



A "Terminal" improvement in Dubai

The considerable sum of 450 million dollars was employed in the investment program for the improvement of Dubai International Airport. The construction of the new terminal, the second one, now enables the southern terminal to receive up to 22 million passengers a year, thus positioning the structure within the twenty biggest airports in the world. And, meanwhile, a third terminal is being conceived...

It is not everyday to be the first to use a new airport! This privilege was given, on April 15, 2000, to the 170 passengers of flight EK 3001 for London, of the United Arab Emirates national airline. These passengers were, as a matter of fact, the first to use the new structure of Dubai International Airport.

The second terminal – the "Sheikh Rashid Terminal" of Dubai International Airport is a masterpiece built on a total surface of 148,000 square meters. The new structure, about 800 meters long and 65 meters wide, is on five levels. More than 14,000 tons of steel were employed to build it.

It is made up of 27 gates, a huge "Duty Free" shop of 5,400 square meters (four times bigger than the existing one), 34 "VIP areas" for passengers in transit, a five star hotel with one hundred rooms, a swimming pool, an Internet Cafe, restaurants, parking spaces and many other spaces for different functions. The connection between the two terminals is possible thanks to the construction of a long pedestrian tunnel, which permits you to comfortably walk about 300 meters which separates the two structures. The dimensions at play were exceptional, just as was the work schedule: as a matter of fact the whole construction was carried out in eighteen months only.

Sheik Ahmed Bin Rashid Al Maktoum – an authority in the United Arab Emirates and, at the same time, the President of the Civil Aviation Department - took part in the airport inauguration and was present at the take-off of the first flight. He was thus able to evaluate, with extreme satisfaction, the quality of the structure of the second Dubai International Airport building. Everything makes you think that the quality of the project and of

the work is prestigious, the result of a demanding selection of both the professional roles involved (designers, consultants and companies) as well as the materials and finishing.

This selection permitted the choosing of a reduced range of partners, among which Mapei, which all around the world, offers a wide range of building solutions, both for the small works and for the large infrastructure work like in this case. Mapei's intervention in the construction of Sheikh Rashid Terminal involved products for the application of stone coverings, mainly natural and agglomerate marbles, and of ceramic tiles.

This was a considerable commitment because of the 148,000 square meters that make up the entire surface of the new structure.

The stone coverings

Consequently we concentrated on planning the installation of the stone covering, which was extremely rich and diversified, as one naturally expects from a building commissioned by the "oil



lords". As many as twenty-five types of natural stones were used for the new terminal. These were all of precious quality. Due to the quality and quantity of stones taken into account during the designing phase, a lot of effort was put into the installation specifications: the method described by the Tile Council of America was required (paragraph F112-98 and F113-98 with the relating references to the ANSI norms).

Because of the clear colour of the stone materials, the specifications required to prepare the mortar bed with sands that must also be clear and with white cement. The installation method required by the Tile Council of America is as follows: on the cement slab apply a uniform layer of cement grout admixed with suitable latex additives; on this still fresh layer, add a thick layer of mortar mixed with the same type of latex as mentioned above.

To facilitate the perfect adhesion of stone materials, apply another layer of grout on the mortar and, on these, immediately lay the marble slabs.

Alternatively to the above mentioned procedure, the prescriptions left the companies the option of choosing to install the stone materials directly on the cured screeds using adhesives, in compliance with what is described in the ANSI A108.1B and ANSI A118.4 standards.

After many samplings, we decided to carry out the installation using both these methods, in compliance with the above mentioned specifications. The choice of using the two different methods

according to the type of material to be installed and the functional destination of the areas, enabled the optimisation of their specific qualities and - thanks to targeted and complementary choices - it contributed to reaching the ambitious goals of the project. The installation involved the entire new structure, and can be divided into six main areas: terminal connecting tunnel; ground floor (for the "Duty Free" area); ground floor (various other areas); first floor (departures); second floor (arrivals); third and fourth floor (hotel).

The installation methods

The first method was used in the tunnel, on the ground floor (apart from the "Duty-Free" area), on the first and second floor and on the levels occupied by the Hotel.

The floors of these areas were mainly made of Silver White granite size 60x60 to 100x100 cm, apart from the Guest and Hotel Area. Different types of natural stones were installed. The procedure was as follows: apply over the concrete slab an even layer of grout obtained by mixing white cement with a water solution and PLANICRETE*. In order to obtain a good adhesion between the concrete slab and the mortar bed, the latter was applied on the still fresh grout. The mortar bed was prepared with sand and cement mixed with a solution of water and PLANICRETE* in the amount necessary to obtain a mixture with the same consistency as wet ground. After the mortar was applied the slabs were laid on it (one at a time) and then beaten. These same slabs were then lifted and the above mentioned grout was applied on the mortar layer. The slabs were then again laid and beaten with a rubber hammer. The installation was carried out with three mm thick joints which were then grouted with KERACOLOR FF* mixed with FUGOLASTIC*. The expansion joints of the floors were sealed with MAPEFLEX PU21*, a polyurethane sealant which is sufficiently elastic to allow the thermal expansion movements of the floor and, at the same time, hard enough to resist wear and tear caused by the intense traffic on the airport floor.

The second system that was used for the ground floor (in the "Duty Fee" area), consisted of different types of agglomerate marbles that were installed using adhesive. These floor coverings



Photo 1. Granite floor in the departure and arrival areas.

Photo 2. Examples of the use of agglomerate marbles in the Duty-Free area. The lively colours of the coverings are distinctly highlighted.

Photo 3 and 4. The granite was installed using PLANICRETE cementitious mortar.

distinguish themselves for the lively colours (yellow, green, red, etc.) which is typical of this material. As a matter of fact agglomerate marble is a particular product obtained from marble powders mixed with resins and manufactured in shapes which are easy to install. For their installation KERACRETE* was chosen, basically because: it complies with the ANSI A118.4 standard and has a long "open time", which makes installation easier at high temperatures, as was the case here, where the works were carried out during summer months with external



temperatures reaching more than +40°C. A cementitious grout was required for grouting these floors in compliance with ANSI 118.6 standard, which set strict limits for water absorption and physical and mechanical characteristics of the hardened product. ULTRACOLOR* was chosen among the cementitious grouts of the Mapei range also to meet these requirements.

The procedure established to carry out the covering and tiling of the many and luxurious bathrooms of the hotel was specifically designed for this purpose. The supports used in these rooms were plasterboard panels. After priming the support with PRIMER G*, the 30x30 cm marble slabs were installed using ADESILEX P9*. The installation was carried out with 3 mm thick joints grouted with KERACOLOR FF* mixed with FUGOLASTIC*.

The ceramic tiles

Now that we have described the methods used for natural and agglomerate marbles, we must analyse the other



Photo 5. Ceramic tiles were used for the airport bathrooms floor and wall coverings.

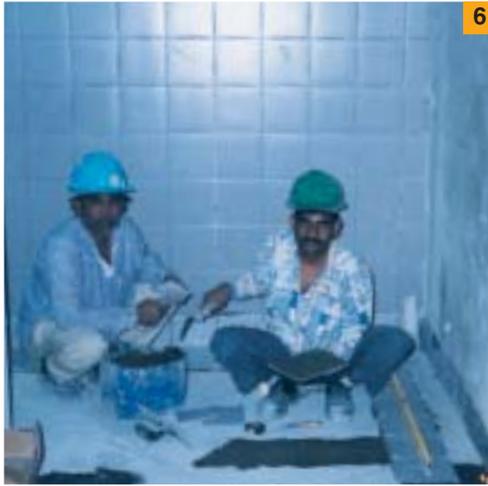


Photo 6. One moment of the installation of ceramic tiles using ADESILEX P9 and KERAPOXY.

Photo 7. A detail of the hotel rooms, walls and floor coverings were laid with marble installed on gypsum.



operations which, apart from the wide surfaces involved (as already said, 14,000 square meters of tiles were installed), can be defined as finishing operations. This installation program involved all the levels of the new terminal for the following areas: toilets, kitchens, terminal bathrooms, checking and surveillance posts. All the ceramic tiles were 20x20 cm and installed according to the classic method which involves the use of a cementitious adhesive. In this case ADESILEX P9* was chosen, in grey and white. For the grouting KERAPOXY* was used, a two-component epoxy acid-proof mortar available in twenty-six colours and particularly suitable for this type of environment where a waterproof, easy to clean grout, that cannot be attacked by acids is needed. For the expansion joints MAPESIL AC* was used, a fungus resistant solvent-free silicon sealant with acetic cross-linking, available in twenty-six colours and in the transparent version. Ceramic tiles were also used for the hotel access corridors, where large-sized tiles (60x60 cm) were installed using KERACRETE* mixed with sand and cement. The joints were then grouted with KERACOLOR FF*.

The connecting stairs

The last work cycle involved the installation of the coverings of the many connecting stairs positioned in the new tunnel over a total surface of 2,000 square meters. The structure of these stairs is

made of metal and, in order to satisfy the need to lift the installation surface by 2 cm, Plywood panels were mechanically applied on the plate. The Silver White granite covering was directly bonded on top of them. For the installation KERALASTIC* was chosen, a two-component polyurethane adhesive designed for ceramic tiles and stone materials particularly suitable for bonding on rubber, PVC, linoleum supports and as in this case on wood panels (which were bonded on the metal structure).

The installation program

In total about 42,000 square meters of natural stone material coverings (mainly granite) were installed in the terminal, plus approximately 6,000 square meters of the "Duty Free Shop" where coloured agglomerate marbles were installed. Another 14,000 square meters were instead involved in the installation of the tiles all around the terminal: in the bathrooms, in some areas of the hotel and in checking and surveillance posts. Total involved surfaces? A program of



Photo 8. The connecting stairs were covered with granite using KERALASTIC.



Photo 9. A detail of the access corridors to the lounges and hotel: large-sized ceramic tiles (60x60) were used and installed with KERACRETE.

Photo 10. Global vision of the airport terminal.

62,000 square meters to be installed exclusively using Mapei products!

The third terminal

As mentioned in the introduction, the Sheikh Rashid Terminal is only one part

of the Dubai Airport improvement program. As a matter of fact Sheik Rashid was particularly pleased with the final quality of the new structure and, during the inauguration, he announced that, with the help of the local government, the Civil





Aviation Department intends to start a project for the third terminal which according to plans, should explicitly recall shapes and contents of the second terminal, but bigger (approximately 36-37 gates).

The Sheik said: “We intend to start the building of the third terminal within two years. The new structure will be built on the right side of the airport and we think it will be able to receive from 18 to 20 million passengers a year. We anticipate that, once the third terminal will be finished in 2018, Dubai Airport will be able to globally receive from 40 to 45 million passengers a year, becoming a reference point for the Middle East operators”. Surely this is not a good period for positive forecasting on the future of airport terminals. The tragic events of September 11th actually made it difficult for the whole world system of airports and air companies.

Waiting for times of more clarity and serenity, we appreciate the effort made by the United Arab Emirates to obtain a modern, safe and comfortable airport. We also applaud those who – at the end of an ambitious project which has been put into practice – have the will and the enthusiasm to start a new challenge. The excellent results obtained for the second terminal will surely make the Customer follow a successful road again, a road followed with Mapei.

We have no doubts that in a few years, we will describe the third terminal as another “Realtà Mapei”.



*The products mentioned in this article belong to the “Products for ceramic tiles and stone materials” and “Building Speciality” lines. The technical data sheets are contained in the “Mapei Global Infonet” CD, and at the “www.mapei.com” website. Mapei adhesives and grouts are compliant to EN 12004 and EN 13888 standards.

Adesilex P9 (C2TE): cement-based adhesive with high bonding strength and no vertical slip for ceramic tiles.

Fugolastic: liquid polymeric additive for Keracolor FF and GG.

Keracolor FF (CG2): cementitious grout for joints up to 6 mm.

Keracrete (C2T): synthetic rubber latex to be mixed with Keracrete powder (white or grey) or with sand and cement (up to 5 mm thick).

Keralastic (R2): two-component acid-resistant epoxy grout for joints over 3 mm. Available in 26 colours.

Mapectex PU21: two-component self-levelling, polyurethane sealant for horizontal movement joints with maximum 5% expansion of the initial size.

Mapesil AC: solvent-free, acetic-crosslinking mildew-resistant silicone sealant, available in 26 colours and transparent.

Planicrete: synthetic rubber latex to improve the adhesion of cementitious mortars.

Primer G: synthetic resin-based water dispersion primer with low VOC content.

Ultracolor (CG2ArW): fast-setting and drying grout for 2 to 20 mm joints, available in 26 colours; does not produce efflorescenc.

TECHNICAL DATA

Dubai International Airport (Terminal 2) Dubai, United Arab Emirates

Project year: 1999

Customer: United Supplies Est

Designer: Al Habtoor

Building Company: Al Habtoor – Murray & Roberts Joint Venture (terminal), Six Construction Co. (control towers)

Marble installation company: Carrara Mid-East LLC (Duty-Free), Al Habtoor Marble LLC (all the other areas)

Ceraming laying company: Al Habtoor Murray & Roberts (bathrooms and toilets), Ceramic Tile Co. - H&R Johnson U.K. (kitchens), Summitville - U.S.A. (all the other areas).

Mapei reseller: United Supplies Est

Mapei coordinator: Anselmo Marchi and Francesco Stronati.

Materials installed	Operational area	Mapei Products
42,000 square meters of natural stone materials (marbles sizes 60x60 and 100x100 cm – mainly Silver White Granite)	• TUNNEL	PLANICRETE, KERACOLOR FF + FUGOLASTIC, MAPEFLEX PU21
	• GROUND FLOOR (apart from Duty-Free)	PLANICRETE, KERACOLOR FF + FUGOLASTIC, MAPEFLEX PU21
	• FIRST FLOOR (departures)	PLANICRETE, KERACOLOR FF + FUGOLASTIC, MAPEFLEX PU21, ADESILEX P9, PRIMER G
	• SECOND FLOOR (arrivals)	PLANICRETE, KERACOLOR FF + FUGOLASTIC, MAPEFLEX PU21
	• THIRD AND FOURTH FLOOR (hotel)	PLANICRETE, KERACOLOR FF + FUGOLASTIC, MAPEFLEX PU21, ADESILEX P9, PRIMER G
	• STAIRS	KERALASTIC
6,000 square meters of coloured agglomerate marbles (size 60x60 cm in 19 different colour tones)	• DUTY FREE (ground floor)	KERACRETE, ULTRACOLOR
14,000 square meters of ceramics (tiles size 20x20 in different colours)	• KITCHENS AND BATHROOMS (all floors)	ADESILEX P9, KERAPOXY, MAPESIL AC

Total: 62,000 square meters of coverings installed with Mapei products