



ABOVE: Baird's Building (fmr) and Globe Hotel, Perth

## INTRODUCTION

Often buildings were painted for practical reasons. Cheaper, less attractive, more permeable bricks may have been used with the expectation that the building would be painted, or painting might have been used to cover badly patched stone walls. Stripping may therefore reveal ugly bricks, mismatched repairs and additions. Or it may remove a protective rainproof coating.

Some buildings have however been painted late in life only because they looked dirty. In this case stripping the paint is the best course of action and in the long term the most economical. It simplifies the maintenance of the buildings, which will no longer need to be repainted every few years.

For paint removal only gentle treatments should be used which will not damage the masonry.

Sometimes it is better to leave traces of paint on the masonry if this means that the mortar joints are left intact. This way re-pointing won't be necessary, which may represent considerable savings.

The overall appearance is usually not spoiled by leaving these traces of paint which will eventually weather anyway.

Acceptable forms of paint removal which do not cause any damage are often laborious and slow but they are worth the effort because the results are very satisfying.

Different paints respond to different methods and it is therefore helpful before deciding on the best way of removing paint, to identify the types (i.e. water thinned, oil-bound, cement, bitumen, polyurethane based, acrylic layers). Each layer will most likely need different removal methods.

A "response test" should be made first over a small and inconspicuous area to see if the paint can be lifted and to ensure that the substrate will not be damaged. The use of the wrong removal technique can make the process very difficult as well as damage the surface of the masonry. This test should decide the specifications for the job.

Where old paintwork on the interior of a historic building is sound it is best left undisturbed. No removal system is completely effective and all are potentially hazardous.

When carrying out paint removal keep a record of the existing layers of paint.

The greatest hazard, though, may be from the stripping chemicals themselves. Chemical strippers should only be used outside or with active ventilation. Exposure to Methylene Chloride, which is the most common base used for commercial paint strippers, poses numerous health risks. Eye protection and protective clothing should be worn at all times when handling strippers which contain this chemical.

A splatter of Methylene Chloride will produce burns, and even very limited eye contact can produce corneal scarring and permanently impaired vision.

A major metabolic by-product of Methylene Chloride is carbon monoxide. Exposure to unsafe levels of Methylene Chloride fumes can produce oxygen deficiency in the blood. This puts a strain on internal organs, particularly the heart. Methylene Chloride is a suspected carcinogen and chronic exposure may cause cancer.

The appropriate standards with regard to necessary personal protective equipment and safety measures are established by the Occupational Health, Safety and Welfare Act and associated regulations. For further information, contact WorkSafe WA.

## PAINT STRIPPING HAZARDS

When stripping paint it is important to be aware of all the potential hazards. Understanding the danger is the first step in minimizing the risks. One danger is from white lead, a white pigment which was commonly used as a component for oil-based paints until about 1950. For this reason it is recommended to take special precautions when stripping oil-based paints. In uncertain cases it would be useful to have a sample of the paint removed and tested, to assess the presence and percentage of lead, before starting the paint removal job. Samples of paint can be analysed for a fee by the W.A. Chemistry Centre.

Testing takes approximately two weeks. If the paint contains lead, appropriate precautions should be taken for the safety of the operators and people living in the place. Proper arrangements must be made for the disposal of residues.



ABOVE: Baird's Building (fmr), Perth - before removal of paint

## SUBSTRATES

### Plaster

To remove paint from plaster keep water to the minimum. Prolonged soaking will soften the plaster. Solvent strippers, or steam strippers in conjunction with methylated spirits, can be successful. When using steam strippers do not hold the appliance too long in the same position because the surface of plaster may blister.

Alkaline removers should not be used as the harmful residues can be readily absorbed by plaster. Gesso can be destroyed by alkaline strippers.

Sometimes the painted surface fails because of underlying calcimine. This whitening (limestone) based paint, once common, was supposed to be washed away before repainting but often was not. In this case a wallpaper steamer should be used working at the edges of the loose areas. If the steam can get under the calcimine, it will loosen the whole which can then be scraped off.

To strip plaster mouldings, use a chemical stripper. Because of the usually very thick layers of paints, this should be left to really 'soak in' all the way. Try to keep it moist, adding more on top or covering with plastic. Scrape off the paint only when it is completely softened.

### Bricks (Internals)

Old bricks, being a rough porous material, hold paint very well and cannot be stripped with heat unless the layer of paint is thick and heavy. It may be best to leave the bricks alone or repaint them brick colour. It will prevent them from crumbling and save time and money.

### Marble

Marble is best stripped with chemical paint removers. Use only non metallic scrapers so as not to scratch the surface of the marble (which is rather soft). Paint residue or other stains may be removed with a poultice made of an absorbent material (i.e. clay mixed with a cleanser).

### Brick and stone (External)

Most methods of removing paint from brick or stone will damage the base material to some extent. Although removing the paint would benefit the wall, sometimes the ideal course would be that of allowing the paintwork to weather and disintegrate naturally. But if you want to remove the paint, carry out tests beforehand. Don't go ahead with the paint removal until the results of the tests are satisfactory, and until you are sure that no damage will be caused to the substrate or the pointing. Remember, it is better to leave some of the paint than to damage the substrate or to have to repoint extensively (and expensively) afterwards.

In an old wall, dampness can become trapped behind a paint film and weaken its adhesion. Also, alkali from lime mortar and soluble salts may attack oil-based paints.

Breakdown of paintwork on eroded brick or stone is likely to occur within five years for most modern paint types.

Solvent (non caustic) strippers can be successful in removing some paints. A poultice using attapulgite or sepiolite clay, together with a solvent, may be necessary where paint is embedded in grooves. Old paint can be very difficult to remove from porous brick or stone.

Alkaline (caustic) strippers and abrasive methods should not be used unless testing has proved they will not cause damage and can be completely rinsed off. Air abrasive pencils can be used for small areas of high value detailing or for conservation of museum pieces which require paint removal.

## DISPOSING OF WASTE

When chemical strippers are used this effluent is a sludge, formed by chemicals strong enough to strip paint mixed with the softened old paint, which may contain lead. This sludge is classified as toxic waste.

Flushing strippers or sludge into the soil will contaminate the earth and well water for many years to come. If flushed down the sewers it may contaminate water sources and it is a prohibited discharge under regulations.

The effluent should be caught, (i.e. in tarps covered with absorbent straw) put into drums and disposed of properly (methylene chloride can be recycled). The disposal of toxic waste should always be carried out by a licensed waste contractor.

## METHODS

### Water washing

Water washing can be helpful in removing some paints. Some emulsion paints can be softened with hot water then sponged, scrubbed or scraped off.

Old limewash and soft (size-bound) distemper can usually be removed with warm water and soft brushing. If the effect is spotty these spots can be carefully washed with vinegar and then rinsed. But some old distemper is virtually impossible to remove without damage to the masonry and should be left. Liquid neutral detergents are more suitable than alkaline soaps which may leave harmful residues and attack new paintwork.

### Steam stripping

Steam at low pressure applied to the paint film via a hose capped with a perforated metal concentrator (of the type normally used for stripping wallpaper), can be very useful in the stripping of paint.

Water thinned paints, including emulsion paints, are softened by the combination of heat and moisture and then removed with a sponge and water. Steam in conjunction with methylated spirits can be effective in removing multiple applications of old emulsion paint.

Steam stripping can be faster and more effective than water washing, especially over large areas, but it can be difficult to remove multiple layers of old paint. The result may be a patchy surface.

## Chemical paint removers

There are two main types of chemical strippers: solvent (non caustic) and alkaline (caustic).

### Solvent (non caustic) removers

To this type belong the most common commercial paint strippers. They are usually based on methylene chloride waxes or gels are included to retard evaporation. They are very effective in removing oil-based and latex paints but may be less effective with other types of paint.

The paint remover is applied with a brush; the solvent swells and softens the paint which is then removed by scraping, peeling or brushing and washing with water.

A test should always be done to determine:

- multiple layers of different types of paint;
- the type of stripper to be used;
- the concentration to be used;
- the optimum time for the chemicals to sit on the masonry;
- the optimum pressure and volume of rinse water.

As their major disadvantages these solvents are:

- expensive;
- dangerous and unpleasant to use;
- not always effective on old, hard, thick paint;
- better used in small areas, or for graffiti removal.

Because of the risk of residues left in cracks or not easily accessible areas, this treatment should always be followed by a thorough wash with water. Afterwards the masonry should be repointed where necessary. Good paint removal practice, though, will not damage sound pointing or substrate.

Chemical strippers will produce toxic waste which needs to be disposed of appropriately.

In general, the use of chemical paint removers (specially when dealing with multiple layers of different types of paints on a masonry surface) is a specialised job and should be left to professionals.

### Alkaline (caustic) removers

These removers are based on caustic soda, potash, washing soda or similar materials and can create severe problems. They are particularly harmful to brickwork, stonework, metal, and most types of plaster or putty, if they are not thoroughly washed off. The harmful residues are easily absorbed by porous surfaces and very difficult to remove. Application of these removers should therefore be avoided.

## Poulticing

This may be necessary for stubborn areas of paintwork where paint is embedded in pits and grooves such as in decorative stonework or picked ashlar. For use on brick and stone the poultice may be made up by using powdered clay, such as attapulgate or sepiolite (commonly used in kitty litter). Whiting or sawdust mixed with a suitable non-caustic proprietary stripper can also be used. The mix once applied is prevented from drying out by covering with polyethylene sheeting (cling film) and left in place for as long as required. The paste is then removed with a scraper and the surface is washed down thoroughly with water. A sponge or bristle/plastic scrubbing brush may be necessary to remove any paint residues.

## Hot air paint stripper

Hot air is produced by an electric filament and the heat can usually be adjusted. The tool is designed to soften and blister oil based paints and varnishes – the paint is then scraped away. This system is mostly used for removal of paint from timber. It is not suitable for the removal of water based paints or for removing paint from plaster or slate (which may exfoliate if exposed to such concentrated heat).

## Burning off method

This is similar to the hot air method but higher temperatures are reached. The flame of a blowlamp is used to burn off the paint. The use of this method should be avoided because it can pose serious fire risks, especially in old buildings where fire hazards are greater.

The burning-off method is not recommended for paint removal from masonry. The melted paint, or its volatile oil compounds, can be driven into the stone leaving patches and stains while the heat will tend to chip, fret or exfoliate weak stone. The cleaned surface is usually suitable only for repainting.

## Abrasive methods

These can be manual or mechanical methods.

### Hand scraping and sanding

If the paint or varnish has become brittle it should easily come off when brushed (rough surface), scraped or sanded with wet and dry carborundum (smooth surface). Otherwise this method is ineffective and bruises and damages the surface of the substrate.

### Mechanical methods

Mechanical methods should preferably not be used because they may damage the masonry surface. Testing of the method on the particular surface will give the final answer.

### High-pressure water cleaning

The use of high pressure water to remove paint is usually too aggressive to the masonry and may cause saturation of walls, especially in the presence of cracking, because of the large amount of water employed.

### Sandblasting

In abrasive blasting, sand or another abrasive is shot against the building in a high-pressure jet of air or water (water blasting). This quickly removes the paint, but it often removes some of the building too because it is very difficult to keep control over all the factors involved.

In general any grit blasted at high enough pressure to remove paint from masonry will harm the surface underneath unless the masonry surface is not reached.

Dry or air blasting is banned in WA because of the environmental hazard of flying abrasives and dust.

### Air abrasive pencil

Due to its small size it can be controlled, but normally used only for small areas and special masonry details or features because it is a very slow process.

Abrasive methods are generally not recommended for removal of paint from masonry.

## WARNING

Be wary of commercial operators offering fast cheap paint removal by abrasive methods. The use of such methods by an unskilled or careless operator may cause irreversible deterioration of the substrate and create further problems.

## GRAFFITI

Graffiti are extremely difficult to remove from a porous surface and old buildings may be permanently disfigured by them.

If the graffiti have been applied to a painted surface it may be appropriate to repaint over it, taking care to match the new coating with the existing colour on the wall as well as applying a coating thick enough to prevent the graffiti from showing through.

To remove graffiti from masonry, products are required which have a high level of effectiveness but do not alter the original appearance of the masonry. Testing is essential.

The materials most commonly used for graffiti are: Aerosol paints (enamel and metallic), crayons, lipstick and felt tip markers (very difficult to remove). All contain a large number of different chemical compositions and colours. Knowledge of these components and testing of procedures are therefore essential.

### Timing

It is important to begin treatment for removal of graffiti as soon as possible, so that the paint does not have time to harden. Before the paint dries, much can be removed by patting with absorbent cloth or paper, dampening with a solvent or wiping with a cloth, followed by washing with hot water and detergent.

If it is done quickly, marker pen can be wiped off many surfaces using methylated spirit.

## Removal of old graffiti

Old, dry graffiti paint could first be treated with commercial paint stripper and then brushed off with a non ferrous brush.

Long standing aerosol paints are almost impossible to remove from porous surfaces such as old brickwork and stonework; there is also a risk of spreading the paint and increasing absorption in the process. In fact, the ability of a remover to migrate into a substrate may aid the removal of marking materials embedded in it, or it may contribute to unnecessary defacement by carrying waxes or solvents to areas previously free of markings.

In some cases, the application of a solvent based (non caustic) poultice can be tried. If this fails a slightly alkaline (caustic) remover in poultice form might be effective. The brick and stone must be thoroughly washed afterwards. A second poultice, (without the chemicals) can be applied to help draw out the residual salts.

Measurement of the Ph of the graffiti removers is necessary, especially when the graffiti are on acid-sensitive materials such as limestone or concrete. To avoid damage only neutral (Ph7) or slightly alkaline (Ph7 to 8) removers should be used on acid sensitive masonry.

Cleaning with an air abrasive pencil using a suitable fine abrasive, followed by toning down the cleaned patch by rubbing with stone or brick dust, may be at times successful.

## Preventive coatings

Coatings are available to protect walls and aid the removal of graffiti but they can create problems by trapping moisture and salts behind an impermeable membrane. Generally, coating of masonry is not recommended, but if such a repellent is necessary it should be one that permits the passage of moisture and is easily removable if required. Each case should be individually evaluated by an expert in the field.

It is therefore important to correctly evaluate the situation before embarking on such a difficult and expensive task.

In some cases it is necessary to strip the paint from masonry to remove a heavy buildup of paint layers (especially oil-based paint) which have "sealed" the masonry. In such cases the accumulation of moisture and salts under the paint layers may generate a pressure which will lift and break the paint skin, often taking a thin layer of masonry with it.

## REPAINTING

There might be a need to strip the paint from masonry to remove:

cracked or peeling layers prior to repainting. (At times failed paint has to be stripped almost completely from the masonry before repainting.)

excessive layers which obscure architectural detail prior to repainting.

In general though, especially if the wall has to be repainted, be happy with 95% of paint removal or less. This can save further damaging of the stone due to a too thorough paint removal treatment.

The use of impervious type paint on a wall that has previously been lime-washed can frequently introduce damp problems. On the other hand the removal of the paint can damage the wall to a certain extent. It may be preferable to allow the paint to erode and patch with limewash in the meantime.

Paint which is part of the original or which cannot be removed without damage should remain. Deteriorated original paint can be touched up with a matching paint according to circumstances.

## EXTERIOR

Exterior masonry stripping can be difficult and care must be taken to avoid 'secondary effects'.

Water rinse may introduce water into the masonry therefore the pointing should be inspected and the joints temporarily filled if necessary to stop water penetration.

In many old buildings there may be various materials under the top paint coating. These should be identified and a paint removal method appropriate to each different material should be devised. Adjacent materials should be protected.

## APPENDIX

### Methods of Paint Removal

The following are some of the easiest or most used methods for removal of various paint types. Remember, however, that paint removal is often a complex matter best left to specialists.

Bituminous paints (Bitumen in solution with a solvent)

These are difficult to remove satisfactorily. Try steam cleaning. Some types will respond to naphtha. Bituminous stains, if not too dry, may be removed by scraping followed by scrubbing using water containing liquid detergent.

Cement paint (very water resistant)

Very difficult to remove. Therefore leave to the professionals or question the necessity of removal.

Distemper, size-bound (the oldest type of emulsion paint). Also ceiling distemper or whitewash.

These distempers are usually removed by washing with warm clean water. Steam stripping is also used successfully.

Distemper, (oil-bound or washable distemper)

Can be difficult to remove. Steam stripping followed by scraping with a non metal spatula or hot water washing and scrubbing can be successful.

Emulsion paints (based on pva or acrylic copolymers dispersed in water) are used internally and externally.

Removal depends upon the type of emulsion and the number of coats. Some types can be scrubbed or scraped off, using hot water. Some will need a solvent stripper at times combined with a poultice. Steam stripping is usually effective.

Limewash

Can be removed by brushing with a bristle brush followed by washing and scrubbing. Multiple layers of old sulphated limewash (sulphate of zinc was added) may need to be softened with a wet poultice over a long period. An application of vinegar followed by washing should effectively remove unwanted remaining specks.

Oil paints (alkyd, flat or gloss enamel)

Solvent removers are by far the best method for removal of this kind of paint from masonry.

Textured coatings (generally acrylic-based modified to change their flow and thickness).

These will usually respond to chemical strippers but large quantities would be needed in thick films and care must be taken to remove harmful residues specially in porous materials. Some resin bonded coats can only be removed by mechanical methods and are better left alone.

Old Shellac (from the lac beetle) and Varnishes (originally made of raw or cooked vegetable oil and resin in a solvent).

These may still be soluble in acetone or methylated spirit but caution must be taken because wood graining will be destroyed by such treatment. Scrubbing may be necessary and residual stains may require bleaching with sodium hypochlorite (common bleach).

More modern varnishes are polyurethane based and will need stripping with chemicals.

### Further Reading

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