

## **The Restoration Of The St.Francesco's Holly Monastery (Italy)**

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Restauro Italia is a brand that includes several companies dedicated to solving the problems inherent in the conservation of cultural items and Italian monuments. Located in the Italian region of Lucca, in the north of the country, its main activities are the restoration of monuments, improvement of civil works and the manufacture of products for the restoration of degraded structures. Among the jobs realised by the company are the restoration of facades and interiors of several churches and palaces. This article explains the process of restoration of the walls of the convent San Francisco de Asis, in the Italian city of the same name.



Following many tests carried out on the building face in the presence of professor Paolo Rocchi (University "La Sapienza" - Rome) and successive inspections executed by the works management, a methodology of intervention was decided upon after careful consideration of the state of decay.

### **State Of Decay - Analysis**



The area concerning the restoration expands approximately westwards and southwards. The building is constituted by cut stones of Assisi of medium dimensions (about 35 x 15) joined with natural hydraulic lime mortar with dimensions of about 1-3 mm. This mortar presents diffused areas of decohesion. The face develops from the ground with an inclined scarp that, at 15 cm from ground, stops with a string-course where a vertical masonry starts going up to the covering.

In past times, on the perimetrical areas of the scarp, a renewal of original stuccoing with a pigmented lime mortar was realised and subsequently painted of dark red, of doubtful origin. This operation was realised in order to obtain, at a certain distance, a greater geometrical effect of the face. At about 3/4 of its westwards height, the architectural work presents an horizontal brickwork, in some cases alternated with cut stones composed of the remaining part of the building. The stone has shades of soft pink, that could change to a light white. This is a very compact stone without neither deep enclosures nor macropores. In rare cases, there are deep inclusions of other materials such as red jaspere or crystallization of quartzite in the cut stones.



In the analysis of the three faces, there are structural settlements and lacunas of stone material: in particular, we analyse two fissures on the west side from the top to the lower part. Substantial settlements can be pointed out on the north side, for example, in the arch of the window of the scarp and other smaller fissures. On the same side and on the lower part of the west side, we can see meteoric water percolations coming out from the stones and that causes calcareous interventions on the perpetually damp walls. In the area of the face placed between the foundations and the first string-course and length of the perimeter of the building there is a uniformly strong biological attack on the stone that spreads stronger and more actively on the west and north side, and weaker (but no less widespread) on the south side.

The above said biological attack consists of moss, lichens, and in the deeper fissures of the stone consists of superior plants and wooden shrubs.

Where stones suffered a stronger attack by lichens and symbiotic microflora, the stone surface suffered a biochemical alteration, due to the soluble and disintegrating action of the nutritional apparatus of the same lichen, which interacts with the chrystalline structure of the stone and makes alterations unlike other areas of stone material with moss and algae.

On the central side of the three ornaments face, there are some areas not too narrow with presence of black crusts (oxalate of calcium). Besides, we notice some traces of color (water-green or yellow ochre) located on the underside of the arches of the ornament, set on the central side of the north side face. These chromatic traces are strongly anchored to the substrate of calcium that covers a good percentage of the internal areas of the arches and borders.

### **Methodologies of Intervention**

The intervention was begun with a careful photographic documentation of the areas involved by the biological attack and of the lacunas of the faces and fissures.

The superior plants were removed by mechanical means in order to extract some deep roots.

Where stronger root apparatus could endanger the stability of the stones, these were eliminated by deep drilling, assuring this way complete elimination.

In every fissure, from where plants or roots were removed, a solution of hydrogen peroxide was injected to sterilize the same hollow.

Many cleaning tests were done, from the use of direct microsand abrasives to the use of chemical products, to remove the microflora.

The first solution produces a considerable drawback of taking the coat away from the cut stones, and removing the original layer. That operation increases the microspores considerably and causes a loss of the chromatic tone.

The cleaning methods we have chosen are based on the use of variable pressure water spout machine, with helicoidal jet nozzles, at tangential impact, that do not damage the stone surface at all.

Where fissures between stones are particularly deep, because of settlements of original mortar, a mortar with a basis of natural calcium was applied the granulation of which is like the original one and whose chromatic tone is lighter to emphasize the restoration.

In the areas affected by a formation of black crusts, not removable by washing, the application of compress of ARBOCEL was indispensable, with a water solution of variable percentage of ammonium carbonate.

Where the original mortar is covering the stonework, because of the precariousness of the material, we recommend a consolidation with a basis of silicates, as in the areas where the superficial layer presents original pigmentations.