

# GMBOND®

SAND BINDER

As published in *Foundry Management & Technology*, January 2005

## Staying Competitive with Environmentally Friendly Sand Binders

By David Parker and Richard Herreid, Hormel Foods Corporation

The foundry industry has long looked at environmental compliance as purely a cost factor. However, new options in environmentally friendly sand binders and other foundry technologies offer the opportunity to decrease environmental impacts while improving overall competitiveness. Environmentally friendly sand binders like GMBOND® Sand Binder, produced by Hormel Foods, offer equal if not better performance than petroleum based products with fewer environmental and health risks.

### Thinking green adds up to savings

There are numerous layers of cost savings that an organic sand binder offers such as savings on shake-out, emissions compliance, sand reclamation and disposal, and reduced energy costs from not having to bake out cores. The basic ingredient of GMBOND® Sand Binder is water-soluble protein. When GMBOND coated sand is mixed with water, biopolymeric bonds are formed adhering the sand particles together. After cores have been formed, water continues to evaporate further, hardening the core. This formulation offers advantages ranging from sourcing to disposal. Because the protein used is a renewable, domestically produced resource, its price is stable and not tied to petroleum market fluctuations.

According to statistics from Foundry Industry Recycling Starts Today (FIRST), six to ten million tons of foundry sand are discarded annually. Disposal of sand after casting is simplified with the use of environmentally friendly binder systems. For example, GMBOND® Sand Binder will biodegrade in spent sand. Because it is not toxic it does not have to be disposed of as solid waste, and is available for geotechnical, manufactured products and agricultural applications. Thermal reclamation of sand is also easier with GMBOND® Sand Binder than with traditional binder



*Easier core-sand removal and tighter dimensional accuracy allows thinner casting walls to be employed to remove weight from the cast part.*

systems. Sand coated with GMBOND can be reground to make new cores several times without loss of core integrity.

### Organic sand binders are ready for prime time

Some believe that environmentally friendly sand binders are still in the development stage, and not available or suitable for high production foundry operations. In fact, organic sand binders are well suited for high volume production because it is the type of manufacturing environment where they provide the greatest health and cost benefits. Testing by the Casting Emission Reduction Program (CERP) has proven that GMBOND reduces VOC emissions by more than 90 percent in baseline comparisons to cores made with phenolic urethane resins. Binders like GMBOND® Sand Binder are helping foundries achieve their production goals today.

# Testing by the **Casting Emission Reduction Program** has proven that GMBOND reduces VOC emissions by more than 90% in **baseline comparisons** to cores made with phenolic urethane resins.

The qualities of easy thermal degradation and water-solubility further support high-volume production by eliminating bake-out, reducing shake-out time and reducing damage to cast parts which occur during the decoring process. According to market forecasts by Stratcast, Inc., aluminum casting shipments are expected to grow 7.1 percent in 2004, and will continue to increase annually at a rate of 2.0 percent by 2013. To meet this demand, foundries must identify methods to improve production rates. The easy thermal degradation quality of GMBOND® Sand Binder benefits foundries producing non-ferrous metals, which are cast at lower temperature ranges, by making core removal less difficult and eliminating bake-out. Foundries in Iowa, Illinois and Ohio have experienced significant improvements in shake-out — ranging from 50-90 percent reductions in time — depending on the casting design. One Ohio foundry using GMBOND® Sand Binder for casting pump nozzles was able to greatly increase production rates by eliminating the need to manually drill out the core from a Zinc alloy cast part.

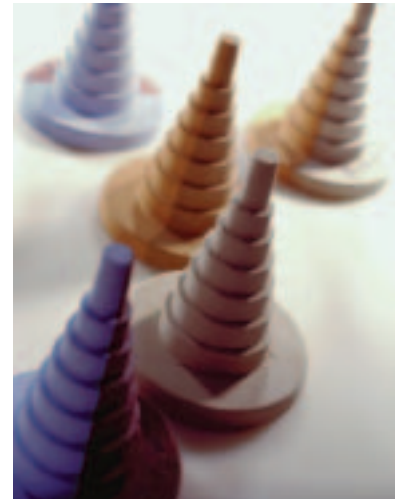
## Production quality performance

GMBOND® Sand Binder used both with silica sand and a synthetic aggregate offers comparable dimensional accuracy



*Cores formed with environmentally friendly sand binders offer performance similar to cores made with petroleum-based binders.*

*Step cone cores made with environmentally friendly sand binders can help to assess casting performance characteristics.*



and tensile strength to a baseline phenolic urethane coldbox binder (PUCB) sample on silica sand. For

handling, cores made with GMBOND® Sand Binder do not have to be completely dried since a strong, hard shell develops during the curing cycle. The tensile strength of GMBOND® Sand Binder cores ranges from 250psi and higher depending on the aggregate medium with strength increasing as it continues to dry. Complementing this, the protein binder's transverse strength decreases more quickly than the PUCB binder does with heat over time so does not require hammering or bake-out for core removal. This allows material to be removed easily and minimizes the likelihood of unwanted core sand in the casting. The easier core sand removal and tighter dimensional accuracy allows thinner casting walls to be employed to remove weight from the cast part, further reducing the component's cost.

In summary, running a competitive foundry business and being environmentally conscious are not mutually exclusive goals. Environmentally friendly sand binders offer quality performance and cost benefits that can improve foundries bottom line. Non-toxic sand additives like GMBOND® Sand Binder are available now and can help foundries reduce costs, reduce shake-out issues and achieve environmental goals.



Specialty Products