Mortars & Plasters used in Building Conservation – A Study of the Local Scenario

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ABSTRACT

Mortars and plasters are important in the conservation of masonry buildings, as they can serve as "sacrificial materials" for the masonry blocks. Even though some studies on such mixes have been carried out in Malta in the past, much further work in this field has been identified. This lacuna of information inspired the research undertaken in connection with this dissertation. This work was thus focused on the investigation of current trends relating to the application of mortars and plasters in Maltese conservation works, with the aim of determining whether the mixes being currently employed are compatible with local substrates and suitable for local conditions. Initial investigations showed that most of the current mixes being used in local restoration projects are based on blends of either locally produced air-lime binders, or imported hydraulic lime binders, mixed with locally produced sands, often with additives such as crushed pottery and/or marble dust. A limited number of imported proprietary mixes were also identified. Twelve test mixes were thus chosen as representative samples of Maltese conservation mixes, and these were subjected to a testing programme to evaluate their performance. Mix samples were tested in their "fresh" state, as well as hardened mortars; this included the determination of mechanical strength, aesthetic properties, physical properties, salt content and salt resistance. Results showed that traditional air-lime based mixes are good candidates as sacrificial materials as regards mechanical damage and salt damage, yet their very slow curing processes are undesirable in aggressive conditions. Gauging such mixes with white cement enhances the initial resistance to salt and mechanical damage, but also increases the level of salt content within the mix, and drastically increases the mix’s capillarity. Hence, it was concluded that the negative effects produced by cement gauging would outweigh its advantages. Hydraulic lime mixes have better salt and mechanical damage resistance than the air-lime mixes whilst still being good sacrificial materials. However, their high flexural strength does not allow them to act as suitable sacrificial materials in cases of structural movement, when used as bedding mortars. Proprietary mixes showed superior salt resistance to other mixes, and acceptable levels of mechanical strength, but the result for water absorption by capillarity indicated that they would fail to efficiently extract moisture and salt solutions from the substrate beneath. Moreover, the elevated quantities of soluble salts that these mixes have, in relation to freshly quarried Globigerina Limestone, indicate that they could be a potential source of deleterious soluble salts.