



**Photo 1.** The large glass window which illuminates the foyer.



Photo by Trond Isaksen

# The Oslo opera house

An evocative building overlooking the North Sea has become the new home of Norwegian opera and ballet

**T**he home of the Norwegian National Opera and Ballet and the National Opera Theatre, the Oslo Opera House, rises in the ex-docks area on the peninsula of Bjørvika, at the start of the fjord overlooked by the capital of Norway.

Due to its vicinity with the city centre, the entire area will be transformed into a residential and commercial area. And the new structure is considered to represent just a starting point for the new urban development of the area by designers and investors alike. A tunnel underneath the fjord is currently under construc-

tion, in order to eliminate all the road traffic so that a green area may be developed around the Opera House.

This grandiose national theatre, which the Norwegian people have been waiting for for more than one hundred years, was inaugurated by King Harald V in April, 2008 and is the largest cultural centre built in Norway since 1300, the inaugural year of the Cathedral of Trondheim.

An international tender for the construction of the theatre was published in 1999. The winner, chosen from among 350 participants, was the Norwegian design

## A WAIT OF MORE THAN 120 YEARS

**1881.** An Oslo daily paper announces that the capital will soon have its own Opera House.

**1998.** Vestbanen is proposed as a suitable location to build the new Opera House, but the idea is rejected by the Norwegian parliament.

**1999.** Three options are proposed to Parliament for the site: Vestbanen, Bjørvika and the Folketeater. On the 15<sup>th</sup> of June, the majority deliberates in favour of constructing the new theatre on Bjørvika.

**2000.** An international architectural competition is presented by the Norwegian Ministry for Cultural and Ecclesiastical Affairs to choose the best project. 240 projects are accepted for the competition, the winner is the Norwegian design studio Snøhetta.

**2001.** The final design for the new Opera House, with the signature of Snøhetta design studio, is presented.

**2002.** The Norwegian Government officially approves the design for the new theatre in Oslo.

**2003.** In mid-February, work officially starts on Bjørvika.

**2004.** In September, King Harald V laid the first stone.

**2005.** In mid-May the Stage Tower, the highest structure of the theatre complex, is completed.

**2006.** Work starts on the inside of the theatre.

**2007.** In the Winter, the complex is handed over to the client.

**2008.** In April, the Opera House is inaugurated in the presence of the Norwegian Royal Family (in the photo to the side).





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studio Snøhetta, which may boast the construction of the new library in Alessandria (Egypt) amongst its reference list of projects.

The Opera House also won the World Architecture Festival held in Barcelona in 2008 and the Mies van der Rohe Award at the European Union Prize for Contemporary Architecture in 2009.

Construction started in 2003 and was completed five years later. The execution of the project was particularly complex with more than 50 companies being involved, all working together to create this imposing building with some of the most technologically advanced features. Visitors can now see the building as being completely covered with white marble from the quarries in the Apuane Alps, apart from a strip at the base of the building made using local granite, which is partially immersed in saltwater and exposed to the local freezing winter weather.

When choosing the snow-white Carrara marble covering, the designers wanted to remind us of the Arctic landscape which characterises the northern part of the country, while at the same time creating a monolithic-like structure, reminiscent of a cliff of ice, divided into a series of inclined levels, with a large glass wall reaching out towards the bay to create movement in the lines of the building.

The spaces inside the Opera House cover an area of 38,500 m<sup>2</sup>, sub-divided into three main sections: the actual theatre part of

the building with two theatres with 1400 and 440 seats, a foyer covered in oak, ticket booths, cloak-room, bars, restaurants, services and conference and teaching facilities; rehearsal rooms and the administration offices; an area dedicated to workshops for the scenery, costumes and make-up.

**Mapei's Role in the Project**

Such a challenging structure, for its sheer size and materials used in its construction, had to count on tried and tested, high quality products suitable for the damp climate and rigid winter, with the capacity of supporting the passage of thousands of people throughout the year.

The designers of the building turned to Rescon Mapei AS, the Norwegian subsidiary of the Mapei Group, which recommended the best and most suitable products for such an avant-garde project.

**Concrete Repair and Structural Anchoring**

The designers wanted the foyer of the Opera House to be illuminated by a large glass wall, supported by a seemingly fragile metallic structure, which changes colour according to the time of day and the weather conditions: opaque grey on windy days or reflective blue during fair weather, and then with a softer light at the onset of dusk. In the foyer area and in the two theatres where the performances are held, Rescon Mapei AS supplied a series of products for

**Photo 2.** Rescon Mapei AS (the Norwegian subsidiary of the Mapei Group) supplied a series of products for structural bonding and for anchoring the metallic components: MAPEPOXY LR, MAPEPOXY UV-L, MAPEPOXY BI and NONSETT 120.

**Photos 3 and 4.** The concrete elements suffered from cracking. Rescon Mapei AS recommended using several products tested specifically for the repair of concrete: MURTETT, REDIREP 25 RSF and CONFIX.



the repair of concrete (MURTETT, REDIREP 25 RSF and CONFIX) and for structural bonding with epoxy resin and fluid mortar products for anchoring purposes (MAPEPOXY LR, MAPEPOXY UV-L, MAPEPOXY BI and NONSETT 120).



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These products are manufactured and distributed in the Northern European countries by Rescon Mapei AS.

#### Waterproofing and the Installation of Ceramic Tiles and Glass Mosaics

The substrates in the bathrooms were waterproofed using MAPEGUM WPS quick-drying flexible liquid membrane, ideal for waterproofing damp environments before laying tiles. The surfaces were then treated with the synthetic resin-based primer in water dispersion PRIMER G.

To cover the walls and floors, the designers chose 1x1 cm glass mosaic tiles and 10x10 cm ceramic tiles, in an anthracite-grey colour. KERAFLEX MAXI S1 high-performance cementitious adhesive with Low Dust technology and MEGAFIX LIGHT one-component, cementitious adhesive, manufactured and distributed in the Northern European countries by Rescon Mapei, were recommended for laying the coverings. All the joints between the mosaic and ceramic tiles were grouted with ULTRACOLOR PLUS high-performance mortar with DropEffect® technology, which guarantees excellent water repellence, and is anti-mould with BioBlock® technology. The expansion joints were then sealed with MAPESIL AC and MEGATEC sealants, the latter of which is manufactured and distributed in the Northern European countries by Rescon Mapei AS.

**Photo 5.** The bathrooms substrates were waterproofed with MAPEGUM WPS. The adhesives KERAFLEX MAXI S1 and MEGAFIX LIGHT were used to lay the glass mosaics and ceramic tiles, while ULTRACOLOR PLUS was used to grout the joints.

**Photo 6.** An oak covering characterises the entrance to the theatre.

## IN THE SPOTLIGHT

### KERAFLEX MAXI S1

It is a deformable (S1), improved (2) slip resistant (T) cementitious adhesive (C) with extended open time (E) of class C2TE S1 according to EN 12004 standard.

It is particularly suitable for interior and exterior bonding, up to 15 mm thick, of ceramic tiles of every type and size (single and double fired tiles, porcelain tiles, klinker, terracotta, etc.) on uneven substrates and renders; for bonding stone materials, provided that they are not sensitive to moisture; for spot bonding of insulating material in interior such as expanded polystyrene, rock and glass wool,




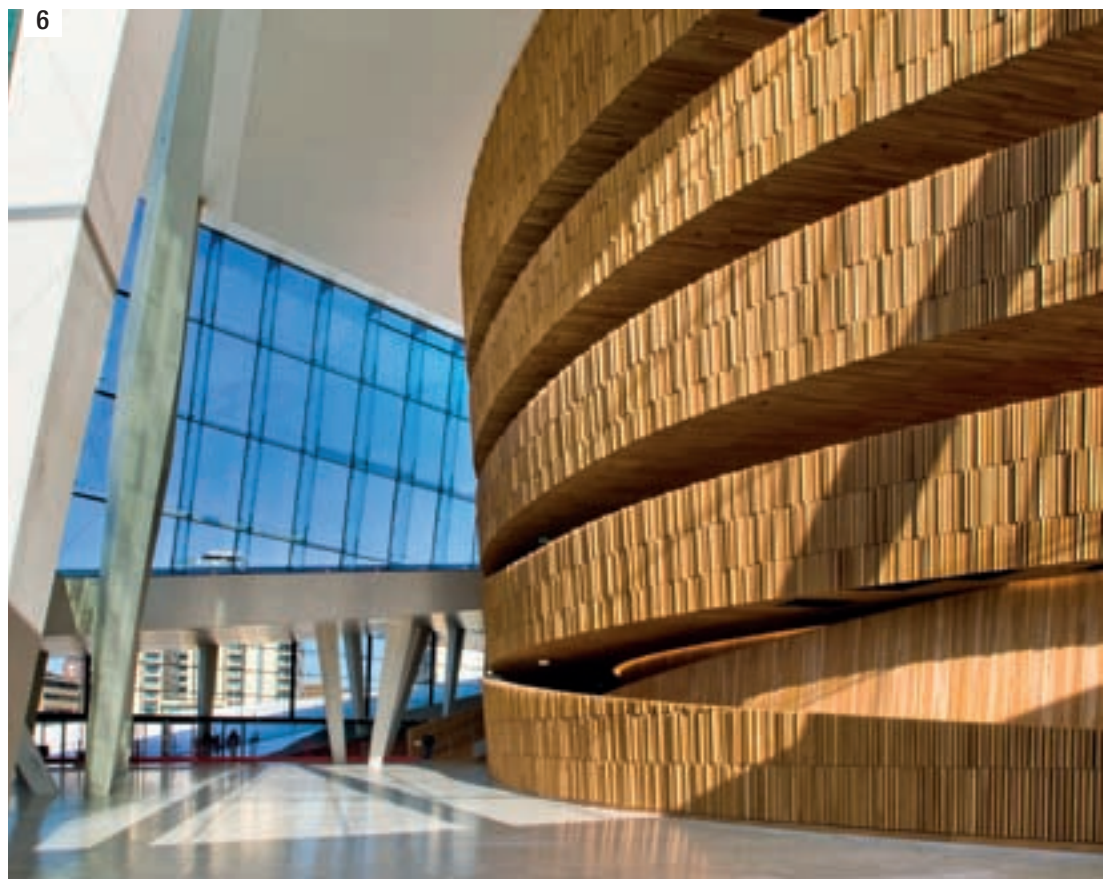
Eraclit® (wood-cement panels), sound-deadening panels, cork, etc. The innovative Low Dust technology which characterises this adhesive, allows the amount of dust emitted while mixing the product to be drastically reduced compared with standard cementitious Mapei adhesives, making the work area more comfortable and healthy for floor layers.

It features low viscosity, therefore it is easily workable; it is highly thixotropic and can be applied on a vertical surface without sagging or letting even heavy and large tiles slip. It has good capability to accommodate the different deformation of the covering from the substrate. It ensures perfect bonding to all materials normally used in building. It has a particularly extended open and adjustability time, facilitating installation.

### Laying the Parquet

Mapei also supplied its own product to lay the parquet in one of the small rehearsal rooms used by performers in the thea-

tre: ULTRABOND P990 1K one-component, solvent-free adhesive with a very low emission level of volatile organic compounds (VOC). 



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## TECHNICAL DATA

**The Opera House**, Bjørvika, Oslo (Norway)

**Period of Construction:** 2002-2008

**Period of the Intervention:** 2007-2008

**Intervention by Mapei:** supplying products for laying and grouting mosaics and

ceramic tiles in the bathrooms, restoring concrete, anchoring structures and laying parquet

**Client:** Statsbygg - Norwegian Ministry for Cultural and Ecclesiastical Affairs, Oslo

**Designers:** Studio Snøhetta AS and Reinertsen Engineering ANS

**Contractors:** AF Scandinavia, Norma and Norsk Epoxy AS

**Mapei Co-ordinators:** Lars Andersen and Tony Hamran, Rescon Mapei AS (Norway)

## MAPEI PRODUCTS

The products mentioned in the article belong to the “Products for Ceramic Tiles and Stone Materials” and “Products for the Installation of Wooden Floors” ranges. The technical data sheets are available at the web site [www.mapei.com](http://www.mapei.com). Mapei’s adhesives for ceramics and stone materials conform to EN 12004 standard and have been awarded the CE mark in compliance with Annex ZA, standard EN 12004. Mapei grouts for ceramics and stone materials conform to EN 13888 standard. Almost all the Mapei products for laying floors and walls are also GEV-certified and have been awarded the EMICODE EC1 (“very low emission level of volatile organic compounds”) mark by GEV. Mapei plasticizers and superplasticizers for mortars and concrete have been awarded the CE mark in compliance with standard EN 934-2 and EN 932-4 standard. Mapei products for repairing and protecting concrete structures comply with EN 1504 standard. Mapei cementitious mortars and membranes used for waterproofing before installing ceramics comply with EN 14891 standard. Mapei sealants conform to ISO 11600 standard. More than 150 Mapei products can contribute to obtain the LEED (Leadership in Energy and Environmental Design) certification.

### Waterproofing and laying ceramic tiles and mosaics

**Keraflex Maxi S1 (C2TE S1, CE EN 12004):** high-performance deformable cementitious adhesive with no vertical slip, extended open time and Low Dust technology for ceramic tiles, particularly recommended for laying large porcelain tiles and natural stone.

**Mapegum WPS:** quick-drying flexible liquid membrane for waterproofing internal surfaces.

**Mapesil AC (F-25-LM):** pure, anti-mould, acetic silicone sealant for movements up to 25%.

**Megafix Light:** one-component, cementitious adhesive. N.B. The product is manufactured and distributed in the Northern European countries by Rescon Mapei AS.

**Megatech:** polymer based highly deformable sealant. N.B. The products is manufactured and distributed in the Northern European countries by Rescon Mapei AS.

**Primer G (EC1):** synthetic resin primer in water dispersion with a very low emission level of volatile organic compounds (VOC).

**Ultracolor Plus:** high-performance, anti-efflorescence, quick-setting and drying polymer-modified mortar with water-repellent DropEffect® and anti-mould BioBlock® technology for grouting joints from 2 to 20 mm wide.

### Concrete repair

**Confix:** mortar for repairing concrete to be applied by spraying.

N.B. The product is manufactured and distributed in the Northern European countries by Rescon Mapei AS.

**Murtett:** cement mix for repairing concrete. N.B. The product is manufactured and distributed in the Northern European countries by Rescon Mapei.

**Redirep 25 RSF:** mortar for repairing concrete. N.B. The product is manufactured and distributed in the Northern European countries by Rescon Mapei AS.

### Structural anchoring and bonding

**Mapepoxy LR:** epoxy adhesive. N.B. The product is manufactured and distributed in the Northern European countries by Rescon Mapei AS.

**Mapepoxy UV-L:** solvent-free epoxy resin, especially suitable for underwater bonding. N.B. The product is manufactured and distributed in the Northern European countries by Rescon Mapei.

**Mapepoxy BI:** solvent-free, low viscosity epoxy resin for injections.

**Nonsett 120:** fluid expansive mortar for anchoring. N.B. The product is distributed in the Northern European countries by Rescon Mapei AS.

### Laying parquet

**Ultrabond P990 1K (EC1 R):** one-component, ready-to-use, solvent-free, flexible polyurethane adhesive for all types of parquet on screeds made from Mapecem, Mapecem Pronto, Topcem and Topcem Pronto, cementitious screeds, old wooden, ceramic, marble and terrazzo floors, etc.



Photo by Trond Isaksen

# The floating sculpture

Steel and glass for the installation located in the sea opposite the Oslo Opera House

**O**n the 11<sup>th</sup> of May last year, in the stretch of sea overlooked by the Opera House of Oslo, Queen Sonja of Norway inaugurated the sculpture “She lies” by Monica Bonvicini. Originally from Venice, the artist uses her works to express the relationship between architecture and man, and also often includes many historical and artistic references. In fact, for “She lies”, she was freely inspired by the romantic painter Caspar David Friedrich and his famous painting “Das Eismeer”.

In fact the sculpture, as with the painting itself, represents the force of nature and man’s belief in his own ability to control nature and its elements.

The three-dimensional sculpture/installation won the “Aquatic Project” competition announced in 2007 to complete the programme of works of art which decorate the Opera House. The competition asked artists to propose works of art which illustrate the close bond of Norway’s history and identity with the sea.

The 12 m high and 17x6 m struc-

ture sits on concrete base and weighs 335 tonnes. It has been formed around an open stainless steel framework partially covered with semi-transparent panes of glass which reflect each other.

The transparency of the glass, the varying atmospheric conditions and continuously changing light from the sea all contribute to modify one’s perception of the sculpture.

From the coast, admirers may view the installation from an ever-changing perspective, with the sculpture itself in continuous movement and rotating on its own axis according to the direction of the wind and the force of the waves. At night, to achieve the same mutation effect, the sculpture is illuminated by shafts of light from lighthouses situated along the coast.

The company which coordinated the installation of the sculpture contacted Rescon Mapei AS, the Norwegian subsidiary of the Mapei Group, to supply a product which could be used to grout the panes of tempered glass fixed on the steel structure to the concrete base.

## Above.

The sculpture “She lies” is located opposite the Opera House.

The panes of glass were grouted with MAPECOAT UNIVERSAL mixed with Sylotix.

The Rescon Mapei AS Technical Service Department suggested MAPECOAT UNIVERSAL transparent epoxy resin, produced and distributed in the Northern European countries by Rescon Mapei AS. In this particular case, to increase its consistency and viscosity, the resin was mixed with Sylotix calibrated grain size compound.

So even an evocative work of art in a “difficult” environment such as this carries the Mapei signature.



## TECHNICAL DATA

“She lies” sculpture, Oslo (Norway)

Year of Construction: 2010

Year of the Intervention: 2010

Intervention by Mapei: supplying products for grouting glass panes on the steel structure

Client: Kistefos AS (sponsor of the “She lies” project)

Project: Studio Riksantikvaren; work of art by Monica Bonvicini

Mapei Co-ordinator: Helge Aasen, Rescon Mapei AS (Norway)

## MAPEI PRODUCTS

The product mentioned in the article is manufactured and distributed in the Northern European countries by Rescon Mapei AS, the Norwegian subsidiary of the Mapei Group. The technical data sheet is available at [www.mapei.no](http://www.mapei.no).

**Mapecoat Universal:** two-component, solvent-free transparent epoxy resin.