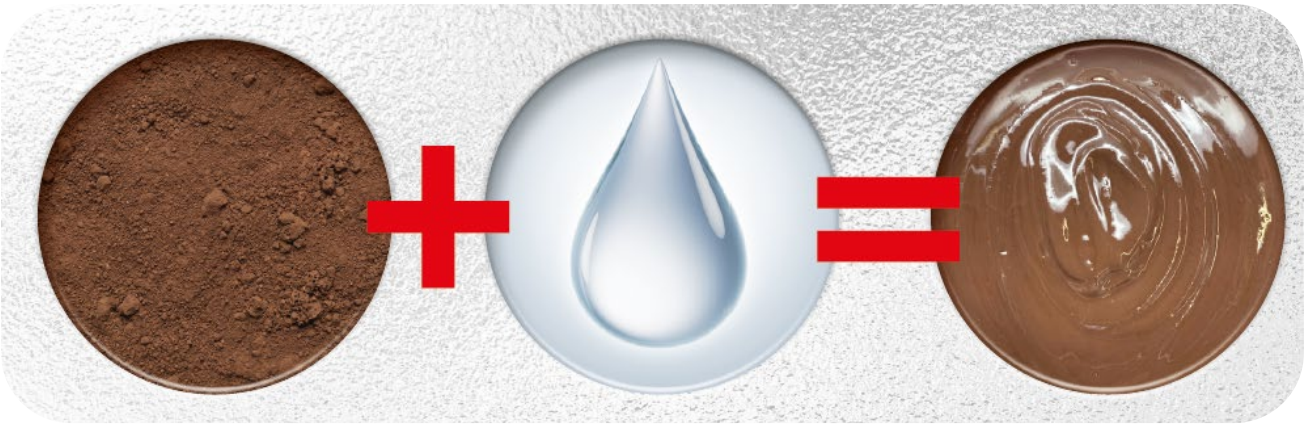
CASE STUDY
ADVANCING REFRACTORY COATINGS

The Next-Generation of Performance
Application: Serial Production Block Casting
Solution: G- Series Granulated Refractory Coating



Background

High-volume engine block production demands coating systems that are not only technically reliable, but also operationally efficient.

A leading North American foundry initiated a review of its refractory coating approach to identify opportunities to reduce logistics complexity, improve material consistency, and modernize preparation methods without disrupting established production flow.

Traditional premixed liquid coatings, while effective, introduced challenges related to transportation weight, storage, handling, and product aging over time.

The Challenge

The operation identified operational constraints associated with premix technology:

- Excess material handling tied to liquid tote management
- Freight inefficiencies from shipping water-based product
- Variability in coating performance due to coating preparation
- Labor and time required for staging and mixing product properly
- Storage space dedicated to returnable containers

These factors created an opportunity to evaluate a more agile, point-of-use preparation model aligned with lean manufacturing objectives.

The Solution: Granulated Coating Technology

Arkopal® G 4114 US was introduced as an alternative delivery system designed to shift coating preparation from the supplier to the foundry floor, enabling **on-demand production of fresh coating**.

Unlike conventional liquids, the granulated refractory is delivered as a moist, free-flowing material that is reconstituted onsite through controlled water addition and high-shear mixing. This approach allows the facility to:

- Prepare coating only as needed
- Maintain consistent rheology and performance
- Eliminate shipment of non-value-added water weight
- Simplify storage and internal logistics

Implementation Approach

Integration into production required minimal process disruption. The material was prepared using the HAI Granulated Preparation Unit (GPU) and introduced into the existing workflow with:

- On-site technical guidance and validation
- Operator training focused on repeatable preparation methods
- Process verification to ensure compatibility with current application practices

Technology Characteristics

- Moist, granulated format engineered for controlled dispersion
- Clean, low-residue handling during transfer and mixing
- Eliminated or reduced dependence on returnable liquid containers
- Streamlined staging with predictable batch preparation

Figure 1: Granulated Preparation Unit (GPU) with integrated preparation system

Results & Operational Benefits

Measurable Operational Improvements

- **30-minute reduction** in preparation time compared to the 45 minute minimum mixing time required for a tote. Enabling up to three times more material to be prepared in the same timeframe.
- Faster preparation with fewer manual steps
- Reduced operator interaction during batching and staging
- Consistent coating homogeneity at application

Reduced Material Handling

- 53% reduction in total units handled compared with premix systems
- Significant decrease in tote movement and storage requirements
- Improved material utilization with minimal residual waste
- Cleaner work environment and simplified housekeeping

Logistics & Sustainability Gains

- **63% reduction in required truckloads**, including delivery and return of empty containers
- **56% reduction in CO_2 footprint associated with freight**
- Lower freight demand by eliminating transport of water weight
- Fewer deliveries required to sustain production volumes
- Reduced transportation impact supporting sustainability initiatives

Business Value

The evaluation demonstrated that granulated coating technology can deliver measurable advantages over traditional premix systems:

- Streamlined workflow and labor optimization
- Reduced total logistics burden across the supply chain
- Improved production readiness through fresh, on-demand preparation
- Lower environmental impact aligned with corporate sustainability goals
- A scalable model suitable for broader implementation

Outcome

Following the successful production trial, the foundry validated the technology for continued evaluation, establishing a pathway for expanded adoption as part of ongoing process optimization and cost-efficiency initiatives.

About Granulated Refractory Coatings

Granulated coating technology represents a shift from shipping ready-to-use liquids to delivering concentrated materials prepared at the point of use.
By moving preparation closer to application, foundries gain:

- Greater control over coating consistency
- Reduced waste and storage complexity
- Improved operational flexibility
- A modernized approach to plant coating logistics