Promotion of R&D Activities

Benefiting from the cooperation between the Central Research Laboratory and each business division, the scope of our R&D encompasses the fields of international mineral resources, the environment, building materials, architecture and civil engineering, with a focus on cement and concrete.

■ Computational Fluid Dynamics (CFD) toward Optimizing the Cement Production Process

The behavior of raw material particles and their thermal interaction with fuels inside the production process can significantly influence the energy consumption during cement manufacture. Therefore, at each cement plant depending on the output and specific production system employed, it is crucial to optimize these conditions. However, equipment modifications, process optimization and verification incur a significant cost and takes considerable time.

To address this, we are working on improving accuracy and reducing the time needed by simulating the conditions using a technology called computational fluid dynamics (CFD). The behavior of combustion gases and raw materials during the production process are very complex. We can effectively optimize our cement production process by applying CFD to visualize those behaviors.

We continue to work on further improving this simulation technology and establishing a more efficient cement production process to contribute to the creation of an energy-saving, low-carbon society.

■ Mortar Spacer "i-con Spacer®" that Incorporates IC Tags

Productivity improvements at construction sites and a wider use of precast concrete have been promoted in line with the development of the "i-Construction" initiative, launched by the Ministry of Land, Infrastructure, Transport and Tourism. In reinforced concrete construction the i-con Spacer is a mortar reinforcement spacer that incorporates an embedded IC tag. It supports a simplified inspection system and the ready traceability of concrete by incorporating and using the memory function. It also facilitates a more efficient management of inspection records by recording the results of close visual inspection of structures as required by law. Moreover, it allows us to manage construction records easily as digital data instead of conventional written documents by combining working drawings and photographs of completed structures stored on the Internet and i-con Spacer’s ID information. Consequently, the application of i-con Spacers will contribute to improving productivity.

■ Mudflat Improvement Technology Using Ceraclean® Obtained ETV Mark Certification from the Ministry of the Environment

Mudflats, also known as tidal flats, are important ecosystems and nurture the development of numerous marine creatures that, in turn, have the effect of restoring environmental conditions such as through water purification. Unfortunately, mudflats are increasingly subject to pollution. To address this we developed a mudflat improvement technology combining the application of our Ceraclean® water purification material to mudflats and “plowing-in” as used in agricultural work. Ceraclean® neutralizes acidified mudflats and promotes the growth of diatoms and shellfish by supplying silicates and calcium. Its high porosity extends the period for “plowing-in” to facilitate the intake of air and improves the mudflat environment. In fiscal 2017, this technology obtained the ETV mark certification in the “Water environment improvement technologies in enclosed coastal seas field” of the Environmental Technology Verification (ETV) project, sponsored by the Ministry of the Environment. We will contribute to reviving environmentally degraded mudflats and other enclosed water areas by applying the product as an environmental protection measure for local communities.