



The Chemical Company

Glenium SKY

for Ready-Mix



Admixture Systems Europe

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Adding Value to Concrete

Total Performance Control

Environment

Concrete has to fulfil a variety of requirements, depending on its user, its field of application and the environment in which it is placed. For operators of ready-mix batching plants economical concrete production is vital, whereas contractors need concrete with long workability and easy placing characteristics, and engineers are mainly concerned with high durability.

How to achieve high-quality concrete with extended workability

To meet all these requirements simultaneously was difficult until now and the parties concerned often had to accept compromises. Nevertheless, the whole concrete industry has one common goal in mind: the production of an economical, yet high-quality concrete of low water/cement ratios.

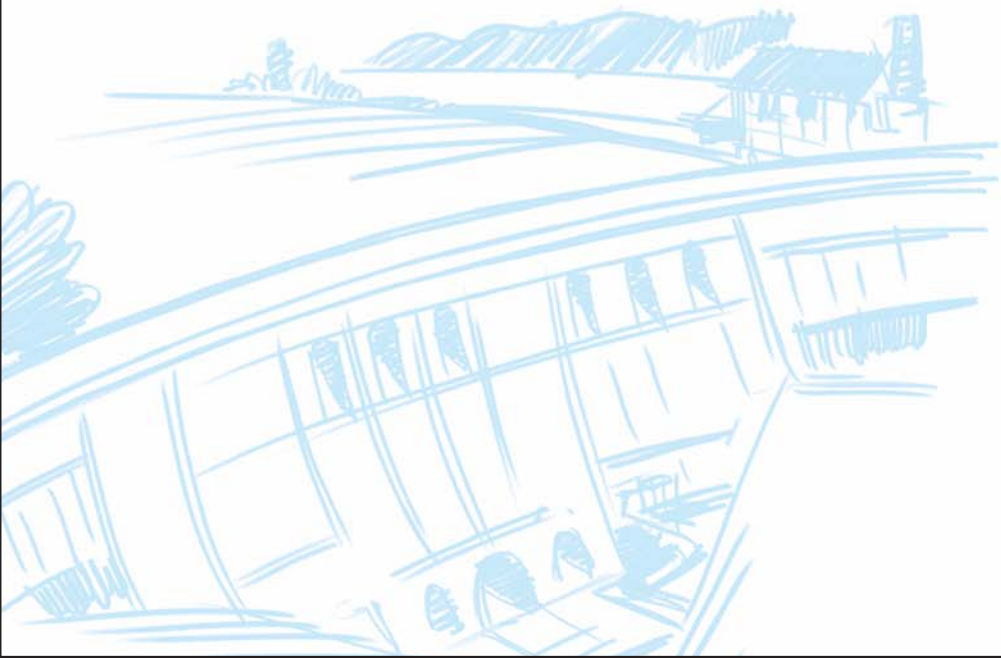
To overcome these problems, BASF Construction Chemicals has introduced Total Performance Control™, based on the newly developed Glenium® SKY technology. This approach allows local conditions and requirements to be addressed individually for the first time by delivering concrete of uncompromising high quality.

Concept

The Total Performance Control concept ensures that ready-mix producers, contractors and engineers achieve a concrete that is of the same high quality as originally specified; starting from production at the batching plant, to the delivery and application into place, and followed by its hardening process. Rheodynamic™ concrete, a latest-generation self-compacting concrete, provides a concrete mix with exceptional placing characteristics, accelerated cement hydration for early strength development and high-quality concrete.

Total Performance Control is the state-of-the-art technology that provides improved short and longterm performances of concrete by controlling the two distinct features essential for high-quality concrete: extended workability and low water/cement ratio.

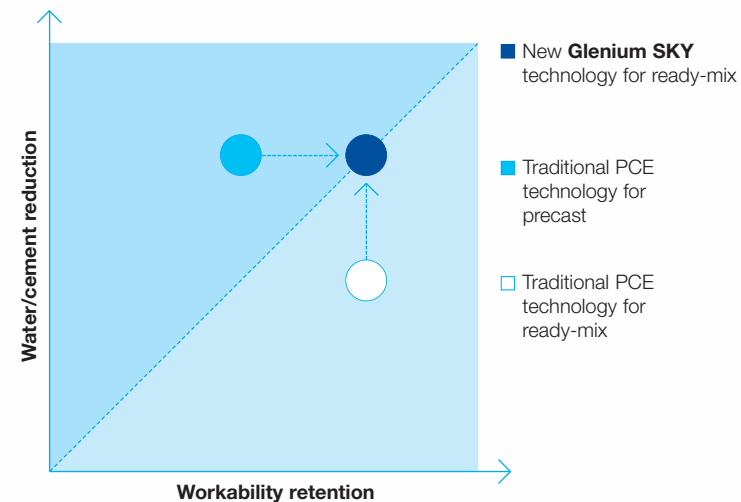
A key element of the Total Performance Control concept is the newly developed Glenium SKY superplasticizer.



Glenium SKY

Glenium SKY is an innovative superplasticizer based on second-generation polycarboxylate ether (PCE) polymers. It is derived directly from the Total Performance Control concept and is specially engineered to provide high water reduction and slump retention for ready-mix concrete simultaneously. As compared with other PCE superplasticizers, it is possible to obtain a high-quality concrete mix with accelerated strength development and extended workability without delayed setting characteristics.

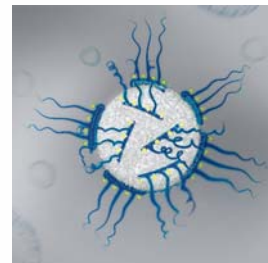
Evolution of admixtures performances



Nanotechnology

Nanotechnology is a science dealing with the interaction of extremely small objects measured in nanometres. A nanometre (nm) is a millionth of millimetre – the dimension of molecules and polymeric chains. This technology has made enormous strides in the last decade on the predictability of both structure and properties. Today, each individual atom or molecule can be manipulated in order to design functionality into materials at the nanoscale.

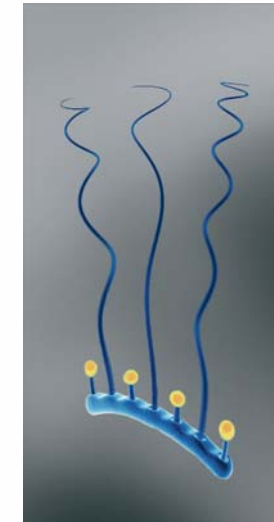
In-house expertise in nanotechnology allows BASF Construction Chemicals to control the chemical and physical behaviour of polymers and their interactions with cement by augmenting chain length, side chain length and density, and electrical charges as well as free functional groups. For the first time, nanotechnology allows local requirements and conditions to be better met.



Mechanism of action

The dispersion effect of superplasticizers is based on the adsorption of molecules on cement particles, imparting a negative charge that causes electrostatic repulsion and steric hindrance between them and, therefore, dispersion. The hydration, and particularly the ettringite formation, work against the superplasticizer. Already adsorbed molecules are covered by the ettringite lawn, thus are ineffective. The particular configuration of the Glenium SKY molecules allows its delayed adsorption onto the cement particles and disperses them efficiently over a long period of time.

The molecular structure is essential for the early development of strength. With superplasticizers based on conventional polycarboxylate ether, the molecules cover the entire surface of the cement grain and build a barrier against contact with water. Therefore, the hydration process takes place slowly. The Glenium SKY molecules on the other hand leave sufficient room on the cement surface to allow a rapid hydration reaction, resulting in high early strength development.



Benefits of Total Performance Control



Ready-mix producer

Ready-mix concrete is characterized by a great number and variety of different mix designs. Utilizing different types of fillers, cements and binders together with the trend towards special concretes for specific applications such as coloured or white concrete increases this variety. At the same time, ready-mix producers must maintain their profitability in the face of rising materials, labour and machine costs, and during a period of falling prices. As a result, producers are optimising their production and logistic costs. The Total Performance Control concept supports these goals by providing the capability of delivering high-quality concrete at any time to the job site. This new concept facilitates the production of concrete with both extended workability and a low water/cement ratio meeting the requirements of EN 206-1. Cost savings in production may be realized through mix design optimizations for cement types and aggregate composition. In addition, the single product Glenium SKY is suitable for many applications. As a result, it enables ready-mix producers to optimize inventory, to facilitate logistics and to reduce investments in tanks and dispenser equipment and thus also, decreases maintenance costs.



Contractor

The focus of the contractor is twofold. During the placing process, contractors require easy placing and finishing characteristics as well as extended workability in order to save labour. As a result, the structure consists of high-quality concrete with improved concrete surfaces. After placing, the need for fast strength development arises. Certain minimal strengths must be achieved before a structural element can be removed from its form and borne off. The faster a form can be reused, the more profitable the process. Increased early strength makes more rapid reutilization of the form possible, therefore shortening the production cycle. The building process is quicker, and equipment and personnel can be employed more efficiently.

The Total Performance Control concept guarantees the placement of the same concrete as specified and ordered from the ready-mix plant. The requirements of easy placing and finishing as well as early strength development are achieved by using Glenium SKY. If a site-mix operation is in use, the same benefits as for ready-mix may be additionally utilized.



Engineer

The engineer is aiming for extended service life and less maintenance work for applications with heavy reinforcement and thin sections. Service life expectations of over 100 years are no longer uncommon and will increasingly become the norm. To optimize service life, tendering may also include the maintenance work for several decades as well as the building of the construction. An accelerated building process reducing overall costs is becoming part of the engineering remit, especially in road and tunnel constructions.

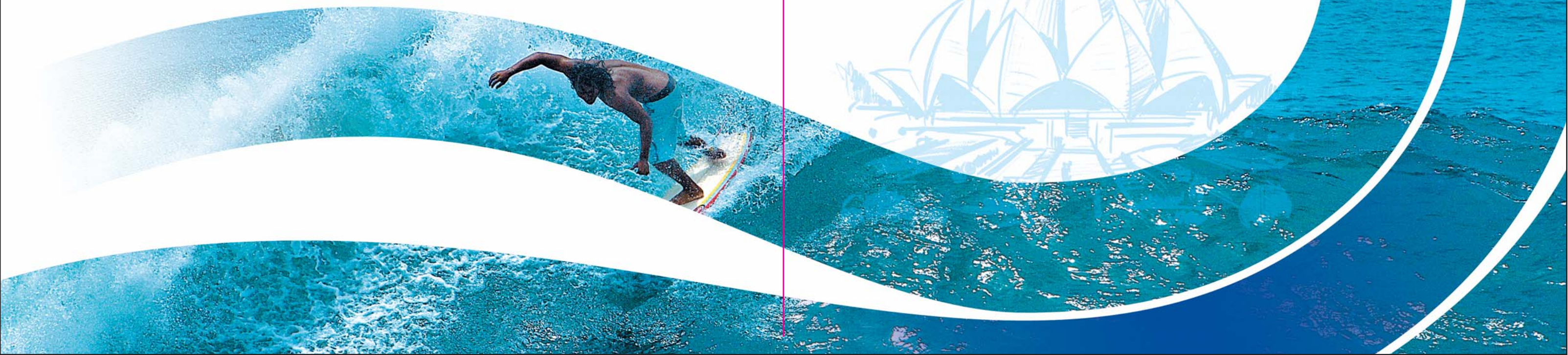


To optimize costs during the whole service life, it is necessary to process a high-quality concrete with better durability and to have the insurance that concrete meets original specifications. The two distinct features essential for high-quality concrete and thus higher durability are a low water/cement ratio and long workability. The Total Performance Control concept with Glenium SKY provides both performances simultaneously. As a result, longer service lives with less maintenance work and, therefore, optimized economy are given.

Conclusion

Total Performance Control and Glenium SKY technology introduce a new generation of superplasticizers, solving the needs of the entire ready-mix industry:

- **Ensuring a constant high-quality concrete at a low water/cement ratio.**
- **Providing a concrete with extended workability at high temperatures, without delayed strength development.**
- **Guaranteeing a concrete that meets the original specification from the fresh to the hardened stage.**
- **Offering a single, versatile admixture for many types of applications and conditions.**



Adding Value to Concrete

Deliverables of the global leader

As part of the world's largest chemical company, BASF Construction Chemicals is the market leader in the admixtures business. We are committed to engineering quality solutions to drive the concrete industry forward. Through constant research and development into new products, systems, application methods and equipment, we add value to concrete. Our market-segmented structure means that you can rely on the proximity of a regional company with the backing of a global group.

- **Innovative products**
Comprehensive range of admixtures specially engineered for the needs of ready-mix producers, precast operators, contractors and manufactured concrete products producers
- **Single source**
Complete range of latest technology admixtures for concrete and mortar as well as auxiliary products such as form release agents, curing compounds and surface retarders
- **Superior logistics**
Easy communication and proficient means of transportation ensured by local organization
- **Knowledge and experience**
Superior expertise in concrete and mortar technology, its application and design with full local coverage
- **Value-added service**
Specification development, mix design and production process optimization support and quality control
- **Expert training**
Specific programmes for producers and contractors

