

## **Natural Lime Mortars for Restoration and Conservation - an article by Ugo Spano**

Mortar is essential for the preservation of the fabric of our historical and vernacular heritage. The most important factor to bear in mind is the compatibility of the new mortar with the existing one. This does not necessarily mean a "like for like" replacement. In many cases the original aggregate will not be available or the binder has lost most of its characteristics to be suitably identified. In other cases the building is not in the same condition as when it was originally built and the mortar might have to perform differently from the original.

Buildings pre 1900 would not have been built with cement (with few exceptions in the late 19th century) but with a lime mortar. To introduce cement or cementitious mortar in these buildings means to introduce a decay process due to the chemical composition of cement with high presence of gypsum and alkalis that will cause sulphate and alkali-silica reactions. Irreversible damage can be caused, especially in consolidation and grouting work, with the result that in few years we could seriously damage structures that centuries have not.

In surface work cement mortar does not offer the high level of breathability provided by most types of lime mortar. Damp and rot might occur and further damage could be inflicted using chemical or unsympathetic remedies.

When using cement/lime mortar to reduce the strength of pure cement mortar and improve their workability we are not avoiding the problems mentioned above.

Why do so if it is possible to achieve most of the required mechanical performance by using a pure lime mortar, hydraulic or not, which would be totally compatible with the existing ones and suitable for the envisaged work.

It could be that there is not sufficient awareness of the properties and performance of lime mortars. The reason for this could be two fold: the user has not studied in depth the characteristics of various limes and the Manufacturers or Suppliers are not giving sufficient useful and complete scientific and application information. Another consideration could be the reticence by some Builders to use materials with which they are not familiar and wrongly justifying this by blaming presumed higher costs.

The cost of using lime binders, especially a low density natural hydraulic lime (NHL), is not as high as it might seem once it is realized that, weight for weight, the volume of mortar made with NHL binders could be up to 3 times the amount made with cement. The cost consideration, however, should not even be there if the health of the building is at stake.

It is true that good, reliable and meaningful information from Suppliers is scarce. This has contributed to mystifying lime and to endless discussions and doubts about its properties and performance. At a conference on lime held at the BRE this subject was the basis of the conference and the objective is to improve the information on products and good working practice.

A lot of this information is, however, already at hand, backed by experienced and reliable suppliers. An example is the TransMineral USA web site (<http://www.limes.us>), which goes a long way in providing information that will assist specifiers and users to choose the correct NHL product.

There is no reason for the user not to ask questions and demand answers on the composition of the lime they intend to use, its sulphate and alkali content, its fineness and density and on the expected performance of mortars at different dosages, their breathability values, their elasticity and strength over a long period and so on. Correct and proven answers to these questions will improve the user's knowledge and confidence and will ensure that the mortar adopted is not the result of a designer imagination, hear say or sheer habit.