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**The neglected craft of repointing – an architect's view**  
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## **About the Speaker**

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## **The neglected craft of repointing – an architect’s view**

**Sean Johnson**

Repointing is the preparation and filling of decayed mortar joints in masonry. This may seem a straightforward operation but it is one that demands a high level of skill on the part of the craftspeople involved. It has a crucial effect on the appearance and durability of masonry walling.

Repointing is a neglected craft. These days much good masonry, especially brickwork, is spoilt by inferior pointing. The skills are still available but they must be demanded and paid for.

This paper focuses on brickwork. In the author’s experience, stonemasons are more likely to have the necessary skills and sensitivity to do a satisfactory job of repointing than bricklayers. Furthermore, mortar constitutes up to 25% of the surface of a traditionally bonded brick wall, so the pointing will greatly influence its colour and texture. The same principles, however, apply to all masonry walls.

In specifying the repointing of a historic building the conservation architect needs to consider three main questions:

- To what extent is repointing necessary?
- What type of mortar should be used?
- What is the correct joint profile?

This paper discusses these questions and refers to some of the practical problems in the execution of such work.

### **Extent of Repointing**

One of the most difficult and crucial decisions the architect has to make in documenting repointing is how far to go with the work. Usually it is only needed in limited areas where the mortar has been damaged. The joints may be eroded in particularly exposed locations such as copings of parapets or on chimneys, or the damage may be due to a faulty downpipe or rising damp. Naturally one should address the cause of the problem first, otherwise repointing will be a waste of time. The rule of thumb is that if joints are eroded to a depth greater than their width they should be repointed. If the joints are further neglected water will penetrate the walling. The masonry units will begin eroding and in extreme cases will start to fall out of the wall.

It is often tempting, for the sake of uniformity, to go further than absolutely necessary with repointing but this tendency should be resisted. There will always be some visible difference between old and new work but if the pointing is basically well matched the overall effect will be pleasing, and in time it will blend in well.

Traditional lime mortar can be raked out with ease but this does not mean it is necessarily defective. If it is intact and is still doing its job as “the first line of defence of the wall” it can safely be left alone.<sup>1</sup>

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<sup>1</sup> Mack and Speweik, p.16.

Certainly any evidence of the original jointing remaining in sheltered parts of the building (for example, under eaves or verandahs) must be preserved.

If only small areas need to be repointed it is all the more important to blend in the new work. Particular care should be taken to match the texture and colour of the old mortar to avoid a glaring repair.

In extreme cases, due to long neglect, the erosion of brickwork joints is so widespread and severe that it threatens the structural stability of the whole building. The Railway Institute in Surry Hills, Sydney was one such example of this until the New South Wales Department of Public Works repaired the exterior in 1994/95. This impressive, Queen Anne style, brick edifice was built in 1891 using fine red bricks made at Cook's of Marrickville.

By the 1990s many of the bricks had simply fallen out of the walls due to lack of mortar.<sup>2</sup> There was an obvious and desperate need for repointing but even here there were many areas with perfectly intact mortar. The walls were cleaned before being repointed. This allowed an acceptable match to be made between new and old pointing. Most of the undamaged mortar is still there.

The specification should describe the repointing process in full so that tenderers are aware of the labour-intensive nature of the work. Before letting the contract, a sample panel of representative work should be carried out in an inconspicuous location on the building. Once the desired results are achieved on the sample panel (this may take several attempts) the architect can feel some confidence that the skills are available and the contractor knows what is required. The panel should be kept throughout the job as a benchmark for the quality of the work.

### **Raking out**

The first part of the job is the raking out of decayed mortar. This is where disastrous mistakes can be made if power tools are used. The specification should state in capital letters "No power tools are allowed" and the site supervisor should enforce this from the start. Saws, drills or, worst of all, angle grinders, can widen the joints or over shoot the perpend and leave irreparable damage. There is no need to use power tools on most mortars. A hand-held wheeled chariot will deal with soft mortar and a hammer and a plugging chisel or flat bladed quirk will do the job. Cold chisels should not be used as they will tend to wedge in the joint and damage the masonry arrises.

Yet it is difficult to remove hard cement mortar *without* power tools. In this case a thin saw cut may have to be made along the bed joint followed by chiselling the remaining mortar towards the centre. Alternatively, if the cement is doing no harm it can be left in place.

The depth of raking out will affect the durability of the repointing. According to most authorities it should be 2½ times the width of the joint.<sup>3</sup>

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<sup>2</sup> Partly this seems to have been due to failure of the original sand/ lime bedding mortar to set properly. Once the outer surface had eroded the remainder of the mortar quickly washed out. This illustrates the important role the pointing has plays in protecting the wall proper.

<sup>3</sup> Mack and Speweik, p.9.

Once the outer crust of traditional lime mortar is penetrated the bedding mortar is often found to be soft. As long as it is sound and there are not large voids, there is no reason to renew it. It is misleading to specify that all loose mortar shall be removed. Perfectly sound lime mortar can easily be removed by hand quite unnecessarily.

Once raked out the joints should be rinsed with a low pressure water jet to remove dust. Filling can start while joints are still damp (but not wet) after washing.

## **Mortar**

It is necessary to closely inspect the building to understand the original joint finish and mortar type. Often this varies within the building. The suburbs of Sydney are full of houses with tuck pointed fronts and plain sides. Nineteenth century builders used cement sparingly as an additive to improve mortar durability in exposed locations. Further complications are created by previous campaigns of repointing; but there are often areas of original pointing remaining in sheltered locations or covered up by later additions.

Historic photographs are an invaluable aid in correctly interpreting the physical evidence and in gauging the desired overall appearance. This was the case with the Railway Institute Building where the physical evidence indicated that it had been tuck pointed but the photographic record showed that this was only done in the 1920s. The original treatment was flush joints of traditional lime mortar; and this was confirmed by closer inspection.

Laboratory analysis is useful as long as a sample of original mortar is obtained (and laboratories need a fairly large quantity to give meaningful results). The most common test is to dissolve the cementitious material in acid leaving the sand behind. This indicates the proportion of sand and cement or lime but cannot distinguish between lime and cement. More usefully it isolates the sand, allowing its colour and grading to be copied. Using the correct type of sand is the key to matching the historic mortar.

It is worthwhile for the architect to take a sample of the mortar for reference. A clean break will allow one to observe its texture and colour. Crushing will reveal its hardness and any inclusions such as shells or gravel should be noted.

The mortar should always be softer and more porous than the masonry units it separates. Lime mortar is essential for soft hand-made bricks whereas cement mortar is quite appropriate for a hard, impervious stone like granite.

The danger of indiscriminate use of cement is widely understood now and the advantages of lime are beginning to be appreciated. We now know how the use of lime mortar made it possible in the past to build large brick structures without expansion joints; but we still have much to relearn about the preparation and use of lime. Mortar made with slaked lime putty that is well aged and thoroughly knocked up is quite different from mortar made with hydrated lime. The former will be highly workable and cohesive making it much easier to apply neatly – it is so much easier to repoint when the mortar stays on the trowel when offered up to the wall. Lime mortar can accommodate slight movements in the walling without cracking.

Its slight solubility allows it to heal itself. It is more porous than cement mortar and crucially, from an architect's viewpoint, its light colour and soft texture look right in the context of traditional brickwork.

Despite all these advantages we rarely see traditional lime mortar used today. Who is willing to deal with a dangerous material like quicklime and spend hours knocking it up into coarse stuff? Who has the foresight to prepare the coarse stuff weeks in advance? The slow hardening of lime mortar is another disadvantage. The need to protect the joint from drying out for the first few weeks is commonly overlooked even by stonemasons.

### **Joint Profile**

Mortar should be inserted in layers to minimise shrinkage. Once the joint is filled the surface is tooled to whatever profile is considered correct. What happens now determines the final appearance of the job but the tooling or ironing-in of the joint has a practical function as well as an aesthetic one. The action of compressing the face of the mortar closes the pores and gives it weather resistance. Timing is vital. The mortar should be allowed to go off slightly but not too much.

Repointing requires special tools. Jointers will need to be made or modified to suit the particular joint widths present on the job.

If an undisturbed section of original pointing cannot be found and no evidence is available, the architect will have to choose a joint profile on stylistic grounds. It is usually safe to assume a flush joint but it should be well ironed-in to keep the mortar back behind any eroded edges. John Ashurst's well-known drawings clearly illustrate this point.<sup>4</sup>

The cardinal sin is widening the apparent joint width by spreading mortar on the face of the masonry – it distorts the overall appearance of the walling and will be difficult to rectify in the future. Thin joints are particularly difficult to repoint. Ashurst recommends masking the joint with tape, cutting a slit and inserting a lime putty or stone dust mortar. This painstaking technique would be beyond most bricklayers. It is better to leave thin joints as they are than to enlarge them to a convenient width.

Different joint profiles will transform the appearance of the wall. Struck pointing should be subtle, not angled too far back from the outer face; and on the exterior the traditional (and correct) profile is "weathered" not "overhand". Moving up the scale of difficulty we have ruled, reeded or beaded joints. You need brickwork in really good condition to have success with these. The ultimate is tuck pointing. This is really the subject of a separate paper but I would like to caution against its widespread use. It is a superficial technique but the visual effect is dramatic. Many colonial buildings employed tuck pointing on arches.

In cases where a whole building was tuck pointed, as was popular in the Edwardian period, the decision to reconstruct the original finish should not be taken lightly.

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<sup>4</sup> John Ashurst and Francis G. Dimes, Vol. 2 p.87.

It is impossible to blend new tuck pointing with weathered walling and the overall effect will be rather like giving your historic building a lurid respray.

## **Summary**

Repointing is not recognised as a demanding, skilled technique and therefore an expensive one. All too often it is just left to the lowest tenderer. Building owners must realise that to be done well repointing will be expensive but this can be offset by restricting it to those areas that really need it.

At least one area of original pointing should be left alone for the reference of future restorers. Preferably there will be many such areas alongside well matched but visibly new sections. We architects are taught to be consistent and thorough in our designs, but the conservation architect needs to resist this and be open to a certain degree of patchiness. The beauty of an old wall is precisely this quality and it should be treasured.

With the exception of features such as tuck pointed arches and the like, the eye should not be drawn to the pointing but to the overall effect of the wall.

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