

December 23, 2007

Paving the way to clean air

Cement developed in Italy can reduce airborne pollution

By **VIVIAN SONG**

When visitors arrive at the Jubilee Church in Rome, they soak in the architectural marvel and take a deep breath -- a breath of fresh air being cleaned by the building that stands before them.

The church is made of a smog-eating cement. It's like a dual-action cleansing formula: The church washes away your sins and also turns such air pollutants as nitrogen and sulphur oxides into harmless nitrates and sulphates -- or salt -- which is absorbed or washed away with rainwater.

Its blindingly white church facade and trio of concrete sails is made from a cement product called TX Active by Italcementi, one of the biggest cement producers in Europe.

It's enhanced with titanium dioxide and works by photocatalysis, a process which alters the speed of a chemical reaction through light. Exposure to light accelerates the natural oxidation or decomposition process of air pollutants emitted from cars and heating units and prevents them from accumulating on surfaces. The company calls it a self-cleaning, depolluting product that will retain its brilliancy for years as opposed to conventional concrete, which stains and erodes over time.

The product is getting a lot of hype in Europe, where it's been applied to large-scale projects like the new headquarters of Air France at Charles de Gaulle airport in Paris and the Cite de la Musique et des Beaux-Arts in Chambéry. And for optimal results, product manager Dan Schaffer says it thrives on dirt.

"The higher the pollution level, the better the percentage of reduction you'll see," said Dan Schaffer, product manager at Essroc based in Pennsylvania, a subsidiary of Italcementi Group. "The brighter the intensity of the sun, the better results you'll see. It works best in worst case scenarios. That's the neat thing about the technology."

The product was 10 years in the making, and boasts some impressive performance claims. For example, if 15% of Milan were covered with products containing TX Active, the company says the city could reduce its air pollution by 50%.

The product's effectiveness has been certified by Italy's National Research Council, and Picada, Photocatalytic Innovative Coverings Applications for Depollution Assessment. Picada is a consortium of eight European partners from manufacturing, testing and research centres -- including Italcementi -- and got C\$2.8 million in financing by the European Commission's Joint Research Centre.

But the product is not without its skeptics.

"To try and deal with air pollution by capturing them selectively on surfaces is not an effective strategy," said Deniz Karman, a professor of environmental engineering at Carleton University.

He likened the concept to indoor air purifiers which treat the problem as opposed to preventing it.

"You have to reduce it at its source. Trying to deal with the atmosphere selectively is not the road to go down."

According to Environment Canada, the cement industry produced 4.58 megatonnes of greenhouse gases in 2005 in Canada. About one tonne of cement produces one tonne of carbon dioxide. Worldwide, cement production is estimated to produce about 5% of all carbon dioxide emissions and global demand for cement is forecast to grow 4.7% annually to 2.8 billion metric tones in 2010, with China leading the way.

Meanwhile, the company says urban settings treated with TX Active can reduce pollutants between 20% and 70% depending on atmospheric and light conditions. In 2002, applications covering a 230 metres long, 10 metres wide stretch of a high traffic roadway in Milan reduced nitrogen oxides by 60%.

Italcementi is trying to pave its way into the North American market and has won accolades in the U.S.,

winning the Most Innovative Product title at the World of Concrete trade fair in Las Vegas.

Though it's most effective on large scale and restoration projects and urban centres, Schaffer said the product, expected to enter Canada in the next two years, could also enter the residential market.

TX ACTIVE TEST RESULTS

Nitrogen oxides, or NOx, is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. The primary man-made sources of NOx are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. NOx can also be formed naturally.

Two test results are shown at right, indicating TX Active cement reduced levels of NOx as compared with untreated reference sections.

TX Active treated portion of a street in Milan reduced the amount of NOx by up to 60% as compared with the untreated reference section.

8,000 sq. metres of TX Active cement block pavement, laid at the Calusco d'Adda plant in Italy, reduced the amount of NOx by 45% as compared with the traditional asphalt section.

TX Active cement works as a photocatalyst -- using light to speed up the natural oxidation or decomposition of nitrogen oxides and other air pollutants.

1. Buildings or pavement made of or coated with TX Active cement use sunlight to speed oxidation of pollutants in air.
2. Nitrogen oxides, a group of gases released as the result of burning fuel, are turned into salts which gather on surfaces.
3. Rainfall washes away the salts.
4. Depending on atmospheric and light conditions, urban settings treated with TX Active can reduce pollutants between 20% to 70%

Source: Italcementi