

APPLICATION REVIEW

Mineral Extraction Industry

Innovative Mobile Industrial Processing System Meets the Mixing & Blending Demands of Changing Manufacturing Environments

The Challenge

Staying competitive in process manufacturing requires even the fittest of companies to be agile and dynamic. The complexities of manufacturing have compounded over the last decade as economic metrics have been expanded to account for global shifts and quickly changing trends. Production facilities that were once expansive and centralized have now been reorganized, adjusting to smaller volumes and utilizing regional production sites. Cost reductions and environmental stewardship initiatives cross paths as production reclaims revenue sources in forgotten waste streams.

For this reason mobile production, or modular pre-processing, is becoming increasingly vital to all major process driven industries and range from oil and gas, chemical, and energy, to food processing and pharmaceutical. One way to overcome the challenge of processing new raw materials in uncertain operating environments is to mix or pre-process at the source rather

Project Summary

CHALLENGE

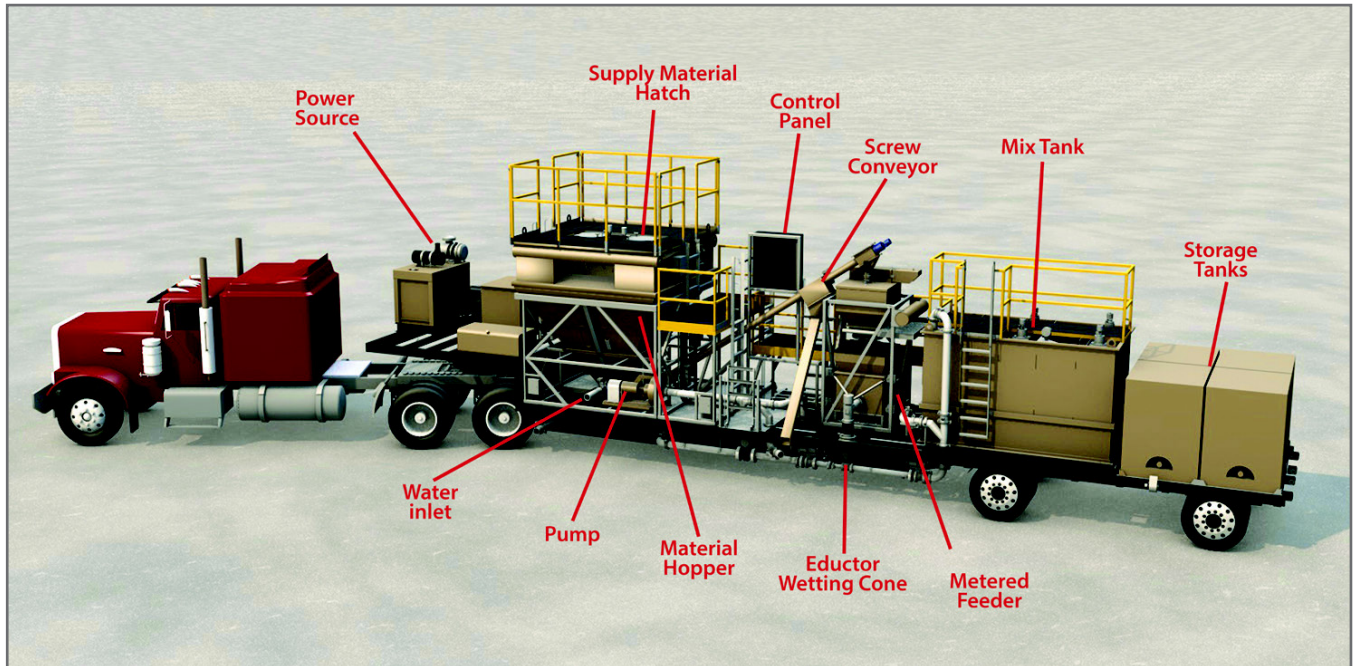
- Reducing cost and hazards of transporting pre-mixed chemical solutions to a remote processing site.
- Processing new raw material in uncertain operating environments.

BUSINESS RESULTS

- Reduced transportation and labor costs
- Increased quality of blended chemicals for processing
- Significantly reduced operating costs
- Mitigated environmental risks



Hapman's mobile mixing system provided a capability that many other companies can not do - the ability to mix dry chemicals at the job site as needed.



Hapman's Solidiquid technology, combined with a PosiPortion feeder, (left) precisely measures and adds dry chemicals at an accuracy of $\pm 2\%$. (Right) The vortex action of the eductor efficiently and thoroughly blends fluids and dry materials together. The resulting pre-mixed slurry is easily transported and blended with other ingredients in the mixing process and dramatically reduces mix times.

than trucking feedstock directly from the sourced location. Mixing material at the source can reduce transportation and processing costs, and improve chemical volume and quality through mixing or preprocessing.

Thinking Outside the Plant - Mineral Extraction Challenges and Production Boundaries

Mining natural resources is oftentimes conducted for extended periods in remote areas. The transportation and storage of the necessary chemicals for extraction increases operating costs and reduces profit margins due to lack of infrastructure and utilities. Even in ideal conditions, transporting sensitive chemicals in their fluid state can negatively affect the necessary viscosity or other properties. When a natural resources customer came to Hapman with this problem, Hapman engineers developed an innovative solution that allowed the customer to boost their operating efficiency, and decrease costs using a modular, mobile production system.

The chemicals the customer used in their process were trucked to the remote work site in a premixed liquid state within large plastic totes. This was problematic for several reasons. Storing and transporting the chemicals in totes made them susceptible to viscosity degradation, which negatively impacted process efficiency. Plus, these polymeric compounds can react adversely in the presence of UV light, oxidation, temperature fluctuations, and contamination from bacteria or other compounds.

Stabilizers can be added to slow down breakdown of the polymer's chemical bonds, but they increase the total investment of the final product and can also add to contamination.

Another drawback of the totes was the fluid weight of these chemicals increased both transportation and labor costs. Large numbers of flatbed trucks hauling these totes were required to maintain uninterrupted operation.

Production Mixing on Wheels

Hapman engineers developed an innovative approach – transport the chemicals in their stable dry state, and mix them on-site as needed with available water. This solution promised to reduce the amount of chemicals needed, decrease transportation and labor costs, maintain the necessary viscosity of the chemicals used, and make the overall operations more efficient.

Putting Theory into Practice

Creating a homogeneous blend of dry and wet ingredients to specific ratios is a challenge for many industries, even within controlled plant environments. Accomplishing a similar task in the field required a different tactic. Hapman engineers took an unconventional approach and rigged a 40-foot flatbed trailer with a fully-functional customized mobile mixing delivery system designed to easily go wherever it was needed.

The cornerstone of this mobile mixing system is Hapman's Solidquid™ educator technology, which precisely measures and adds dry chemicals at an accuracy of 0.5%.

The vortex action of the Solidquid effectively achieves a thorough blending of fluids and powders. The controls for this application required a unique loss and weight algorithm, designed by Hapman Engineers. The loss

and weight feeding system achieved the tight mixing tolerances required for this application.

Transport of the dry chemicals into the process was accomplished using the Helix® flexible screw conveyor to move chemical powder from the bulk bag unloader and into the mixing process. All moving parts in the new mixing system were hydraulically driven. A bag-house and storage bin were also included.

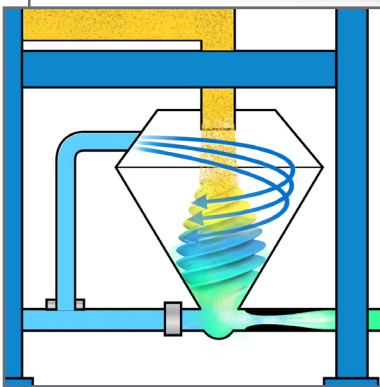
On-board pumps provided sufficient flow and pressure to the educator, and was fed by Hapman's PosiPortion™ Feeder. Specifically programmed controls automated the process and precisely measured delivery of the chemical solution. The educator system proved ideal for this application, having been successfully used for pre-mixing and wetting fine powders, granular solids, drilling muds, and semi-solids in other industries.

Innovative Design Cutting-Edge Results

Hapman's mobile mixing system provided a capability that no other company currently has – the ability to mix dry chemicals at the job site as needed. In addition to this benefit, the mobile processing system also:

- Reduced transportation and labor costs.
- Increased the quality/viscosity of the chemicals.
- Decreased the amount of chemicals required to do the job.
- Improved the process by eliminating the variability of chemical quality.

The mobile mixing system also provided the added capability of weighing the dry chemical material and measuring an accurate amount of powder, then providing valuable usage reports for the field services customers. The fully automated system produced a concentrated delivery of the chemical mixture compared to the previous system and was an overall cost effective improvement in efficiency.



Hapman's Solidquid technology, combined with a Posi-Portion feeder, (above) precisely measures and adds dry chemicals at an accuracy of $\pm 2\%$. (Left) The vortex action of the educator efficiently and thoroughly blends fluids and dry materials together. The resulting pre-mixed slurry is easily transported and blended with other ingredients in the mixing process, dramatically reduces mix times.

ABOUT HAPMAN

For 70 years, Hapman has provided manufacturing plants around the world with the most technologically advanced powder and bulk handling equipment and systems, offering custom engineered equipment and systems for chemical, food, pharmaceutical, plastics, building, minerals, and other industries. For more information on Hapman, visit hapman.com

