

LIME STILL MAKES THE BEST MORTAR

Lime has been the principal binder in mortar, plaster, render and limewash for more than 12,000 years. One of the earliest surviving examples of the use of this material is a mask of polished lime, dated between 9000 and 8000 years B.C.. The mask was of such fine detail that it is clear that by this time man was not only well used to burning limestone to produce quicklime, he was also experienced in its use and had developed a very high standard of skill which is seldom found in the work carried out today.

Between A.D. 1800 and 1824 a number of manufacturers experimented with a variety of mixes of limestone and clay, much of which was dredged from the sea bed in the form of detached nodules known as septaria. Parker, Atkinson, Martin, Keen, Howe and Keating all manufactured various forms of early “cement” but it was not until 1824 that Aspdin emerged as the lead player when he took out his patent for Portland Cement. Twice the price of an equivalent quantity of lime, Portland Cement was slow to take its place as the principal binder in mortar and it was only during the last 70 years that it emerged as the predominate material.

Much of the early use of cement was as a binder in external render and this probably gave rise to the trade name ‘Portland’, as it was said that it cured to a colour that was similar to Portland stone, unlike the cement mortars made today which usually have the characteristic drab grey appearance. Natural lime is fired at 900°C and for many years the large lumps of burnt limestone were slaked in water filled pits. Modern cement is produced by blending relatively pure limestone with good quality clay and fired initially at 1300°C, and then crushed, before firing at an even higher temperature. Probably the most important development that Aspdin introduced into the manufacturing process was the hydration of the product. Instead of slaking in a pond or pit, he passed the crushed product, on a conveyor belt, through a chamber with a fine mist of hot water spraying down onto the particles as they passed. The ensuing exothermic reaction when the quicklime was sprayed with hot water generated sufficient heat for the cement to emerge as a fine dry powder. Aspdin marketed his new ‘Portland Cement’ in barrels originally and the paper bags we see today came later.

When we consider that nearly all the churches, abbeys, cathedrals, castles, stately homes and half the building stock in the U.K. was built with lime, including the now famous Coronation Street, it is hardly surprising that the use of lime is fast coming back. With so many buildings constructed of lime there has been a huge revival in the use of this well proven historic material. Not only has there been a need to repair the historic building with matching lime mortars, plasters and renders, there has also been a rapid acceptance that new build with lime meets the need for sustainable building. Any builder will tell you that bricks laid in a lime mortar can be used over and over again, hence the proliferation of the salvage yards. Bricks bonded with cement mortar can only be used once, after which they are debris.

Environmentalists approve of lime as a binder because the firing temperature of 900°C is far less harmful to the environment than the temperatures in excess of 1300°C required when producing cement. Furthermore, a proportion of the carbon dioxide emitted when burning lime is absorbed back into the lime as it cures.

Bricklayers like lime mortars because they are more flexible and comfortable to work with. Waste is also reduced as materials produced at the end of the afternoon can be used the following morning. This method of leaving the mortar overnight is particularly popular with plasterers who find the material adhesive and easy to work when left in this way. Furthermore, lime renders and plasters do not craze in the same way as their cement counterparts, which need expansion joints.

Because lime mortar can be left overnight, it is not surprising to find that it is still possible to build at the same speed as a modern cement mortar. A simple test, carried out at the Building Research Establishment when testing the lime mortar used to build the Bedford School Library, showed great stability within a very short time.

Owners like the vapour permeability of lime materials because buildings with solid masonry walls must remain vapour permeable if 'cold bridge syndrome' is to be avoided. If vapour from showering, cooking, house plants and drying clothes is trapped inside houses built with solid walls, condensation may occur on the inner wall surfaces unless adequate ventilation is installed. The problem is that most owners are reluctant to change the air that has cost so much to heat. The resulting damp has generated an army of 'experts' running around with moisture meters (originally intended for checking the moisture content of timber) advising unwary owners of rising damp, penetrating damp and a host of other problems which often do not exist. Buildings are like human beings, they need to breathe.

Another early example of the use of lime that survives in a lime concrete is the floor to a fisherman's cottage on the banks of the Euphrates River. Dating back 11000 years, the cottage has long since left the floor exposed to the elements for thousands of years. At the historic site of Yiftah El, a 180 M² polished lime concrete floor is a further example of the highly skilled workmanship employed in the use of lime mortar. It is hardly surprising that the Roman harbour works survive today after decades of rising and falling tides, as natural lime mortars do not contain the sulphate and tricalcium aluminates found in modern cement. These contaminants react with the chloride in sea water. Lime has proved itself as being one of man's best construction materials.

Architects enjoy designing with lime as there is no need for unsightly expansion joints and the material is vapour-permeable. Apart from the fact that lime can also match and even exceed the performance of cement in many respects, the subtle colour and texture of old lime mortars is now readily available for both the repair of old, and the building of new, houses.