Church on the Edge of Rome Offers a Solution to Smog

By ELISABETTA POVOLEDO

MILAN, Nov. 27 — When the American architect Richard Meier was asked to design a church in Rome to commemorate the 2,000th anniversary of Christianity, he offered an imposing white concrete structure dominated by three soaring "sails."

The project's main technical sponsor got to work on a coating that would enhance Mr. Meier's trademark white sculptural forms. It came up with a material that essentially cleans itself, minimizing the need for maintenance.

What the sponsor, the Italcementi Group, did not know was that the new material — which contains titanium dioxide, a white pigment — has another peculiarity. It "eats" surrounding smog.

Extensive testing has since determined that construction products containing titanium dioxide help to destroy pollutants found in car exhaust and heating emissions, scientists say.

Several companies are now developing smog-eating products that can be used not only for the facades of buildings but also in paint, plaster and paving materials for roads. The new substances are now being tried in buildings, squares and highways in Europe and Japan.

Hailed by some scientists as a breakthrough, the process is still being evaluated by others. The question, said Melanie L. Sattler, professor of civil and environmental engineering at the University of Texas at Arlington, is "whether coatings on buildings would be able to treat enough of the atmospheric air to make a difference."

Titanium dioxide had been used in self-cleaning coatings before because of its photocatalytic properties: sunlight sets off a chemical reaction that accelerates natural oxidation. Upon testing its new compound, however, Italcementi realized that the material could also break down nitrogen oxides emitted in the burning of fossil fuels.

"Theoretical work in photocatalysis has been going on since the 1980s," said Enrico Borgarello, Italcementi's director of research and development. "The problem is that no one had developed any practical applications."

According to Italcementi, tests in urban settings determined that some pollutants could be reduced by 20 to 70 percent.

The reduction of pollutants is greatest within about eight feet of a surface that has been treated, the company said. This means that a pedestrian on a street with traffic would inhale fewer pollutants while passing treated buildings.

In one test, paving material using photocatalytic cement was used to cover the asphalt surface of a 1,000-foot stretch of road outside Milan with an average traffic flow of 1,000 vehicles an hour. Tests showed a reduction of about 60 percent in nitrogen oxides at street level, according to Italcementi.

Environmental scientists and engineers are following the development with keen interest.

"Philosophically, it is better never to form pollutants than to find ways to destroy pollutants, but this is a useful technique for air pollutants that humans already make," said Dr. Howard Liljestrand, a specialist in environmental chemistry at the University of Texas at Austin.

But he cautioned that the cost efficiency of such products would depend on long-term performance, adding, "Catalysts tend to lose their effectiveness over time."

Now that Italcementi's product, TX Active, has gone beyond the testing phase, does it work? Three years after Mr. Meier's church opened in Tor Tre Teste, in eastern Rome, the bulk of the majestic structure remains remarkably bright, in contrast to the grimy gray joints, which were not treated with the product.

"It's hard to say if it's revolutionary," Mr. Meier said by telephone, "but we're happy with the results."