

SUPERFICIAL TREATMENT RECOVER FOR THE VALENCIAN HISTORICAL MANUFACTURATES.

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Color application in the historical buildings of the cities of the Valencian Community constitute a very usual practise which have characterized with an identity hallmark every street, district and city. The color is part of the indigenous culture of the village, and these are identificates with its owns colors which are part of the land, its geological nature, its climate and its natural environment.

The research carried out is trying to find not only the original colors and also those that the building have had in the time, but also its main purpose is to come to the conclusion that which is the correct way to restore the building to recover its original sense using resistant materials.

The methodology of the study tries, in the first part of it, to know which are the manufacturates and supports of the cover layers, as of them we can get conclusions about the adhesion of the materials and futures pathologies we can find. Later is carried out an analytical research through the extractioof samples which are analized using physico-chemical methods to know the number of paint layers that the building has had in its history and its organic and inorganic components. With this information is created a color chart and is defined the chromatic purpose as a conclusion of the results obtained. Lastly is done a practical reflexion about the different paints which can be used in the outside façade and the result that we can get in base our own proof bank.

The cover layer support

Most of the valencian buildings façades have been built in the past centuries using solid brick supports or masonry which adhesion has been done with mortars with great quantity of clay, sand, plaster and lime. For the protection of this manufacturates it was applied a support made of mortars of plaster or lime, leaving in some cases the materials of the manufacturates free of sight (bricks, stones, etc.)¹

The present applications have displaced this support technics for the use of new materials whose base component is cement (cement mortars, monolayer mortar, etc). In Valencia was not very common that the white-whasing were with color en masse, but the habit was to paint as a sucesion of paint layers of coloured lime with minerals pigments from grounded stone obtaining by this way a typical color range of ochres and red ochre.

The selection of the materials to restore or rehabilitate the façades of our historical centres constitute, in occasions, the great doubt between a great number of factors to be borne in mind (humidity, sun, previous support, wind, etc.).



Lime Mortars

Lime mortar is the one which has presented the best results in the area and the most extended in the last centuries. Its composition includes sand from the limestone quarries and grease lime in proportion of 3:1. Lime was used to slowly burn at work at least 30 days before its use. The presence of plaster in some sample evidence that sometimes a part of plaster was put every three parts of lime to get a high mortar density, improving adherence and avoiding superficial cracks.

¹ In our area there is not tradition for the stone work contrary to the great tradition of the central areas of Spain.

The use of lime to get stuccos was not very common outside the buildings but we can find some important examples which indicate its use inside the palace buildings.

Plaster mortars

It was common its use in the voluminous elements of the façade (lintels, ornamental elements, etc.), although we also find some façades supported by this mortar. The advantages of its easy work, fast hardener and great adherence counteract by its bad humidity resistance, water of rain, condensations, etc. but the kindness of the Mediterranean climate allowed to accept this kind of supports. The proportion of its components is of 2-3 parts of very fine sand and one part of dead plaster. It was used to add to the hotchpotch water some lime favour its resistance.

There are also cases in which are found in equal parts plaster and lime knowing this as a "Yesón"

Cement mortars

Is the common practice at the end of the XX century, displacing the use of the traditional mortars of lime and plaster. Occasionally the short information collected from the building produced the presentation of capillary humidity problems, condensations and mainly cracks and fractures for the high rigid of the mass. Is

common to mix a lime proportion obtaining by this way high elasticity and a more handy and elasticity mass. This one is known as a mixed or bastard mortar.



Proceso de ejecución del revoco coloreado

Extraction and samples analysis

The analytical methodology used for the recover of the historical color is understood primarily and necessarily in the outside-working, by means of it we determinate the buildings we study through the revoke samples extraction from the façade.

The building selection about the extraction of samples is going to be done covering all the architectonical and typological variables which refers all the differents cases found in the historical centres that we have been studing since 1989, specifically the historical centre of Valencia.

Is trying to analized the whole of the oldest buildings of the area, if its conservation state allows, taking samples af all the buildings belongings to the selected typologies. This is a essential point to generate the correspondences between the chromatic scale and all of each of the architectonic typologies. Samples are also taken from those buildigs which are architecnically or historically singulars.

In base to the global analysis of the samples we can know the paint layers number, not only the one that we see but also those going until the support used, obtaining by this way all the coloured layers applied in the time.

The number of samples taken from the buildings is directed related with the chromatic complexity façade, so in that cases in which different colors have been detected in the diferent parts of the building, several samples have been taken to characterized completely all the chromatic games of the façade, doing an intervention purpose characterizing all the different chromatic parts.

The samples have been taken from that parts of the buildings protected by its situation, parts in which atmosferic agents arrive hardly, as the inferior face of the balcony cornice under the high aileron of the façade, in the internal face of the windows and generally in points of difficult acces.

The extraction procces samples is done using specified instrumentation prepared for the pigments samples extraction.

Selection processes and extraction samples in buildings can be described in severals phases:

First phase:

The extraction of the coloured samples is taken always the conservation surface of the building allows through a diamont twist drill bit specially designed to avoid flaws in the building surface.

FOTOGRAFÍA DEL ROSCO

Samples obtained by this process are able to be observed the several chromatic layers

Superposition. Layers are different in number and thikness, finding in some cases until three or four paint layers of different shade and intensity.

Second phase:

In the secon phase of the analysis process we go through the sample, layer by layer until the hidden layer which is the manufacturate support revoke.

In this layer we realized a chromatic meditation with the contact colorimeter. Meditation, which is obtained in base luminance, saturation and chroma is taken to tha informatic program of application and technic translation through is possible to know the chromatic value of that area.

By this way we obtain a first notation, which will be concluyent when contrasting the results with those obtained in the third phase of the analysis.

We do not have to forget that the first chromatic layer was sommitted at several weather harshness, and that will be also reflected in the meditation taken, so that will be conclusive when interpreting results.

Third phase:

The third phase consist on the physico-chemical analysis and catalogation of the coloured samples taken. Samples are stuff in resin for an stratigraphy study of the layers through cross section. Later a mineralogical composition stydy of the layers is realized.

FOTO MUESTRAS EMBUTIDAS

Solids samples taken from the façades are generally mixed of inorganic components, and in some cases organic components. For its identification is neccesary the use of several analitycal technics with the aim to obtain a complete samples characterization. The analysis technics used have been optic microscopy, scanning electron microscopy, RX diffraction and infrared spectroscopy by Fourier Transformed (FT-IR).

Optic microscopy of lower magnification power (binocular lens and stereoscopic microscope) with a x10 - x60 magnification, allows the direct observation of the sample magnificated, making easy the process to obtain the cross section in the most interesting part. With the sample in resin we have a very easy manipulated sample, improving the observations of the diferents layers. This technic combined with the scanning electron microscopy (SEM/EDX) gives information about the morphology and composition of the sample.

FOTO ESTRATIGRAFIA

Scanning electron microscope (SEM) combined with the microanalysis by energy dispersion (EDX) allows to obtain the puntual inorganic composition of the different layers of the sample, identifying by this way pigments presents in the layers. We can also analyzed inorganic material with RX diffraction, used to characterized mineralogical and petrography materials of construction and its alterations caused by the diferents climate effects.

IMAGEN MICROSCPCOPIO ELECTRÖNICO ESPECTRO DIFRACCUÖN

Infrared spectroscopy by Fourier Transformed has also its complementary application for the study of inorganic components, althought its main application is to identifie organic components (oils, varnish, adhesives, consolidants, etc.) finded between layers or inside the color layers.

Pathologies

The most common pathologies found in the area are those caused by the capillarity humidity. The narrower streets of the historical centre avoid sun goes inside the buildings add with the waterproffing caused by the asphalt or cements in the streets has avoid the natural transpiration of the soil, so this fact has potencie the transpiration of the humidity through the walls of the buildings (as is the only way out), being the oldest one the most damaged.

The other pathologies found in the façades of the historical centres buildings are those related with lose of surface as a lack of adhesion of the materials, craks and fisures, bombing of paint layers for not using the right tipe of paint, lose of paint layers, eflorescences, etc.

We have not to forget the absence of maintenance or conservation of the buildings, and mainly the lack of culture about the historic culture that allow very agresive

interventions or “restorations” not very corrects from the point of view of the architectonical heritage conservation.

The cover layer intervention

The importance of the existent pathologies determinate the actuation of our cover layers and make us to have present with care all the new “hight” products sent as the most technologically advanced in the market in front those traditionals whose results are quite accetable and are much more humility. Different samples of paint are been investigated on the revokes listed before and its analized its evolution and compatibility between all of them. Paints selected for our study are include in four groups.

Silicat paints

Silicat paints are without any kind of doubt the most similar to those of minerals finished applied in the past. Its main advantage is the great resistance and durability of color, whenever organic components of this paints are less of 4%.

Different test done with several marks and colorations have shown the most interested resoltos until this moments, being a very advisory treatment when the state of the manufacturate material is right.

Plastic paints

It corresponde to those form by polymeres in watery dispersion and mineral and organic pigments. The great evolution of the industry in tha last years have elaborated a great variety and types used in a very indiscriminatesd way without any criteria and compatibility study respect the other materials of the surface. The main pathology observed is the appear of bulkiness, lose of color, strip off, etc as a consequence of the lack of transpiration by the opposite of the silicat paints.

Lime paints

Lime paints are the traditional paints use in the past. Components are slow burn lime with mineral pigments added to get the wishful color.

The main inconvenient is the repaint, as a consequence of its low flexibility which does not allow the application of a lot of layers producing it that occurs flakes in the surface.

Pigments in the revokes

There is not a very extended technique in our area, althought in the last years is growing its use through monolayer mortars and industrial stuccos. Our interest is to achieve that the industrial production was able to have the old and traditional color range used in the historical buildings of the city centres. The investigation consist on analized the pigments addition in the cover layer supports.

