NEW COATING TECHNOLOGIES FOR THE PRODUCTION OF MONOPOROSA FINISHES

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1. INTRODUCTION

In the last few years, great efforts have been devoted to searching for new production methods that offer greater benefits in the manufacture and quality of the resulting products[2], due to the increasing interest shown by the market and manufacturers in new aesthetic solutions, proposed as a function of the development of new glaze formulations[1]. With the advance of enamelling and decoration technologies[3], together with the growing expansion of the polymers industries, new uses and technologies for these materials are appearing at a surprising speed. With this evolution, much has been done to improve existing techniques, products and facilities utilized by the polymer industries. This has led polymers to replace traditional materials such as metals, wood and glass in many areas of application[4]. Considering the importance of current production and glazing technologies for ceramic coatings, this work presents an objective, general view of the possibility of using polymeric materials as an innovative alternative to ceramic coatings, in order to obtain products with differentiated characteristics, while also enabling elimination of some processing stages.

2. EXPERIMENTAL PROCEDURE

The acrylic polymer (PMMA) utilized in this work was selected for its functional properties, such as good resistance to atmospheric agents, stability to light, excellent transparency, wide colouring capacity, good resistance to high and low temperatures and good abrasion resistance. The polymeric solution was prepared by solubilizing acrylic polymers in 100 ml of hot organic solvent (90°C). Subsequently, a solution of 0.4g of orange, violet and white dye was added. The polymeric coating was then applied onto the ceramic piece at room temperature. For that, an automotive painting pistol was utilized with inferior feed.

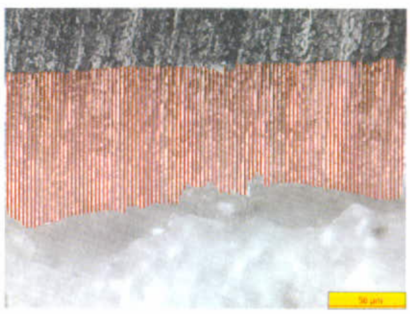
2.1. ANALYSIS

Surface analysis of the ceramic samples before and after coating with the polymer was carried out by scanning electron microscopy (SEM) in a Philips, model XL 30, microscope with tungsten filament coupled to an energy dispersive X-ray spectroscopy (EDS) facility. The thickness of the polymeric layer was also determined by image analysis The experiments, involving exposure to saline haze, acid and ozone chamber, and ultraviolet chamber, were carried out as described in standards NBR 8094, NBR 8096 and ANSI/ASTM G 53.

3. RESULTS AND DISCUSSION

Analysing the micrograph shown in figure 1a, it can be observed that the non-coated ceramic sample presents a very irregular surface.

(a)



(b)

Figure 1. (a) Micrograph of the non-coated ceramic surface, (b) surface coated with polymer.

However, after coating the sample with the polymeric material (figure 1b), it was verified that the ceramic surface presented a better finish: i.e., absence of roughness, colour homogeneity and furthermore, good bonding of the coating to the ceramic body.

Nevertheless, it was observed that the polymeric layer did not present constant thickness for the same studied region, a variation in thickness being found between 72 and 102 µm. In the experiments carried out in the saline and acid haze chamber, no visible effect was observed in the material surface after the tests, indicating that it is adequate for places that reproduce the conditions found in the marine atmosphere, as well as corrosive places. The analyses performed show that the material studied doe not undergo photo-oxidative degradation on being irradiated by ultraviolet light and ozone. That is, there is no absorption of this radiation by specific polymer groups which could increase electronic excitement and possibly lead to molecular rupture of the polymeric chain at the most susceptible sites[4].

The use of polymers in coating ceramic surfaces has enabled producing a great variety of strong colours that are difficult to obtain through traditional glazing techniques. Furthermore, it deserves to be mentioned that this technique presents the advantage of easy colour reproduction, from the combination of a reduced number of dyes. There is moreover a reduction in the number of necessary stages required to obtain the final product, because the utilization of this type of coating eliminates a second firing for special effects, leading to a reduction in production costs. As there are currently problems regarding shades in glazes, using such materials for coating ceramic surfaces allows minimising these variations.

4. CONCLUSION

The results of the experiments carried out show that the material used presents good resistance to weather changes, as well as to ozone and ultraviolet attack. It should also be mentioned that the coating technology of ceramic surfaces with polymeric materials is a highly promising technique, which make it possible to obtain a product with very attractive characteristics, for markets that are yet relatively unexplored. The considerable economy associated with the process constitutes a stimulus for setting forth this study, to obtain more information to enable more widely disseminated application of this new coating technology. However, the use of this type of material is limited just to coating building facings.

5. REFERENCES

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