



INTERVIEW WITH DENIS MAÎTRE, DIRECTOR OF RESEARCH AND DEVELOPMENT

PRODUCT INNOVATION, SUSTAINABLE CONSTRUCTION AND PARTNERSHIPS

What are the major orientations of Lafarge's R&D strategy?

At Lafarge, research is centralized and development is decentralized. Some 200 scientists, specialized in chemistry, physics, mechanics, analysis and digital modeling, conduct pure research in our center at l'Isle d'Abeau, near Lyon. The center is dedicated to the understanding of mechanisms which are fundamental to the confirmation of entirely new technologies applicable in the fields of cement, aggregates, concrete and gypsum.

Development, on the other hand, is dealt with by our different technical centers in France and abroad. Their responsibilities range from the optimization of existing products to meet specific requirements to the industrialization of new products and project engineering. Our new Sensium® technological cements were developed in one of these centers. These quick-setting, easy-to-use materials are dust free thanks to a fluorinated polymer process which was developed in Japan. The polymer distributes itself very finely throughout the cement and forms "nano glue points", which stick the finest particles to the other particles.

Which of your current innovations are the most advanced?

Chronolia™ cement, launched in 2007, offers greater workability and more rapid hardening during the pour phase. This product can be worked for 2 hours and formwork can be removed after only 4 hours, resulting in significant productivity gains on the building site.

Another major challenge is mastering the fissuring of our materials. With this in mind, we have launched another cement this year, Extensia™. By improving this performance characteristic, we have made it possible to produce large industrial slabs without joints and without cracking.

Lafarge focuses on materials for sustainable construction. What's your approach in this field?

Sustainable construction presents a number of challenges, from the choice of initial materials right through to the demolition of buildings. Lafarge is a founding member of the Building Energy Foundation, which finances R&D projects that seek to decrease greenhouse gas emissions by reducing energy consumption and increasing the use of renewable energy. Moreover, in collaboration with the Ecole Polytechnique and the Ecole des Ponts we recently created a research chair in the science of materials for sustainable construction.

As concerns CO₂, we know that 90% of a building's emissions occur during its operational lifetime while 10% result from the industrial production of its building materials. We work on both aspects. The cement industry emits CO₂ because clinker, the main component of cement, is produced by decarbonising limestone. We are therefore working to use raw materials that contain less limestone from the outset, such as pulverized fuel ash from heating plants or slag from blast furnaces. We are also investigating the sequestration of CO₂ emitted during cement processing. Finally, our research aims to improve the properties of concrete so they enhance a building's thermal characteristics.

What is being done in the context of the framework agreement between Lafarge and the CNRS?

Signed in early 2002, the framework agreement relates to chemistry, engineering sciences, physics and mathematics and has led us to collaborate with nearly 30 different units. To take just 3 examples, we work with the University of Bourgogne on cement hydration, with INSA of Lyon on image analysis issues, and with the Ecole des Mines of Sophia Antipolis on questions relating to concrete flow.

At the European level, what is your role in the Nanocem network?

The European Nanocem network, which was created in 2002, brings together about thirty industrialists and academics. They are working to increase our knowledge of phenomena occurring at the nanoscale that influence the characteristics of cements. The consortium has set up a number of non-competitive core projects, such as hydration or pore structure, in which Lafarge participates. One of the projects aims to determine the basic thermodynamic scales of our materials. Such knowledge is quite far upstream but it is essential for improving modelling tools. Each of the partners will be able to use the results as they see fit.

Do you have other international partnerships?

We work with two American teams in particular. With the team of Professor Franz-Josef Ulm at MIT (Massachusetts Institute of Technology), we have a partnership to study the mechanical behaviour of cement at the nano-scale. This study concerns nanoindentation, an indentation being a hollow print left in a material by localised pressure. We operate an R&D program on the micromechanics of materials with the University of California at Berkeley. As part of a consortium of North-American industrialists, we also have a partnership with Laval University in Quebec, which is working to model the durability of our materials. In addition, we intend to initiate a partnership with a major Chinese research institute.

DENIS MAÎTRE

Denis Maître (b. 1958), a graduate of the Ecole Polytechnique, joined Lafarge in 1996. Before heading its R&D department, he was Strategy Director of the Gypsum Business and Chief Executive Officer of the Road Marking Business (which is no longer within the scope of the Group's operations). He previously worked for 12 years with the Rhône-Poulenc Group and for 5 years in a consulting firm in Lyon.