



SlurrySMART®



Advancing Slurry Technology

Specifically Designed for Mechanical & Hydraulic Grabs and for Bored Piling

Introduction

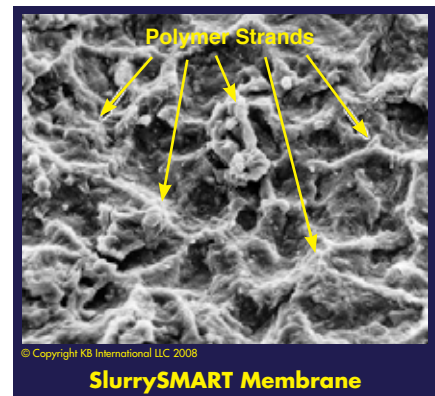
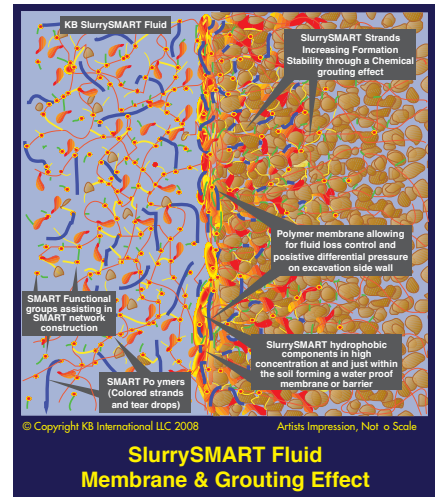
In 1991 KB International patented and introduced "Vinyl" polymer technology to the foundation industry. With continued investment in research and development, KB championed the use of Vinyl technology in the marketplace. After extensive field acceptance, it became increasingly apparent to KB that there were still limitations to Vinyl polymer technology. To meet this challenge, KB embarked into a new and emerging area of technology, nano-chemistry.

The result, SMART polymer technology. SMART refers to "Self Modifying Applied Response Technology". Simply stated, KB's SMART polymers react to field conditions and perform where, when and as needed based on system demands.

With the introduction of KB's SMART technology, significant advancements in slurry quality control, worker safety and application performance have been achieved. The elimination of multiple additives has brought about a new level of worker understanding of the slurry's application while gaining significant improvement in side wall stabilization, fluid loss control and wall quality.

Superior Excavation Performance

SlurrySMART possesses all of the unique performance properties that KB's product lines are known for, combined in a single package. SlurrySMART forms a synthetic cake or "membrane" on the formation sidewalls during excavation that controls loss of fluid to the formation. It also allows for positive pressure to be applied to the formation wall insuring excavation stability. Unlike bentonite, this cake does not continue to grow on itself over time.



Advantage SlurrySMART

Reduces - Eliminates:

- Transportation Costs for Product
- Slurry Mixing Time
- Bentonite Hydration Time
- Treatment of Slurry prior to Koden
- Disposal Costs of Excavated Spoils
- Desanding Operation
- Equipment & Personnel
- Spent Bentonite Slurry Disposal
- Concrete Defects
- Concrete Consumption
- Chipping/Removing at top of Concrete
- Projects Cleanup Time

Increases - Improves:

- Profitability
- Soil stability
- Joint Quality
- Rebar to Concrete Bonding
- Skin Friction of Elements Walls
- Concrete Quality
- Site Cleanliness
- Quality Control
- Worker Safety
- On-Site Slurry Disposal
- Environmental Friendliness

Soil Stabilization and Grouting Effects

During the initial fluid loss spurt, SlurrySMART is the only proven product that penetrates into porous formation soils where it functions as a soil stabilizer, greatly increasing the strength of low cohesion porous soils. This means that a panel can be held open for prolonged periods of time without the worry of becoming unstable. This extends the time frame allowed to perform complex cage placements and more convenient concreting times.

In water sensitive soils, such as clays, shales and mudstone, SlurrySMART prevents fines from being formed and distributed within the slurry. SlurrySMART also insures that clay, shale or mudstone at the excavation face does not swell or slough, preserving the strength of the formation, yielding a more gauge panel and improved concrete to soil bonding.

No Desanding Requirements

A SlurrySMART fluid is clean immediately upon completion of panel excavation. There is no need for any subsequent desanding and de-silting to take place. This results in significant increases in productivity and ultimately in increased profitability.

Spoil Removal and Site Cleanness

Spoils excavated with KB's SlurrySMART polymer technology are typically dry, having the same properties as the formation from which they were taken. There is no inter-mixing of the spoils with the slurry as there can be with a bentonite fluid. This makes the spoils easier to handle at the surface and readily transportable without leakage from the disposal truck. It also provides a clean and dry work site, improving worker safety.

Soil and Ground Water Conditions

SlurrySMART unique excavation properties makes it effective in soil conditions ranging from highly water sensitive clays and shales, to weak clays with high silt contents, to glacial tills and to low cohesion porous sands. The excavation stability imparted by a SlurrySMART fluid yields a higher quality excavation closer to theoretical volume than does bentonite and other conventional polymers. When used under normal practices, SlurrySMART is not negatively affected by seawater. Slurry viscosity and performance parameters are maintained during excavation insuring that the same level of quality is achieved as in non-marine conditions without all the drawbacks of using a bentonite or a conventional polymer slurry in a saltwater environment.

Koden Logging or Other Sonic Visualization

Koden logs and other methods of sonic panel visualization may be run immediately in a SMART slurry. There is normally no requirement to clean or exchange the slurry when using SlurrySMART. A SMART slurry stays virtually clean of entrained fines. There is nothing to interfere or dampen the sonic waves yielding exceptionally clear and accurate sonic logging.



Excavating a Diaphragm Wall in Shore line Sands with Seawater Saturation and Tidal Influence



Holding Uncompacted Dry Sand Side Wall or 48 Hours



SlurrySMART Grouting Effect in Cohesionless Sands



SlurrySMART Stabilizing a Fluidizable Silt in NYC



Excavating Panels on a Barge at Harbor Front

Wall and Concrete Quality

Walls constructed under a SMART fluid exhibit improved concrete to soil bonding, increased concrete to rebar bonding, high quality joints and low concrete over break due to a more uniform excavation. As there is no residual colloidal material in the slurry, there is no chance of a clay residue forming on the primary panel joint face while the secondary panel is poured. This clean interface coupled with SlurrySMART sensitivity to virgin concrete, results in a higher quality joint.

Concrete Cutoff Readiness and Quality

Due to the lack of entrained fines and the absence of any clay in the slurry, there is no intermixing of a SMART slurry and concrete. Therefore, a clean concrete surface is produced at the top of the panel eliminating the need for concrete over pour. High quality concrete is present just centimeters below the surface dramatically reducing chipping and preparation time. SlurrySMART's superior stabilization of a broad range of soil types also produces a more gauge panel than does bentonite saving significant concrete.

Urban & Logistical Advantages

When working in a city, a smaller plant can be used for a SMART system, as compared to bentonite, allowing for improved plant mobility and placement. This coupled with a clean dry work site, free of equipment congestion, slick bentonite pools and liquid spoils, yields numerous advantages to both the contractor and the public. These advantages include reduced mud and dust, clean streets and sidewalks, reduced noise, and reduced traffic congestion and most importantly, reduced liabilities.

On-site handling and storage is greatly simplified with SlurrySMART. On average, a system requires 30 to 40 times less SlurrySMART than bentonite. With freight costs on the rise, one truckload of SlurrySMART will replace 30 to 40 truckloads of bentonite, giving SlurrySMART the obvious advantage.

Unlike bentonite, there is no extended hydration period or high shear mixing equipment required for a SMART fluid. It is readily mixed into solution using KB's in-line mixer, a fanned stream of water or returned slurry. SlurrySMART hydrates in just a few minutes and is ready to transfer to the excavation or to storage. SMART fluids do not require periodic discharge as does a bentonite slurry. This greatly reduces the quantity of waste slurry to handle, transport and dispose of. By eliminating the need to dispose of the slurry after every few panels, significant cost savings are realized.

KB's fluids have also been entrusted for use immediately adjacent to older structures on floating slabs in New York City on the 2nd Avenue Subway expansion, Oxford University for the new chemistry building and Boston for the Central Artery. KB has also worked adjacent to major structures in Singapore, Kuala Lumpur, Kaushung and Taipei.



Koden being Dropped into Panel Immediately after withdrawal of Grab



Clean Concrete Rise Virtually Eliminates Chipping



Exposed Wall Constructed under KB Slurry



Concrete Rise Under Bentonite vs. KB Slurry on same project in Marine Clay

Environmental & Slurry Disposal

KB's SMART technology is environmentally friendly and readily disposed of to municipal sewer systems. KB's fluids have also been discharged directly to the environment under permit in a number of environmentally sensitive areas such as Yosemite National Park, the Columbia River, the Florida Everglades, the Atchafalya swamplands, the Tagus River in Portugal and Richards Bay, South Africa. A SlurrySMART fluid discharged to the environment is readily broken down by sunlight, dehydration and contact with naturally occurring minerals.

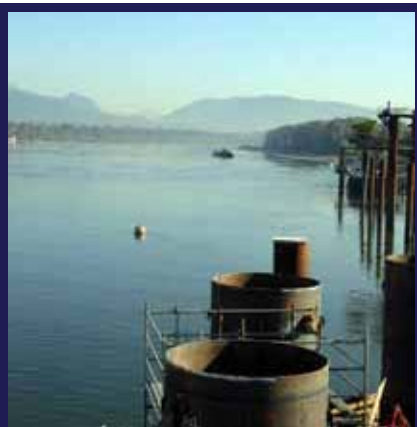
Under normal excavating conditions a SMART fluid is NEVER discarded. It is reused throughout the length of the project. All SMART slurry is returned to the plant and augmented as required to maintain performance. At the completion of a project the remaining SMART fluid is typically discharged under permit to the local municipal waste system. In many cases it may even be discharged directly to the construction site under the owner's or general contractor's permit for site water disposal. If the slurry's viscosity requires lowering, this can be done by dilution with locally available water (pond, run off, river, ocean, etc.) or by the addition of a small quantity of a decomposition product. There is no need to truck the remaining slurry to a landfill or other disposal site, greatly reducing handling costs and liability.

Typically, No Need for Additives

Typically, additives are not required. However, KB has significant experience in extreme conditions such as in utilizing and working in salt water, stabilizing exceptionally low cohesion soils, and countering artesian effects. When system adjustments are required, KB can recommend the proper solution and assist with their implementation on site.



Excavating Immediately Adjacent to a Several Story Building



Periodic Slurry Discharged were made to the Fraser River in BC, Canada



Excavating on 2nd Avenue Subway Expansion in New York City

KB International, LLC

In 1991 KB International, LLC patented and introduced "Vinyl" polymer technology to the foundation industry. The holder of multiple international patents, KB continues to be dedicated to the advancement of polymer chemistry in excavation fluids. Pioneering the use of nano-chemistry for geotechnical applications, KB now offers its SMART polymer technology. With the introduction of SMART technology, KB has the most advanced, yet simple and dependable, line of slurry products in the industry.

KB now, more than ever, offers its customers **Simplicity, Affordability and Effectiveness**

KB's synthetic slurry technologies, including SlurrySMART, have been successfully used on some of the largest and most challenging diaphragm wall and piling projects on six continents. Over the past two decades KB's synthetic slurries have been used on major portions of the Boston Central Artery, New York 2nd Avenue Subway System, the Taipei MRT, the Singapore MRT, the Singapore Port expansion, the Vasco da Gamma Bridge in Portugal, the Channel Tunnel Rail Link in England, the KL Metro, the Bangkok Metro, the Taiwan High Speed Rail, and skyscraper and transportation systems foundations throughout Southeast Asia, Europe, America and Africa.



Technology to Build On!™

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