

To clean or not to clean?

Jasper Swann examines the pros and cons of cleaning historic masonry, and considers the benefits and disadvantages of the various available methodologies.

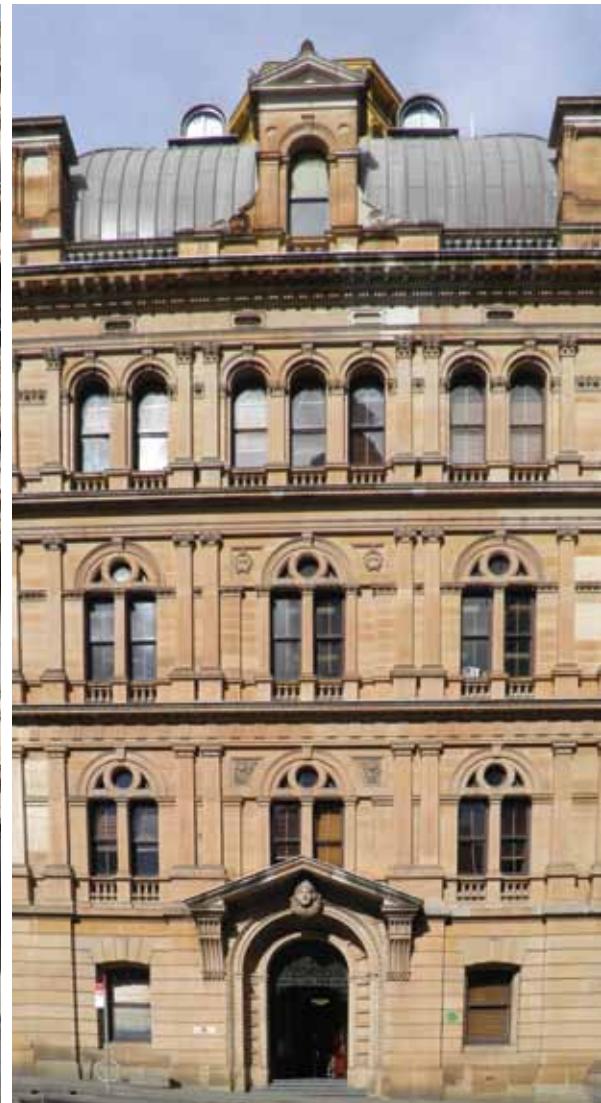
Building cleaned in the 1980s with ammonium bifluoride. Below: Customs House at Circular Quay. Below right: Lands Department, Bridge St NSW showing 'bleach out'.

When presented with an historic stone building in need of conservation, almost without exception, the very first question that needs to be asked is whether or not the stonework needs to be cleaned. Perhaps more accurately, it is what is likely to be gained from attempting to clean it, and what might be lost. It is true that in some cases the full extent to which a stone building might need conservation or repair cannot be determined if the stone itself is heavily soiled. It is also true that certain types of deposits at the surface may increase the effects of weathering or the capacity for decay. The desire to clean, however, can often be driven solely by a client's desire to improve the overall appearance of a building for aesthetic reasons, and it is important to counter such influence by a full determination of what the effects of any given cleaning process might be upon the fabric of the building. After all, the effects of cleaning are irreversible. Clearly, the

human forces at work within such a diametrically-opposed dynamic are often considerable, and it is not surprising, therefore, that cleaning can be a controversial issue.

Philosophies and methods of cleaning

Until recently, (within the last 10 years or so), a broad principle was fairly widely held in Australia, that no cleaning process should aim to return any stone building to its original appearance. The primary reason for this was that there was no way in which this could be achieved without the application of particularly aggressive chemicals such as hydrofluoric acid or ammonium bifluoride, or of abrasive methods that only achieved their results by the removal of some portion of the surface, albeit small. A number of prominent Sydney buildings were quite successfully cleaned during the 1980s using hydrofluoric acid - for





example, the Lands Department, Bridge St - and less successfully using ammonium bi-fluoride, as at Customs House at Circular Quay, which, though it removed all contaminants from the stone very well, had a tendency to 'bleach out' the colour associated with the yellowblock sandstone. Neither methods find any favour today, in part due to the environmental and OH&S issues associated with the use of such highly corrosive materials, and in part due to a largely ill-founded concern for the use of acids on argillaceous sandstones.

As chemical cleaning techniques have waned, abrasive methods have improved dramatically, with the development of micro-abrasive techniques, such as the French 'Façade-Gommage' and German 'Jos' systems, both of which have found a degree of favour amongst some conservation architects in Australia. The former propels fine, low-mass particles of aluminium oxide or glass lag powder in a dry, constant low-pressure stream, directly at the surface of the stone. The latter has the advantage of being able to be used with a greater variety of abrasives, including aluminium oxide, calcium carbonate, dolomite, and glass slag. It also delivers the abrasive to the surface in a swirling vortex rather than a direct jet, and with a small amount of water, thus producing less dust.

Through these characteristics, some contractors believe that the Jos system provides greater flexibility and site-specific capabilities. The use of these two particular methods is widespread in Europe and North America, both systems having been used on numerous iconic structures of varying stone types, including London's Westminster Abbey and Buckingham Palace, and the Place de la Concorde in Paris. However, the systems have been shown to have different effects on different stones, and even different results on the same stone in different locations. Clearly, testing is essential prior to use of either of these methods.

Use of these systems in Australia is now becoming commonplace, but divisions remain amongst conservation architects as to the efficacy of employing them. There is certainly a feeling amongst some of our more 'Ruskinian' conservation architects that the micro-abrasive systems, and indeed the chemical processes discussed above, inherently cause damage to the surface of the stone, (though the term 'damage' perhaps needs to be more clearly defined), and whilst their detractors might infer that they suffer from an Antipodean conservatism, only time will tell whether or not they are right in this assertion. In support of their claim, studies conducted in Scotland in the late 1990s demonstrated that the rate of decay of Scottish sandstones was greatly accelerated in the decade immediately after cleaning by either method – abrasive or chemical – with the effects of chemical cleaning being worse than of abrasive cleaning.

There is also a perception amongst some in the community that these cleaning methods produce such a starkly clean appearance

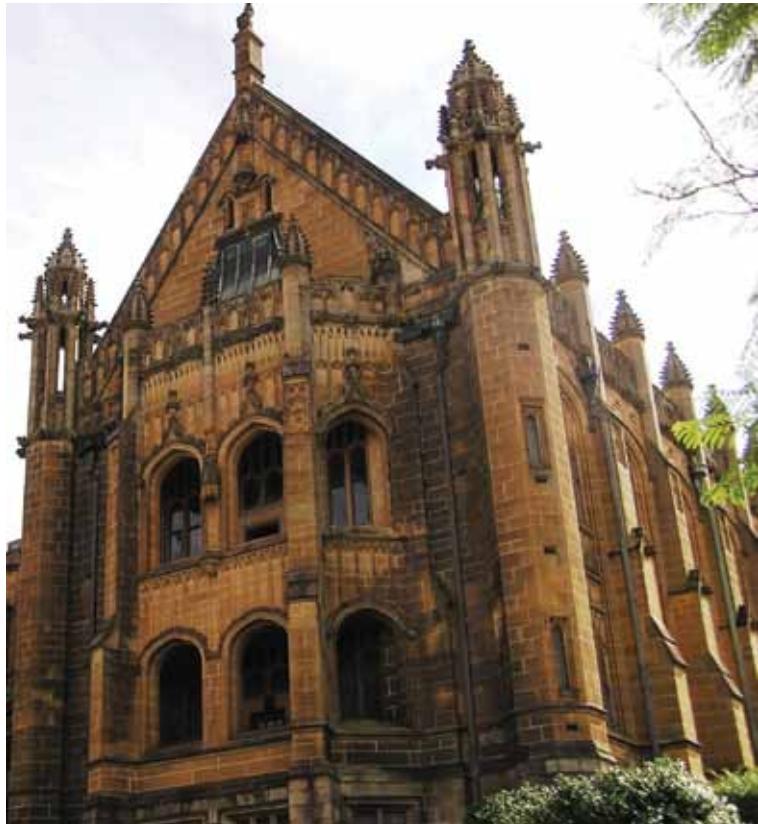
Left: The Brookman Building, University of Adelaide, cleaned using the Jos system in 2008. (Photo: Jasper Swann 2009). **Right:** Sydney's GPO has only ever been cleaned with water. (Photo: Jasper Swann, 2008)

that the building cleaned by this method loses much of its historic character. Adelaide University's Brookman Building, cleaned using the Jos system in 2008, is one of many grandiose buildings gracing the elegant North Terrace. Its present appearance is almost that of a 'doll's house', being almost overly neat and tidy. A building, however, cannot always look at its optimum, and in this instance, in the words of one prominent conservation architect in Adelaide, Bruce Harry, 'it will probably be 30 years before the building looks its historic best again'. But perhaps better this outcome than the alternative of never cleaning it and allowing it to become progressively further disfigured.

Similar sentiments have been expressed in relation to the recent cleaning of Sydney's Central Station viaducts. The (in places) heavily soiled appearance had become such a familiar backdrop for Sydney-siders that when cleaned, (using the Façade Gommage micro-abrasive system), it appeared 'too clean' to many observers, and again, for some, lost its historic character.

So there are issues relating to aesthetics, perception and fabric degradation that can be voiced in favour of minimalist cleaning. The minimalist approach more often than not takes the form of scrubbing with nylon bristle brushes and fresh water and is based upon the fundamental premise of guaranteeing that no harm can come to the building through this process, something that no other method can claim. Sydney's GPO has only ever undergone this kind of cleaning, and some would say that it looks suitably aged and retains its historic stature and dignity as a result. A client with greater expectations of having a significantly cleaner building, however, might very well feel that the process had been almost worthless, and it is not hard to see why. The amount of accumulated surface dirt and grime that can realistically be removed using water and scrubbing brushes alone is very limited.

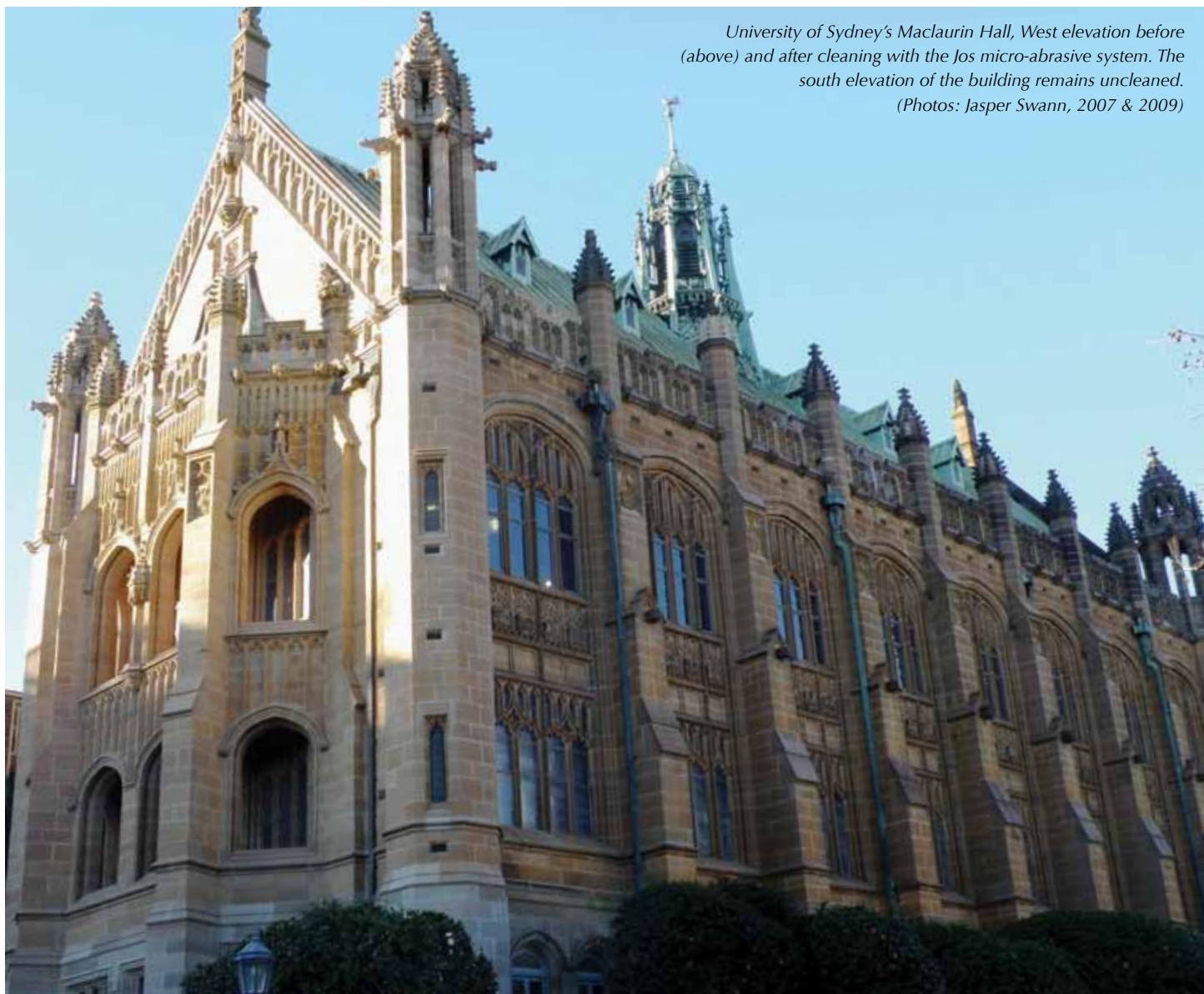
There are times when regardless of any of the above arguments, the extensive cleaning of a stone building is an essential part of its conservation and cannot responsibly be ignored. This is particularly the case where heavy carbon or gypsum deposits are present on the stone. Deposits associated with the combustion of coal have gathered layer upon layer on many prominent buildings, and more recently, diesel particulates have been a major source of surface contamination in urban areas. The latter are especially harmful to the stone, being not only very fine, but also very sticky, owing to their hydrocarbon constituents. They infiltrate the pores of sandstone readily, stick to it,



and attract a range of other airborne contaminants. The removal of these deposits is therefore essential, as their continued presence will threaten the weathering capacity of the stone, and the micro-abrasive systems such as Jos or Façade Gommage are especially suited to this type of cleaning. Whilst there would be those who would argue that use of a micro-abrasive system results in some loss of surface stone, the net gain is ultimately likely to be greater than the likely loss were the harmful deposits allowed to remain.

In many instances, however, a façade may exhibit only localized areas of heavy carbon deposits, whilst much of the remainder has only accumulated layers of general surface grime that might be ordinarily removed with water and a scrubbing brush. This presents a dilemma. The removal of harmful carbon deposits is difficult if what might be called 'over-cleaning' is to be avoided. In instances such as this, as was the case on the western elevation of the University of Sydney's Maclaurin Hall in 2008, it is probably necessary to accept that a major overall clean is the only sensible option, notwithstanding that some may find the immediate ultra-clean appearance confronting. In this particular example, although the south elevation of the building exhibited a moderate level of carbon deposits, the decision was taken that it remain uncleaved. There was certainly some anxiety on the part of all associated with the project with regard to the appearance of the building when the scaffold came down – the fear being that the uncleaved south elevation would look decidedly dirty alongside the

*University of Sydney's Maclaurin Hall, West elevation before (above) and after cleaning with the Jos micro-abrasive system. The south elevation of the building remains uncleaved.
(Photos: Jasper Swann, 2007 & 2009)*



MAINTENANCE

TYPE OF SOILING	PREFERABLE CLEANING METHOD	LIKELY CONSERVATION OUTCOME	APPROXIMATE CLEANING CYCLE	COST
General surface grime, light atmospheric pollutants, and light organic deposits	Nylon bristle-brush and clean water.	Removal of harmful deposits, increasing the longevity of the stonework. 5-20% improvement in appearance.* Retention of patina of age and historic character.	10- 20 years	Low
Heavy organic deposits – algae, lichens, moss,	Nylon bristle-brush and clean water. Dilute quaternary ammonia solutions where soiling is very heavy	Removal of harmful deposits increasing the longevity of the stonework. (Use of quaternary ammonia solution will significantly retard regrowth). 20-40% improvement in appearance.* Retention of patina of age and historic character.	2-5 years	Low
Inorganic – Carbon deposits, diesel particulates, heavy soot encrustations, Mineral deposits (e.g copper and lead run-off)	Micro-abrasive systems (such as Jos or Façade Gommage)	Removal of harmful deposits increasing the longevity of the stonework. 70-90% improvement in appearance.* Loss of some patina of age and some historic character	40-60 years	High

* The term is used here as a measure of the extent to which the stone may be returned to its original 'new' appearance.

newly cleaned west elevation. There would be some who might feel that a noticeable difference in brightness between the two facades exists. However, if the heavy carbon deposits on the west elevation were to be removed, this was largely unavoidable, and the correct conservation decision was probably made.

The preferable methods of cleaning, and what gains can be expected to be derived from them, are summarized in the table above.

So, to clean or not to clean?

The forces for cleaning for aesthetic purposes can be very considerable, and the significance of aesthetics is reflected in established conservation policies. The most important point to make in relation to cleaning an historic stone building, however, is that it should only be undertaken if there is an undeniable case that *not* to do so will cause harm to the stonework. This is not such a

prescriptive assertion as it may seem. If a building is so heavily soiled that it is badly disfigured as a result, then it is likely that the soiling will be doing damage to the stonework.

And finally... Inform your client well!

Importantly, when the decision to clean is made, the client's expectations must be expertly managed by provision of sound advice as to what the likely outcome of the various available cleaning methods will be. The limitations of each method must be clearly stated, and the need to balance good conservation practice against purely aesthetic criteria must be expressed. Representative sample panels should always be provided and well documented. Failure to adequately address these fundamentals carries with it every likelihood of ultimately having a disappointed client – something everybody wishes to avoid. 



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