

BUILDINGS AT RISK

Lime in construction – both old and new

Buildings at Risk looks at our built heritage – buildings and structures, how they have evolved, and their place and role in the landscape.

In this instalment, **Martyn Thomas of horncastle:thomas architects** looks at the use of lime in construction, not just to repair older buildings but also improve newer ones, sharing a case study which highlights the benefits of careful choice of materials; and **John-Paul Walker, MNH's historic buildings architect**, summarises the benefits of lime in buildings old and new.

The recent UNESCO Biosphere webinar 'Mann made: built heritage and a sustainable future' was hosted by the Isle of Man Biosphere in conjunction with the Kerry and Dublin Bay Biospheres.

Speaking alongside Ross Brazier, DEFA's principal registered buildings officer and John-Paul Walker, historic buildings architect at Manx National Heritage, I presented a number of our practice's recent projects focusing on the sensitive work we have undertaken on heritage and traditional Manx buildings.

One of our case study projects exemplifies the careful approach needed when refurbishing and upgrading the solid stone wall buildings that we find so often in the island, as well as improving the variety and quality of the spaces to make the house more suitable for the way we live now.

This project is not a registered building but it is in the Castletown conservation area; a terraced house which we designed a modern extension for, as well as carrying out a top-to-bottom refurbishment of the main part of the house.

The original outrigger was removed and rebuilt with a



A handsome limestone terrace in the Castletown Conservation Area

Photo: Patricia Tutt

living/dining/kitchen space that connected the house to the garden much more directly.

Above that there is a new bathroom off the staircase half-landing and next to that, over the kitchen, a large rooftop bringing plenty of

natural light into the heart of the house.

We took care selecting the materials and designing the forms of these new sections with the idea that they should be relatively low key.

The white rendered walls and zinc roofs sit nicely

with the neighbours in the conservation area but these materials clearly show that these parts of the house are new. They don't resort to mimicking something old with stone cladding and traditional windows but they complement the traditional

palette of limestone, render and slate.

The interior of the house was carefully refurbished reusing original timber panelling and doors. The joinery details were made to match the original skirtings and architraves. The new parts

of the property are modern though and the spaces and details sit well with the traditional parts.

The main living space opens onto the garden and there is a new garden office too, also with a zinc roof.

As well as improving the thermal performance of the house, its energy efficiency, the refurbishment had to deal with damp problems in the solid limestone walls. These were addressed by removing modern internal linings and replacing these with more natural and breathable insulating materials to upgrade the walls.

The roof was stripped and the slates retained, some structural alterations made and then insulated using modern 'kingspan' style materials.

Similarly, the ground floor was removed and replaced, taking the opportunity to well insulate this area. All of the windows were replaced - the front windows with slimline double-glazed windows in timber frames designed to match the originals.

The pointing on the external walls was raked out and the limestone was repointed with lime mortar. Cement pointing and render will trap moisture within the walls whereas lime-based materials will allow the walls to breathe and for the moisture to escape, reducing the risk of dampness within the building.

This 'moisture open' breathable approach extends to the insulating lining where a breathable woodfibre board has been used. You will often find that traditional solid wall houses have been lined with a standard modern insulation board and this approach will cause problems. Due to the lack of breathability, moisture would not be able to escape the construction, causing dampness and mould growth within the structure.

To provide further protection, the gable wall has been rendered. A lime render was used for this despite the fact that these houses were originally rendered with cement, as with a lot of buildings from this period onwards in the island.



The replacement sash windows in the front rooms have slimline double-glazing units, while the timber panelling has been restored

Patricia Tutt



New modern spaces open into the garden at the rear of the property

Patricia Tutt



(Left image) The external walls were repointed using lime mortar, while modern materials complement the conservation area

Photo: Patricia Tutt

In a sense, this is not a 'correct' historical approach as a different material has been used, rather it is a more technically correct approach making use of traditional 'vapour open' materials.

There are of course a great many similar houses of this sort in the island which would need to be upgraded correctly; using the correct materials is a learning curve for us as well as for homeowners, builders and other consultants and it is being brought into very sharp focus in relation to the island's aspirations to reach net zero carbon.

There are barriers to taking this kind of approach though. There is often a lack of real understanding from building owners, builders and consultants that it is necessary. Currently, there is a total lack of an established supply chain to the island for these sorts of materials and

'special order' items often come at a premium.

Generally the cost of doing this kind of work is much higher both in terms of the costs of materials and the amount of labour often involved in their use.

While grants were once available for maintenance and refurbishment work to registered buildings and properties in conservation areas, these are a thing of the past.

The professional publication 'The Architects Journal' has recently instigated the #retrofirst campaign (<https://www.architectsjournal.co.uk/news/retrofirst>), highlighting the social, environmental and economic benefits of reusing redundant buildings rather than demolishing them to build something new.

Retaining and reusing a building represents a massive saving in 'embodied carbon' which, in the construction industry, is a measure of the energy that it takes to construct a building.

It is surprising and disappointing that the island's NetZero targets do not include embodied carbon in construction, particularly when considering the carbon-cost of transporting the majority of building materials to the island.

This issue remains highly significant within the construction industry though and the retrofit, or refurbishment, of our building stock does not only relate to our historic registered buildings or buildings in conservation areas, it applies to all buildings.

In addition, the careful specification of materials is key to reducing embodied carbon in con-

struction and, while cement production is responsible for a staggering 5% of global carbon emissions, lime mortars and renders reabsorb a proportion of the CO₂ released in their manufacture as they harden.

Taking the #retrofirst lobbying to the UK Government has focused on changes in planning policy and procurement processes and also suggesting that the level of VAT raised on work to existing buildings be reduced from the current 20% to 5%.

In the Isle of Man we can be very pleased to be a step ahead in that we already have a reduced 5% VAT rate on domestic repairs.

Why not lead the way

further though and extend this to commercial buildings, then in the absence of available sources of serious grant funding for the historic buildings that are available in the UK, how about reducing work on registered buildings and buildings in conservation areas to 0% VAT?

That would represent an instant 5% or 20% grant and would massively help shift perception in the island that owning a registered building can be a blessing and a benefit, rather than the often perceived millstone.

Martyn Thomas is a RIBA chartered architect and a founder, with Karen Horncastle, of horncastle:thomas architects.



A sketch showing the new living spaces to the rear of the terrace

horncastle:thomas



(Left) on the inside of the house, the external walls were given a coat of lime render before being lined with woodfibre insulation (right)

horncastle:thomas



Three cheers for lime!

Of all the traditional building materials, lime is one of the most diverse and wide ranging. It can be used to make mortars, renders, plasters, paints, solid floors, and it can even be used to make a more sustainable version of concrete.

Its uses in both the refurbishment of historic buildings and construction of new is only being realised as we rediscover old techniques and innovate new ones.

Its main use is an alternative to cement. It is fast becoming a replacement for cement as a result of its ecological credentials and favourable characteristics. These are:

- Sustainable - its manufacture uses far less energy than cement and it eventually turns back into natural limestone, whereas cement will always stay in its manufactured state,

therefore creating a potential landfill issue.

- Mouldable - enabling construction of large areas of masonry without the need for unsightly and expensive expansion joints. This also enables mortar to be removed and masonry to be reused at the end of a building's life.

- Moisture control - last but not least, lime's ability to control moisture is essential for historic solid wall construction. It also means it can be used effectively with low-energy, sustainable materials, such as water reed, straw, hemp, timber, clay and earth.

The appropriate use of lime, therefore, can help us to both conserve our past and create new buildings that are more sustainable for the future.

John-Paul Walker,
MNH Historic Buildings Architect