

**High technology
for a place of worship
with a capacity
of 10,000 pilgrims**

THE CHURCH OF THE HOLY TRINITY OF FATIMA

More than ninety years have gone by since the events of that miraculous morning. On the 13th of May, 1917, three young children Lucia de Jesus dos Santos (aged 10), Francisco Marto (aged 9) and Jacinta Marto (aged 7) claimed that they had seen the Madonna in Cova da Iria, a neighbourhood of Fatima, in Estremadura, Portugal. They described her as being "...a lady brighter than the sun itself", above a small ledge (which is now the site of the Chapel of the Apparitions). This mysterious figure appeared several times during that distant summer, and on the 13th of October, around 50,000 pilgrims were present in Cova da Iria, with many of them claiming to have seen the so-called "miracle of the sun", a promise made by the Madonna to the three children in July and September.

The flow of pilgrims has never ceased since that summer, and quickly became too much for the small Basilica and the area of land around the Basilica which soon became a favourite assembly point to celebrate and worship together.

Thanks to the increasing importance of Fatima in the life of the Church at both a national and international level, the

number of worshippers who carry out a pilgrimage to Fatima is around 4 to 5 million every year.

The Project for a New Church

Over the years, therefore, the need for a new, larger place of worship opposite the old Basilica built in the 1930's became more and more pressing, to offer the thousands of pilgrims shelter from the freezing cold during the winter and the scorching heat during the summer.

In the middle of the 1990's, an international design contest was launched to define a project suitable for the new Church of Fatima. The choice was very precise, but also very difficult. To create a commemorative place of worship which can hold 10,000 people is not a simple task, and it is certainly no easier to insert such a monument with full respect for the context and harmony of the surroundings. The winner of the contest was the Greek architect Alexandros Tombazis, with a design which was very innovative for a church, yet in perfect harmony with the atmosphere of the sanctuary.

The basic idea behind the design was that it should not dominate the area and, in spite of the new church's

monumental proportions, it should be present without being overwhelming. The square, which had been trodden for decades by pilgrims from all around the world, had to maintain its characteristic and central role.

Tombazis chose to locate the new building on the area of land which spreads out after the churchyard of the existing Basilica, in Pio XII Square.

The new building is circular, with a diameter of 125 metres. It is held up by two horizontal pillars which support the entire roof, a solution chosen to avoid using columns inside the temple. With a volume of almost 130,000 m³ and an average height of 15 metres, the new Church of the Holy Trinity of Fatima (the name of the new church) is characterised by its central nave with seating for approximately 8,500 people.

The building has 13 doors: 12 bronze side doors dedicated to the Apostles, and a central door covering an area of 64 m², dedicated to Christ. The lower floor of the building is decorated with a panel of tiles created by Alvaro Siza Viera, with a theme of Galilee and the apostles Saint Peter and Saint Paul.

The atrium has two water basins, one depicting the Baptism (with water

In the two photos to the side:
The new Church of the Holy Trinity of Fatima. The new building, which is opposite the old Basilica built in the 1930's, is an imposing, circular construction which can hold up to 10,000 worshippers.

Photo 1.
The floors inside the church were made using slabs of stone laid with ADESILEX P9 grouted with KERACOLOR FF.

Photo 2.
After the waterproofing treatment with MAPELASTIC, the external flights of steps were covered with stone material. ELASTORAPID was used to lay the stone and KERACOLOR FF was used to grout the tile joints.



the laying of the first stone, a fragment of the tomb of the apostle Saint Peter, which the Rector of the Sanctuary of Fatima personally received from the hands of the Pope at the time, John Paul II. The new church was inaugurated on the 13th of October 2007, as part of the celebrations to commemorate the 90th anniversary of the first apparition of the Madonna. The cost of the project, which had been originally estimated at 40 million Euro, was more than 60 million Euro upon completion.

Mapei's Contribution

Mapei started working on this grandiose project following a specific request by the engineers responsible for the site. The suppliers of the stone used for the floor and wall coverings expressed their doubts regarding the compatibility of their products with the adhesives which had been proposed to lay them. And this is why Mapei was contacted, to offer an alternative solution for laying, grouting and sealing the stone wall

and floor coverings and for the internal and external flights of steps for the new Church of Fatima.

Various types of stone were used from local quarries, and they all had a limestone origin. The types of stone used were as follows:

- light-blue Vidraço de Ataija: grey and bluish-grey limestone, particularly suitable for *cantarias* (decorative cornices around the windows), external floor and wall coverings
- cream-coloured Vidraço de Ataija: pale, greyish-cream limestone, particularly suitable for *cantarias*, internal and external floor and wall coverings
- Branco do Mar (also known as Semi-Rijo do Arrimal): white limestone which, because of its lower degree of hardness, is particularly recommended for *cantarias* and internal coverings.

To fully satisfy all the requirements of the client, the Mapei Technical Service Department decided to carry out a precautionary analysis of the material in the Company's Research

flowing from above) and the other which depicts the Creation (with water rising from below), and gives access to various chapels, the confessionals and the vestry. Tombazis clearly wished to create a bond between the existing Sanctuary and the Church of the Holy Trinity, while creating a physical boundary to the walkway, with two walls of white cement on which the two pillars which support the structure are located.

Construction of the Church of the Holy Trinity started at the end of 2003 with





Photo 3.
 A close-up view of the mosaic in terracotta and gold, which covers the wall behind the altar. Worthy of mention is the original approach used to lay the terracotta tesseras, and the trowelled stucco finish using white NIVOPLAN and PLANICRETE.

Photo 4.
 The metallic substrate on which the mosaic was laid was levelled off with NIVOPLAN with added PLANICRETE, then smoothed over with NIVOPLAN with added ISOLASTIC.

Photos 5, 6 and 7.
 Phases of the creation of the impressive mosaic, and a partial view of the finished work of art.



& Development Laboratories in Milan, in order to scientifically define their dimensional behaviour and their compatibility with the adhesives, grouts and sealants which were to be used to install the materials. This process proved to be fundamental, both for the correct definition of the characteristics of the materials and the choice of the most suitable laying systems, and also in the final decision to use Mapei as the sole supplier of these products.

The systems indicated by Mapei were the following. To lay all the floor areas in the central nave of the church (more than 8,600 m²), in the "Chapels of Reconciliation", the refectory, the corridors and the internal flights of steps, cream and blue Vidraço de Atafaja limestone were used. According to the results of the analysis carried out in Mapei's laboratories, the most suitable adhesive was ADESILEX P9 cementitious adhesive with no vertical slip and extended open time. To grout the joints in these floors, the choice fell on KERACOLOR FF high-performance, polymer-modified cementitious mortar, water-repellent with DropEffect® technology (which makes products smoother and water-resistant). MAPEFLEX PU30 two-component, thixotropic, polyurethane sealant was selected to seal the expansion joints, in a colour specially created for the occasion, to make it the same colour as the tile joints.

The large-format skirtings around the perimeters of all the areas mentioned above were again made using light-blue and cream Vidraço de Atafaja. They were laid using ELASTORAPID high-

IN THE SPOTLIGHT

KERABOND+ISOLASTIC

When mixing KERABOND with ISOLASTIC as a substitute for water, the performance characteristics improve, satisfying class **C2E** (improved cementitious adhesive with extended open time) according to **EN 12004** and class **S2** (highly deformable adhesive) according to **EN 12002**.



Important:

Use KERABOND mixed with ISOLASTIC in the following cases:

- on foamed concrete walls;
- on precast or cast-concrete structures;
- on underfloor heating installations;
- with large-size tiles;
- for the installation of glass mosaics;
- for the installation of stone materials as long as they are stable and moisture proof.

ELASTORAPID was chosen for all the compositions made using Branco do Mar limestone. Finally, light-blue and cream Vidraço de Ataija limestone was also used to cover the external flights of steps. Before laying, a waterproofing treatment was carried out using MAPELASTIC two-component, waterproofing cementitious mortar. ELASTORAPID was again used to bond the stone, while KERACOLOR FF was chosen to grout the joints.

An Unforgettable Mosaic

A decision taken at the last minute helped make Mapei's contribution to this project unforgettable and unmistakable.

When the site was almost ready to start decommissioning, the designers realised that the great central nave did not have a reference point with a high visual and emotive impact.

The Church's central nave after completion of the works and open to the worshippers.

performance two-component, fast-setting and hydration cementitious adhesive with extended open time and no vertical slip. Also, because of its very high stability,



Father Marko Ivan Rupnik set to in designing a large terracotta and gold panel covering an area of 500 m² for the wall behind the altar, representing the message received from Fatima, inspired by Chapter 22 of Saint John's Apocalypse.

The panel was created on a structure similar to the one already made for the ceiling of the private chapel of Pope John Paul II in the Vatican (the "Redemptoris Mater" presented in issue no. 11 of *Realtà Mapei International*). To get the best results, apart from the excellent teamwork of the Atelier dell'Arte Spirituale from the Centro Aletti in Rome, the collaboration between the Technical Service Departments from Lusomapei S.A. and Mapei SpA, which opted for the solutions already successfully applied in the Vatican Chapel, proved to be decisive. To smoothen and level off the

substrate, which was made of metallic mesh fixed mechanically to a tubular steel structure, NIVOPLAN levelling mortar made from cement, selected aggregates and special synthetic resin was mixed with PLANICRETE synthetic rubber latex for cementitious mortar, and water to improve its bond and mechanical characteristics. The surface was then levelled off using NIVOPLAN, this time mixed with ISOLASTIC flexible latex to improve its bond to the substrate, its deformability and waterproofing properties – and water, incorporating 5x5 millimetre mesh and 160 g/m² of anti-alkali treatment.

The combination of all these products allowed for a continuous wall only 5 cm thick to be created, without having to insert fraction joints.

The solution chosen to lay the terracotta tesseras used to create the mosaic was KERABOND + ISOLASTIC, a mixture which forms an improved adhesive with an extended open time and which is classified as C2E according to EN 12002 standards. Because this type of mosaic was not grouted, it was also fundamental that the colour which appeared through the joints was as "neutral" as possible. This requirement was perfectly met, to the enormous satisfaction of the client, due to the fact that white KERABOND + ISOLASTIC had been used. Lastly, a particularly interesting touch for its creativity and efficient application was the use of white NIVOPLAN mixed with PLANICRETE in the areas in which the mosaic tesseras had not been applied. A trowelled,

stucco effect was obtained using this product, which was then finished off with a coat of paint. It was the final artist's touch in the creation of an original work of art and showed, once again, how Mapei products excel thanks to their versatility of use. 

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TECHNICAL DATA

The Church of the Holy Trinity of Fatima (Igreja Santíssima Trindade de Fatima), Fatima (Portugal)

Designer: arch. Alexandro Tombazis

Period of construction: 2003-2007

Intervention by Mapei: laying and grouting natural stone walls and floors in inside and outside areas; waterproofing the substrates of the external stairs; preparing the substrates and laying mosaics on the wall behind the high altar.

Client: Fatima Sanctuary

Design and Completion of the Mosaic: Centro Ezio Aletti (Pontificio Istituto Orientale) with the supervision of Father Marko Ivan Rupnik

Contractor: Somague Engenharia S.A.

Laying Company: Somague Engenharia S.A.

Mapei Coordinators: Roger Moita (Lusomapei S.A.), Andrea Aliverti and Pino Mancini (Mapei SpA)

Mapei Products: the products mentioned in this article belong to the "Products for Ceramic Tiles and Stone Materials" range. The technical data sheets are available at the web site: www.mapei.com. Mapei products for interior and exterior renders have been awarded the CE mark in compliance with Standard EN 998-1. Mapei's adhesives and grouts conform to EN 12004 and EN 13888 standards. Almost all the Mapei products for laying floors and walls are also GEV-certified.

Adesilex P9 (C2TE, EC1R): high performance cementitious adhesive with no vertical slip and extended open time for ceramic tiles.

Elastorapid (C2FTES2, EC1R): two-component, highly flexible, high performance, quick setting and quick hydration cementitious adhesive with extended open time and no vertical slip, for ceramic tiles and stone material.

Isolastic: flexible latex additive to be mixed

with Kerabond, Kerabond T, Kerafloor and Adesilex P10.

Kerabond (C1, EC1R, becomes C2ES2 if mixed with Isolastic): cementitious adhesive for ceramic tiles (thickness of adhesive up to 5 mm).

Keracolor FF (CG2, EC1R): high performance, polymer-modified, water-repellent, cement-based grout with DropEffect® technology for joints up to 6 mm.

Mapeiflex PU30: two-component thixotropic polyurethane sealant for joints with maximum 10% expansion of the initial size.

Mapelastix: two-component flexible cementitious mortar for waterproofing balconies, terraces and bathrooms.

Nivoplan (CE EN 998-1): levelling mortar for interior and exterior walls and ceilings.

Planicrete: synthetic-rubber latex for cementitious mortars for improving bonding and mechanical strength.

