

## Century-old Master Builders fulfills promise of its brand

In the year that witnessed such landmark events as Henry Ford's "Model T" debut, explorers reaching the North Pole, and Panama's independence from Colombia, an auspicious occurrence for the construction industry also transpired: chemist S.W. Flesheim received a \$4,000 loan in 1909 from his uncle to start a business in Cleveland, Ohio, that would use chemistry to meet myriad building challenges.

Now in its 100th year, the Master Builders brand celebrates a history of construction industry leadership and innovation highlighted by links to some of the world's most renowned structures—Hoover Dam, Sears Tower, Sydney Opera House, Panama Canal, and Federal Triangle. Stretching the limit of engineering capabilities in their time, each of the projects constitutes a milestone achieved in large part due to Master Builders product and technology contributions. Today, as part of the BASF Construction Chemicals division, Master Builders continues to offer industry-advancing resources.

### BUILDING HISTORY

The first Master Builders product was a cement/iron floor topping mix broadcast on freshly placed concrete to replace wood block systems typically used by factories at the time. That initial offering dramatically improved floor wear resistance and appearance, promoting greater longevity and enhancing performance characteristics. Later, the company invented non-shrink grouts used to secure massive machinery. Master Builders was one of the first manufacturers to supply water-reducing and air-entraining admixtures, as well as waterproofing for concrete mortars.

Admixture products in the current Master Builders portfolio optimize the plastic properties of concrete to promote high strength and durability, improve aesthetics, inhibit corrosion of embedded steel, reduce permeability, maximize resistance to chemical attack, allow effective placement of concrete in varying weather conditions, and even permit underwater concrete pours. Similarly, grouting products provide extended working time, corrosion protection, optimal flow characteristics, and high strength

in addition to effective load bearing distribution, stability and alignment. Concrete repair products prevent water intrusion, protect rebar from corrosion, and enable repair solutions on vertical, overhead and horizontal surfaces. Master Builders flooring products improve wear resistance in areas subject to extreme abrasion and impact, enhance energy absorbing properties, add color and aesthetics, ensure a fast cure, and provide skid resistance.

Through the decades, Master Builders performance-enhancing products have been instrumental in the construction of projects ranging from simple slab-on-grade structures to iconic engineering feats. Among a multitude of roads, bridges, skyscrapers, dams, power plants, tunnels, transportation terminals, factories, civic buildings and residences to which the brand has contributed, Master Builders can cite such high-profile projects as the Denver International Airport, Sydney Opera House, Los Angeles Red Line subway system, Toronto City Hall, Chrysler Technology Center, Hibernia offshore oil platform, and Boston's Deer Island and Outfall tunnels.

Supporting that success is a focus on innovation propelled by thinking beyond the bounds of traditional construction chemistry. In the 1990s, BASF sent concrete to space to determine the impact of zero gravity on its properties. The company has also spearheaded initiatives like RMC 2000 and PCI 21 to foster innovation in the ready-mixed and precast concrete industries. Further, it has garnered hundreds of patents for products that place customers on the cutting edge.

Offering technical experience and expertise, BASF has been actively involved in several industry associations, including American Concrete Institute (ACI), National Ready Mixed Concrete Association (NRMCA), and International Concrete Repair Institute (ICRI). That participation has aided in the creation of groundbreaking industry standards. Additionally, BASF employees help advance industry initiatives by chairing technical and marketing committees, as well as serving on various group boards. Several individuals have been named Fellows of ACI and ICRI in recognition of their

### CLEVELAND TECH CENTER

The BASF Construction Chemicals Technical Center in Cleveland is one of the world's largest private facilities dedicated to concrete technology. Equipped with the latest analytical and physical concrete-testing equipment, the 55,000-sq.-ft. research center houses 13 laboratories and five humidity and temperature-controlled rooms. There, the company's Technology Group formulates products, develops new technologies, and provides a testing and support resource for customers. Technical Center functions are fivefold:

*Forensic Analysis*—Members of the Chemistry and Petrography laboratories provide analysis of hardened concrete, concrete raw materials, admixtures, and other chemicals.

*Concrete Design, Mixing, and Testing*—The Concrete Technology and Material Testing laboratories perform density, gradation, and chemical analyses for individual components according to ASTM procedures. Standard and specialized plastic and hardening engineering tests target slump, air content, density, set time, scaling, absorption, freeze thaw, water repellency, length change, modulus of elasticity, flexural, and compressive strength for troubleshooting.

*New Product Development, Admixtures*—Research is conducted to develop and commercialize technologies for ready mix, precast, manufactured concrete products, paving, and underground market segments.

*New Product Development, Protection and Repair*—Expertise in polymer and cement chemistry, application techniques, and engineering principles allows continuous development of products and material systems to protect and repair concrete and masonry.

*Applications and Test Method Development*—The Engineering Research and Application group has developed specialized concrete mixtures. Its software tools facilitate design of mixes resistant to chloride-induced rebar corrosion and shrinkage cracking. Among its industry-recognized test methods is a restrained ring test for quantifying shrinkage cracking.

leadership roles.

## FUTURE OF CHEMISTRY IN CONSTRUCTION

The Master Builders brand today is part of a leading global chemical supplier that upholds the values and ideals promoted by S.W. Flesheim when he launched the business in 1909. Providing a platform for innovation, the company's founding principles will sustain future efforts. Although the construction industry faces a challenging year, BASF and Master Builders anticipate growing opportunities to maximize sustainability, durability and longevity in wide-ranging construction projects. Product innovations that address emerging needs include:

- Self-consolidating concrete (SCC) mixture optimization software identifies best-performing material and admixture combinations to eliminate 'trial and error'.
- Glenium high-range water-reducing admixtures can be regionally tailored for specific performance.
- MasterFiber additives—comprising a complete fiber product line that offers micro, macro, steel, and 'green' fibers—enhance concrete strength and durability for longer-lasting structures that require less maintenance.
- Rheocolor L liquid coloring admixtures enhance concrete aesthetics, simulating the look of more expensive, less durable building products.
- Ucrete Iron Filled is a four-component polyurethane-concrete metal aggregate flooring system that provides superior abrasion and impact resistance.
- Masterflow 1205 cementitious pumpable grout mitigates chloride migration, while allowing the product to be easily pumped over long distances through small openings.

Construction industry professionals are encouraged to join in the centennial celebration online at [www.100yearsofchemistry.com](http://www.100yearsofchemistry.com). Featured at the site are innovations, brand history, and photo galleries.

—John Salvatore is Chief Executive Officer of BASF Construction Chemicals, North America

## BASF/MASTER BUILDERS: 100 YEARS OF INNOVATION

- 1909**—Invented cement/iron floor topping to improve wear resistance and appearance
- 1911**—Introduced Masterplate metallic dry-shake surface hardeners
- 1927**—Invented Embeco 885 "non-shrink" cement grout with metallic aggregate; and, Omicron water-repellent admixtures for concrete, mortar and cement stucco
- 1932**—Developed first water-reducing admixture, Pozzololith, and Micro-Air air-entraining admixture
- 1937**—Invented accelerating admixtures
- 1954**—Invented epoxy grouts Ceilcote - Masterflow 648
- 1955**—Introduced liquid Pozzololith admixtures and dispenser technology
- 1964**—Developed Pozzololith 100, 200, and 300 series hydroxylated polymer admixtures
- 1966**—Invented Masterflow 713 & Embeco 636 expansion (chemical reaction) grouts
- 1973**—Developed third-generation high-range water-reducer Rheobuild and ultra-stable air-entraining admixture Micro-Air
- 1982**—Acquired Set 45 magnesium phosphate compositions technology for rapid road repair
- 1985**—Introduced Masterflow 928 and Embeco 885 extended working time fluid grouts; developed Lumiplate nonoxidizing floor surface hardener
- 1986**—Introduced first mid-range water-reducer PolyHeed, first hydration-control admixture Delvo Stabilizer, and first freezing-weather admixture Pozzutec 20
- 1987**—Acquired Concrete product technology for structural crack repair of concrete with epoxies
- 1989**—Acquired APE technology method for encapsulation of structural members; and, introduced Emaco S rheoplastic, shrinkage compensated flowable, sprayable, and trowelable mortars for concrete repair
- 1991**—Developed first organic corrosion inhibitor, Rheocrete
- 1993**—Assisted industry in organizing Ready Mixed Concrete 2000 grassroots movement; invented viscosity-modifying admixture, Rheomac VMA
- 1994**—Formed business alliance with New Block Corp. to license Control Blok value-added concrete masonry system; developed Rheocell foaming agent; sponsored first and only concrete mixing test in space aboard the Shuttle Endeavor; introduced Emaco T-415/T-430 alkali-activated fly ash compositions for rapid road repairs
- 1996**—Developed Rheocell Rheofill dry admixture for flowable fill; introduced nonchloride accelerators
- 1997**—Introduced integral corrosion inhibitors into concrete repair mortars, Emaco T, Emaco S, and Emaco R CI products; offered polycarboxylate mid-range water-reducer; launched PolyHeed FC 100 based on Glenium technology; introduced Delvo ESC self-contained hydration-control admixture and Delvomac computer software program; released Rheobuild 2000FC new-generation high-range water reducer for precast
- 1998**—Introduced Rheodynamic Self-Consolidating Concrete admixture system
- 2001**—Invented Masterflow 1205, first prepackaged cementitious, nonbleeding post-tensioning grout for corrosion protection of steel tendons; invented 4x4 Concrete System for fast-track paving projects
- 2002**—Invented the Liquid Sand System
- 2005**—Developed the first admixture system for pervious concrete applications
- 2006**—Developed Rheopel Plus water-repellent and efflorescence-controlling admixture for concrete masonry applications
- 2007**—Developed Glenium 7000 series high-range water-reducing admixtures based on regional polymer technology and raw materials; introduced CAM Color-master system for dispensing liquid concrete coloring admixtures; invented Navitas rheology-controlling admixtures; released Ucrete Iron Filled polyurethane-concrete, metal aggregate resurfacing flooring system for abrasion and impact resistance
- 2008**—Invented Masterflow 1515 Pipesaver hydraulic cement-based pumpable grout; introduced Masterseal CP surface-applied solution to inhibit the electrochemical corrosion process; launched MasterFiber products for reinforced concrete; developed RheoFit 900 plasticizing admixture for concrete masonry products
- 2009**—Introduced Rheocolor liquid coloring admixtures for decorative concrete