

CEMENT TECHNOLOGY EVOLVES IN RESPONSE TO A CHANGING SOCIETY

Through the decades, the built environment has evolved in response to the changing needs of society and to support this evolution, cement technology has continued to advance. The 20th century concept of so-called “pure” Portland cement is rapidly becoming obsolete with the development of technologically advanced composite cements far more suited to the visionary needs of the present century.

“Our challenge is to balance the increasing demands of ever more sophisticated business and industry against a fragile environment under increasing pressure,” Grant Nesor, AfriSam’s Sales and Marketing Executive, says. “We cannot afford to keep producing cements with conventional technologies that generate large quantities of carbon dioxide emissions, when we have the option of using more technologically advanced composite cements that offer additional advantages.”

AfriSam has become a globally recognised leader in the production of these advanced composite cements that harness by-products from the steel manufacturing and coal-fired power station industries, together with chemical activators, to improve the characteristics and performance of traditional Portland cement.

“For the past two decades, we’ve been investing extensively into research and development focused on the production of these advanced cements, replacing the environmentally unfriendly clinker and dramatically reducing our carbon footprint,” Nesor continues. “AfriSam has also poured considerable capital investment into upgrading our production facilities to produce advanced composite cements. As a result, we’ve been able to reduce our clinker factor from a world average of about 90% to an average of 60%, with a clinker factor as low as 35% when using Eco Building Cement, which is particularly environmentally friendly.

“Using by-products such as silica fume, pulverised fly ash and ground granulated blast furnace slag, we produce cements that generate concrete with improved heat of hydration, reduced porosity, improved strength, durability and resistance to chemical attack. For instance, slag

binds with chlorides in coastal environments, protecting reinforcing steel from corrosion. A lower heat of hydration means that heat generation can be far better controlled during bulk pours, reducing thermal cracking and the resultant porosity. In other words, producing advanced composite cements enables us to control and improve consistency in the performance of concrete to a greater degree.

“We continue to refine our range of advanced composite cements in response to both customer and market requirements, with our finger consistently on the pulse of the latest scientific advances,” he says.

Today AfriSam produces a full range of branded composite cements, including All-Purpose, High-Strength, Eco Building Cement and Rapid Hard Cements, as well as customised blends for customers with specific requirements.

Technological advances

There is a great deal of discussion around the use of extenders in concrete and, in order to ensure a concrete containing significant quantities of extenders is uncompromised in strength and integrity, extensive experience and knowledge is essential. AfriSam is able to leverage its vast experience in concrete manufacturing involving the successful application of composite cements with advanced chemical admixture technologies.

Cement extenders are also finding increasing favour from an environmental perspective. Primarily, the use of extenders results in a significant reduction in the equivalent carbon dioxide per ton of cement. AfriSam’s “green cement” uses extenders such as milled slag, fly ash and limestone to reduce the amount of clinker needed. The use of these extender materials is an excellent example of environmental synergies being achieved between industries, since much of this material would otherwise end up in landfills.

The expected shift towards civil infrastructure projects and the reduction in residential and building projects are likely to have a marked effect on the required properties of cement in coming years. Nesper predicts there will be an increase in demand for the cement types that

complement the high quality concrete used in infrastructural work. He says this in turn will lead to a call for a more specialised product with superior handling and placing characteristics.

AfriSam's Centre of Product Excellence at its Roodepoort plant is responsible for quality assurance and provides support services to all AfriSam operations and external customers. This team, working closely with the Construction Materials product technical team, regularly assesses and enhances concrete mixes to ensure the most appropriate solution for customers, effectively optimising cement and concrete technology, both in terms of cost and material content.

"Typically a technical consultant would meet with the customer to assess the specific application requirement and from there test work is initiated at the laboratory. Based on the results, recommendations would be given to the customer. The advantage of this approach is that the data has been validated in a laboratory, minimising risk on site. Site personnel can be confident that the end product will have the necessary integrity and that quality has not been compromised. We therefore regard our product laboratory as an important part of customer support, providing substantial benefit to our customers."

This service is provided free of charge to customers and is considered an integral part of AfriSam's value strategy and commitment to customers. Many of these customers are aware of the environmental impacts of construction materials and are increasingly specifying environmentally friendly types of concrete for their structures. A high percentage of these contracts call for readymix concrete and AfriSam's readymix business unit is equipped to provide readymix concrete solutions that comply with these environmental requirements.

Centre of Product Excellence

The AfriSam Centre of Product Excellence in Roodepoort also works closely with customers to develop and test products to ensure that they suit particular specifications and applications. In addition, the Centre has developed cements with remarkably low carbon dioxide footprints.

The Centre supports all AfriSam business units from a scientific and technical perspective, responding to queries from AfriSam personnel at the company's cement and concrete plants, as well as its sales teams, and fielding regular requests from customers.

This team conducts extensive analyses and forensic investigation of products to pre-empt any shortcomings or weaknesses, to determine the reason for any exceptions and to develop solutions using high-tech analytical facilities.

In the interests of upholding industry standards, AfriSam collaborates with several leading universities, reviews projects for the National Research Foundation and assists MSc and PhD students with their theses. Company specialists also provide critical professional input to numerous industry boards and sit on the relevant committees of the South African Bureau of Standards, the Concrete Institute and the Association of Cementitious Manufacturing Producers, playing a leading role in a variety of technical work groups.

“All our production processes and materials, as well as our final products, are put through rigorous and ongoing quality assurance tests to ensure nothing short of the best for our customers,” Nesor concludes. “The South African cement market is fiercely competitive and we continue to look at innovative solutions to win over new customers and retain existing customers.

“All these recent developments are part of our in-house Customer Value Management initiative implemented to unlock value for customers across the board. This initiative is starting to gain real traction across the industry and we regard this as a significant achievement and proof that we're making headway on our journey to delivering a whole new level of service to our customers.”