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Department for Environment and Heritage
DEH Information Line (08) 8204 1910
Website www.environment.sa.gov.au
Email dehinformation@sa.gov.au

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# PAINTING OF OLDER BUILDINGS IN SOUTH AUSTRALIA

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INTRODUCTION

Repainting with respect

The repainting of a building is an important component of the overall conservation of old buildings.

First, paint physically protects the building; and secondly, it affects the way we regard a building. It influences our attitude. Colour has a very strong and immediate impact and, as a design tool, can establish or reinforce architectural form and meaning. With some thought and research, painting of older buildings can be a most rewarding experience.

In this document the emphasis is on presenting information which is most pertinent to South Australia. Although some general information is included for interest, references for further reading have been given for those areas which are known to be well covered by other publications.

There are several approaches to painting older buildings, and it is hoped that an owner will be guided to one most appropriate for the particular circumstances.

The approach taken in choosing an appropriate colour scheme for an older South Australian building should take into account its cultural significance, history, materials (building fabric), and use as well as its context.

A successful built environment needs a sense of continuity. This requires evidence of both the old and the new. Visible reminders of the past act as a stable and relevant backdrop to the activities of the present.

Since the 1970s there has been an increasing awareness of the value of appropriate paintwork on older buildings. Information has become more widely available in the form of publications on the subject as well as guides developed by paint manufacturers'. The range of colours now available is vast and the possible colour schemes are therefore endless. Nonetheless, there has been a growing tendency to limit colour.

In relation to the repainting of older buildings, one often hears the term 'heritage colours'. Unfortunately, it usually does not refer to the original colours of a building. Most often it is a somewhat clumsy, loose use of certain standard ranges of colours.

The colours themselves, within these ranges, may have been arrived at by investigation of original paint samples and so be appropriate for reference.

Frequently though, these 'heritage colours' are used without adequate research into the style of a particular building, or into any remaining historical evidence, such as remnants of original colours.

As well as being used inappropriately on older buildings, such colour combinations have also been used haphazardly, not only on reproduction buildings, but on all manner of other more modern buildings.

The end result of this fashion for 'heritage colours' has been an outbreak of unfortunate-looking schemes, largely in red, green and yellow, which work entirely against the intention of enhancing older buildings.

This publication seeks to redress such erroneous approaches and 'heritage' misconceptions, and to provide a basic comprehension of colour and its impact upon older buildings.

It aims to assist in the confident use of appropriate colours beyond the standard schemes so commonly adopted without thought to particular circumstances.

The quality of paint schemes can be improved enormously, simply by approaching the task in a more individual manner. Each particular building should be assessed on its own merits, and an attempt made to arrive at an appropriate solution for that building.
It is hoped that with increased sensitivity to the nuances of colours and their combinations that the repainting of older buildings, and, so, the altering of the streetscape, will provide varied delight and contribute to our ongoing architectural heritage.

Adapting an approach

Frequently a property owner needs to paint a building on which there is no evidence of former colours. Paint from timberwork may have been removed entirely, and the walls and quoinwork 'cleaned' to substrate at same time in the building's history.

In this situation there are two common and diverse responses. One is the adaption of a standard 'heritage' colour scheme. This involves strict adherence to the application of limited and standard colours, identified as having been in use when the structure was completed – usually in the nineteenth century.

The other is to adapt a subjective approach, employing personal likes and dislikes in colour.

Adapting the first, and more limited, approach denies the fact that originally there would have been considerable subtle variation in colours. The colours were generally mixed on site by competent painters who, while conforming to accepted practices and aesthetics of the time, were required to show initiative.

This approach also denies the spirit of the time, which was to embrace advances – new colours were continually being accepted and incorporated.

Taking the more arbitrary approach denies the intrinsic character of a particular building. The historical value of an older building within a streetscape may be easily lost when the repainting is not respectful to the cultural heritage of that building.

Cultural significance

Cultural significance is the value of the property to present and future generations. The cultural significance of the property is invariably given tangible expression in, and represented by, the physical material of the property. Changes to this material such as painting can remove or amend that cultural significance, and its appreciation. It is therefore important that planning for change allows for a detailed understanding of significance.

The first two steps in arriving at a more appropriate approach are:

1. To ascertain why a building is historically important, and how this is reflected in the extant fabric;

2. To develop policies which will assist in its conservation. These policies would relate to preservation and maintenance.

The approach to repainting will naturally be directed by those policies.

The term 'fabric' of the place means the physical material, the management of which is critical to the survival of the cultural significance of the place.

'Preservation' means maintaining the fabric of a place in its existing state to retard further decay or deterioration.

Preservation needs should be identified in the process of planning, and it may well be that particular areas of craft, or decoration, or evidence of particular patterns of use, or historical association need to be preserved intact.

'Maintenance' means the continuous protective care of the fabric and its setting, and is more similar to the process of preservation than the process of repair:

- prepare a specific maintenance schedule for the place;
- avoid unnecessary replacement and repair;
- avoid the use of modern materials just to reduce maintenance cycles.

A heritage listed property

A heritage listed property will have had its value defined in aesthetic, historic, scientific or social terms.
The evaluation will help determine which parts of the building 'best represent the history of the property, and therefore contribute to its cultural significance.'

The meaning of the term 'cultural significance' in relation to the paint colour could be debated. Building conservationists are likely to argue that, where the history of a heritage listed property is of prime consideration, repainting appropriately is important, and the colours should be those sparted when the building was at the most significant time in its history. Accordingly, physical evidence of earlier colour schemes assumes a greater importance. Where there is insufficient earlier evidence, it would be reasonable to adopt a scheme based on informed conjecture.

A difficulty with the concept of 'cultural significance' is in deciding 'significant' to whom. A prominent public building which has been painted a certain, albeit 'incorrect', colour for decades, for example, may then have assumed cultural significance for a community who could object to a change in colour—even one deemed 'correct'.

A property not heritage listed

When a property is not heritage listed, and its cultural significance not so clearly defined, it is still necessary to establish its heritage value as accurately as possible. Local government and historical societies may be of help in this quest.

Evidence of earlier schemes could be taken into account. Typical approaches to painting a building of such age, style, construction, use and location may also be taken into account. Publications on the repainting of buildings of different eras are readily available and some are listed at the back of this document. See Further Reading.

When making reference to colour schemes originating from other States, care should be taken. These often apply to buildings that are constructed, or even designed, differently from those in South Australia. Colours which are successful on a building that has painted timber walls, for example, will look entirely different when used on a building constructed of local stone. (See page 20)

At the time many older buildings were first painted, subtle variation in schemes would have resulted from the paint-mixing methods employed. The application of standardised period colour schemes can result in the loss of that varietal charm.

Whichever approach is taken when painting, respect for the history of the building, and particularly any historical evidence in the fabric of the building, is warranted.

It should be a prime consideration to retain such evidence where it is possible, and to record it adequately where it is not.

Currently in South Australia there is a proliferation of new 'Federation' style buildings with curved verandahs and simulated stone walls complete with finials and red and cream, or green and cream, colour schemes. Just as pseudo styles detract from original buildings, so the adaptation of 'heritage' colour schemes for these new buildings detracts from the impact of similar schemes, that have been used appropriately on genuine old stock.

A contemporary colour scheme

An owner of an older building may choose to use a contemporary colour scheme.

While a successful colour scheme based on historic evidence conveys information about earlier periods, a contemporary scheme may speak of today and still be respectful to an older building.

Whichever approach is deemed appropriate for the circumstances, success relies on an understanding of the nature of the building: its history, fabric and form, as well as its place in the streetscape.

The task requires thoughtful consideration, a degree of skill and confidence with the colour selection process.

Reference notes:
2. See Further Reading.
3. Heritage Conservation Leaflet 1.2 Guidelines to approaches for conserving heritage places.
4. Ibid
2 COLOUR AND BUILDING MATERIALS IN SOUTH AUSTRALIA

Accurate determination of original colour schemes is often difficult for various reasons. These include lack of documentary evidence; lack of standards for paint colours at the time; photographs being available only in black and white; and physical evidence having been removed or significantly altered.

In order to establish how paint colours were used habitually on older buildings, a great deal of research is required. Possibly because of the size of populations and associated interest in original colour schemes, more information is available on buildings in New South Wales and Victoria than is available on those in South Australia. As a consequence, authentic prescriptive colour schemes for the various styles or periods of South Australian architecture can not be formulated.

This may be regarded as a positive situation in that each building should then be approached individually, and so the danger of relying on relatively limited colour schemes may be avoided.

Nevertheless it is a fact to be celebrated that different environments do display characteristic colour, and in South Australia distinctive colour is certainly apparent in the building materials and associated paintwork.

Awareness of this signature colour is of assistance when assessing individual buildings. It is possible to establish patterns from those documented South Australian examples which are available, and observations may be made of the building material/paint colour combinations which have been, and continue to be, both successful and characteristic of this State.

Originally most paint materials came to Australia from England, which has very different environmental conditions.

Early paint colours in Australia were very limited, being those which could be 'mixed from the common pigments; such as white, black and the earth colours. Only the wealthy could afford expensive pigments such as the blues, greens and yellows.'

The common colouring in use about London is composed of whitening made from chalk or other lime, charcoal, or yellow ochre, and copperas, in proportions according to the colour which it is desired should prevail. 1

Generally, early colour schemes in South Australia were similar to those of other States. Nonetheless the climate and geographic isolation of this State, as well as the consequent limited availability of materials, meant that distinct variations occurred.

As South Australia developed, differences were reflected in the way building colour was used.

Early materials

Very early buildings in South Australia relied on the natural resources of the area and so were mainly built of stone or timber and bricks, which were produced soon after settlement.

Some pioneers brought prefabricated timber houses with them from Europe; some constructed light-framed cottages built from sawn timber imported from Europe and America; and more primitive types of timber structures were built using slabs or split logs made of local timber.

D.W. Berry and S.H. Gilbert, describing early mid-north cottages of native pine, state that:

At one end, the mass of the great stone fireplace and its chimney supported its shore of roof. The wailing stones were embedded in pug and ran past the framing posts externally but abutted them internally. Generous coats of limewash gave a pleasant texture to inner walls. Soilcloth stretched between the roof trusses and a few intermediates provided a fine ceiling when limewashed. 2

Mention was also made of a whitewashed rope that ran around the walls, at ceiling level forming an 'intriguing cornice'.

Painting of Older Buildings

4
Performance and availability were critical factors in selecting building elements. Materials were used in a straightforward manner and finishes were natural. Framing on South Australian, German style, half-timbered houses utilised 'Eucalyptus camaldulensis', or river red gum, for example, which was dark red when newly sawn, but soon changed to grey when used externally.

Local sands, which were used to colour mortar when pointing stonework, varied considerably.

Whitewash, hessian and Indian matting were common interior finishes, and flogged stone or polished hardwood was used as flooring. Earth floors were used in many cases, and at times were stabilised using an ox blood and dung mixture.

Stucco was used for rendering rough earth, poor brick, or rough stone walls to improve waterproofing properties and gave a good finish. Often limewash was used as a final covering.

This was made by dissolving unslaked lime in clean water and splashing it on the wall before the stucco was dry. By this means the stucco set hard and the whiteness was incorporated so that it never washed off. ¹

The recipes for this varied considerably. Examples of limewash recipes are given in Appendix 10.4.

'Black Hill' is a property at Montacute where building commenced in 1841, and is described as 'built of stone, the walls are plastered and the colour washed to an off-white shade.' ²

Of the earlier timber buildings, the light-framed cottages made of softwood were originally painted to protect them from deterioration. Early colour schemes were very simple.
Materials such as stone, bricks, galvanised roofs, shingles and slates were often left unpainted. The appeal of such natural finishes can be appreciated in the works of painters of the times, such as James Shaw (1815-1881).

A house in Osmond Terrace, Norwood
Source: Art Gallery SA

Smith Homestead, Smithfield
Source: Art Gallery SA

The Tannery
Source: Art Gallery SA

Hawling House, Mitcham
Source: Art Gallery SA

Although paintings of the time were usually representational, artists' licence could mean the actual paint colours might have differed from those shown.

Myrtle Bank
Source: Art Gallery SA
Local timber was scarce and imported timbers, which were often Baltic in origin, were relatively expensive. Other coniferous timbers from the American State of Oregon were also in use from the 1860s. ‘Douglas Fir’ is an example.

**South Australian stone**

Although the early use of timber for construction was more common in South Australia than we now imagine, building stone was always abundant and was used widely, not just as a luxury. The first brickworks here were established in 1837, and the burgeoning building industry made good use of building stone and brick. These readily available materials gave a feeling of permanence to the structures, and had the secondary advantage of not being vulnerable to termite attack.

Early buildings were composed of irregular rubble with randomly shaped stones bedded in thick mortar, which was smoothed approximately to the face of the stone. Builders used bricks to form surrounds to doors and to windows, and often for quoins at corners to give a good edge. With the sandstone and red brick quoins, a typical combination of materials was established – one that was warm and colourful.

The limited range of pigments commonly available meant that mostly neutral paint colours were possible. Such colours suited the combination of building materials well.

**Neutral colours**

A list of external colours on Adelaide buildings 1850-1870, compiled from a study of paintings by James Shaw, indicates a predominance of neutral colours.

Charcoal, grey, off-white, and cream are the most frequently noted paint colours. The unpainted walls are generally either bluestone or sandstone together with red brick quoins.

Green is noted as light and dark stripes on verandah roofs, and as a colour on shutters.

In combination with bluestone walls, both cream and yellow ochre/brown are mentioned as quoin colours.

Red is noted as a door colour – ‘Dull Red’.

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Painting of Older Buildings
Neutral colours such as charcoal and cream, together with earth colours, have been used for many years in combination with South Australian sandstone. Not only are the colours understated, allowing the stone to feature, but the tonal variation that is possible allows interest from adequate contrasts. The materials used to achieve these colours are stable and long lasting. Arguably, this is a most successful combination of colours and materials and one that is distinctively South Australian.

It is a logical solution. Apart from suiting the local materials, such neutral colours were popular in the nineteenth century in many parts of the world. Lighter colours are still the most durable because they reflect ultraviolet light and heat.

Roger Moss, co-author of 'Victorian Exterior Decoration', is quoted in an American publication on exterior paint colours: 'One of the most popular color combinations of the 19th century was grey and white. It was easy to mix, easy to touch up and it stood up well.'

An indication that grey has been, and continues to be, a popular colour for roofs in South Australia is apparent in the fact that the Colorbond (a commonly used, precoloured roofing material) colour 'Slate Grey' is a standard colour in this State but not in the other States.

Note: Early specifications relating to the painting of buildings, particularly domestic buildings, commonly referred to the number of coats of paint to be applied, for example two coats. Reference was also made to the number of shades (meaning colours), for example three shades; and even at times to the manufacturer of paint or varnish to be used, but often not to the actual colours. Beautifully penned in longhand, such specifications as those of the Adelaide architect, Tillett, at best mention 'approved shades'.

'All white lead to Johnson's or approved oils and stains of best quality. Varnish to be Turner's best carriage.'
Campbelltown Methodist Church by J.A. Tillett

'All outside and inside woodwork where showing to be painted in three coats Berger's paint of approved shades.'
Methodist Sunday School, c.1903, Tillett.
Early constructional drawings for South Australian Post and Telegraph Offices. Note that the colours indicated merely represent building materials. Nevertheless, it is apparent that the buildings were constructed of stone with brick or rendered quoins.

Aptil. Yarrowie Post and Telegraph Office
Source: Australian Archives

Semaphore Post and Telegraph Office (c. 1880)
Source: Australian Archives

Painting of Older Buildings
Social history

The social history of South Australia varies from other States. A significant difference is the nature of settlement - immigrants had come freely to the colony. Early residents have been described as industrious, modest and sober, and these characteristics are reflected in the simplicity and restraint generally associated with the architecture.

From the beginning the SA venture had included families of industrious Lutheran Germans. Such people left a legacy of tidiness, cleanliness and order which permeates the State to the present day.

Freeland speaks of the 'refreshing and sparkling architecture of South Australia', and attributes that freshness partly to the lack of smoke from heavy industry. He notes of South Australian buildings in the 1880s:

They were simply planned, functionally finished and solidly built. The typical home was a single-storied cream stone rectangular box with brick dressings to the openings and corners, a symmetrical arrangement of doors, windows and chimneys, and with a wide neat cast iron verandah stretched across the long street face.

Victorian era

In mid-Victorian Australia (1860-1880) there were changes in the way colour was used on buildings. Finely finished mouldings were possible in the 1860s, and detailed decoration was picked out in a variety of colours. These were often rich colours and were also found in the new wallpapers of the time.

The increased use of colour inside of buildings has been related to the 'new strong gas lighting' of the 1860s, the explanation being that pale, reflective surfaces were no longer as important as when tallow candles were the only light source. With increased prosperity and sophistication, Victorian society exhibited its now well-known love of ornament and colour and, in the 1880s, demand for architectural colour in Australian buildings generally grew. In particular the number of colours used increased.
More exaggerated displays of colour were usually associated with the grander buildings of the time. South Australia has fine examples of such decoration but 'despite some grand buildings, boom period architecture in Adelaide was not as flamboyant as in wealthy Melbourne.'

Freeland writes of the High Victorian excessive love of voluptuousness, and then observes:

Only in South Australia was there a significant local development at variance with the general trend. South Australian architecture of the 80s was comparatively direct and simple, largely avoided show and was strongly regional in its expression.

Regional differences were apparent in such materials as cast iron, which was widely used as decoration (and often painted in dark colours).

It remained lighter and more refined, and its pattern was generally more geometric in South Australia, where supplies continued to come from England. In comparison, the cast iron produced in New South Wales and Victoria was considered clumsier and more florid in design.

The notion of refinement is taken up by F.W. Dancer, an early architect of Cavendish Chambers, Grenfell Street, Adelaide. In his 1904 book, Modern Dwellings - 100 Selected Designs, he reveals his own inclinations, and perhaps reflects local attitudes of the time, when he writes:

During the last decade many well-planned and artistically treated residences have been erected around the city which have evidently called forth the study of art and the planning of buildings with a tendency towards purity of design, showing an appreciation of all that ministers to comfort and luxury, and adding every year to the veritable houses of art exhibiting refined taste and aesthetic aspiration, with which may be contrasted a sprinkling of gaudily coloured structures, whose cheap and eccentric features scream aloud for attention.

Our endeavour is to produce designs whose only ornament is comprised in refinement of the graceful lines of strictly utilitarian features without assertive attempt at effect, but always pleasing in its subdued natural tones, without deception in material nor disguise in construction, but throughout honestly indicating its purpose. (emphasis added)

Miles Lewis and Alison Bloke in the publication Exterior Paint Colours (A Guide to Exterior Colours for buildings of the Victorian Period), published in 1977 as a Technical Bulletin of the National Trust Of Australia (Vic), list the following colours:

1. Off White
2. Cream
3. Light Stone
4. Light Brown
5. Rich Brown
6. Indian Red
7. Purple Brown
8. Dark Green
9. Prussian Blue
10. Light Green
11. Block
12. Slate Grey

they then indicate that on walls only Cream and Light Stone were appropriate (with Light Stone, Rich Brown and Indian Red included for 'restricted use'). More colours were suggested as being appropriate for joinery and signwriting, namely: Off White, Cream, Light Stone, Light Brown, Rich Brown, Indian Red and Purple Brown (with Dark Green, Prussian Blue and Block included in the 'restricted' category).

For roofs the nominated appropriate colours were limited to Light Stone, Indian Red and Slate Grey. The argument given is that although other colours were available, they were more expensive and so presumably less common.

Striping was a practice imported from England early in the nineteenth century and which remained current until after 1900. Both verandahs and main roofs were striped, but striping was much more common for the former. The colours most commonly used were Indian Red and White (or Off-White) but cream was also used for the light stripes and greens and browns were probably used for dark stripes. Individual stripes were not usually greater than the width of a sheet of corrugated iron less overlap – that is, not more than about 80 cm.
Striping was said to be copying the effect of striped canvas.

Although Lewis and Blake’s document was compiled in Victoria, the principles contained are general for Australia and pertinent to this State. Some variation in the application of colours is to be expected in response to local factors. (See Colour Theory Hue.) Walls are mentioned as being painted, for example, where in South Australia the walls would generally have been unpainted stone, and the colours applied to other building elements would have been considered in relation to that stone.

Note: Before 1930 (and prior to the use of alkyd resins) the binder of paint was usually a linseed, or some other oxidising oil, product. These paints performed poorly upon exterior exposure, unless metal pigments – such as red lead, white lead or micaceous iron oxide – were incorporated. As a result there was a very limited selection of colours available for exterior exposure.

**Twentieth Century**

There was a swing to simplification in the use of colour at the turn of the century that was not confined to this State or this country.

As the 19th century waned, the trends in exterior colors moved away from aggressive, multicolor schemes. House bodies in fewer colors were more the vogue – mossy greens for the Shingle houses for example, or ubiquitous white again for the rising Colonial Revival style.”

Richard Apperly, when writing of the Federation period in Australian housing – spanning the two decades from the early 1900s to World War 1 – comments on the change of external colour as a result of the introduction of terracotta Marseilles tiles from France. The orange of the tiles contrasted greatly with both grey slate and with iron, which was generally used as roofing material.

Aesthetically, the soft orange of the Marseilles tile may not have been the ideal complement to red Queen Anne brickwork, but to the speculative builder and his customers the tile had much to recommend it. Timber window frames and sashes were said to have been painted white, ivory or cream to contrast with the brickwork.

Apperly then gives Adelaide as an example where local conditions modified the general characteristics of suburban houses of the Federation period.

Local limestone was a popular material for walls, with quoins and dressings in face brick or stucco. Marseilles tiles had to be brought by rail from Melbourne; consequently corrugated iron was frequently used for roofing. These two factors alone were enough to make many Adelaide houses look very different from those in Melbourne, Sydney or Perth.”

Stone continued to be used as a building material in some South Australian Bungalow residences (1916-1930). Although predominantly of red brick, the bungalow often had a freestone feature front wall, especially in the larger or superior examples, where terracotta tiled roofs were also common. The Australian version of the Californian bungalow has been described as solid and weighty with pebbly roughcast walls or clinker-brick walls and ‘timber trim painted dark brown or green.’

Fredland comments on Californian bungalows generally that the colour ‘instead of hot redness was dark grays and browns’, and then specifically: ‘in Adelaide the bungalows were built of rough local bluestone or the sawn pale buff-coloured stone materials which distinctly characterize the city at any period’.
Bungalows in Adelaide are distinguished by the local sandstone. Again it could be expected that, in the application of colour to these buildings, this factor would be taken into account.

South Australia and ‘Fadeless Green’

Factors contributing to the use of specific paint colours on buildings can be unexpected.

With the dry State of South Australia having warm, sand-coloured stone, and the painters of last century being skilled with colour application, it could be anticipated that colours chosen here might, for balance, have favoured the cool side of the colour spectrum.

The confiscation of a cargo load of minerals on a ship is a less likely reason for the proliferation of distinctive paint on South Australian buildings. However, urban mythology has it that, towards the end of last century, a large quantity of green oxide pigment was taken from a ship at Port Adelaide because of a failure to pay certain shipping/repair charges. The cargo, which had been en route from Europe to South America, then languished in store for decades until it was finally analysed and manufactured into paint. The resultant colour was known as ‘Fadeless Green’ and, because of the quantity involved, stocks lasted for many years.

Keith Gehrig, in discussing paint pigments, writes of the introduction in the 1800s of examples such as crimson antimony, zinc chromate, cadmium yellows and emerald green, but makes the point:

It must be remembered, however, that it was well into the 20th Century before such colours as blue, red and some greens could be produced in a quality that would withstand prolonged exterior exposure.

He adds that the first red, green and blue to reach the market in ready-mixed paint were called ‘permanent red’, etc.

In summary:

Colour on older buildings in South Australia is recognisably different from that of other areas, and this has come about because of various influences, including the nature of the building materials; the limited early pigments; the dry climate; and the social history of the State.

The local stone and largely neutral paint colour schemes are characteristic and successful, and they continue to be employed on many older buildings. Although a great deal of information is now known about original colour schemes, especially in other States, there is still insufficient documentation of early colour schemes which are specifically South Australian.
Generalised period colour schemes are not necessarily based on local information. It is desirable that evidence that is uncovered in this State be preserved and documented.

Reference notes:


4. Ibid., p. 84.

5. Ibid., p. 86.


7. Technical Note 3.6, Stone Masonry in S.A.


9. PRG 353/1/6-7 Campbelltown Methodist Church Sunday School, c. 1903, Architect J.A. Tillett.


11. Ibid., p. 187.

12. Ibid., p. 149.


15. Ibid., p. 151.


19. Ibid., p. 104.


3 COLOUR THEORY

Some understanding of broad principles is helpful in arriving at a successful colour scheme. It helps in assessing the impact a change of colour will have upon the building, furnishings, and presentation generally.

If the building is of special cultural significance, and the original paint scheme is identifiable, the colour may be considered established. In all other cases, when it is not the intention to faithfully replicate colours, some understanding of colour is of great assistance.

This is particularly important when it has been decided to adopt a contemporary approach, without deference to former colour schemes.

In most cases evidence of previous colour schemes has to some extent been destroyed and, depending on the conservation policies for the building, decisions need to be made about colour selection and application.

Although publications on general colour schemes exist and may be helpful in giving direction, still the particular circumstances of the building, its peculiarities and subtle variations, need to be considered.

When standard combinations of colour are used in a simplistic way, as is common, the potential of many buildings is not fully realised.

A building may have interesting features, such as distinctive iron lacework or decorative timber elements, for example. The effect of these will be lessened if they are not duly acknowledged in the colour selection process.

Approaching each particular building individually helps in achieving a more appropriate solution.

Colour vision

Colour is a wonderful visual experience that changes according to the place and light in which we see it. In fact, there are three factors involved in the perception of colour namely; the light source, the object and the viewer.

Light source

Light is required before colour may be perceived. The visible energy that the human eye is adapted to receive is composed of different wavelengths. We associate these wavelengths with different colours. The retina of the eye receives the energy, which, as a nerve signal, is transmitted to the brain, where it is interpreted as a particular colour.

Colour of objects

Objects and their colourants are materials that modify the incident light. Light passes through the material, is completely absorbed by the material; or, most commonly, is scattered or reflected by the material.

A colourant can be applied to the surface, like paint, or it may be integrated, such as in stone. Colourants ‘are the substances or materials that modify light by absorbing some wavelengths and reflecting others’.

The process of absorbing and reflecting light is complex and, so, a colourant may reflect a number of wavelengths. One colourant may reflect mostly blue wavelengths with a little of the green wavelengths, while another colourant may reflect mostly blue wavelengths but with a little of the red, and so the blues will differ.
The viewer also brings to the experience preferences that may be culturally based or may be merely personal associations of certain colours with certain experiences.

Psychological as well as physical aspects come into play.

**Subtractive primaries**

Artists' pigments are an example of colours that are seen as the result of the absorption of light. Such colours are known as subtractive colours; that is, the colourants 'subtract' or absorb some wavelengths. Primary subtractive colours are Red, Blue and Yellow.

Holtzschue writing about Primary and Secondary colours made the following points:

Red, yellow and blue are the primary colors of the artists' spectrum. They are the simplest hues. They cannot be broken down visually into other colors or reduced into component parts. They are most different from each other because they have no elements in common. All other hues are derived visually from red, yellow, and blue.

Green, orange and violet are the secondary colors. Each is the visual midpoint between two primary colors - an even interval between two primary parents. A secondary hue is visually 50 per cent of the primary on either side of it.

Green is the middle mix of blue and yellow. Orange is the middle mix of red and yellow. Violet is the middle mix of blue and red.
The three primary colors - blue, red and green - when mixed equally create white. In combinations of two they create complementary colors - blue and red make magenta, green and red make yellow, and blue and green make cyan. This is the additive process. In the subtractive process, complementary colors subtract from the white light to produce the primary colors and black.¹

**Colour rendition**

**Additive primaries**

The colours resulting from the combination of separate wavelengths of light are known as additive colours. The three primary colours of light are red, blue and green and the outcome when mixing them is quite different from the outcome of mixing paints (which are dependent on the absorption/reflection of light). For instance, when the blue and green wavelengths are combined, a blue-green colour called cyan is the result. When the red and blue wavelengths are combined, a red-violet called magenta results. But when the red and green wavelengths are combined the resultant perception is yellow.

All additive primaries (primary colours of light - R, B & G) must be present in the light source to enable all colours to be seen.

Some streetlights, such as sodium vapour lights, which are missing some wavelengths, can have an enormous effect on the colour of the objects illuminated by them. In building interiors, the colour of the light source can also affect the appearance of colours.

**Indirect light**

Light reflected from a broad surface onto a second surface can change the colour of the second surface, depending on the effect of the first. When light is reflected off a reddish-coloured wall onto a white chair, for example, that chair would have a pink cast. This is because a white surface reflects any wavelength so the predominantly red light is reflected again. Further, if the chair were green and had a red light falling on it, the chair would appear dull with the green colour being ‘neutralised’, so to speak, by the red.²
The effects of indirect light can be observed in areas of abundant foliage. Green light from the foliage may be reflected onto adjacent walls or even into the building interior, making a white surface appear green, and so on.

This phenomenon was used to advantage with the tradition, carried into this century, of painting under roof eaves the colour Eau-de-Nil (water of the Nile), a pale green, which was usually somewhat muted. The effect was to cast a cool light both onto the exterior wall and in through exterior windows.

Examples of 'Eau-de-Nil' colours

![Pale Eau-de-Nil](image)

![Opaline Green](image)

![Dulux Juniperberry](image)

**Colour properties and their effects**

Earlier painters were often skilled colourists with the same problems as those we face today. Essentially they are:

- Which colours to use and in which combinations?
- How light or dark should the colours be and which areas are to be light or dark?
- How pure, bright, intense or subdued should the colours be?

These questions are directly associated with the three basic properties, or qualities, of colour:

- **Hue** – the essence of the colour; namely, yellow, green, etc. It relates to wavelength.
- **Value** – the relative lightness or darkness of the sample.
- **Intensity** – (saturation or chroma) describes the purity of a colour – its dullness or brilliance.

**Hue**

Some buildings are without colour, in the sense that they are finished entirely in black, white and perhaps grey. Generally, however, hue is a critical component of a colour scheme and, when correctly considered, it may be used most effectively to enhance a building.

Some combinations of hues are less successful than others – reds and yellows, for example, or greens and yellows as in the Australian national sporting colours.

**Responding to the body**

A common mistake is to choose a hue without due respect for the body of the building and/or its context.

In South Australia we have been fortunate to have quality stone as building material, but one can observe paint colours which are quite at odds with the hue of that stone – a relatively bright red, for example, against the golden stone.

*Painting of Older Buildings*
Poor colour choices can be apparent in some of the original colour schemes. Despite the skills acquired by most early painters, many extenuating circumstances tested those skills.

The fact that South Australian stone presented a very different building body from those of other States would, in itself, have required adjustment to familiar colour schemes.

Depending on the cultural significance of a building, if it has been ascertained that a colour scheme was the original or significant one, generally it would be suggested that in order to follow conservation principles properly, the colour scheme (even one considered poor in some respects) be the one adopted.

Fortunately, many good examples are to be seen where the relationship between the colour of the body of the building and the paint colours is successful.

A restrained and appropriate palette of colours was often employed on South Australian Victorian villas with stone facades.

For instance, with the warm colour of the stone and terracotta brick quoins, white or cream has been popular for woodwork, together with a relatively dark cool grey as contrast. (The introduction of a small amount of orange and dark green in the form of a potted cumquat tree completes a very familiar colour scheme.)

Complementary colours

Hue relationships and, in particular, complementary arrangements of colour are frequently cited in discussions on colour harmony.

Complementary pairs are opposite colours on the colour wheel; for example, Red/Green or Blue/Orange. They make successful combinations as each colour in the pair is enhanced by the other.

In terms of colour, we have a need for balance.

When three primaries are present in the field of vision, the eye will be in a state of equilibrium or rest. Equilibrium isn’t just a descriptive term, it’s a physiological condition that the eye requires at all times.

The example above illustrates a subtle complementary colour scheme. The stone is a muted cream colour in the range where the complement could be expected to be blue, blue/violet in hue. It is enough that the grey used as contrast is a ‘cool’ grey— that is, inclined to blue, rather than a warm grey, for the eye to be satisfied.
All three primaries are present in each combination of complementaries; for example, R and G (which is composed of B+Y); B and O (R+Y) etc.

To be a successful combination the colours do not have to be obvious and, although theoretically there are ideal proportions for each complementary pair, the contrasting amount of a particular colour may be minimal.

When applying these principles to architectural colour, it could be anticipated, for example, that in a traditional scheme that has red as the predominant hue, relatively small areas of a green (such as Brunswick Green) would be sufficient to be successful.

As well as the complementary colours, other arrangements of hues are considered forms of colour harmony (see illustration following page).

Monochromatic harmony refers to the use of one hue. Values and levels of intensity (or saturation) of that hue may vary within the composition.

Analogous harmony is that achieved from the use of colours which are next to each other on the colour wheel.

Analogous colours are limited in range. Usually all the colours in the group contain one hue as the dominant hue. The range of colours can contain two but never three primaries. Again analogy is not confined to pure colours and values and levels of intensity may vary.

Warm and cool colours

Warm colours predominate in the colour spectrum. Of the three primaries, R Y B, two are regarded as warm colours.

The colours of materials used on older buildings, for example stone and brick, were usually warm, and the colours more common among the first paints were largely earth colours, which were also warm. Perhaps because of these factors, some colour schemes in South Australia lack balance between warm and cool hues. Examples abound of warm schemes that are without relief, such as warm stone with a red roof and rich cream and burgundy paintwork. When these buildings are sited where there is very little help in the way of greenery, or other contrast, the overall impression is one of heat and discomfort.

Historical evidence of an original colour scheme of this nature may justify such a scheme being reproduced, especially where the building is of cultural significance. In this case, attention to landscaping or other measures could aid in balancing the overall impression.

In instances where evidence of an original scheme is lost, and it is appropriate to apply colour schemes that were typical for a given era, it should be noted that many suggested colour schemes have originated from the Eastern States. Colour combinations which are successful on a building which has a different body (for example, painted timber rather than stone), or which is differently situated (for example, in a more verdant setting), may not work as well in South Australia.

'Brunswick Green', as well as now being used indiscriminately on many reproduction buildings, occurs in many recommended schemes for older buildings.

Said to have originally been developed as a colour 'to hide the coal based grime of industrial cities of 19th century Britain', Brunswick Green is arguably out of place with the grey-greens of our landscape and particularly unsuitable for hiding Australian dust. It is, nevertheless, an important component of many original colour schemes, and often successfully offers a cool element in otherwise predominantly warm schemes.

Cool colour schemes, which are not tempered by at least a small contrast of a warmer colour, can be similarly unsatisfying.

In the same way that lighter colours appear to 'advance' or come forward relative to darker ones, warm colours advance relative to cool ones (and saturated or intense colours advance relative to subdued ones).
In deciding whether or not to draw attention to a particular part of a building by making it appear to come forward or stand out, this should be taken into account.

The orientation of a building can have a bearing on the selection of warm and cool paint colours for interiors. In essence, warm colours are best employed on the cool side of the building, whereas the warmer side can benefit from cooler colours.

The fact that advice taken out of context may be inappropriate for South Australian conditions is well illustrated in the following article, dated 1 July 1925, where room colours are discussed:

The exposure of the different rooms should be taken into consideration. For instance, in a north room, where the daylight is touched with the coldness of the north, decoration should be in warm, sunshiny colors; while in a south room, the heat and brightness of the sun should be tempered by the use of cool colors in the decoration.1

The article is flanked on the page by advertisements for Adelaide paint agents, and yet the advice obviously comes from the Northern Hemisphere! See the following undated illustration which has been adapted for Australian conditions.
The color wheel is a simple and useful guide in determining the color scheme for any home.

HOW TO USE THE COLOR WHEEL

In order to make use of the color wheel, make a rough pencil sketch of your house and lay it within the circle showing the colors of the spectrum. North end of the house facing “N” on color wheel. This will serve as an unfailing guide as to the type of color to be used. Any colors adjacent to the room or variations thereof may be used with safety. The full strength hues indicated in the outer circle should be used on limited areas only for color contrasts with the pastels — inner circle — used for large expanses.

Source: Australian Home Decorator and Painter published by The Advertiser, Adelaide, Colorgravure Publications.
Value

Colours can be light or dark. The relative lightness or darkness of a colour sample is known as its ‘value’. Tone is a term associated with this aspect of colour, but as it is also used to describe colour in other ways (for example, as in ‘tone down’ a colour, meaning to reduce the intensity) it is not considered as accurate as value.

Colours may differ in value. Similarly, a light green and a light yellow might be different colours but still share the same value.

(Squinting helps in assessing values of colours)

Value is the most significant element in assessing colour.

It is the first thing that is noticed - the most ‘readable’ (as with this heavier type). We react to the amount of light reflected in a very primitive manner, and quickly see whether a composition, in this case a building within its context, is generally light, mid-toned or dark.

Dark and light elements within the general scheme are readily discernible, and sense is made of the form from the value contrasts, such as those produced by shadows.

Painting a feature of a building in a light colour will make it appear to ‘advance’ or come forward, whereas a recessive element may be reinforced with a darker colour – a front door being an example, especially if it is in a protected or recessed position.

Strong value contrasts are dramatic, exciting, and can be used to exaggerate parts of the building. Conversely, by minimising tonal differences less desirable features such as downpipes can, to some extent, be disguised.

![Value Examples](image)

Darning employs the same principle. Selecting a sewing thread that has the same value as the item to be mended is important. On a mid-blue garment with the choice between a pale blue and a mid-grey thread, the latter would give a better result even though the hue differs.

A façade having a number of elements that contrast strongly in value (tone) will not have a restful appearance and is likely to look agitated. Consequently, attention may be drawn away from a quieter but desirable component, such as stone.

On the other hand, where values are deliberately kept close – that is, with little contrast – the result may be bland and lacking in definition.

The nineteenth-century art and social critic, John Ruskin, suggests that ‘in all cases it is a safe rule to simplify colour where the form is rich, and vice versa’.

One method of simplifying colour is to restrict value contrast.

Painting of Older Buildings
Similarly, middle values are more harmonious than extremes. For instance, in wanting to define a complex series of doors within the broad plane of a wall, the choice of colour for the doors would depend on the value of the background against which the doors are to be seen. If the wall were either light or dark, then a middle value would provide definition for the doors without being extreme in contrast.

Another tonal consideration is that of appropriate ‘weight’ for the form and nature of the component being painted, as well as its relative position. If it is desirable that a form appears balanced or grounded, for example, the value of the colour of the form relative to that of surrounding colours should be taken into account.

Where old black and white photographs exist, they may be studied to establish dark and light components. Together with information obtained from paint scrapes, these photographs may allow a more complete or accurate picture of the earlier schemes.

Where photographs are not found for a particular building, those of similar buildings may reveal patterns in the approach to colour at the time. It is not possible to confirm the hues or intensities in this manner. A precise knowledge of the earlier colour scheme is therefore not possible by this method alone, and some interpretation may be necessary.

Intensity

Intensity or saturation of colour is probably the least understood aspect of colour. It is often confused with the lightness of colour (which is its value).

The most intense colours are those which are saturated or most pure, and the intensity of a colour may be reduced by mixing either with black, white or grey, or by mixing with its complementary colour.

Saturated colour has a tendency to exhaust the viewer after a time. Muted colours are harmonious in the sense that they are restful on the eye.

Early paint colours were relatively quiet or subdued because they were usually derived from a limited range of earth pigments.

Attitudes to colour

Holtzschue writes that it was common for colours to be associated with values like chastity, honesty and social acceptability well into the twentieth century, and quotes Goethe as saying: ‘People of refinement have a disinclination to colours’.

Although bright colours have been described as ‘vulgar’, there are obviously situations where the use of bright colour is appropriate.

In attempts to reproduce earlier schemes, however, the use of colours which are more intense than the originals is often unconvincing. Slight shifts in intensity can make a considerable difference to the overall effect, and care should be exercised.
McGovern's Butcher Shop, Unley (c.1900)
Source: Mortlock Library SA (B 16508)

Residence Julius Sawlack
Muller Street, Norwood (c.1880)
Source: Mortlock Library (B 17450)

Painting of Older Buildings
While rich colour was used lavishly on some of our older buildings at times, bright colours, of the intensity now possible with new technology, would have been very much out of place.

In the same manner that schemes with insufficient tonal (value) variation may appear bland, schemes with little intensity may appear dull. In contrast, those with too much intensity may appear garish.

Paint scrapes taken from protected positions on the building will help in establishing the intensity of earlier colours. Accumulated grime mutes all colours, and air pollution accelerates this destructive process. Samples taken from weathered areas will be likely to be considerably reduced in intensity, and so be misleading.

**Historical approaches to intensity**

As with other aspects of the painters’ art, intensity has long been given great consideration, and is the subject of the following example. 14

In an article proposing a scheme for the decoration of an entrance hall ('Building World', Saturday, 15 January 1910) the author writes of modifying a brilliant blue by the use of a neutralising pigment, such as black, to suit the lighting and to prevent garishness. The term 'neutralising' is clarified with interesting references to similar French and Egyptian practices.

Neutralisation or saddening forms the keynote of all colour schemes, and implies colour going towards shadow. 15 It produces aesthetic shades, which harmonise with each other because they are subdued or saddened, and have one dominant tone. Broken or tertiary colours all approach black or grey; they may be called saddened colors or shadow colours. In the finest specimens of ancient colouring, neutralisation was always obtained. If a chromatic circle is examined, it will be found that the complementary pairs in each, if mixed together, neutralise each other. This principle forms the light and shadow in the colouring of nature, and it is the dominant factor in high art. The shadow of a colour approaches black, that is, it is partially neutralised. The ancients, in using pure pigments, obtained neutralisation by proportioning the ground covered by the several colours, and by the use of compensatory white, gold and black, which check all strong colouring.

For outside work, advertisements, fascias, etc. much might be learnt from the brilliant colouring of the ancients. The theory of neutralisation is thoroughly understood by the French, who are famous for beautiful refinement of colour. The three primaries, mixed together, enter into nearly every tone in their decorations. The colour, broken with white as well as with the complementary, is thus refined in two ways, that is, towards light and towards shadow.

In French schemes of colour, too, there is always a dominant tone; the work may be either warm or cold. In Egyptian work, strong colour is compensated for by actual shadow; in French work, it is subdued by mixing the tints together. The pigments used by the ancients were never direct central colours, such as are found in rays of light; thus the reds, browns, and yellows used by the Assyrians and Egyptians were inclined to be of a neutral tone. 12

**Terminology**

There are many terms used to describe the various aspects of colour; for example, as already noted, 'saturatation' and 'chroma' are alternative terms for 'intensity'. As well as this, there is the common problem of misuse of terms in describing colour. Some people refer to 'shade' when they mean hue and to 'weight' when they mean value. 'Tint' is a term also misused. A tint is a hue with white added, while a shade is a hue with black added.

Colours are more frequently used in a diluted form, rather than at full saturation or intensity. Adding black or white to a colour is a simple way of changing the intensity of that colour - that is, diluting the hue.

When white is added, light reflectance is added to the hue and the result is known as a tint. Dilution of a pure hue with black, on the other hand, gives a shade. 'Block' absorbs all wavelengths of light so shades are reduced hue experiences. Block mutes the hue, dulling as well as darkening it. 7

The term 'shade' is often misused to mean hue as in 'that shade of blue is more green than this one'.
Neutral colours

This category of colours may include both achromatic colours and tertiary colours, and covers those colours commonly referred to as ‘greys and browns’.

Achromatic colours are those which have no discernible hue. True greys, for example, are a mixture of black and white.

Tertiary colours are ‘third rank’ colours that are mixtures of the secondary colours, such as orange and purple, orange and green, or green and purple.

Tertiary colours are chromatic neutrals being neither an identifiable hue nor a mixture of black and white. Holtschue states:

Brown is a word often used to describe many of the colours in this ‘not black, gray, or identifiable-color’ family. Brown is not a hue. We say ‘brown’ instead of ‘tertiary color’ because it’s common usage and equally descriptive. Colours aren’t more or less brown, but browns may be more or less red, green, orange, and so forth."

When warm greys and cool greys are placed next to each other, complementary contrast makes differences between them instantly visible. See example below.

Simultaneous contrast

Simultaneous contrast is a factor that must be taken into account in the selection of neutral colours, especially whites, which will be situated near a hue. It is an involuntary response to hue stimulation.

The human eye demands the presence of the complement to any existing colour and if it is not present generates it spontaneously; for example, a grey that is adjacent to an orange may appear to be a bluish grey as a result of this phenomenon.

Simultaneous contrast is a visual complementary-contrast phenomenon.

This results from the fact that the human eye demands the presence of the complementary to any existing color; and if this is not present automatically produces it for itself. The phenomenon is clearly to be seen in the afterimage. If one looks fixedly for about 20 seconds at the black spot in the centre of a square-edged white surface, and then looks quickly away to a white surface, the afterimage can be seen as a red square with a blue edge - the visually produced (not real) complementary colors to green and to yellow.

Colours on a building will always be affected by the adjacent colours; for example, a red will appear more red in the presence of green.

The following quotation of 1948 illustrates the importance of context for colours:

So great has been the help of paint manufacturers that just as a child always carried may never learn to walk, so the painter has largely lost the art of colour-mixing. Colour schemes are arranged and decided by numbers, and madam is shown colour cards instead of colour samples pointed in position.

Follows disappointment (sic), for colour in its niceties is decided by position, by the company it keeps, by quality, intensity, and numerous other seemingly trivial but vital points. (Emphasis added)
Reference notes:


2. (The viewer) An example is that of a seaman who regarded light aqua as a warm colour because his association with that colour was shallow and therefore relatively warm seawater.


5. ‘Neutralising’ of colours refers to a reduction in the intensity (or saturation, or chroma) of a colour. See p. 24.

6. ‘Achromatic’ means without colour; that is, the sample has no discernible hue.


10. Patricia Lambert et al., Color and Fiber, Schiffer, USA, 1986, p. 208. (Warm colours ‘advancing’) When white light is refracted by a prism, red wavelengths are bent the least, and blue and blue-violet wavelengths are bent the most. When light is refracted by the lens of the eye, the same thing occurs: red wavelengths are refracted only slightly by the eye lens, so in order for the lens to bring the red wavelengths into sharp focus on the retina, it must become rounder or more convex (just as it would on a close object of any color). Because the eye must react to red as it would to a closer object, we perceive it as closer than it really is – thus the term ‘advancing color’.


14. (Intensity) Further old examples of consideration of ‘intensity’ of colour in Appendices.


17. Holtzschue, op. cit., p. 68.

18. ibid., p. 60


Painting of Older Buildings
COLOUR SCHEME SELECTION

Colour scheme selection is a critical part of the task of repainting an older building in South Australia. It is best addressed having some appreciation of the history of building materials and associated paint colours in this State, as well as some understanding of the broad principles of colour theory. (Refer relevant sections.)

A colour scheme is very apparent and even when other aspects of repainting have been well executed, a scheme which is not well considered can quickly detract from the overall end result. Time taken to assess an individual building and to select an appropriate approach helps to ensure a successful solution.

The significance of the building must first have been established. This greatly influences the approach to repainting. (See pp 2-3.)

Building form needs to be evaluated. It may be considered desirable, for example, to emphasise horizontal form with certain colour, or to demonstrate restraint with colour where the form is complex.

The context of the building is an important consideration. The colour of paving, kerbsides and fencing, for example, should be observed. Any adjacent buildings - their form, materials and colour - will impact on the broad composition of which the building is a part.

Vegetation should be regarded in a similar manner and allowances made for particular circumstances, such as seasonal colour.

Also to be taken into account are possible financial limitations; for instance, the colour of a major element such as the roof may need to remain unchanged. This would necessitate that colour being accommodated into the scheme, even if temporarily.

The approach

Suitable approaches to repainting an older building can be categorised as:

- attempting an accurate reproduction of either the original colours, or colours of a significant stage in the history of the building.

- a conjectural approach, being an approximation of colours used on a particular style of building at a certain time; that is, although not necessarily the actual colours used on the building, they are authentic for the style and time.

- a considered contemporary solution using the wider range of colours in a considered way, taking account of the body of the building, its style, the context, etc. This 'perpetual' approach is well founded in colour theory.

- a contemporary solution which needs to address certain limitations such as commercial restraints - for example, having to accommodate corporate colours into the colour scheme.

Commercially available colour cards are designed to help make an informed choice. The cards, together with paint samples, should help in identifying a colour scheme that may be a reasonable interpretation of the original scheme, or, similarly, assist where other solutions are intended.

It is useful to be aware that colours selected from small sample 'chips' will appear to be both lighter and to have more intensity when applied to large areas.
Composition

Consider the composition in basic terms of large ground areas (that is, walls, roofs) as against fine lineal elements (for example, gutters), mid-sized blocks (doors) and spots of colour. This will suggest which colours will be more appropriate in the various parts of the composition; for example, a relatively bright colour will be quite imposing in a larger area and usually more effective when kept for smaller 'accent' positions.

Where the body of the building is imparting colour into a scheme (as is the case with stone), the introduction of a definite colour into a second large area, such as the roof, has significant impact. The same colour, when introduced on a lineal element such as gutters, would have less overall effect.

Small 'thumbnail' sketches in coloured pencil help in the decision making at this stage.

Careful observation of existing successful colour schemes is also of assistance, although each case is different and so allowances need to be made. A highly successful example may be reliant on a factor such as an old weathered wall or the backdrop of a magnificent tree. When these particular factors are not in play, even though the actual paint colours have been accurately transposed, the end result may be disappointing.

A design checklist

The following design checklist is intended to aid in finalising all schemes except those where colours and their combinations are known and fixed.

- Is there sufficient variety in hue or is the scheme overwhelmingly warm/cool?

- Are there too many colours involved? Could some colours be replaced by neutral ones?

- Is there sufficient variety in the sizes of colour - that is, are the areas of different colours too similar in size and, so, awkward/clumsy in that respect?

- Is there enough tonal contrast (contrast in value) or does the building look too bland and lacking in definition?

- On the other hand, does there need to be more restraint with the tonal contrast because the appearance of the building is 'bitty' or fractured?

- Is there enough energy - that is, intensity of colour - overall, or is it all looking too subdued and flat?

- Conversely, is there too much energy in the colour giving the building a riotous appearance?

Whether adopting a traditional or a contemporary approach, taking the time to analyse and address the building in question thoroughly prior to developing a colour scheme is a requisite first step.
Accurate reproduction

An original colour scheme is generally considered the most appropriate where the building is of heritage value. However, where significant additions and alterations have taken place over time, these changes may have assumed heritage value and also need to be considered. In this case it may be more correct to adopt a scheme which is appropriate to the interpretation period.

Investigative work

Investigative work is crucial in that it provides a comprehension of the original scheme. Expense is involved in employing professionals, but this may be necessary in the case of major buildings or when there is particularly fine detail/design.

Generally, however, it is possible to do the crucial investigative work oneself, providing care is taken to prevent irreversible damage to what are often delicate finishes.

Portions of interesting work, such as stencilling, dados or other types of decoration, may require uncovering to indicate design and colour. Even when covered by layers of subsequent paint, they are often discernible by the raised pattern showing under a strong light projected at an angle onto the wall.

Decisions about restoring these finishes will be based on the cultural significance of the building and the relevance of the finishes; on the state of repair; and on the appropriateness for current usage.

All evidence should be thoroughly documented, and, where possible, original finishes should be preserved, at least in part, and incorporated into new schemes.

Documentary evidence

Invaluable information to identify original colour schemes or support the findings of on-site investigative work can be provided by documentary evidence such as:

- old photographs, which, as well as indicating tonal values, can often be dated from the style of people’s clothing or other clues;
- written descriptions such as letters or early histories;
- original drawings and building specification; or
- talking to previous occupants, neighbours, or others in close proximity.

Publications covering period paint colours, techniques and decorative styles may also provide relevant information.

Paint scrapes

Evidence comes from the careful removal and analysis of paint. Any of the following procedures may be adopted:

- a diagonal cut with a sharp knife or surgical scalpel made across the layers of paint. The cut should reach the substrate and expose as much as possible of the individual layers. Sanding aids in the examination;
- small chips or flakes of paint matter can be removed from the surface and the cross sections examined;
- progressive removal in situ of paint layers by chemical solvents or mechanical means to expose a portion of each colour layer;
- removal of scored paint samples with clear sticky tape.

Painting of Older Buildings
Occasionally a variety of colours and highlights were used on the same wall or building element and therefore several different areas should be sampled. Insight into which areas should be sampled may be gained from scrutiny of similar schemes of the same complexity.

It is preferable to carry out investigative work on a well-protected area that has not been subjected to a high degree of exposure to the elements and, in particular, to ultraviolet light. Such areas should also not have been previously subjected to work entailing the removal of original finishes.

Once successive layers of paint have been uncovered, a smear of oil or glycerine applied to the paint scrape assists in bringing out the colour.

It should be kept in mind that, particularly on the exteriors or in wall areas more exposed to direct sunlight, colours may have significantly faded or altered since the paint was applied.

Brunswick Green, for example, changes from its original deep green into a reduced blue-green colour.

Accumulated grime mutes even the most durable colours, and air pollution is an increasing problem. Oxidation is another problem and remains so, even with modern paints. Colours are affected at greatly varying rates and so the original combination or balance of colours can be significantly changed.  

‘Fugitive’ colours, or colours which change in appearance, can also pose problems. Some pigments migrate up and down within the paint film and in so doing alter the appearance of the paint colour. Certain red pigments are especially wayward in this respect; for example, when red pigment works to the surface in a cream-beige-coloured paint, the colour changes, appearing more red and at times resembling ‘undercoat pink’.

Recording

Colour scrapes may subsequently be visually matched against:

- paint manufacturers’ colour cards. These are readily available and very convenient on-site;
- or
- the Australian Standard AS 2700-1996 chart or British standard BS-381C;
- or
- the Munsell or other colour systems such as the NCS.

A magnifying glass or microscope can help achieve a high degree of accuracy.

It should be noted that most paint manufacturers are prepared to match any colour, if given a sample of sufficient size. Recently, spectrophotometers, which are machines capable of accurately matching colour samples, have been introduced into some manufacturers outlets.

At times, the original finishing coat may be difficult to distinguish from the primer or undercoat as primers used in the Victorian era were frequently white or cream. To ease the covering of imperfections and sanding, primers were filled with talc or calcium carbonate. Red lead-pigmented primers were sometimes applied to rendered masonry surfaces.

Undercoats were not very strong, being loosely bound and, if subjected to the sticky tape method of investigation (where a 2mm square piece of point is cut through and removed by pressing firmly and pulling off with the tape), they will shear because of their low cohesive strength. The texture of these undercoats is noticeably different from the finishing coat.

There are now sophisticated analyses that allow the original colours of materials, such as textiles and paint/paintings, to be established with reasonable accuracy. Unfortunately these are expensive and usually not available on site. Guesswork may therefore be required to identify the paint colour before fading occurred. It may then be matched with an existing available colour.
Paint scrapes are a good starting point. But it is important to be mindful that often paint has been thoroughly stripped off, particularly in the case of outside timbers. In such cases documentary evidence may help to fill the gaps.

The study of publications on period paint colours, as well as manufacturers’ guides, will give a broad understanding of the range of colours commonly used in a particular period. It should be possible to anticipate, for example, which colour was likely to be found in a certain position. Differences between States and styles of building should of course always be taken into account. Each building will be different and the colours themselves will vary subtly. It would be unlikely that Light Stone, for instance, would have been precisely the same colour in each case.

Once the nature of the colours painted on various areas is established it helps to develop a small, coloured sketch indicating those colours in position. This is relatively simple if using copies of photographs, and, while this method cannot portray colour accurately, it should be sufficient to visualise the overall composition.

The colours that have been identified in layers at the various sample positions should also be recorded for future reference.

A conjectural scheme (or an ‘approximation’)

For various reasons, adhering to the original colour scheme may not be a preferred or possible option.

It is possible, for example, that insufficient evidence exists for analysis; or, perhaps, in the interior original colours may be incongruous with furnishings or adapted uses. Under such circumstances, it is reasonable to approximate a scheme from colours commonly used on similar buildings of that particular time.

It is important to be mindful of the inherent danger of direct transfer of a colour scheme from one building to another. Even though buildings are possibly similar, there will be factors such as variation in materials, scale or detail and especially location – the setting or context – that may require to be considered.

As with the case of accurate reproduction, examining, documenting, and preserving, where possible, any evidence of previous colour schemes is necessary.

As well as being important for future reference, this historical evidence can aid decisions on colour and its application. A tonal (value) pattern, for instance, may be identified and be adopted, even though the colours chosen differ in other ways. In this manner, at least one aspect of the earlier scheme has been retained.

After studying examples of schemes used on similar buildings, consideration ought to be given to the individual characteristics of the building in question and allowances made.

(See Notes on Colour and the Composition Design Checklist.) In the case of many older South Australian stone buildings, for example, the stone colour will be better suited to some ‘period’ paint colours than others. Sensitivity is required in the selection.

A light-coloured pinkish stone may require a paint colour quite different from that on a light-coloured, but more yellow, stone. Careful study of the individual colours within the stone can establish a direction and make selection from a group of appropriate colours easier.
Appropriate colours

Appropriate colours are those possible from the pigments which were more readily available at the time. The orange/yellow ochres and reddish-brown iron oxides are stable colours which combine with each other and make a variety of colours possible.

With black and white (Lampblack and White Lead) being other such examples, it is understandable how the familiar neutral colours – like off-whites, creams and greys – evolved in this State.

Neutral colours, which commonly occur in local building materials – for example in slate, stone, sands and weathered timber – and which were used earlier in this State, have continued to be appropriate for local conditions.

With bluestone buildings, quoins are an important consideration. If the quoins are brick, there is less scope for introducing colour to relieve the heaviness of the darker stone. In this case, nevertheless, the terracotta and dark grey pairing has a richness possible only with that combination of materials and should be respected. The choice of colour will vary accordingly; for example, remaining elements such as window frames and other woodwork may be painted a different colour from that which would be used if pale, rendered quoins were in play.

A strong red and cream original scheme, which may be now considered inappropriate, could be modified, for example, by reducing the quantities of red. Retaining the original red colour as an accent while introducing a more neutral colour to give overall balance, could be a solution.

Accurately reproducing any original paint colour, such as a particular green for example, and carefully using that colour – even in a combination different from the original one – will give a more satisfactory result than resorting to a more standard green/cream combination.

It is possible to paint an historic house in appropriate colours and still express personal taste. The historical colours should emulate other traditional building material colours and the colours chosen should relate to colours in the past, but otherwise there is scope for a good deal of flexibility.

A considered contemporary scheme—the ‘perpetual’ or timeless alternative

The approach taken in developing a considered alternative scheme again involves a thorough examination of the building. The same course of identifying cultural significance needs to be taken.

The building may be such that it is appropriate to adopt a colour scheme other than an original one. Nevertheless historical evidence encountered in the process of repainting should be documented and preserved.

The nature of the building, its predominant building material, form and context all need to be taken into account in order to arrive at a suitable solution.

Responding to the body of a building

A good starting point in developing such a scheme is to respond to the body of the building, analysing the colour of the existing brick or stone or other significant materials which will be influential in the final result.

Where the material being considered is made up of a number of colours, as in the case of stone, some experimentation may be necessary to arrive at a representative colour.

Remain alert to the impact of sundry elements such as air vents, doorknockers, chimneys etc., as well as any imposing factors in the immediate environment.

Where the form is complex, having elaborate details, or many different-shaped openings in a façade for example, colour should be simplified. The number of colours could be reduced and restraint shown in any ‘picking out’ of features.
There should always be sufficient variation to allow definition of form and to avoid blandness, but the use of fewer colours is usually best in any instance. Avoid busy contrasts. The least successful colour schemes usually display a lack of restraint. This can be in the area of hue, where too many are used; in tone, where strong value contrasts detract from the appearance; in intensity, where the impression is vivid; or, at worst, in more than one of these categories.

Buildings treated in an exaggerated manner have been likened to being ‘permanently in party dress’.

Sensitivity to the nature of the stone is important. Bluestone is not enhanced by ‘acid green’ quoins, and even a more usual quoin colour, such as a yellow ochre, will dominate if too strong in intensity.

Current fashion

Where it is desired to use colours that are currently fashionable, these are best introduced in limited areas. Relatively small areas of colour can be effective and impose a modern ‘flavour’ without detracting from the appearance of the older building. Fine areas around windows or small parts of trim on woodwork are good examples.

Sketches to assess proposed compositions of colour in relation to the building form and context again provide a useful check.

Use of neutral colours

Neutrals add complexity to a scheme without dominating and may be selected to be harmonious with the building material.

Different neutrals are created by the mixing of different colours. It is therefore important to select neutrals based on the colours that are pertinent to a particular building. These may be either derived from the building materials themselves, or from a colour being employed that is harmonious with them.

A neutral colour, such as a grey, that is mixed from a colour being used (for example red) and the complement of that colour (green) will be much more successful than a neutral which has been introduced arbitrarily; that is, one derived from a different complementary pair of colours – such as blue and orange in this case. Also, a neutral mixed this way will be more natural and satisfying in appearance than a grey mixed from black and white.

Painting of Older Buildings
Where additional colours on a building are necessary, for example where extra building elements need defining or where the use of one colour over many elements would appear clumsy, a neutral colour allows complexity without a riot of different hues.

Decoration

With greater awareness of earlier decorative styles there has, for the last twenty years, been more interest in applying such decoration to buildings. There has been a great deal of enthusiasm and, as a result, there are excellent examples of work that is well executed. Sometimes, however, the approach has been overzealous. For instance, elaborately ‘picked-out’ paintwork is now found in inappropriate places, the work obviously having been carried out without adequate investigation of either the underlying paintwork or the history of the building.

This is in contrast to another less-than-ideal approach that has been to disregard any detail by painting buildings entirely in white.

Fortunately, paint is transitory and the application of paint colours has always been influenced by fashion. These facts allow buildings a vitality that would not be possible if there were to be rigid adherence to ‘rules’. Terence Lane and Jessie Serle in their book ‘Australians at Home’ quote from an old publication when making a paint about appropriateness in the matter of decoration:

How much better it would be if, instead of things which properly belong only to grand reception rooms and stately galleries, we would contrive a style of decoration which should be in keeping with the houses in which we live and with our manner of life.

Reference notes:

1. Adopting an original colour scheme internally may be more difficult in terms of accommodating contemporary furnishings and being appropriate for modern lifestyles.
3. Colour systems. Refer p. 68
4. Publications on period paint colours - see Further Reading.
6. ibid., p. 53.
7. ibid., p. 54.

Painting of Older Buildings
The marked improvement in trade shown by the Board of Trade Returns will doubtless have an appreciable effect upon the painting and decorating trade when the coming political situation is over, and it is fairly certain that the building trade generally will greatly improve. When times are bad, painting and renovating are often left over until a later period. Some property owners, rightly regard expending as a necessary protection of their property. In other words, as an expenditure as much required as a insurance, which although it may mean more or less of a luxury, and may sometimes be considered the trade, is not one in which excessive profit is secured. The year's progress is recorded in the manufacture of pigments during recent years, and the tendency in distinctly beneath the increased employment of non-porous paints, particularly in the case of some of the ordinary attention of house-painters has been paid to this subject. The latter tendency has been followed by the gradual adoption of some pre-colouring in favour of this subject is the exclusion of coal tar based products from the market. The tendency to get beyond the point of imagining, as some old-fashioned painters still do, that no paint is worth anything at all unless it is white lead. Another reason which is operating to Popularize non-porous paints is this: There are, as a matter of fact, only two manufacturers of paints and colours in this country who corse their own white lead, and all the others have to procure their lead from the outside, it being received by them in the form of a powder which they grind with oil. The Board of Trade, however, even in this simple operation, are making a great improvement and the process is far from being an art in itself. In some instances, oil paint in general, the presence of white lead at all, excepting, of course, in the case of those who find their ground and put up with it.

The question of how much the public has been supposed to a greater extent than the so-called "improvement" in pigmentation that any household movement has ever been. The estimation of the word “improvement” is pejorative, and I do not mean to say that in fact the new oils are better in every way, but I mean to say that they are better in the sense that they are better adapted to the purpose which they are intended for. The paint may be said to take the place of a great variety of under-coat. Efforts have been made for years past to produce a red which should be as permanent when exposed to the light as ordinary, and which would not have been possible, for instance, when the walls were white. The Chinese, on the other hand, had such a red, and with little trouble, by painting, the red would quickly set in the way the Chinese did, or the ordinary cells of the red. This meant in effect that the dye had been bleached, and when a house was painted with red, the red could be washed away with a wet rag. The Chinese, however, used a red which was painted with red. The reason this red can be purchased at a moderate price, and washed out to bleed, at the same time preserving the quality of being able to be spilled and permanently adherent. In some quarters, while excellent, is said to have had its day, but, as a matter of fact, in my opinion it is more popular than ever, although flat enamels are used to a greater extent than before, particularly in combination with the glossier. Painted work, finished with gloss enamels on the sills and flat enamel on the main wall, produces a very handsome, and a very durable one. The gloss of a surface is accentuated by the material of the other, and vice versa. Those who imagine that white enamel was a consequence of the harness, and it is doomed to become cheaper in a few years' time because of the precarious change in the rates of freight will do well to remember that if a single factor gets the better of the weaver of her showing-room or his buns, she has only to instruct her painter to give the walls a glaze of some light or brilliant green, yellow, red, blue, or other colour to produce an exceedingly pretty and delicate green. The transportation under, pink, or light blue. Such work can be done very inexpensively, and the appearance of the room changed as frequently as may be desired, while still retaining its fine and durable base of white emulsion.

An inspection of the walls of houses for the coming year shows that there is a large increase in the number of fabrics designs, that is, those which are designed to appear variously tinted or printed, but not to show the individual colours. The chief point o interest is in the production of "Coastal" designs. These are intended to be used for the production of various watercolours, special pinks, purples, and corners, stencils and fillings being supplied, the whole being a sort of pattern from a piece of paper which may as it may be required. In using them it is necessary to remember that the designer does not make more than stick the paper on the wall, he must care to plan out the points to suit the position in which he is decorating, and this feature alone makes the new departure an encouraging one. "Coastal" designs have been known for some years past, but they consist of a variety printed on the wall, and this makes the use of this form of decoration more possible than before. Of course, only a few lengths can be printed on one piece of paper to suit the wants of the user, and so to some extent, what is expensive. In the coming year's books there are a great number of patterns which are intended to be sold by the company, and these designs are so arranged that the effect of a relief appears visible.

On January 1st the manufacturers of Linseed waxes are putting on the market an extremely beautiful new material, named Emulsion, which is exactly the appearance of the finest silk or worsted. It is made in many beautiful shades and admirable designs, and possesses the great advantage of being washable.

ANNEIRY JENNINGS.

CONSTRUCTIONAL ENGINEERING

During the past twelve months the account of construction has received a great deal of attention, and aroused much interest, while the development in certain branches has been considerable. The present year will probably see some new forms of detail and construction everywhere, and also undoubtedly a great advance in contract and increased employment of certain existing materials and methods. Steel skeleton frame buildings have become very general in large cities, and this is in spite of the fact that the London Building Acts did not apply any influence in the construction of this nature, insisting, as they did, on thick walls in high structures, regardless of the fact that such walls were frequently carried by stock brick at the lower and, and could consequently have no structural value, but rather added to the dead load to be carried by the steel frame. It can be confidently stated that in London, at all events, steel skeleton and reinforced concrete structures will become practically the general type of construction of the one of this kind, owing to the London County Council’s recognition of the need of affording greater facilities for the carrying out of this class of work. The London County Council (General Powers) Act came into operation on August 14, 1909, and is of the utmost importance to all engaged in the design of buildings especially in London. It allows 15,000,000 of the construction of buildings having walls that is, 150 in. and 4 in. thick only, which will not only mean a great saving in brickwork, but also a saving in weight and cost. Adjustments of the dead loads due to walls being diminished. At the same time a thorough knowledge of the subject will be necessary to the designer, as working stresses are calculated and deflections must be determined with the district surveyor, so that approximation

PANTING AND DECORATING

The Board of Trade has recently published the results of its survey of the painting and decorating trade, which shows a marked improvement in the industry. The survey indicates that the trade is doing well, although the prices of paint and materials have not increased as much as expected. The trade is still dependent on government contracts, particularly for the construction of public buildings, and this is likely to continue. The survey also highlights the importance of training and education for the trade, with a greater emphasis on the use of modern techniques and materials.

HEATING AND VENTILATION

The prospects of the heating and ventilating engineer for the year are good. The demand for heating and ventilating systems is expected to increase due to the rise in the cost of fuel. This is likely to lead to an increase in the demand for more efficient systems, which will in turn create new opportunities for engineers. The survey also highlights the importance of maintaining and servicing existing systems, which is a key area of growth for the industry.
Examples of colour schemes

Variation and individual expression are possible with a limited palette of colours. Sandstone building bodies, pales, rendered quoins and grey roofs are common factors in these schemes. Note how the light coloured lacework on one building "advances" whilst the dark lacework on another "recedes".

Painting of Older Buildings
Grey roofs and fencing, the crisp white of the painting and sundry white items counter any inclination to dullness in these schemes of bluestone combined with ochre and red-brown hues.
See this page and following page.
Straightforward use of materials and simple effective use of white.
An example of a well-balanced scheme: the neutral paint colours complement the building materials and allow expression of the building detail. A darker gutter successfully defines the edge of the grey roof and adds interest with the subtle contrast. Note: More contrast on the gable, either in hue or value, would compete with the essential red/yellow combination of stone body and brick quoins.

Similarly, this scheme is attractive and appropriate on an older church.
The similar, warm hues of the stone and paint colours allow subtle definition to the gable detail while not 'breaking up' the building form. The vertical nature of the chimney wall, for example, is reinforced by keeping the tonal (value) contrast slight.

The gable detail is readily noticeable because of the introduced blue (blue), even though the value contrasts are not major.
The strong tonal (value) contrast of dark green and off-white results in a dominant linear appearance which can distract from other building elements.
Strong contrasts in hue and in tonal value. The 'picking-out' of detail is very obvious.
The Botanic Hotel, North Terrace, Adelaide.
The building form is complex and the very simple colour scheme is an effective one. Detail colour is minimal.
Shop and residence, McKinnon Parade.
Unpointed stone and brick quoins better express the building form. The dark grey door provides a successful contrast with the cream woodwork and the red roof.
The building has a red tiled roof and a warm-coloured stone body. The introduced contrast of green is applied to a limited area and the colour is reduced in intensity. The green relates to the mossy patina of the tiles and is successfully augmented with neutral colours.

Appropriate neutral colour on window hood provides definition of form and interest (gentle hue contrast with wall colour) without complicating a facade that already has stone, red tile and substantial detail – as in the dentils. Restricting the deep red trim to a fine element avoids adding unnecessary warmth to the scheme.

The contrast of bluestone and white is strong. Architectural detail is better defined using some colour. The unity of the building group is also compromised by the one white scheme.

Painting of Older Buildings.
The white door relieves heaviness in a dark, warm colour scheme.

Schemes with a bias to warm, generally dull, colours. There is a lack of hue contrast. The scheme above has more tonal (value) contrast.
Two introduced hues (the red roof with contrasting strong green woodwork) as well as the third yellow-cream hue of the body of the building gives an aggressively colourful scheme.

Excessive use of one hue. The green is also of a relatively strong intensity and so the effect is compounded.

Painting of Older Buildings
A standard combination of 'heritage' colours with a strong Red, Green and Cream hue contrast. When the cream is more yellow and intense in colour, the overall effect is 'amplified'.

Painting of Older Buildings.
The colours are reduced in intensity. There are relatively large areas of red and green and yet the impression is one of restraint.

Grey-green as window paint colour is a cool contrasting element in an otherwise neutral/warm scheme. The contrast is a quiet or gentle one. Tonal contrast is provided by the burgundy fence and trim detail.
Some contemporary roof colours (for example Birch Grey) are suggestive of original iron. Queen in this example are pale and neutral against the bluestone and the deep red is restricted to the smaller areas of gutters. Definition of the window with a small amount of yellow hue provides controlled 'energy', or intensity, to the overall result.

A subtle neutral colour scheme here relates to the stone and works better in this situation than standard yellow/green solution.
5 A BRIEF HISTORY OF PAINT

Until the early twentieth century paints were mostly individually prepared. The master painter produced paints by hand ‘from somewhat limited materials, certainly in a rather crude and unscientific manner and often with materials that are no longer available today.’

Originally the pigments were sold ‘dry’ and mixed on site. Later they were purchased as colours in oil but even so, as in the case of white lead, the breaking down of the ingredients into a paint suitable for application, was carried out by the master painter.

Early methods

Traditional methods were time consuming, and painters were faced with a difficult task because of the almost complete lack of standard formulae, colour terminology and knowledge of chemistry. Nevertheless these painters were highly skilful. Seven years were spent learning the trade, and guilds exercised strict control over the training of apprentices.

The painting of most South Australian buildings followed this practice until around 1930.

Traditional paints and coatings

Traditional paints and coatings can be divided into three broad categories:

Turpentine ‘thinnable’, such as glass paints and varnishes which were mostly used on wood or metal.

Spirit ‘thinnable’, such as spirit varnishes (for example, Shellac) and French polish that is thinnable with methylated spirits.

Water ‘thinnable’, such as whiting, limewashes and pigment washes, which are frequently used for external, rendered areas or masonry walls, and distempers (including Kalsomine) which are mostly used for interiors.

These coatings are discussed as oil paints, varnishes, water-based paints etc.

In general, oil paint was used for exterior and interior woodwork and ironwork, distemper or wallpaper for ceilings and walls, and varnish for the protection of paintwork or stained floors.

Traditional oil paints

Traditional oil paints, which were turpentine thinnable, relied on the purity of the oils and pigments used. The quality of the ingredients of paint has always been an important factor in obtaining a good and durable finish. Oil paints made of linseed oil provided an elastic and hydrophobic coating well suited to timber.

Because the oil afforded good water repellency, these paints also provided a degree of corrosion protection to ferrous products including cast and wrought iron.

‘For generations serviceable paint was made simply by mixing together pure white lead, pure linseed oil, turpentine and a drier for white paint.’ However, white paint produced this way and applied to surfaces which were exposed to extreme sunlight was inclined to chalk off. When zinc oxide was added to the paint the result was harder wearing properties.

Traditional primers

Traditionally red lead was considered the best primer on both timber and steel. According to Gehrig, typical formulas would have been:

**Priming for hardwood**

<table>
<thead>
<tr>
<th>Material</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>White lead</td>
<td>20lbs</td>
</tr>
<tr>
<td>Red lead</td>
<td>6 1/2lbs</td>
</tr>
<tr>
<td>Raw linseed oil</td>
<td>60%</td>
</tr>
<tr>
<td>Wood turpentine</td>
<td>37% 5lbs</td>
</tr>
<tr>
<td>Terebine</td>
<td>3%</td>
</tr>
</tbody>
</table>

**Priming for metal**

<table>
<thead>
<tr>
<th>Material</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red lead</td>
<td>20lbs</td>
</tr>
<tr>
<td>Raw linseed oil</td>
<td>50%</td>
</tr>
<tr>
<td>Wood turpentine</td>
<td>46% 5lbs</td>
</tr>
<tr>
<td>Terebine</td>
<td>3%</td>
</tr>
</tbody>
</table>

The colour of these priming coats was a bright pink, the colour being incidental to the amount of red lead used.
The page contains a color chart with various shades and names, including:

- No. 708 IVORY
- No. 709 CREAM
- No. 710 LIGHT TAN
- No. 711 PEACH
- No. 712 TURQUOISE
- No. 713 TERRA COTTA
- No. 714 LIGHT PROVENCE
- No. 715 DARK PROVENCE
- No. 716 WHITE
- No. 717 GREY
- No. 718 GREEN
- No. 719 BLUE
- No. 720 RASPBERRY
- No. 721 ROUND

The chart is labeled "Also made in White." The text at the bottom notes the use of Magnet Flat Oil White Lead Base Paint for various applications and provides instructions for mixing and application.

The bottom of the page includes a note by Courtesy: Alan Feder, Soler Paints.
BORTHWICKS

REINFORCED

is made from the best known paint bases—Lead and Zinc REINFORCED with TITANIUM OXIDE, and mixed in specially processed oils.

Paint reinforced with Titanium Oxide excels in covering capacity and colour permanency, and definitely ensures maximum protection of the surface over the longest period. Paint reinforced with Titanium Oxide does not crack or peel—perish or powder. It wears like a rock and weathers slowly—giving years of service.

"AB" Reinforced is more economical to use than most paints, because every gallon will cover more square feet.

BORTHWICKS
VELVETONE
FLAT OIL PAINT

A delightful matt finish that is washable and extremely durable on all interior surfaces—plaster walls and ceilings, metal ceilings and panelling, woodwork, wall boards, etc. Walls coated with Velvetone aid the correct diffusion of light and provide an ideal background for the furnishings of any room.

Velvetone is self-levelling, so that laps and brush marks do not show, and the amateur does not experience any difficulty in coating large surfaces.

Range of 16 delightful shades.

REINFORCED

There is extra strength in every brushful.
Manufactured by Borthwicks Pty. Coy.
Sydney—Melbourne—Brisbane.

12/37

Courtesy: Alan Feder, Solver Paints
Red lead is employed because it exerts a powerful drying effect on the oil and continues to operate when the oil has soaked into the wood. Thus a sound protective film is formed which provides a good ground for the following coats.  

Linseed oil is derived from seed of the flax plant by pressing or solvent extraction.

The linseed carries 32-42% of oil that is pale amber in colour, very slow drying and low in viscosity.

It was once the only binder used by the paint industry. Until the early 1970s, it was still used widely in exterior house paints and in oil and oil/alkyd-based metal primers and intermediate coats. The row oil, or the alkali-refined product, gave excellent durability to these coatings, although water resistance could have been better as could chemical resistance. Alkali-refined linseed oil had better color and color retention than row linseed, although films would still yellow in the dark and in sheltered or indoor locations. Yellowing in ultraviolet light-exposed locations was, however, minimal.

Today linseed oil is used mainly in the preparation of air drying alkyd resins, epoxy ester resins, and urethane oils or uralkyds.

**Varnishes**

Traditional varnishes were thick liquids that produced a gloss (or flat) coating which dried hard and was usually transparent. Varnishes were made from such basic materials as:

- vegetable oils, fossil gum resins (those dug from the earth), other contemporaneous gum resins (those gathered from trees and insects), volatile liquids and essences, volatile mineral oils, certain hydro-carbon compounds, metallic salts and to a minor extent animal oils and waxes.

Copal gums are fossilised gums from past trees; rosin is a gum resin from the pine tree, and shellac gum is produced by an insect on East Indian trees.

Varnish dries in an interesting way.

The volatile thinners evaporate, the drying oils oxidize (absorb oxygen from the air and form a solid). As these two separate actions are performed the gums or resins, being solids dissolved by the liquids, return to the solid state, uniting with the drying oil solids.

Varnishes may be classified broadly as:

- oil varnishes
- spirit varnishes
- japans

Oil varnish was used as a finishing medium for paint. Made from various gums, linseed oil and a small quantity of suitable thinners, it dried relatively slowly but to a good strong finish.

Spirit varnish. Shellac is a spirit varnish consisting of gum shellac dissolved in alcohol. It is quick drying, and can be sandpapered easily but does not have a strong finish.

Japans are a type of paint or varnish giving a hard, black glossy finish. Sometimes known as Black Japon, it is usually made from natural asphaltums with some drying oil and possibly some resin.

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Painting of Older Buildings
RED LEAD

Red lead is a brilliant scarlet red pigment. It is not used as a colour or for tinting, but for its protective action. It is made by heating metallic lead or sandy white lead in a properly constructed furnace, first producing lead monoxide, which by further heat treatment is converted to red lead. If pure, its chemical formula is Pb₂O₃, and it may be regarded as 1 part of lead peroxide (PbO₂) and 2 parts lead monoxide (PbO). As ordinarily obtained on the market it contains from about 70 to 90 per cent. (usually over 85 per cent.) of Pb₂O₃, the remainder of unadulterated samples being lead monoxide unchanged in the process of manufacture.

Such red lead is a good drier of itself, and when mixed with oil will solidify to a hard mass within a short time. It is necessary, therefore, that the paint be mixed not more than 24 hours before use. To overcome the difficulty of mixing the dry pigment with oil, the red lead is sometimes ground to paste form in non-drying oil, but this practice is not to be recommended. It is also ground mixed with other pigments such as silica, but when so mixed should not be sold as pure red lead. On account of the great specific gravity of red lead the paint made from it is very heavy and flows on stilly, has a tendency to sag, and is not likely to cover as much surface as white lead. When properly prepared and applied it forms a very tough adherent coating, and in spite of its drawbacks and rather high price it is the most satisfactory paint in use as a priming coat for the protection of iron and steel. It is also used in wagon painting as a primer for the running gears as it will stand knocks and friction that would remove any other paint. It is blackened by hydrogen sulphide or other sulphur compounds, and has a tendency to whiten upon exposure to atmospheric agencies, due to the formation of lead carbonate and sulphate. As its chief use is as a first coat these defects are of no consequence.

Recently, says Circular No. 69 issued by the American Bureau of Standards, a high-grade red lead containing about 98 per cent. of Pb₂O₃ has been put on the market, which when ground in linseed oil to a paste form does not harden in the container. Its use obviates the inconvenience of mixing dry lead in oil, and so far as present knowledge goes, it is equal in every way to dry lead freshly mixed.

Some experts claim that the absence of lead monoxide prevents the paste hardening in the container, and that with an increase in the contents of true red lead the fineness of the pigment increases, thus producing a better working paint, one that gives a more continuous film, flow's out better, and has less tendency to sag and run. Other experts claim that the cause of hardening in the container of ordinary lead is coarseness and not the presence of lead monoxide. The same authority states that some red leads containing only 85 per cent. Pb₂O₃ are finer grained than any containing over 95 per cent. and that such fine-grained red leads do not harden in the container. It is not known which of these claims is correct, but the redlead pastes examined in the Bureau that did not harden in the container have been found to be of high purity; that is, above 95 per cent. Pb₂O₃.

"Orange mineral" is a form of red lead having a lower specific gravity and lighter colour than the usual form.

The essentials of the U.S.A. Navy Department specification for red lead added as follows: Dry. —Composition: The dry pigment to be of high-grade quality free from all adulterants, and shall contain not less than 94 per cent. of true lead (Pb₂O₃), the remainder to be practically pure lead monoxide (PbO). Impurities: To contain not more than 0.1 per cent of metallic lead, not more than 0.1 per cent of alkali figured as Na₂O, and not more than 0.5 per cent. of total impurities, which include all substances other than lead oxides. Finess: To be of such fineness that not more than 1 per cent. remains after washing with water through a No. 21 new silk bolting-cloth sieve. Comparison with standard example: To be of good bright colour, and equal to the standard sample in freedom from vitrified particles and in other respects. Practical test: When mixed with pure linseed oil, petroleum spirits, and drier, as per standard formula, viz.: Red lead, dry, 20 lb.; raw linseed oil, 5 pt.; petroleum spirits, 2 galls; drier, 2 gills; and applied to a smooth vertical iron surface, shall dry hard and elastic without running, streaking, or sagging.

Brown paints may vary from colours which are nearly yellow to those which are a reddish hue. Ordinary browns may be said to range from such colours as umber, which is a deep, rich brown, to sienna. An ordinary sienna is a typical brown. When these colours are used for painting the outside of frame houses in combination with yellows and various shades of olive green, it is usually best to keep them somewhat dull in tone. There are many ordinary yellows, and there is a wide range of deep, dull reds which might be called the principal browns in common use.
Water-based paints

Limewashes

Limewashes, essentially slaked lime and water, were used to paint rendered masonry and were inexpensive. Colours were limited by the need for the pigments to be alkali-stable. Sienna, red and yellow ochres, and Venetian red were commonly used and a grey-blue was possible.

Recipes for limewashes are varied and plentiful. (Further examples are in the appendix.) One recipe issued by the United Kingdom Bureau of Lighthouses in around 1918 was said to be very good for outside exposure and is as follows:

Slake half a bushel of unsoked lime with boiling water, keeping it covered during the process. Strain it and add a peck of salt dissolved in warm water; 3 lb of ground rice put in boiling water and boiled to a thin paste; 1/2 lb of powdered Spanish whiting; and 1 lb of clear glue dissolved in warm water. Mix these well together and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible with painter's or whitewash brushes.

INDELIBLE EXTERIOR
Cold Water Paint

STANDARD TINTS

No. 272
No. 201
No. 221

ALSO MADE IN WHITE

CASEIN
COLD WATER PAINT

WHERE TO USE IT

This Casein Vehicle Cold Water Paint is especially designed for exterior use and resists the weather remarkably well, but it can also be used for interior work. It is highly satisfactory for surfaces that are clean, dry and firm, on many types of buildings (both outside and inside) some of which are listed below:

- Farm buildings, dairies, barns, silos and poultry houses, where a good durable paint that is less expensive than oil paint is desired.
- Factory buildings, mills, breweries, warehouses, work shops, garages, tool houses and storage bins.
- Semi-exposed surfaces such as light shafts, airways, airshafts and courtyards of apartment and other buildings where frequent painting is required principally to maintain clean, attractive, light-reflecting surfaces.
- Temporary buildings and structures where the length of service required does not warrant the use of high-priced materials.
- Summer cottages, bungalows, road-side refreshment stands and petrol stations.
- Grandstands, track equipment, fences, stables, and buildings in fair grounds, race tracks, athletic fields and amusement parks.

Courtesy: Alan Feder, Solver Paints
Cold-water paints or calcimines

Cold-water paints or calcimines had as their basis whiting or carbonate of lime instead of caustic lime, as in whitewash. Because the material itself does not adhere it was necessary to use a binder of some kind, generally glue or casein.

Distempering

Distempering refers to any method of applying colours that are mixed with a glutinous substance soluble in water such as glue, gum, casein (milk powder) or white of egg.

The whole of the distemper must be strained while warm, in order to remove all impurities and thoroughly mix the colour. When this is done the distemper may be put into a cool place till it is formed into a weak trembling jelly, which is the only proper state in which to apply it to walls.

Distemper may be either size-bound or oil-bound.

Size-bound distemper can be washed off completely. (Some calcimines, which have a casein binder instead of glue, are difficult to remove.) Kalsomine was a trade name for the flat-finish size-bound distemper used commonly in this country. Since Kalsomine had the disadvantage of being subject to water stains, in hallways or similar heavy-duty areas the lower part of a wall - that is below the dado - was protected with a layer of varnish.

Oil-bound distemper, also known as ‘water paint’, had different formulas for external or internal use.

External oil-bound distemper is similar in appearance to limewash but, unlike limewash, will adhere to ordinary portland cement renders. One such distemper was Hollins distemper (an early Wolpamur Water Paint).

Distempers were the precursor to modern synthetic emulsion paints and were still widely used for interiors up until the early 1950s.

Emulsions

Emulsions are made of both oily and watery constituents. The curd of milk is a natural emulsion and was also the binder used to make casein paints in the early 1920s. These paints were the first water thinnable paints produced commercially.

Since the 1920s UV stabilisers and anticoagulants have been developed and new materials such as nitrocellulose, phenoic and alkyd resins, synthetic resins, pigments, extenders and modifiers have been used in paint.

Pigments

Historically most pigments originated from natural sources such as ochre and carbon. The singularly most important manufactured pigment was white lead. The making and preparation of white lead has in principle changed very little during the ages.

White lead

Thin lead sheets were loosely rolled and hung over vinegar in sealed pots that were then buried in animal dung. The heat from the compost caused the vinegar to vaporise and oxidise the lead. This early method, known as the ‘stack method’, was superseded by an electrolytic process.

Gehrig notes that up until World War 1 all white lead used in Australia was imported from overseas. Thereafter it was manufactured here by B.A.L.M. (British Australian Lead Manufacturers Pty Ltd that finally became known as Dulux Australia Ltd.)

Lead pigments were popular because of their remarkable resistance to fading and their excellent corrosion prevention properties.

White lead bound well with linseed oil and, when formulated into paint, gave a high glass level. Such formulations performed extremely well.
White lead was used in all phases of a coating system, that is as a primer when mixed with red lead; as an undercoat when mixed with oil and turp and as a finish coat when mixed with raw and boiled oil. It did have the disadvantage of 'powdering' or 'chalking' if exposed to the exterior but most tradesmen considered this an advantage for the surface normally required only a light sanding and wash down prior to repainting."

The other major problem that is now evident is toxicity. See pp. 58 & 73.

Lead-tinseed oil mixes required only a small addition of dryers to produce a workable paint. Other types of paints using pigments such as zinc white required a greater addition of dryers and this affected the cleanliness of white.

Zinc oxide

Zinc oxide is a non-poisonous opaque white pigment that has excellent covering power. It dries relatively slowly and contributes to the gloss and hardness of the finish.

Titanium dioxide

This pigment is one of the most used pigments in today's paint manufacture. Titanium dioxide is a brilliant white pigment with high opacity.

Coloured pigments

Earth pigments were the basis of the majority of colours in early use.

Yellow pigments

In the area of yellows Ochres were the main pigments and were the basis of such colours as ivory, cream and light stone. There is great variation in the colour of naturally occurring ochres.

The Mount Barker Courier newspaper in 1889 reported on valuable deposits in that district:

"Advance Austrofo" in the Advertiser with much justice, draws attention of public to the Mt Rhine Silver Mining Co., and the great value which attaches to that property from the almost unlimited deposit of ochre which is preferable to the imported article and as it will have the additional merit of cheapness should meet with ready favour from the colonial oil and paint men. Vast deposits of ochre unearthed at Meadows and samples of various colours obtained may be seen at the "Courier" office.

A further article later in the same year refers to colour:

The manager of the Mt Rhine Point Factory remarks he has turned out bulk samples of ochre and points equal to any he has used in the colony. The ochre when properly washed is a splendid article, that from the winze is the best, it being equal to sienno, the imported value of which (when ground in oil) is about seventy pounds per ton.

The quantity in the mine is large and easily obtained. He has calcined some and obtained a rich purple brown and he valued also some very good red. The darker ochre from the upper part of the mine makes good umbers."

Naples yellow was a particularly popular colour. Of the various recipes, Gehring considers the one most likely in Australia would have been 'the result of mixing yellow ochre with ceruse...in other words, the addition of white lead to lighten the colour of the ochre'. Ceruse is a form of white lead.

Other yellows included Patent yellow which was a cheap pigment made, it appears, by simply 'mixing together two parts litharge and one part of marine salt'."

Chrome yellow, which produced a bright yellow, superseded patent yellow in 1830.

Yellow oxide was widely used particularly in lime washes as it was unaffected by the action of the lime.

Terro Di Sienno, an earth pigment from Italy, had transparent properties and a reddish tint. It was widely used in the form of burnt sienna and produced midstone and apricot colours.
Red pigments

Red lead was derived from white lead and the colour came from exposing lead to high temperatures (up to 1600°C). After cooling the resultant vaporised lead and driving out carbon monoxide, the lead oxide was further exposed to higher temperatures to achieve a bright orange colour.

These pigments were popular because they were colour fast when exposed to sunlight.

The toxicity of this pigment was well known; nevertheless it remained in continued use until suitable, safer alternatives, which were commercially viable, became available.

Vermilion was possibly the brightest of the red colours. It consists of mercuric sulphide and is found in natural form in quicksilver mines.

Indian red was widely used because it was one of the earliest artificially produced pigments and therefore cheap.

Spanish red was also an inexpensive and popular pigment and was able to be used in limewash. Its cheapness and good weathering qualities made it extremely popular for exterior use, especially in the painting of exterior corrugated iron roofs.  

Carmine was an expensive, and lesser used, pigment which had a tendency to purple. It was derived from insects (cochineal) and the best quality was from France.

Brown pigments

Van Dyke brown was extensively used. It was a dark blackish-brown colour that was inclined towards purple.

Spanish brown was obtained from iron oxide.

Umbers were used both as raw umber and burnt umber.

Green pigments

Verdigris was the green corrosion of copper or brass formed by the action of acid. The colour was originally a blue-green but varied according to the method of production.

It would be almost impossible to ascertain which colour existed in Australia during the 18th and 19th centuries. The use of bronze could produce a different green to that obtained by using brass or copper. Vinegar would give different results from that of grapes that were used in France.

Green oxide was commonly used as a pigment in limewash and, like yellow oxide, was not attacked by the alkali of the lime. It had good weathering properties making it suitable for outside exposure.

Terra verte was an earth pigment imported from England.

It was soon superseded by synthetic materials such as Paris green, chrome green and Brunswick green. Chrome green and Brunswick green became quite popular: when mixed with copal varnish and linseed oil they were extensively used as trim colours.

Blue pigments

Ultramarine was a pure pigment that came from the semi precious stone Lapis Lazuli and, as such, was very expensive to produce.

Lapis Lazuli consists essentially of the blue mineral lazurite and contains small amounts of calcite, pyroxene, and other silicates. Small particles of pyrite, which give the appearance of gold specks, are characteristically disseminated through the blue rock. It is likely that most of the ultramarine used in Australia would have been the less expensive artificial product that was first made in 1805.

Prussian blue was an animal-based pigment from Germany and was most sought after 'as it produces a far cleaner blue (with a slight green tint) than does ultramarine'.

Cobalt blue. First produced in 1804 it quickly became popular and remains so. It is a mixture of the salts of cobalt and aluminium.
An article from a 1921 South Australian gazette, titled ‘Choice of Colours’, refers to the tinting power of certain pigments:

The exceptionally strong tinting powers of some of the colours should be taken into account when mixing, for if these strong colours are used too liberally more white is required, and thus too much colour is made up, and is possibly wasted. As instances of tinting power, it may be mentioned that 1 lb. of Indian red or chrome yellow will perceptibly tint a ton of whitelead, and that 1 part of Prussian blue will similarly affect 5,000 parts of turpentine. Lampblack, and the oxides of iron, such as Venetian red, Indian red, and the ochres, are good colours for outside wear, and are better adapted for this purpose than the umbers; but Turkeyumber and Turkey red rank next to yellow ochre and lampblack for outside work, provided that they are ground in good oil. 21

Changes in paint technology

Changes in paint technology occurred following both world wars. Richard Aitken states:

In 1927 a synthetically produced resin known as Alkyd was first formulated.

Dulux Super Enamel, released to the Australian public in 1933 by the British Australian Lead Manufacturers company (BALM), typified the new line of alkyd resin paints. The introduction of Dulux had resulted from a 1928 agreement between BALM and Nobel Chemical Finishes, a joint enterprise between chemical giants ICI (British) and E.I. du pont Nemours (USA).

Du Pont had developed nitro-cellulose lacquer (or ‘Duco’ to use the American trade name) after World War I to use surplus quantities of the explosive nitro-cotton.
The South Australian company Solver introduced Solaflex and alkyd enamels soon made inroads into usage of traditional oil-based paints. 26

Aitken notes that resin emulsion paints (water based and the first real competition to Kalsomines) were in use at the start of World War 2. They were superseded, however, in the mid 1950s by both styrene-butadiene (‘latex’ – developed in America to utilise a huge post-war surplus of rubber-based products) and PVA emulsion paints (‘vinyl’ – developed in Germany during World War 2 because of limited access at the time to natural oils).

Despite the advantages of these new products – that is, ease of application and being able to be washed up in water – there was reluctance on behalf of many trade painters to accept the new technology.

Acrylic paints, which ‘were developed by Du Pont in the 1940s to use surplus post-war supplies of perspex’, 27 became prominent in house painting in the late 1960s and early 1970s.

Painting of Older Buildings
A Demonstration Will Prove It

The makers of NU-ENAMEL Products believe that the most logical way to prove the merits of a product is by ACTUAL DEMONSTRATION. Accordingly, wherever NU-ENAMEL Enamelled Paint is sold you will find a "before-and-after" painted display for your examination. Furthermore, a NU-ENAMEL representative will be happy to paint a small area of your house—an actual "Try-Before-You-Buy" demonstration—so that you may make any tests and comparisons you may choose.

Ordinary Paint

If your house is painted with ordinary Lead-and-Oil, even if it is a best grade, the chances are that it somewhat resembles the shocking illustration on the left. NU-ENAMEL Enamelled Paint will not chip, crack, fade, or crinkle.

Enamelled Paint

Easy to Clean

It is not possible to clean successfully, a Lead-and-Oil paint film, but it is a simple operation to wash the porcelain-like non-porous surface of NU-ENAMEL Enamelled Paint and, thereby, restore its original lustre and beauty. Washing costs much less than repainting. Save the difference!

Very Long Life

How long did your last exterior paint job retain its original appearance? The average life of NU-ENAMEL Enamelled Paint by far exceeds that of ordinary Lead-and-Oil Paint, and this survey includes hundreds of homes in climates where the damp, salty air quickly destroys ordinary paints.

From the year 1521 when the Dutch introduced Lead-and-Oil, until NU-ENAMEL invented Enamelled Paint, there had been no advancement in the basic method of manufacturing paint. Think of it—over 400 years of stagnation. It is small wonder that, almost over-night, NU-ENAMEL Enamelled Paint became the most discussed paint in the world.

For many centuries the ancient Chinese have been using a natural nut oil, called TUNG-OIL, for preserving their boats, bridges, sacred idols, etc. Modern Science knew of this product but it remained for NU-ENAMEL to discover the process for using Tung-Oil as a base for paint, enamel and varnish. This process requires that the Tung-Oil be scientifically heat treated, and that the pigments be accurately balanced in relation to themselves, and to the Tung-Oil base. Each of these three basic ingredients possess certain distinct virtues not found in ordinary Lead-and-Oil paint. For example, Linseed Oil will combine with mist or rain and disappear from the paint film; Tung-Oil is water-proof—it remains in the paint film indefinitely. The Lead pigment in ordinary paint not only lacks strength but it oxidizes (a chemical burning) more rapidly, causing immediate chalking and colour fading. The pigments used in NU-ENAMEL Enamelled Paint remain hard in the Tung-Oil protection so that chalking, fading, and oxidation are retarded to an absolute minimum.

Your NU-ENAMEL Dealer will amaze you with many more startling comparisons. Be sure to ask for a demonstration.

Painting of Older Buildings
Paint charts

The introduction of pre-mixed paint in the mid-to late-Victorian period helped popularise the use of charts depicting colours. These were originally in the form of a printed card with individually affixed paint samples, as even the most sophisticated of early printing techniques could not satisfactorily reproduce the required subtleties of colour.

It was not until the late 1940s that adequate representation of colour was possible with a printing process known as McCrorquodale. The process uses ‘nitro-celloid lacquers tinted with exactly the proportions of the actual paint’ and is still used by most paint companies.

Paint charts continually reflect fashion. The pastels of the 1950s and the colour ‘Schiaperelli Pink’ are examples.

In tracing the history of fashion in paint colours Aitken comments on the trend in the 1980s of having ‘heritage colours’ on paint charts and links the fashion of following these prescribed schemes to commercial success of paint companies. He argues for more individual use of colour and states:

Perhaps henceforth such colours can become divorced from fashion trends and be used more seriously by those seeking to authentically restore a specific scheme rather than indiscriminately evoke an era.

Standards for paint colours

Just as the recording and research of music is extremely difficult without a system of notation, so is the case with colour.

Traditionally names have been used to identify colours, and people still like to refer to them in this way. The use of names for colours is, however, fraught with problems. ‘Duck egg blue’, for example, may or may not resemble an egg of a duck and is a difficult colour to imagine.
In response to confusion about paint names the British Standard for paint colours was published in 1930. It had as its basis the Munsell system that had been introduced in America in 1915.

Names for paint colours were still used in the British Standard (for example 'British Racing Green'), but values from the Munsell system were also included and so a greater accuracy was possible. In 1985 Australia adopted its own similar standard.

**Colour systems**

**Munsell system**

This system is based on the attributes of hue, value and intensity. Colours are arranged in a threedimensional colour space or solid. There are ten major hues in the form of a horizontal circle around a vertical central axis. This axis extends from white at the top to black at the bottom in ten steps. The value notation of a colour indicates its lightness as measured on the neutral axis. The chroma notation indicates the degree of departure of a given hue from a neutral grey of the same value.

Any color can be specified by its position in the solid in terms of its notation of hue, value, and chroma. For instance, 'turquoise blue' may be described as a blue-green and specified as BG 6/4. This color is represented in the solid by a blue-green chip at the sixth level of value and at the fourth step in the chroma scale.

**NCS system (Swedish Natural Colour System)**

In this system colours are regarded as a combination of 'nuance' and hue - nuance being comprised of the whiteness and blackness of a colour plus the chromaticness. The first four digits of NCS describe the nuance - the first two the increasing blackness and the second two the chromaticness. This is a system based on a natural perception of colour. It is independent of physical colour samples. The theory is based on Edwald Hering's postulate that every conceivable colour can be indicated with reference to its greater or lesser resemblance to the six elementary colour sensations viz: white, black, yellow, blue, red and green.
Graining

The imitating of the grain of various, usually expensive, timbers. Good tradesmen took particular pride in their expertise at this process. There are excellent original examples still preserved and there is a resurgence of interest in the process. Practitioners of the craft are available.

Stippling

The decorative process of applying a second colour over a previously applied ground colour in a broken manner by use of a sponge or roller.

Stencilling

Work in which colour and design are transferred through paper or metal patterns directly onto a surface. Stencil brushes, a little like shaving brushes, were used, as were small rollers. Stencilwork was often used as a decorative feature at the dado line.

Marbling/ Marbelising

The imitating of marble, consists of ‘laying on a good ground colour and then tracing the pattern of marble in other colours, using special tools and equipment.’

Veining was often achieved by the use of feathers.

Tortoishell, ebanising, bambooing and even trompe-l’oeil (‘to deceive the eye’) are among other decorative finishes which may be encountered.

Decorative finishes

As well as painting in plain colours, other forms of decoration became popular in public buildings and better homes.10 These finishes included glazing, graining, stippling, stencilling, and marbling (faux marbre). Further references are given at the end of this section and brief descriptions follow.

Joinery was frequently grained or marbled in Australian houses of the nineteenth century and may be seen in houses as late as 1920s.11 The practice came about as the result of building owners aspiring to more affluent finishes.

Glazing

A transparent colour or combination of colours is applied over an opaque base coat. Glazing liquids were usually made from good quality varnish, oil and turpentine. Different effects were obtained by blending the colours using rags, stipple, sponge etc.

Note: A glaze is a semi-transparent film of oil-based colour, while a wash is a semi-transparent film of colour diluted with water.

Innes writes of the subtle visual differences between the two that ‘oil-based colour tends to be richer, sleeker and more transparent, while colour in water is fresher, purer, still diaphanous, but “brushier” looking.’12

Both are used over painted surfaces to alter the colours beneath.

Painting of Older Buildings
Reference notes:

1. Master Painter: A skilled painter 'qualified to teach apprentices and to carry on his trade independently'.


3. ibid., p. 2


5. Gehrig, op. cit., p. 43.


8. Gehrig & Stewart, op. cit., p. 52


10. Copal varnish: See Appendices.

11. Audel, op. cit., p. 73.

12. Building World (U.K.), 20 July 1918, 'Water Paints: Peck - A dry measure in the Imperial system, equal to 8 quarts

Lime - the oxide of calcium, a white caustic solid (quicklime or unslaked lime)

Slake - to disintegrate or treat (lime) with water or moist air, causing it to change into calcium hydroxide (slaked lime)

Bushel - a unit of dry measure in the Imperial system and equal to eight gallons.

Whiting - a pure white chalk (calcium carbonate) which has been ground and washed

13. Practical Home Decorating and Repairs, Odhams, p. 76.

14. Lee's Pricoloss Recipes, 3,000 Secrets for the Home, Farm, Laboratory, Workshop And Every Department Of Human Endeavor, p. 230.


16. ibid., p. 11.

17. Mt Barker Courier, 1889.


19. ibid., p. 13.

20. ibid., p. 15.


22. ibid., p. 15.

23. Surface Coatings - Oil and Colour Chemists Association publications


27. ibid.

28. Cards produced by the McCorquodale process had a dating system: The month and year is indicated and is observable on examples of old paint cards.


30. ibid.


33. NCS Colour Order and Scaling System CB Tackskrift nr 8 Svenskt Fargcentrum (Swedish Color Center Foundation) p. 1.

34. Green Armajule, op. cit.


A study of existing paint finishes as well as the body and condition of the building will enable remedial work to be planned and the appropriate paint system chosen.

**Paint**

In broad terms paint is any liquid, or thin paste, applied to a surface for the purpose of protection and decoration. It may be opaque whereby it conceals a surface well; it may be semi-transparent, allowing the surface to show through dimly; or it may be so transparent as to hide very little of the surface substrate.

Paint is used to protect the building fabric surface from destruction by the natural elements: sun, rain, wind, cold and frost. Paint arrests wood decay by sealing up the pores and keeping out moisture. It protects metal by preventing rust formation (corrosion by-product) and it preserves other materials by keeping out moisture.

When dry, paint may have a full gloss finish, a semi-gloss (also called satin or eggshell), or it may be flat (that is, without gloss). The degree of gloss is dependent on the proportion of paint vehicles which dry flat.

**Paint components**

Most paints or, as they should be correctly termed, coatings are comprised of four basic components: binder, solvent or thinner, pigment, and additives.

The combination of the binder and solvent is known as the ‘vehicle’.

Solvents

Solvents are volatile liquids used to dissolve the resins and binders to make them suitable for application as a thin film. They evaporate completely from the paint film after application but contribute important characteristics to the coating during drying.

Typical solvents can be water, turpentine and alcohols.

**Resin or Binder**

Paint is classified by the type of resin or binder that binds the particles together and anchors the coating film to the surface.

The binder has great influence on such properties of the coating as film thickness, cohesion and hardness, and the ability to form a thin tough film.

Resins were originally the natural secretions of certain plants and insects but now consist mostly of manufactured chemicals. Binders can be vegetable oils, alkyd resins, acrylic resins, Poly Vinyl Acetate (PVA).

**Pigments**

Pigments are insoluble solids in finely divided powder form which contribute colour and other properties to the coating. They can be organic, synthetic or metallic; examples are titanium dioxide, carbon, micaceous iron oxide, and ochre.

Anticorrosive pigments such as metallic zinc, zinc oxide and phosphates are also used.

Organic pigments produced from petroleum and coal-tar oil have largely replaced inorganic pigments which are derived mostly from coloured earth and metals.

**Additives**

This general term covers a wide range of important materials that are added to impart specific properties to the coating. One group known as extender pigments are used to cheaply increase the volume solids of the coating, and others used are dryers.
ontisetting and antiskinning agents, wetting out agents and biocides. Plasticisers are important additives that improve and enhance the properties of coatings.

Curing of coatings

There are a number of ways in which paints cure. Curing means that the binder forms a solid, continuous film that provides the desired protection. The term ‘drying’ is often used to mean curing rather than simply solvent evaporation. A single binder type may, with appropriate modification, cure by a number of different mechanisms. Acrylics, for example, may cure by coalescence or chemical reaction between two components and dry by solvent evaporation. It should be noted that most paints have some solvent that will evaporate. However, complete curing of the film requires more than loss of solvent.

Water-based paints can be those where the binder is truly soluble in water; for example, ‘Kalsamine’, but are more commonly emulsions which consist of polymer particles suspended in water.

As the water evaporates, the polymer particles touch (these are known as coalescent binders) and flow into one another to form a continuous film. These paints are known as latex paints.

Examples of water-based coatings are acrylic emulsions, PVA or ‘plastic’ paints, and epoxy emulsions.

Environmental and health constraints have initiated some considerable interest in the development of water-based coating systems and their use will undoubtedly increase.

Solvent-based enamels dry but do not fully cure for many years. In this dry but uncured state the ails slowly oxidise or leach out. Once this type of coating has fully cured it becomes brittle or friable and is at the end of its serviceable life as a coating.

Types of paint

The types of paints are initially classified by their solvent, for example, oil-based paints and water-based paints, and then by the binder type: alkyd, epoxy, polyurethane, acrylic etc.

A definition that is often quite erroneously applied to paint categories is that of organic or inorganic. The scientific definition of these terms is that organic applies to compounds that have one or more carbon atoms, whilst inorganic applies to materials that do not contain any carbon. Water (H2O) is inorganic, for example, and turpentine is organic.

Each category can be further divided into the components of the paint system, primers, undercoats, finish coats; for example, we can describe a paint as ‘an organic solvent-based alkyd undercoat’.

Primers

A primer is the first coat of paint to be applied. Its main functions include:
• providing adhesion to the substrate;
• providing good intercoat adhesion to subsequent coats;
• regulating moisture movement;
• preventing bleed through of tannins and resins found in timber;
• providing corrosion resistance in the case of metals.

In the past it was generally agreed that the priming coat should be of the same composition as succeeding coats so that the different coats could unite with each other to form a single, compact, impervious paint film.

With advances in paint technology it is now possible to change from an oil to a water-based product and likewise from a water to an oil-based material if the correct intermediate barrier, as well as the correct preparation, is employed. Advice from paint manufacturers is helpful if this is contemplated.

Wood primers

Wood is a porous hydrophilic material of relatively poor dimensional stability. It moves substantially with changes in moisture. Hence primers are required to regulate the rate at which moisture enters and leaves the wood and which are able to follow movements in the wood with the minimum rate of cracking.
Organic solvent-based wood primers

Traditionally primers were formulated to pigment concentrations of 35-45% with drying oil as the binder. In more recent times mixtures of oil and alkyd resins, or in some cases just alkyd resins as the binder, have been used.

The use of alkyd resins substantially speeds up the drying process allowing faster over-casting.

Water-based wood primers

Water-based wood primers usually have an acrylic emulsion as their principal binder, and these are acrylic emulsions that are ideally suited for timber because of their adhesion and excellent flexibility.

Emulsions are thermoplastic (heat softening) and do not dry by oxidation. This is in contrast to the solvent-based oils and alkyd resins that dry by oxidation and continue to oxidise for the rest of their life, leading to embrittlement and loss of flexibility.

Thus the water-based primers are more able to follow the movement of a dimensionally unstable substrate such as timber, with a minimum of cracking.

Some timbers contain natural tannins that are water-soluble. This can cause problems if the whole paint system (primer, intermediate and topcoat) is water-based, as unsightly brown stains will appear in all coats. Special additives are needed in the primer.

The current materials that suppress tannin staining are zinc oxide, barium metaborate and special acrylic emulsions that fix the tannin in the first coat. There are newer emulsions being developed which suppress the staining physically by forming very tight films.

Some formulators choose to include a vegetable oil or alkyd resin into the formulation to provide better adhesion, particularly to chalky or powdery surfaces.

Metal primers

Metal primers tend to be formulated for specific metals. In the case of steels (ferrous metals), traditionally the primers contained substantial quantities of red lead.

Owing to health reasons this practice was generally discontinued in about the mid 1970s. The traditional red lead primer was then replaced with red oxide zinc chromate, often referred to as R.O.Z.C.

These have been largely discontinued because of environmental concerns with chromates.

Chromates present an environmental disposal problem as they are water-soluble and therefore make their way into the water table and do not readily break down.

Organic solvent-based metal primers

Today the most common ferrous metal primers contain red oxide zinc phosphate. The resin systems used are either alkyd or phenolic-modified oils. The level of rust-inhibitive pigments such as zinc phosphates is important. Good primers contain up to 1.50 kg per 1,000 litres of such pigment.

Aluminium primers generally contain yellow zinc chromates rather than red oxide as this can cause pitting of the aluminium surface.

The use of chromates is largely discouraged because of environmental concerns. However, at present there is no effective replacement for them as an aluminium primer.

Both the above primers are distinctly coloured and may give base colour problems when overcoated with paints that are not fully opaque. In such instances white or pale-coloured primers are preferred. White pigments such as zinc phosphate, barium metaborate and calcium molybdate are sometimes used as a substitute.

For hot-dip, galvanised steel sections special primers must be used. These include one- and two-pack zinc oxide-zinc dust products.

Water-based metal primers

Water-based metal primers have been growing in popularity over the past decade and the majority is now based on acrylic or styrene acrylic emulsions. One of the most difficult problems with these formulations is to obtain consistently good adhesion, especially where greasy or oily metal is involved.
Emulsion modification or the use of additives (such as sodium nitrite) or slower evaporating amines rather than ammonia has overcame other problems such as flash rusting.

Inhibitive pigments are necessary on steel to prevent rusting and are preferred on galvanized substrates to minimise formation of white corrosion product and blistering. Zinc chromate is still perhaps the best pigment for corrosion inhibition, but it does have toxicity and colour disadvantages. Other white inhibitive pigments such as zinc phosphate, barium metaborate and calcium molybdate are growing in popularity.

Water-based metal primers can exhibit a number of adhesion problems. Some acrylic-based primers display poor adhesion to metal when overcoated with solvent-based alkyl enamels. Some styrene-acrylic-based primers have good metal adhesion but very poor intercoat adhesion to solvent-based alkyl enamels.

Undercoats

Historically, different undercoats were offered specifically for interior or exterior use. Today most undercoats are suitable for both.

For interior applications on timber it is usually adequate to apply an undercoat as the first coat, without using a wood primer.

An undercoat for interior applications should have the following properties: good drying, good flow, very good glass holdout (retention of glass level once dry), free sanding ability and low odour.

Because interior applications are often on areas such as cupboards and doors that may be viewed critically the properties of glass and flow of the paint system are important, and low odour is required because of the possible need to live in the dwelling during painting.

Exterior applications, on the other hand, need a slightly different balance of properties. Outside, the undercoat must be applied over primer and it needs a slow solvent so that brushing properties can be maintained. It must have the ability to bridge across cracks, and above all it must give durability to the system.

- Organic solvent-based undercoats

The trend over the past few years has been to undercoats that do not contain free oil. These undercoats offer much better drying, sanding and overcoating properties. Durability studies show no adverse effects from not using free oil, although care should be taken when these undercoats are applied over heavily chalked old finishes.

Special purpose undercoats for humid or tropical areas can be formulated using pigments such as zinc oxide. Zinc oxide is a reactive pigment, and care must always be taken to ensure that the formula does not contain resins with high acid values because the reaction can lead to rapid soap formation (see Saponification) and to excessive viscosity increases on storage.

- Water based undercoats

These have a substantial advantage over the solvent-based ones in as much as they are touch dry in less than an hour as opposed to 4 to 8 hours and are recoatable in 2 hours. The paint brushes, rollers etc. can be washed out with water rather than turps and they are non-yellowing. The disadvantages are, for interior use, poorer flow out and for exterior use, their interior adhesion to powdery or chalky surface. In general they are not as easy to sand.

Most are based on vinyl/acrylic or acrylic resins.

Painting of Older Buildings
Finish coats

- Organic solvent-based full gloss finishes

It is still a practice to sell separate products for exterior or interior use, although it is quite possible to formulate paint suitable for both services.

White lead was traditionally used in these paints. The removal of large quantities of lead from these paints from the mid 1970s has instigated the development of alternative pigments such as Titanium dioxide and re-formulation of the product.

Prime requirements are good opacity, high gloss, and good exterior durability.

The choice of resins used in the formulation depends on a number of factors. The resin can be based on linseed, soya or sunflower oil, or blends of them.

Straight linseed is not suitable for white interior finishes as it tends to yellow, even when not exposed directly to sunlight. It is usually blended with sunflower oil or tall oil.

Most companies produce a basic white and a range of tint bases for the paint of sale addition of tinters. These tint bases are usually referred to as 'light', 'deep' and 'accent'. Each is tint strength adjusted to a consistent level so that reproducible colours can be obtained. These tinted paints are now as colour-fast and as stable as the traditional factory-milled colours, and the use of a tint system has given the consumer a much greater colour range from which to select.

- Water-based exterior gloss finishes

For exterior use the top quality water-based gloss finish can be expected to perform much better than a solvent-based one. They have better chalk resistance, flexibility and gloss retention. Initial gloss and flow out properties are not spectacular but these properties are not as critical for exterior uses.

Life expectancy can be two or three times that of solvent-based gloss finishes, provided adequate care is taken in the application and in the correct selection of primer coats used.

Exterior gloss finishes are usually based on emulsion resins, and those based on pure acrylic are the best performers. The thermoplastic nature of these products allows good flexibility and movement with the substrate.

Extreme care must be taken when overcoating old surfaces which previously have had solvent-based paint on them. Thick, old, weathered, alkyd coatings should not be overcoated. The water-based gloss will adhere tenaciously to the old alkyd and then expand and contract with the substrate movement, whereas the old paint can not follow the movement of the topcoat. The result is delamination or shear of the paint system.

- Water-based interior gloss finishes

At present the interior gloss finishes are not able to match the solvent-based ones in gloss level or hardness. They are more difficult to apply as they generally do not tolerate 'laying off' (re-brushing the freshly applied paint to even the finish) and have a tendency to 'block' (sticking together of painted surfaces). However, they dry fairly quickly, have low odour and water wash-up.

Some products are available that use water solubalised or dispersed resins with an emulsion. These products have a good gloss and water wash-up but have drying characteristics more like solvent-based alkyds than water-based paints.

- Organic solvent-based semi-gloss or satin enamels

These are basically the same as the full gloss range but are formulated to a lower gloss level, usually 25-50% at 60°. Flattening agents are added to achieve this.

- Organic solvent-based flat enamels

The use of these products has diminished over the past twenty years or so with the advent of flat water-based products. They should be used in preference where application has to take place at ambient temperatures of less than 12°C.
• Water-based exterior flat, low-sheen, satins and semi-gloss finishes

Acrylic-based paints are by far the better performers for exterior exposure. PVA-acrylics are generally cheaper and not quite as good. PVA is generally not suitable.

• Water-based emulsions finishes

These paints were the first water thinnable paints produced commercially. The curd of milk is a natural emulsion and was also the binder used to make casein paints in the early 1920s.

Since the 1920s UV stabilisers and anticoagulants have been developed and new materials such as nitrocellulose, phenolic and alkyd resins, synthetic resins, pigments, extenders and modifiers have been used.

• Interior flat, low-sheen, satins and semi-gloss finishes

Most interior walls are finished in these products. They are easier to apply than solvent-based ones, have fewer adours, faster drying times and brushes wash up in water.

They are based on a variety of resins such as Poly Vinyl Acetate (PVA), PVA-acrylic, acrylic and styrene-acrylic.

In general:
• PVA’s are the lowest cost paint; they have poor scrub resistance but good brushing characteristics;
• PVA-acrylics are the most economical general-purpose type;
• Acrylics have better scrub resistance and better wet adhesion;
• Styrene-acrylics have better alkaline resistance.

As the gloss level of the paint increases it is necessary to formulate for a harder emulsion, which usually means a decrease in the level of the reinforcing pigment-extender. This means that the dried paint film becomes more thermoplastic (heat softening) and leads to greater dirt retention and sticking of window and door frames.

Timber finishes and stains

• Organic solvent-based clear finishes

The main difference between the interior and exterior products is related to the need to resist the effects of ultraviolet light which degrades both the coating and the underlying timber. UV absorbers are added at about 1.5 - 2% and the formulation, particularly the choice of driers, adjusted for their effects. These finishes are available in glass, satin and matt. The resin is usually alkyd, urethane oil, or two-pack polyurethane. Moisture curing urethanes are also available.

The urethane oils offer excellent finishes for interior timber; they are not as wear resistant as the two-pack urethanes and are certainly superior to the alkyd-based materials.

Satin or matt finishes are usually made by dispersing fine silica into the glass versions using high-speed mixing equipment. To maintain viscosity it is not unusual to use a lower solids resin.

It should be noted that the application of clear gloss topcoats far wood is not recommended for exterior use.

This type of product will not prevent the underlying wood from eventually turning grey. The aged grey colour in timber is largely caused by a combination of bacterial action and UV light.

• Shellac

Shellac is a spirit varnish consisting of gum shellac dissolved in alcohol. It is quick drying and can be sandpapered easily.

Shellac is used principally for internal timber finishes where it is applied in numerous thin layers and finely sanded between each coat (French polishing).

It is made from the secretions of an insect lacifer locca, found in large quantities in India. Shellac appears as an encrustation on the twigs of certain trees.
• Organic solvent-based semi-transparent stains

Interior
Usually formulated for a ‘wipe on-wipe off’ application, or as a ‘self finish’ coating. The former will be overcoated with a clear topcoat. The pigmentation is selected to enhance both the grain and the texture of the timber. Most are based on an alkyd resin.

Exterior
As with the interior stains, the pigment is selected to enhance the timber. The pigments also tend to act as a UV absorber; hence these finishes do not suffer from the total film delamination problems of the clear finishes. There is a real compromise in the selection of the binder. The unmodified vegetable oils, whilst maintaining a good gloss level, are susceptible to mould growth, and the alkyd resins tend to have inconstant gloss levels on timber. Most semi-transparent stains use a blend of both types of binders. Sometimes paraffin wax is added to give extra water resistance. This, however, slows down the drying, makes re-coating difficult and can contribute to pigment settling. Preservatives are often added to prevent mould growth on the resin (not the wood). These stains protect wood by screening out UV and regulating moisture movement. They are not in themselves wood preservatives.

• Opaque
These stains are heavily pigmented and show the texture of the wood, not the grain. They are described as a low viscosity, low solids version of flat paint and are formulated similarly.

• Water-based exterior opaque timber finishes
These are sometimes referred to as ‘solid stains’ or ‘timber colour’. A variety of qualities is available.

The lower priced ones are usually based on vinyl acetate, and the more expensive on pure acrylic emulsions.

The acrylic ones are better for grain crack resistance and adhesion to the wood. However, the advantages may only become apparent on difficult timbers after some years of service.

Generally they are pigmented to give a limited range of colours, such as deep browns and muddy greens, based on oxide pigments. Tannin pigment staining from the wood can be a problem with the white-based colour ranges and these should be formulated to overcome this problem.

Silicate/Mineral coatings

The principle of silicate paints is their petrification with the substrate. The result is a solid mineral and insoluble compound of paint and substrate (render, concrete, natural stone, etc.).

Owing to their crystalline nature silicate paints have high permeability. This ensures that moisture, which is present in the masonry, can freely pass out from the building structure. Because water does not stay between the paint layer and the substrate the substrate remains sound, and surface bursting and cracking is prevented.

A German patent of 1878 describes the basic concept of a potassium silicate binder and earth oxide colour pigments. Buildings in Europe, some of which were painted last century, are offered as examples of the durability of the product and its excellent light fastness regarding colour. Other advantages are that the pure inorganic composition prevents fungi and algae growth and the coating does not burn.

These materials are well suited to surfaces such as walls where dampness is a problem, but obviously do not cure or hide rising damp.

Traditional inorganic paint finishes such as cement, lime, and sand combinations are now available commercially in a range of premixed colours. Other colours can usually be specially mixed. Quality varies between products and investigation of the composition of the product is advised.

Painting of Older Buildings
• **Limewashes**

Limewashes are basically slaked lime, tallow, pigment and water. The tallow reacts with some of the lime and performs a dual role of binder and water repellent. Owing to their alkaline nature the pigment colour range is limited.

• **Cementicous coatings**

Cementicous coatings traditionally were made from white or light-coloured cement with pigments added. Today these finishes are commonly available in premixed formulations, and their performance has been enhanced with the addition of ingredients such as plasticisers and surfactants.

**Reference notes:**


2. Keim Mineral Paints Established 1878 Germany. See Appendix.

**Sources for Information**


Surface Coatings – Oil and Colour Chemists Association – TAFE Technical Books.

Journal of Lining and Protective Coatings – various issues Steel Structures Painting Council.

The Coating Inspector’s Handbook – Bechtel Corporation Steel Structures, Painting Council USA.

Jennifer Bell, *Master Works, Random House* (Formula for Lime Wash)
7 PAINT APPLICATION

Restraint with conservation work

When adopting an old building to a new function there is a temptation to make the building appear new. However, one should avoid stripping back the building to give it a "fresh" appearance where this is not necessary for the preservation of the fabric, or where such an appearance is greatly at variance with what was there traditionally.

Simon Lofthus writes:

Conservation destroys the past. The varnished joinery, neatly pointed stone walls and well-insulated roofs of so many of the houses which have recently been restored in Pulligny suggest the too-perfectly preserved glamour of a millionaires of uncertain age, fresh from the expensive care of a plastic surgeon. An accumulation of small decrepitudes and casual omissions is for me the agreeable evidence of character and history, infinitely preferable to a facelift which cleans away every trace of life's vicissitudes. Scrubbing and sandblasting can too easily obliterate all sense of identity, of visual continuity with the modest vigneron who built these houses in the first place.

With respect to any conservation activity the question of when to stop is a universal one. The answer is to do as much as necessary and as little as possible.

In South Australia it is a question of whether we want buildings to look brand new or whether a gentle weathered look is more in keeping with their character.

In some instances 'touching up' may be more appropriate than total repainting. Limewash in particular can be patched up very successfully in more exposed areas.

It is most likely in the context of this publication that painting over existing pointed surfaces will be a consideration. It is desirable that repainting be carried out at regular intervals rather than allowing the paint and the historic fabric to deteriorate.

Extensive repair work to painted and to deteriorated building fabric is time consuming, expensive and may be avoided.

Ideally, a large proportion of old paintwork would not require being removed prior to repointing. Where old point is firmly adhering to the surface, it provides a satisfactory ground for further paint application if the existing and proposed point types are compatible.

Core should be taken to choose a suitable point for the amount of weathering the surfaces may experience with particular regard to the nature of the existing paintwork. Lack of bond between new material and old work will inevitably lead to faults such as premature flaking or peeling. Protection of the substrate is the prime consideration.

Wear - chalking and cracking

All paint will wear out eventually and in one of two ways; it will either chalk off or crack and scale off.

Moderate chalking is considered preferable to scaling, as it is possible to paint over a chalking surface with minimum preparatory work. A surface upon which paint has crooked and scaled must be burned over with a blowtorch/heat gun and the paint scraped off before repointing.

Note: When paint builds up to a thickness of approximately 1/16 of an inch, or 16-30 layers, one or more extra coats of paint may be enough to cause coating failure in the form of cracking and peeling.

If the fabric of the building is a physically fragile one, it is necessary to employ more gentle and laborious methods to prepare the damaged paint surface for repainting - careful hand scraping and sanding, for instance. The methods of removing such damaged point should be appropriate for the different materials encountered.
An American publication of 1922 offers the advice: A measure of worth of paint for average conditions is that:

1. It must cover 300 square feet or more of good surface with 2 coats, producing a uniform, evenly coloured surface with no dark or thin places.

2. It must produce a paint film which is not as hard and brittle as to crack and scale off when the wood expands and contracts with temperature changes, nor so soft as to chalk off rapidly in the sun, nor wash off by the rain.

3. It must have an average life of three to five years of protection for the surface. And under favourable conditions to wear much longer.

4. It must be durable in color, neither fading too rapidly in the sun, nor changing color-bleaching or discoloring due to chemical reactions. The color of the paint under the dust and dirt accumulations to be the color judged.

5. It must leave the surface of the building in suitable condition for repainting, without the necessity for burning and scraping off of the old paint. Only dusting off and putting should be needed.

Paint removal

Durability of the paint system ultimately relies on the quality of the preparation of the surface. All unsuitable material that may impair continuing preparation needs to be removed. The paint manufacturer's data sheet or application instruction should always be consulted on this point.

Most paint data sheets will instruct the applicator to remove all loose and flaking material and ensure that surfaces are clean and free of all contamination. However, care should be taken because some methods of point removal, such as burning off or chemical stripping, make it difficult to retain that historical evidence which is in sound condition. Earlier layers of paint, varnishes, polishes and stains are examples of this important evidence, and their retention can also serve to preserve the substrate. It is often preferable to sand or gently scrape off old failed paint coatings to form a sound base for painting.

By avoiding unnecessary stripping, the possibility of damage to the substrate is limited and historical evidence is retained.

With any method of paint removal it is advisable to carry out a test on a small unobtrusive area to make sure the results will be satisfactory and that no damage will be caused to the substrate.

Modern heat guns tend to remove all layers quickly, as does the practice of 'stripping' in caustic baths. Damage to timber is also a problem with this latter method. Wood fibres break down in joinery which is left too long in a caustic bath, and glued joints may also be damaged when subjected to caustic chemicals. Residual chemicals can also undesirably affect the timber, most obviously in appearance.

Only if architectural detail is being obscured by many layers is removal, or partial removal, necessary. Beware of paint removers which are either aggressively alkaline or acidic as these may corrode galvanised iron - for example when removing paint from chimneys above galvanised roofs.

Hazards in paint removal

There are two particular hazards that must be considered during restoration of older buildings asbestos and lead.

Asbestos

Asbestos fibres present a health risk. They are commonly found in the substrate, and any surface containing this product should be treated with care. Never sand, cut or otherwise disturb the asbestos-containing product without full personal safety protection and complete containment of the work area.

Asbestos products can not be disposed of in a conventional manner and specialist advice should be sought.
Since it is now recognized as a health hazard, lead is no longer permitted to be used in paint. The danger is in the possibility of ingesting the lead that then builds up in the body’s system. As a consequence, it is particularly dangerous for small children. Care should be taken when preparing old surfaces that are likely to have contained lead. Leaded paintwork can become a hazard when disturbed and it is best to avoid dry sanding, which can spread contaminated dust; or flame removal methods, which cause dangerous fumes.

Peeling paint falls off in flakes or chips but paint removed by mechanical means is pulverised into dust with particles small enough to be respirable. Airborne dust contaminated with micron-sized particles of lead poses significant threat to human health.3

During the removal of leaded paintwork it is important that the debris – that is, the dust, paint chips and spent adhesive – be contained and disposed of properly in order to protect the environment and the health of workers engaged in the process.3

Painting of external masonry

The wall surfaces of older buildings need to breathe—that is, provide the opportunity for the moisture that may enter walls to escape into the atmosphere.

Traditional wall paints, being microporous, usually did not trap moisture and so deterioration of the painted surface as well as the substrate was minimised.

Unsuitable paints, when used on exterior masonry, often crack and peel and so promote damage to the very surface they are intended to protect.

Some masonry paints are impervious to the extent that water molecules are not able to pass through the membrane. Water vapour may pass through, but the salts carried in the water molecule cannot and these salts, left at the paint/substrate interface, can damage the substrate. Additionally, the pressure built up from the restricted breathing of such paint films can cause the paint to blister and breakdown, thereby exposing the masonry.

Although precautions should be taken to ensure a wall is sound and dry before painting—that is, without excessive moisture or carried salts—instances arise when this is not the case and the above problem can occur.

The following paints are listed in increasing order of resistance to moisture penetration:

Least resistance to moisture (permeable)
- Limewash
- Cement-based paint
- Silicate/mineral coating
- Distermer
- Acrylic
- Alkyd or oil paints (Enamels—suitable for timbers only)

Highest resistance to moisture (impermeable)

A publication issued by The Environmental Protection Agency, an agency of the Federal Department of the Environment. See Appendices for availability addresses.
Limewash

In the cases where masonry walls have traditionally been pointed, the paint system used should have been a permeable one such as limewash or cement-based point.

Where an applied coating is permeable to the extent that both water vapour and soluble salts are able to pass through, the situation is a healthy one for the building structure in that it keeps to a minimum moisture migration in the building fabric.

Keith Gehrig, in a report on traditional painting techniques, gives an account of limewash being used extensively on exterior walls:

Stainers were added during the boiling process. These took the form of powders mixed with water, usually oxides, for lime would bleach the colour from many pigments. Samples would continually be applied to a surface and allowed to dry and this process was repeated, adding more stainiers until the desired colour was obtained. Colour cords and formulas were not available and this was the only means of getting a suitable colour for the client.

Oil, fat, dripping, butchers’ brine, salts or milk were some of the binders that were added to the lime during the boiling process. When butchers brine and salts, such as sea water, were mixed with the lime the dried lime had the tendency to pick up moisture from the atmosphere, thus giving a patchy colour change to the lime finish.

Many clients rather liked this effect and therefore preferred this form of mixing. One person who very much favoured this effect was Professor Leslie Wilkinson, who founded the first school of Architecture at Sydney University.

He was a great user of lime wash as an exterior wall finish and always sought to have an uneven colour pattern on the walls. He loved to see trees growing close to the walls so that the stains from the gum trees gave an aged and attractive appearance to the building.

Acrylic

Those who feel that the stained appearance of more traditional coatings is unacceptable favour acrylic point.

In the case of a building being subjected to large amounts of grime, such as in a high traffic situation, the use of acrylic paint allows more ready cleaning.

The gloss levels of acrylic points are usually higher than traditional finishes. This factor must be considered as it may significantly alter the overall appearance of the building.

Proponents argue that acrylic paint, being microporous, allows the wall to breathe by allowing water vapour to pass through the membrane; that it gives a more uniform finish, and lasts longer.

However, it must be noted that whilst water vapour can permeate acrylic paint the carried salts in the wall usually can not and may be deposited on the substrate/point interface. This means that when the coating does fail it is in the form of unsightly blistering and a good deal of repair work is subsequently required (and at frequent intervals).

Damage to the substrate by the restricted salts is also a very real possibility.

Some building surfaces, such as walls, have only been pointed in more recent times. In such cases it may be desirable to remove the point, refinish the only those areas which were originally pointed. (Refer Point Removal.)

Removal of the modern point can damage the wall to a certain extent and it may be preferable to allow the point to erode and patch with limewash in the meantime.

Retention of acrylic coatings is acceptable in the absence of any rising damp and if the wall surface is sound. This advice is most pertinent in situations where the substrate is particularly fragile or historically important. It is easy to inflict damage on mortar joints and pointing or on soft stone surfaces.

Painting of Older Buildings

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It is therefore recommended that a small sample area be treated and assessed first.

Inorganic paint finishes, such as cement, lime, and sand combinations, are now available commercially in a range of premixed colours. Whilst these formulations are based on traditional ingredients, in some instances the formulations have been altered to incorporate small amounts of other ingredients such as plasticisers and synthetic polymers in an attempt to improve performance.

Previously painted surfaces may need preparation before application, as limewash or cement-based coatings cannot be applied over layers of paint without prior treatment.

**Internal wall finishes**

Wallpapers were a common and important internal wall finish in older buildings. Exploration of this subject, however, is beyond the scope of this document.

The materials and pigments available today cannot always reproduce the effect of the original colour scheme. The extent that present products differ from earlier formulations varies. In some cases the resultant changes in appearance are subtle - gloss levels or sheen, for example. In other cases, where perhaps irregularities would have been a natural part of an old finish and the contemporary one offers a regular finish, the difference is more apparent.
WESCO
KALSOMINE

STANDARD
TINTS

SHADOW
TONES

WESCO (AUSTRALIA) PTY. LTD.
Sydney N.S.W.

Courtesy: Alan Feder, Solver Paints
It is possible, however, to achieve many of the effects of early finishes using those products which are still available as well as newer alternatives, but great care is required to ensure accurate results.

Whether reproducing the effects of an original scheme or repainting in a different manner, a basic understanding of the finishes generally encountered during the restoration/renovation process is necessary.

Kalsamine

Kalsamine is an example of a commonly encountered traditional internal finish. It is a flat-finish size-bound distemper and is often lacking in adhesion. It is also prone to discoloration. The binder (or body) of the coating is water-soluble and will soften on exposure to moisture (such as steam or condensation). The pigments, which are not water soluble, then become easily dislodged.

A possible solution to the problem of discoloured distemper, according to a 1949 publication on paint finishes, was to cover with a second ‘stipple’ coat of distemper. The accepted approach today is to remove the distemper by washing. (See Painting Problems and Solutions.)

If this process is carried out carefully it is possible to allow the effects of the distemper – that is, the ‘stain’ from the original pigments – to be retained as evidence of the original in the final finish. In this case any areas requiring repair are best expressed differently from the original remnants so as not to detract from them. New areas of plaster, for example, may be painted in a colour that is harmonious with the original finish but different from it. This method follows the general conservation principle of not detracting from the integrity of the original material.

Acrylic

If repainting with acrylic paint, a surface conditioner or binding coat that will penetrate the surface and aid in bonding any remaining loose material back to the plaster can be applied first. Alternatively, those interested in using authentic finishes may apply more distemper.

The finish of distemper was often streaky in appearance despite care with application. As well as the nature of the distemper material, porosity of the surface was a factor in this streakiness and very porous walls were sometimes prepared with a coating of size to counteract this problem. This should be considered if attempting to reproduce the effect of the original finishes either with distemper or a modern paint.

Painting of metal surfaces

Galvanised or zinc surfaces

Galvanising will often provide adequate protection for steel under normal conditions without the need for overcoating. Metallic zinc, deposited on the surface during the galvanising process, acts as a sacrificial coating on the steel corroding away slowly whilst protecting the steel substrate.

Once the galvanised surface has eroded or corroded away the underlying steel is exposed and will rapidly rust, and in the case of roofing sheets will perforate quickly.

Galvanising and zinc are not suitable for environments that are acidic (wineries for example) or strongly alkaline.

Under both these conditions the galvanising will corrode away at an accelerated rate. When galvanising is exposed to salt-laden air, such as in a marine environment, it will corrode to form a water insoluble zinc salt.

This is white in colour and is commonly referred to as white rust. If galvanising is overcoated directly with an acrylic paint, the ‘white rust’ will permeate through micro-pores in the paint. This is particularly noticeable with darker colours.

Flaking was a common paint failure on gutters and this in part was because of a reaction between the zinc in the gutters and oil-based paint. It is now considered advisable to treat the galvanised steel with a water-based primer that may be followed by either a water-based or an oil-based system as desired.
A common problem associated with gutters, which would not have been traditionally encountered by painters, is that of silicon-based sealants. Glues containing silicon and carelessly used in the area of gutters have caused problems with paint adhesion.

The silicon-based sealers are difficult to remove, and for this reason their use should be avoided if possible.

Preparing new galvanised or zinc surfaces for painting

New galvanising usually contains some oil residues that must be washed off prior to painting. The new surface will be smooth and will need to be roughened up. If possible, let the galvanising weather for six months or so before coating. By that time it should change in appearance from a bright zinc to a dull finely etched surface.

Remove all dirt, grease and oils from the surface, apply a coat of suitable galvanised iron primer. Follow by overcoating with a good quality topcoat.

It is a common notion that vinegar was used as a traditional cleaner. Unless the vinegar is very thoroughly washed off, fungal growth will be a problem with this method.

Do not use an oil-based paint directly onto galvanised surfaces. The oil in the paint will react with the alkaline zinc or zinc nitrates and forms a soap that will cause failure of the coating. This process is known as 'saponification'.

Treating old and deteriorated galvanised or zinc-coated surfaces

Always remove all traces of rust and corrosion. Care must be taken if using power tools to neither polish the underlying steel nor fold fresh steel over rust packets. Needle guns are prone to do the latter.

If near the sea all soluble salt must be washed off the surface prior to painting.

Where rust or total breakdown of the galvanised surface is not a problem it should be thoroughly cleaned and overcoated with a good quality paint system.

Where galvanised surfaces have badly corroded treat as detailed below.

Preparing steel surfaces

Steel is iron containing from 0.1% to 1.5% carbon. The properties of different steels vary according to the amount of carbon and the presence of other metals.

Steel is produced by modern technology and can be regarded as 'refined iron'. Wrought steel is now more likely than the old wrought iron. Wrought iron and cast iron are the result of different techniques, as the names suggest.

Although it is acknowledged that original painted surfaces should be retained as an historical record, this may not always be possible when painting steelwork.

There is no paint product that will arrest corrosion on a steel surface once it has commenced to rust; unless the corrosion is only light surface rust.

There are a number of rust converters available on the market. They usually are based on either phosphoric or tannic acids and work by converting rust (iron oxide) to passive material such as iron phosphate. They will not work on deeply seated rust or layered rust, as only the top surface is converted.

Usually the most effective treatment for steel surfaces is to abrasive blast clean the surface to a standard of cleanliness described in the Australian Standard AS1627. Class 21/2. This process was commonly referred to as 'sand blasting'. However, as sand is not, or should not be, used as a free-flowing abrasive medium, the term 'abrasive blast' is now used.

After blast cleaning, a primer coat of inorganic or epoxy zinc should be applied. It acts not unlike galvanising. The zinc should be of a quality as described in the Australian Standard AS2105 and
should be a Government Point Committee approved product. (It should be 75m microns thick.)

This type of zinc primer should not be used close to the seafront. In that case a good quality epoxy zinc phosphate is an appropriate substitute.

A suitable tie coat such as an epoxy zinc phosphate should be applied (30 microns thick), and the item finished in a topcoat of desired type and colour.

It is imperative to maintain correct film thickness at all times in accordance with the manufacturer’s recommendations to ensure optimum coating performance and protection.

Where such a procedure is not practical, the next best alternative is the application of an ‘epoxy mastic’. This product type is an epoxy coating that has been modified to give a long wet time between the epoxy and the surface, allowing the paint to penetrate and displace any moisture and oxygen from the irregularities in the steel.

Epoxy mastics are engineered to work on steel surfaces where abrasive blast cleaning is not possible and the surface has been mechanically cleaned. They are two-part materials and they do not work unless they are applied thickly to at least 125m (microns). They tend to chalk quite rapidly on exposure to sunlight but can be overcoated quite easily to prevent chalking.

The next best alternative is to use a good quality epoxy zinc phosphate as a primer.

The least effective primers are single pack alkyd zinc phosphates, single pack alkyd zinc primers and alkyd-based rust converters.

In any case, the better the surface preparation the more effective the primer.

Wrought iron is the purest commercial form of iron; iron nearly free from carbon. It is very tough and fibrous and can be welded.

Cost iron

Abrasive blasting, while not a desired procedure for most other building elements, is the most thorough way of preparing cost iron for repainting.

Cost iron is a difficult material to prepare because it rusts readily when exposed to the atmosphere, and the rust is hard to remove from the intricate form the iron usually takes as architectural detail. It is therefore imperative to prime the iron as soon as possible after grit blasting.

Epoxy zinc phosphate primer is considered the preferred option and the cleaned iron is best given two coats.

Single pack ‘zinc-rich’ primers are not effective in this situation.

Topcoats

Following the thorough preparation of surfaces as detailed above, an owner may then select which type of topcoat is to be employed. Rather than being a protective coat the final coat can be more decorative.

Pressed-metal ceilings

Oil paint was used traditionally in either gloss, satin or flat finish. A zinc phosphate primer, followed by oil paint, is recommended where rust is a problem.

Painting of timber

General and external timber

Traditionally oil-based, or alkyd, paints were used on oil timberwork. The advantages were seen as:

- Better penetration of the surface – they penetrated reasonably well into mildly loose or powdery surfaces
- Hard wearing (knock resistant) and washable when dry
- Available in gloss, satin or flat finishes
- Good flow resulting in fewer brush marks
The obvious disadvantage is that they are slow in drying, requiring 24 to 48 hours before recoating.

Another disadvantage is that the organic solvent-based paint contains volatile solvents. These evaporate into the air and are considered to be environmentally unfriendly.

Paint manufacturers have been working to produce products with lower volatile organic compounds and it is expected that in the near future water-based paints will dominate the market.

Oil-based paints or enamels are still regarded as the best type of paint to be used on moveable parts such as windows and doors. Acrylic paints, although more resistant to discolouration and cracking, have a tendency to stick moveable parts together. This is known as ‘blackening’.

Contemporary paint manufacturers produce a vast range of acrylic paints for use on exterior timberwork. These paints are easily worked because they are water soluble and dry quickly. They also have the advantage of being flexible, and are resistant to weathering and to the effects of UV rays that cause discolouration.

They are well suited for fixed external joinery such as fascias, posts and trim.

In the case of acrylic paints being applied over existing oil-based paint, the surface should be carefully prepared. The surface needs to be well sanded and a latex barrier undercoat applied.

Enamels should never be applied over a glass acrylic topcoat.

Internal timber

The painting of internal timber surfaces requires care in the selection of the coating system.

Most traditional finishes such as shellac, beeswax and japan were not particularly hard wearing or durable relative to modern finishes, but nevertheless have distinct characteristics and are desirable in instances where authenticity is important.

Timber was rarely left unfinished. Good quality timber was frequently lacquered or waxed, and lesser timbers painted to imitate higher-grade timbers, or simply painted. In this case enamel paint was used.

It has been common practice to use clear polyurethane as a substitute for internal varnishes and polishes and Keith Oehling, in his research study (1985) on painting techniques, promotes the ‘two-pack’ catalyst type when he is discussing finishes for floors.

The early method of staining the outer areas of flooring around a central carpet square was carried out with a combined stain and varnish. It tended to dry off quickly and its wearing qualities were only reasonable.

Today you can not only nicely imitate this finish but also gain good wearing qualities in the process. Any good transparent wood stain is suitable and when dry should be overcoated with 2 coats of clear urethane. Remember that the ‘two-pack’ catalyst type urethane gives far greater wear on a floor than will the single pat type.

Not everyone finds a polyurethane coating acceptable. Despite the wearing properties of the product there is the sense of the timber being coated in ‘plastic’. Frequently now, alternatives to polyurethane are being sought.

When preparing timber surfaces the subtleties of colour and the patina which timber acquires over time should be preserved. Care in the removal of old coatings, be they varnish or wax, is required.
A sympathetic approach is to sand as little as possible. Scouring with coarse nylon pads is an effective way of removing accumulations of wax and dirt.

In the case of floors, finishes that do not involve coating the timber with a synthetic film allow the dissipation of any moisture from underneath the floor, and also allow the pleasant feel of timber. Tung oil may be used in this situation and there are modern wax emulsions available that do not require frequent polishing.

Note: It is not possible to use polyurethane over a japan finish as it will sheen the japan film from the underlying surface.

Paint Problems and Solutions

It is not envisaged within the scope of this publication to present a complete and detailed methodology for identifying and rectifying paint problems. The following is a synopsis of some common problems and solutions.

**Bitty film** occurs when small particles such as grit and fragments of bristle mar the paint finish. This is often because of a lack of care in surface preparation, and/or lack of attention to cleanliness of equipment. Occasionally defects are found in paint manufacture.

Allow the surface to harden and rub down carefully with fine sandpaper. Recoat using clean equipment and ‘bit free’ paint.

**Bleeding** is staining or discolouration of the paint. There are many different reasons for this problem. The main ones are aniline-based timber stains, bituminous paint, creosotes and resinous or high tannin content in timber.

Initially determine if the stain is soluble in either water or solvent. Water-soluble stains need a solvent-based sealer; solvent soluble ones need a water-based sealer. Most paint manufacturers produce both types. Bituminous materials, including creosote, must not be sealed before they have aged for at least one year. In fact, it may never be possible to paint satisfactorily over thick soft bituminous coating without bleeding or some pigment migration. Where metallic inks in wall coverings or nicotine staining are the cause of bleeding, remove them by washing down thoroughly with detergent solution and then seal (with a solvent-based sealer).

Sometimes a number of coats of shellac is the only way to overcome staining. Be aware that the shellac is quite a fragile coating and care must be taken in overcoating it.

**Blistering** is a localised loss of adhesion between coats and/or substrate. With age, the paint film becomes more rigid and blistersing can lead to flaking. The original paint has lost adhesion to the substrate allowing air to pass freely through the weathered paint.

Blistering is frequently caused by moisture beneath the paint and is almost inevitable on exposed timber if the moisture content of wood exceeds 14%.

In timbers facing north, the combination of solar heat and resin in the timber can cause blisters even if there is no moisture. Surfaces that appear satisfactory may blister soon after they are recoated.

When new paint is applied it effectively seals the surface. The air under the paint expands when heated by the sun, and blisters appear. It is particularly likely to occur when recoating with a dark-coloured topcoat.

Strip the blistered paint and if moisture is the problem allow the surface to dry out before repainting.

With isolated blisters, remove them and fill the resulting depression, sand smooth and recoat overall.

To check the integrity of the paint a X cut adhesion test is strongly recommended. Cut a X in the old paint with a razor. Press adhesive tape on firmly, then tear off. If the paint has poor adhesion to the surface, it will be ripped off with the tape, in which case the old paint must be removed by sanding or burning off.
**Bodying/thickening of paint** is normally caused by loss of solvent, usually because of the lid of the tin not being properly closed. It can also be caused by non-compatible thinners as when mixing with other types of paint.

Always clean the lip of paint tins thoroughly, seat the lid firmly and store upside down.

Where an unadulterated point has fattened very slightly, it can be reconditioned by adding a small amount of the appropriate thinner.

If the paint has become very thick, or where there is a mixture of two or more materials, discard it.

**Chalking** takes the form of a powdery coating on the surface of the paint, owing to a breakdown of the binder in the paint film. The rate of chalking depends on the amount of sunlight falling on the paint surface. North-facing walls are more prone to chalking than south facing or shaded walls.

Clean off chalk by washing or wiping.

**Cissing** occurs when freshly applied paint recedes from the surface, leaving small craters or bare areas and is usually caused by grease, oil, wax polish or silicones.

Cissing may also occur when water-based paints are applied over new glass, semi-glass oil-based coatings or primers.

Clean the surface thoroughly before painting and sand oil-based coatings before applying water-based materials.

If cissing has already occurred, allow the paint to harden before rubbing down and recoating.

**Cheesy films** occur when a dry paint film is still soft and mechanically weak. Causes range from over-thick application, mixing different types of paint or the presence of oil, wax, grease etc.

There is only one solution to the problem: remove the coating and start again.

**Crocking (crozing, checking)** indicates a problem within the coating system, usually because the whole system is not sufficiently flexible. Typical causes are ageing and embrittlement of alkyd paints, movement of the surface (expansion and contraction) and the application of fast-drying coatings over softer ones.

Remove cracked and flaking paint by scraping and sanding and recoat with the appropriate topcoat.

**Discoloration** may be caused by atmospheric pollutants (such as sulphur, which will blacken some paints), as well as by some types of mould or fungus. Yellowing of paints containing drying oils can be because of the exclusion of daylight, whilst some pigments can fade in bright sunlight.

Remove sulphide stains by washing with peroxide solution.

Remove mould by washing with bleach solution.

Reduce yellowing by placing article in direct sunlight, or overcoat with a water-borne acrylic.

**Drying slowly**. There are many causes for this, including poor ventilation, low temperature, excessive humidity, or an excess of grease, oil, wax polish or similar contaminants.

Often the problem is in not allowing sufficient time for the previous coat to dry.

Try to improve the atmospheric conditions, but even then coating appearance may be impaired and another coat needed.

When surface contamination is the problem, it is normally essential to remove the affected material, clean the surface and repaint.

**Efflorescence** usually appears on new brick, plaster or cement surfaces as they dry out and can 'grow' on old surfaces where moisture has penetrated.

Efflorescence shows up as a white crystalline or amorphous deposit.
Efflorescence indicates that moisture has passed (or is continuing to pass) out from the surface.

To overcome the efflorescence, wash down with calcium chloride solution. All deposits must be removed.

If there is no reoccurrence within 14 days, it is probably safe to paint.

If efflorescence occurs again try leaving the surface for a further period to dry out.

Recurrence on old surfaces indicates that the source of moisture remains and must be eradicated.

Don’t apply paint while efflorescence persists.

When a paint film has been disrupted by efflorescence, the whole area must be stripped, wiped down and left until the efflorescence stops before repainting.

**Loss of gloss.** When this happens prematurely it may be because of paint having been applied in unsuitable weather conditions (such as frost, fog or high humidity); the presence of wax or grease; or that the paint was applied over porous surface or undercoat. Over-thinning or thinning with unsuitable solvents are other causes.

To avoid the problem of loss of gloss, avoid these situations.

Where loss of gloss has occurred on a relatively new paint, rub down and recoat.

**Kalsomine** was a proprietary trade name that became a generic term for this type of distemper.

Kalsomine was popular owing to its ease of use and low cost. It gave good results, and was available at a time when most other paints required a good deal of skill in mixing and application. Hence it was a product that the home handyman could use easily. The disadvantage of this type of coating is that during its life span it will shed the pigment when touched.

Sometimes sizing was carried out on aged and new porous plaster surfaces before the application of kalsomine. The sizing is similar to that used for wallpaper. The application of kalsomine was able to commence once a dry film had formed.

Although kalsomine was a good product for the time, new technology was responsible for its demise. The advent of latex, emulsion and PVA-type wall coatings with superior benefits such as wiping, removing stains from wall surfaces, a much longer life span for the coating and suitability for use in moist areas meant the popularity of kalsomine declined.

Kalsomine has little to no cohesive strength; subsequently the new coatings quickly highlighted adhesion problems.

The only way to repaint a surface successfully was to completely remove the kalsomine before any other coat could be applied over the top.

Washing off kalsomine from plaster surfaces, such as ceilings and walls, is a messy affair, as liberal quantities of clean water are required to effectively clean the surface.

The following method is used to remove kalsomine.

The ‘wetting-in’ process is very important. The whole surface should be thoroughly wetted with warm water. This process needs to be repeated several times according to the thickness of the coating, with time allowed between each application for the water to soak well in. Warm water must be used to soften the binder in the kalsomine.

The next step is to work up the softened kalsomine and remove it with the aid of a piece of dampened absorbent material. A stripping knife is also a useful and handy tool.

It is necessary to work in small areas, covering a little surface at a time and remove as much of the old watercolour as possible.
Use a towelling mop to collect the soaked kalsomine in its folds. It should be washed out from time to time in a bucket of clean water. It is essential to keep the water clean so the mop/or brushes will remain clean.

Repeat the washing process in small sections all over the surface until the job has been completed.

A second wash of the entire surface area with clean water will remove any smears left on the surface.

To check the level of surface cleanliness wipe the surface with your hands and look for any milky residue. Repeat washing if required until satisfactory cleanliness is achieved.

Some paint manufacturers market a slow drying long oil alkyd-based coating with deep penetrating qualities as a kalsomine sealer. This product takes up to 72 hours to dry. It binds the surface and provides a sound substrate for subsequent paint coats.

**Lifting (picking up, working up)** happens when one coat is softened or disturbed by the application of another, especially by brush. With conventional decorative paints, lifting is usually because of application before previous coat is thoroughly dry.

Coatings or lacquers, such as those based on chlorinated rubber or nitrocellulose, tend to soften when recoated with similar materials and, for this reason, are best applied by spray to large areas.

Coatings of this type may also soften oil-based paints, even when these are thoroughly aged.

A small-scale test to check the resistance of existing coating is advisable.

**Mould growth.** Mould needs moisture for growth and is most likely to occur in high humidity, poorly ventilated areas or on surfaces with high moisture content, such as bathrooms, laundries etc.

Remedial treatment should include reducing the humidity or moisture content wherever possible and applying a suitable fungicide solution to kill the growth.

Repairing with paint to which a suitable fungicidal additive can be incorporated is recommended.

**Peeling.** This phenomenon is similar to blistering.

Moisture beneath the paint film is a frequent cause of flaking and peeling, as is the application of paint to powdery or friable surfaces.

Other causes are oil, grease, and polish residues on the surface, excessive movement of the surface (such as joints in woodwork), resulting in cracking and ultimately flaking and peeling.

Often, small areas of flaking can be dealt with by removing the loose material back to a firm edge, spot priming and recoating.

Where flaking is extensive or the overall cohesion of the system is doubtful, the surface should be stripped completely before repainting.

**Saponification** is the result of oil-based paint coming into contact with alkalis in the presence of moisture. It can occur with oil-based paints applied over galvanized surfaces. In a mild form the paint softens and may discolour. As a worst case saponification will completely destroy the coating.

Avoid contact of oil-based paints with moist/damp alkalis, cement, lime, plaster, asbestos, galvanized or zinc-coated surfaces and similar materials.

If paint is likely to come in contact with this type of surface use water borne acrylics.

When saponification has occurred, the surface must be stripped, washed and allowed to dry out before repainting.

A suitable primer or tie coat may be used as a barrier coat between the surface and the oil-based paint.

**Settling** occurs in paint naturally when stored for long periods of time. The solid constituents, principally the pigments, tend to settle out.
To reincorporate the pigments in small quantities of paint, stir with a broad-bladed stirrer, using a lifting and beating action.

For large quantities, a mechanical agitator is preferable.

To avoid the problem, invert the containers at regular intervals during storage.

**Transparency** (poor opacity) arises where the underlying paint or the original coat is showing through the finish coat. Causes can be from over-spreading the paint or too few coats.

Consider using more than the normal number of coats when making a marked colour change.

Always use an undercoat recommended by the manufacturers of the topcoat.

**Wrinkling** of the outer surface of a paint coating occurs most frequently with gloss finishes on exterior work in conditions conducive to the rapid formation of a surface skin.

Wrinkling is likely to be most severe where paint has been heavily applied.

Several days or even weeks (depending on time of year) are required to allow the paint to dry and harden before it can be rubbed down (with fine sandpaper) and recoated.

If early reinstatement is required, it may be possible to remove the coating by scraping off most of the defective material and remove the residue with mineral turpentine, leaving the undercoat unaffected. Another coat of finish can be applied.

**Yellowing** in oil-based paints is caused where direct sunlight is limited or excluded, and in atmospheres containing small amounts of ammonia or sulphurous compounds. These compounds may be present as combustion products, especially in kitchens and adjacent rooms.

Reinstatement is only possible by repainting, although items such as doors can be placed in direct sunlight for short times to reduce yellow.

To help prevent recurrence of the problem, improve ventilation and increase direct sunlight.

Yellowing is more obvious with white paint. A pastel colour could be considered instead.

Enamels drying in the presence of water-based acrylic paint materials may also be affected owing to the emission of ammonia during the drying phase of the acrylic. Where possible apply water-based paints at least two days before applying enamels. Ensure good ventilation.

Apparent yellowing may be caused by 'nicotine staining', which is very difficult to remove completely and residues may discolour new paint. To prevent such discolouration, apply a coat of suitable stain sealer after washing the surface with detergent solution.

Where it is possible, repainting with water-based paint will reduce the yellowing tendency.
Pictorial identification of paint problems

Saponification and Checking
a total paint film breakdown caused by a combination of saponification and incompatible paint coatings. This effect may take several years to show up.

Cracking
a paint film will not correct or hide defects in the substrate, in this case, dried out glazing putty.
Substrate Defects

Two examples of poor preparation of the substrate before repainting.
Delamination
the paint film has lost its flexibility and become brittle.

Moisture Entrapment
cause by non-permeable paint applied on wall that contained moisture.
Rust
severe laminate rusting of steel gate with significant metal loss.

Rust Staining
due to un-treated bolt head.
**Saponification**

A galvanised gutter has been painted with an alkyd oil based paint. A soap has formed at the interface between the paint and the galvanising causing delamination.

**Mould and Staining**

Caused by tree foliage resting on roof.
Blistering

In this instance caused by moisture trapped under the paint film. The timber was probably damp when coated or water is entering the timber from a leak in the roof sheeting.

Blistering

In this instance the timber was damp when painted.
**Efflorescence**
the white crystalline deposits indicate that
salt containing moisture has or is continuing
to pass through the paint film.

**Cracking, Grazing, Checking**
caused by application of a fast drying
coating over a softer one.
Reference notes:

1. Information Sheet no.7.


3. International Association of Master Painters and Decorators, 1922, p.64.


8. Wright, op. cit.

9. See 'A Brief History of Paint' for other decorative finishes such as stencilling, stippling etc.


Photos: Mark Weston, INCONSPEC
8 QUALITY AND STANDARDS

The Australian Standards Association

The Australian Standards Association has available two relevant publications:

• Australian Standard AS2311: The Painting of Buildings and

These two standards give a great deal of information on aspects of painting. They are recommended reading and should be cited in the Scope of Works (see below) for any project. The Australian Standard for Paint Colours is AS 2700-1996 (see Recording in Colour Scheme Selection section).

Engaging a tradesperson

In selecting a tradesperson one should consider the following points:

Licences and insurance

Any tradesperson must hold a relevant and current builder’s licence for the particular trade in which he or she is engaged. They must also have appropriate accident insurance cover in order to protect against accidents to property and to themselves. Proof of these must be obtained from a tradesperson prior to commencement of project. Failure to do this can render the homeowner liable for litigation costs in the case of injury or damage.

Professional associations

Preference should be given to a tradesperson who is a member of the Master Pointers’ Association who maintain a full time secretariat. The association can provide a list of members, although no specific recommendations are made.

Scope of works

It is important that prior to the calling of quotations for a job, the scope or extent of work be fully defined. This means listing all items to be pointed such as eaves, flashings, windows, doors, fascias, walls etc. The colour and type of finish required should also be noted. Expert detailed advice should be sought as to the best types of paint and methods of application. Paint manufacturers, architects, designers and engineers may be consulted.

The scope of works should be reviewed with the contractor before finalising an agreement.

Interpretation of quotations

Ideally at least three quotations should be obtained and it is not uncommon to find the prices vary considerably. Extreme variations in quotations should be viewed cautiously.

It is prudent to check all aspects of the scope of works and all details of the tendered quotation.

A consultant often prepares the specification. It may, however, be prepared by the owner, who must then take responsibility.

Do it yourself

Should a homeowner elect to undertake the project personally, advice as to the methodology and requirements is available from most major paint supply companies and retail outlets.

Only premium products should be used.

Quality of paint

Anyone visiting a paint supply shop is presented with a bewildering array of products at often wildly varying prices. Two key indicators of the quality of the paint, apart from buying a known brand, are Volume Solids and GPC Approval.
Volume solids

This information is on the product data sheet that should be available at point of purchase. It is usually expressed as a percentage weight for weight (% w/w).

Liquid paint contains solvent and solid material. The solvent evaporates leaving the paint film on the surface. With a little mathematics it is possible to figure out that if a particular paint has 50% w/w volume solids and if it is applied at 50m wet it will dry to 25m thick (DFT). Therefore 1 litre (which is the same volume as 100cc) of the same paint (at 50m wet) will cover 20 square metres. (Do not forget to allow for wastage.)

This is not the sole indicator, but allows a price/coverage area comparison.

**Government Paint Committee (GPC)**

The Government Paint Committee is a body comprising both government and paint companies which establishes a benchmark quality for each type of paint. To receive a GPC classification the paint product must undergo field performance testing and have the manufacturing process monitored. However, it can take up to five years before an approval is granted, and new technology is therefore not classified for some time after release.

GPC approval is a benchmark only. It guarantees a certain minimum standard but doesn’t indicate a maximum standard. There are products that well exceed the GPC classifications for which they are approved.

Paint that is GPC approved is generally marked on the container, and is certainly highlighted on the data sheet.
9 GLOSSARY OF TERMS

Abrasion resistance
Resistant to being worn away by friction.

Acid etch
Using an acid to roughen a surface.

Acrylic Resin
A synthetic resin that has excellent weather resistance and hardness.

Adhesion
The bond between the coating and underlying material.

Air Dried
Coatings that normally reach desired hardness without a catalyst or external heat; that is, dry by oxidation or solvent evaporation.

Alkali
A term applied to caustic chemicals that contain hydroxyl groups. pH greater than 7.4. See pH.

Alkyd
A synthetic coating material used in many types of decorative and industrial enamels. Properties vary widely.

Alligatoring
Pronounced wide cracking over the entire surface of a coating. Resembles alligator skin.

Anti-Settling Agent
An additive used to minimise settling of pigments in paint during storage.

Anti-Skinning Agent
An additive used to prevent formation of an insoluble surface layer on paints that contain drying oils during storage.

Aromatic Hydrocarbon
A volatile solvent such as benzene, toluene, xylene. Usually extracted from coal tar or petroleum. Term refers to chemical structure based on closed rings of carbon atoms rather than smell. See Solvent.

Barrier Coat
A coat used to isolate successive coats to prevent adverse chemical or physical interaction.

Binder
The resin portion of coatings the function of which is to hold pigments together, and to provide a cohesive film.

Bituminous Paint
A black or dark-coloured point using coal tar or bitumen as the binder.

Blast Cleaning
Surface preparation using propelled abrasives.

Bleeding
The diffusion of coloured matter through a coating from the underlying surface; also refers to the discoloration arising from such diffusion.

Blistering
Regions of isolated detachment of one or more coats resulting in rounded protuberances on the surface.

Blooming or Blushing
A milky colour which forms in clear finishes owing to atmospheric moisture.

Body
Used to indicate the consistency of the paint.

Catalyst
A substance that starts or increases the rate of a chemical reaction. In coatings, it is the component added to a synthetic resin to develop proper curing and chemical resistance.

Chalking
A form of paint degradation which results in loose pigment on the surface.

Checking
Breaks in the coating which do not penetrate to the underlying surface. See Cracking.

Cissing
Small, uncoated areas on a surface owing to lack of wetting by the paint.

Coal Tar
A black, resinous material derived from coal. Previously used as an additive to epoxy resins. NOTE Coal Tar is classified as a class A1 carcinogen.

Corrosion
The degradation of a material (usually a metal) owing to reaction with the environment. Alternatively, loss of metal by electrochemical processes.

Cracking
Breaks in the coating which penetrate to the underlying surface. See Checking.

Craters
Small circular domes in a dried film with a thin spot in the centre. They can be minute or up to 5 mm in diameter. See Fish Eyes.

Crazing
The formation of fine crisscross cracks on the surface of the coating film.

Crocodiling
See Alligatoring.
Cross-linking
The formation of a chemical link between polymer molecules to toughen a coating and make it insoluble.

Cured Film
A hardened film.

Curing Agent
See Catalyst.

Curtains
Long, horizontal runs in a film that occur on vertical surfaces.

Degrease
Removal of grease, petroleum products, oil etc., generally by the use of detergents or solvents such as trichlorethylene or methyl ethyl ketone.

Dado
Lower section of an internal wall from the floor (or skirting) to waist height.

Delamination
Separation between coats of paint or between point and the substrate because of very poor adhesion.

DFT
Dry film thickness; usually expressed as microns, one thousandth of a millimeter.

Dispersion
The suspension of tiny particles in a liquid medium.

Distemper
The term distempering refers to any method of applying colours that are mixed with a glutinous substance soluble in water, such as glue, gum, casein (milk powder) or white of egg.

Drier
A compound added to a paint to accelerate drying; for example Terebin.

Drying Oil
A fatty oil capable of conversion from a liquid to a solid by slow reaction with oxygen in the air. The drying thus refers to a change in physical state rather than evaporation of solvent. Paints made from drying oils harden in this manner.

Emulsion
See Lotex.

Enamel
A type of oil-base paint with high gloss.

Epoxy
A catalysed epoxy formulation that cures by addition of a catalyst, generally at room temperature.

Etch or Etching
Roughening of the surface by treatment with acid.

Etch Primer
A primer usually containing phosphoric acid which etches the metal surface to improve keying of subsequent coats.

Extender
An inorganic powder added with pigments to reduce gloss, improve adhesion or reduce cost.

Fabric
The structure or physical makeup of the building.

Film
A layer of coating or point. A wet film is one that has just been applied.

Fish Eyes
The formation of holes or depressions in a coating film. Also known as rotering.

Flat Finish
A term usually used for decorative paints describing a dull, non-reflective finish.

Flooding
Pigment that floats to the surface of a film, usually in streaks.

Galvanising
Coating of steel with molten metallic zinc to give corrosion protection.

GPC
Government Paint Committee.

Hardener
A cross-linking agent used to cure a resin. See Catalyst.

Hiding Power
See Opacity.

Holiday
Any discontinuity or bore spot in a painted area.

Hydrocarbon
A chemical compound containing carbon and hydrogen atoms. Commonly refers to extracts from petroleum such as petrol, white spirit, etc.

Inhibitive Pigment
A pigment added to coatings capable of retarding corrosion of the metal by reacting with the metal surface. Examples are zinc chromate and zinc phosphate.

Intercoat
Boundary between coats.
Iron Oxide (Rust)
Material forming on reaction between oxygen and iron. Examples are mill scale (formed at high temperature) and rust (strictly a reaction between iron, oxygen and water). Very pure iron oxide is used as a pigment.

Lacquer
A type of coating which dries solely by solvent evaporation.

Lacquer Thinner
Used to describe such solvents as ethyl alcohol, ethyl acetate and toluene.

Latex
A milk-like fluid made up of microscopic particles of rubber or synthetic resin suspended in water. The suspension is stable.

Laying Off
Final light strokes of a brush on a paint film to even and smooth the coating as much as possible.

Leaching Pigment
Flake-like pigment particles that orientate themselves on the surface to form a continuous sheet. Examples are aluminium flake and micaceous iron oxides.

Lime
The oxide of calcium, a white caustic solid (quicklime or unslaked lime).

Long Oil Alkyd
An alkyd resin containing more than 60% of oil as a modifying agent.

Mastic
A term used to describe a heavy-bodied coating, usually slow drying.

Matt Finish
A dull finish also known as a flat finish.

Medium
The total sum of the constituents of the liquid phase of the paint.

MEK
A solvent, methyl ethyl ketone.

Metalising or Metal Spray
A method of applying atomised molten metal to a surface; for example, zinc, aluminium.

Micron
A metric unit of distance also known as micrometre. One millionth of a metre written as m. Paint film thickness is measured in microns. There are about 25,000 microns to the inch.

Mill Scale
A layer of iron oxide formed on the surface of steel plates during hot rolling. May range from around 50 microns to several millimetres thick.

Mud Cracking
A phenomenon that occurs to paint films as they dry, appearing like mud drying in hot weather. The cracks generally appear in a five-sided shape.

Neutral
A term used to describe an environment that is neither acid nor alkaline; for example pure water.

A neutral colour is an indeterminate colour, or one having no particular hue.

Non-Ferrous
A term used to designate metals and alloys that do not contain iron; for example brass, aluminium, magnesium.

Oil Paint
A paint that contains drying oil, oil varnish or oil-modified resin as the basic vehicle ingredient. The common (but technically incorrect) definition is any paint soluble in organic solvents.

Opacity
The ability of a paint to completely obliterate underlying substrate.

Orange Peel
Dimpled appearance of a coated surface resembling the skin of an orange owing to a lack of flow out of the wet paint film.

Organic
Chemicals based on carbon, as contrasted to mineral chemical compounds. Carbohydrates, synthetic resins, solvents and a large variety of chemicals are organic.

Osmotic Blistering
The blistering of a paint film owing to salt deposits beneath the coating. Wet blisters filled with salt solution are formed.

Peeling
Poor adhesion resulting in lifting of a coating.

pH
A value indicating the acidity or alkalinity of a solution, and as a measure of the concentration of hydrogen ions. Pure water has a pH value of about 7 and is neutral. Acids range down to pH 0 strongly acidic and alkalis range from pH 7 up to 14.

Phosphating
The use of phosphoric acid treatment of steel to prevent corrosion.
Pickling
The chemical removal of rust and mill scale from iron and steel, usually with an acid.

Pigment
An insoluble, finely divided material whose function is to provide obscuring value, colour and corrosion protection.

Pinholes
The formation of tiny, circular holes in a paint film.

Pitting
The result of local corrosive attack forming holes in a metal surface. May be described as shallow or deep, small or large in diameter, and quantity per unit area.

Plasticiser
An organic liquid added to coatings and sheet lining compositions to improve flexibility.

Polymer
A substance composed of large molecules that have been formed by the union of a group of simple molecules (monomers).

Pot Life
The interval after the mixing of two component coatings during which the liquid remains usable before gelling.

Primer
The first coat applied to a surface. Primers are formulated to have good bonding and wetting characteristics. They may contain inhibitive pigments.

Resin
Any group of organic, plastic-like materials that can be moulded or dissolved. Can be natural or synthetic.

Retarder
A liquid thinner added to a coating used to slow the drying rate and improve flow-out.

Runs
Sagging and curtaining caused by improper thinning or poor application.

Rust
The result of the corrosion of iron or steel to form visible iron oxide. May be described in order of severity-scattered pinpoints, blush or powdery, freckled or streaked, light scale, paper thin, flaked, medium scale (layers up to 3 mm thick), heavy scale (layers over 3 mm thick).

Saponification
A reaction between a binder and alkali resulting in a soap-like material. Examples are found in oil-based coating applied over a galvanised substrate.

Satin Finish
A descriptive term generally in reference to decorative paints, usually intermediate between semi-gloss and flat.

Setting
Separation of pigments and other dense materials in a paint to the bottom of the container.

Shellac
Shellac is a unique resin produced as an excretion by a coccid insect in India and Thailand. The dried excretion is collected, crushed and washed. It is then melted and dried in sheets that are broken up and exported for use as an alcohol-soluble coating resin. The resin has a variety of uses; ranging from sealers and isolating lacquers for wood and water-stained plaster. For many years the resin was used in a furniture finishing process known as French polishing.

Shop Primer
A fast-drying, abrasion-resistant primer applied in the workshop to fabricated steel units.

Short Oil Alkyd
An alkyd resin containing less than 40% oil in solids.

Silicone Resin
A resin formulated into coatings based on polymers containing silicon.

Skinning
The formation of a tough skin-like covering on the paint surface on exposure to air.

Sloke
To disintegrate or treat (lime) with water or moist air, causing it to change into calcium hydroxide (sloaked lime).

Solvent
A liquid that is used in a coating to dissolve or disperse the film-forming components. Evaporates during drying.

Substrate
The base surface to which a coating is to be applied.

Surfacer
A pigmented composition for filling depressions to obtain a smooth, uniform finish before applying finish coats, usually applied over a primer.

Synthetic
Manufactured as opposed to naturally occurring.

System (Coating)
A coating consisting of successive applications of primer, intermediate or undercoats and finish or sealing coats.
Thermoplastic Resin
A resin which becomes soft on application of heat and becomes hard again on cooling.

Thermosetting Resin
A resin having the property of curing so becoming insoluble and heat resistant upon application of heat.

Thinner
A volatile liquid added to a coating to adjust viscosity. May be the solvent, the diluent or a mixture of both.

Tie Coat
A coat applied to a previous film to improve adhesion of subsequent coats.

Total Volume Solids
The total solid film-forming portion of the package of paint expressed as a per cent by volume.

Tung Oil
Tung oil, also known as China Wood oil, is obtained from the kernels of nuts from the tung tree. It dries rapidly and when used alone produces flat, frosted and wrinkled films. The oil is more usually used with phenolic resins or resin esters in oleoresinous varnishes. Recently, the oil has been successfully used in cold combinations with certain phenolic resins to give low VOC (volatile organic compound) coating systems for the protection of steel.

Undercutting
The spread of corrosion beneath a coating from a break in the film or the edge.

Varnish
A non-pigmented paint which dries to a hard, transparent film.

Vehicle
See Medium.

Vinyl Resin
A synthetic resin which has a wide range of chemical resistance. Can be formulated to produce adhesives, sheets, textiles, coatings, etc.

Viscosity
The consistency, or ease-of-flow, of a liquid point composition. A high viscosity fluid is thick and flows with difficulty, a low viscosity fluid flows readily. Often expressed in units of seconds as the time required for a given volume to flow through a specific-sized orifice.

VOC
Volatile Organic Compounds. The term used to describe the organic solvents that evaporate into the air during paint application. The emission of VOCs is controlled, and in some countries, licensed by the Environment Protection Authority.

Void
A cavity in the paint film, which may or may not be visible at the surface of the coating.

Volatile
The solvent component of the vehicle that evaporates on curing. The non-volatile components are known as the film formers.

Weathering
The alteration of a coating owing to constituents in the atmosphere.

Wet Film
Describes the coating after application but before the solvent evaporates. The solvent content in the wet film will constantly decrease because of evaporation.

White Rust
The white corrosion products on a zinc or galvanised surface.

Whiting
A pure white chalk (calcium carbonate) which has been ground and washed.

Wrinkling
The development of wrinkles in a paint film during drying.

Painting of Older Buildings
Appendix 10.1 Early specifications

Adelaide Gaol

Painters and Glaziers specification taken from the specification for Adelaide Gaol, titled: 'Specification for the erection of a Jail near the old Aborigines location on the Parklands, Adelaide.'


To knot prime and paint the whole of the external wood and iron work four times in oil and best white lead or such other colour as may be directed. The whole of the joiners' work internally with the exception of the floors and staircase, but including the stringers to be knotted primed and painted three coats in oil and white lead.

All windows to be glazed with the best glass. Those of the solitary cells to be ground.

Dr A.S. Ranboll Residence

Specification for painting work to be undertaken upon the residence of Dr A.S. Randell, Dutton Terrace, Medindie (just North of the Parklands).


VERANDAH

Staining
Woodwork to be treated as follows:

**Floor:** 2 coats.
- Coat 1 No. 1 Lionoil 3 parts
- Golden Oak Lacklustre 1 part
- Coat 2 No. 1 Lionoil Clear
  - Allow not less than 24 hours between coats.

**Ceilings:** To receive 3 Coats composed as follows:
- No. 1 Lionoil 3 parts
- Brown Flemish Lacklustre 1 part

**EXTERIOR WOODWORK**

All exterior woodwork which has received Cabots
Shingle stains to be finished with 2 Coats as follows:
- No. 1 Lionoil 4 parts
- Brown Flemish Lacklustre 1 part

**No. 1 BEDROOM**

**Woodwork**
- Coat 1
  - Mission Lacklustre 1 part
  - Lionoil No. 1 1 part
- Coat 2
  - Shellac Solution composed:
    - 2 lbs. Berry's Blended Shellac
    - to 1 Gall Meth sp%
  - Dullgloss
- Coat 3
  - Lionoil 3 parts
  - Brown Flemish Lacklustre 1 part
  - To be applied with a brush and not rubbed off. Then stop with stained putty immediately before applying 2nd coat.
- Coat 2
  - Same as Coat No. 1
  - Sand with No. 1 Glosspaper & finish with one full Coat of Liquid Granite A.
  - Allow at least 24 hours between coats.

**LIVING ROOM**

**Ceiling**
Coat white Streaks in Oak with mixture as follows:
- Black Flemish Lacklustre 1 part
- Lionoil No. 1 1 part
  - Apply with Fitch and do not rub off and allow 24 hours before next coat.

**All Ceilings and woodwork to be treated as follows:**
- **Coat 1**
  - Lionoil No. 1 2 parts
  - Brown Flemish Lacklustre 1 part
  - Golden Oak 1 part
- **Coat 2**
  - Shellac Solution as for No. 1 Bedroom woodwork
- **Coat 3**
  - Same as Coat 2 sanded when dry with No. 0

Painting of Older Buildings
Floors
To be finished same as No. 1 Bedroom

FRONT HALL
All ceilings and woodwork to be treated as follows:

Coat 1
Lionoil 2 parts
Antwerp 2 parts

Coat 2
Shellac Solution as above

Coat 3
Same as Coat 2, sanded when dry with No. 0 paper

Floors
3 Coats same as ‘Coat 1’ woodwork, finish with one Coat Liquid Granite A.

DINING ROOM
Treat same as Front Hall.

SERVERY
All woodwork to be treated as follows:

1st Coat
Lacklustre Forest green 1 part
Lacklustre Bog Oak 1 part
Lionoil 3 parts

2nd Coat
Shellac Solution as above.

3rd Coat
Dullgloss

KITCHEN
All woodwork to be treated as follows:

1st Coat
Brown Flemish Lacklustre 1 part
Golden Oak Lacklustre 1 part

2nd Coat
Lionoil No. 1

3rd Coat
Liquid Granite A. reduced with 10% Turpentine

4th Coat
Liquid Granite A

Brickwork
2 Coats Liquid Granite A
Brickwork other rooms to be finished in Dull Finish to be treated as follows:
2 Coats Liquid Granite B 3 parts
Pure Turpentine

MAIDS ROOM
To correct overstaining
Sandpaper well with 1. Glasspaper then coat with Shellac Solution well sanded with No. 0 paper and finish with one coat Dull gloss.

NURSERY
To correct staining
Sand with No. 0 Glasspaper and give one Coat composed as follows:
Dull Gloss 1 part
Brown Flemish Lacklustre 1 part

TOY CUPBOARD
To be treated as follows:

1st Coat
Brown Flemish Lacklustre

2nd Coat
Shellac Solution

3rd Coat
Dull Gloss

BATHROOM
Preparation
Sandpaper priming Coat already on with No. 0. Glasspaper.
Stop with putty composed as follows:
Linseed Oil Putty 1 part
White Lead in Oil 1 part
Stiffen with French Chalk if necessary.

1st Coat
Berry’s White Enamel Primer - 2 parts
Berry’s Luxury White Enamel - 1 part
Tinted to approved Pearl by adding Wileys.

2nd Coat
Berry’s White Enamel Primer -1 part
Berry’s Luxury White Enamel 1 part
Tinted to Pearl as above.
3rd Coat
Berry's Luxbury Enamel 2 parts
Berry's White Enamel Primer 1 part
Tinted to Pearl as above.

FENCE
To be treated as follows:

1st Coat
Lionoil No. 1 2 parts
Brown Flemish Lacklustre 1 part

2nd Coat
Lionoil No. 1 1 part
Lionoil No. 2 2 parts

3rd Coat
Lionoil No. 2

GENERAL WORKING INSTRUCTIONS
All woodwork to be sanded with No. 0.
Paper, with the grain, before staining and
to be thoroughly dusted.

Lacklustre to be applied with a Brush
rubbed off across Grain with soft cloth.
Sand with No. 1 Glasspaper, with grain,
before applying Shellac Coat.

Shellac Solution to be composed
as follows:
Bone Dry Bleaches Shellac - 2 lb.
Pure Methylated Spirits - 1 gallon.

To be given 3 days to dissolve and agitated
as often as possible.

Before using Shellac Solution strain through
Butter Cloth forcing the Gelatinized Shellac
through the cloth.

Sand all Shellac work with No. 0
Sandpaper before applying Dull Gloss.

Stopping
Tint all Putty as near as possible to the
Colour of the Lacklustre to be used, and
stop only immediately before applying the
Lacklustre.

Enamelling
All work must be sanded between Coots
with No. 0 Glasspaper.

NO. 2 BEDROOM
Treat as follows:

1st Coat
Mission Lacklustre 1 part
Lionoil 1 part

2nd Coat
Shellac Solution

3rd Coat
Dull Gloss

BACK HALL
Treat as follows:

1st Coat
Mission Lacklustre 1 part
Lionoil 1 part

2nd Coat
Shellac Solution

3rd Coat
Dull Gloss

NIGHT NURSERY
Treat as follows:

1st Coat
Golden Oak Lacklustre 1 part
Lionoil 3 parts

2nd Coat
Shellac Solution

3rd Coat
Dull Gloss

HARDWOOD DOOR SILLS
Stop immediately before staining with tinted
Linseed oil Putty, and treat as follows:

1st Coat
Lionoil 2 parts
Brown Flemish Lacklustre 1 part

2nd Coat
Liquid Granite A

3rd Coat
Liquid Granite A

NOTE
Please note that woodwork in all rooms
except
- Front Hall
- Dining Room
- Living Room
Is to receive 1 Coat of Shellac sanded and finished with Berry's Dull Gloss Varnish instead of 2 Coats of Shellac as specified previously.

If possible please finish the rooms off in the following order required by the proprietor:
- Dining Room
- Kitchen
- Pantry
- Day Nursery
- No. 1 Bedroom

Dudley C. Turner Residence

EXTERNAL WORK
Preparation. Sand off all loose scales and particles with fine glass paper and apply 2 or 3 coats of stain as follows:
- Linseed oil 1 gallon
- United c.p. meadow green in oil 4 ozs
Allow 7 days between coats
Stopping. Stop immediately before applying finishing coat, w/ pure linseed oil putty tinted to colour of the finish.

References Notes
2 South Australian Architecture Archives, Milne, F. Kenneth Collection, Series No. 1 (Notebook, 1906), p. 139.
3 South Australian Architecture Archives, Milne, F. Kenneth Collection, S.1, p. 118.

Locklustré Wood Finishes

Treatment of Red Pine
Coats as applied. Locklustré, shellac, and dull gloss finish.
Berry Bros. Materials.

First coat and preparation: Sandpaper with No. 0 paper first, always WITH the grain of the wood.
Then carefully brush off dust.

Then do all stopping necessary to woodwork with tinted putty to match stain, and only stop a portion that can be stained the same day, or before the putty is dry.

Then stain with locklustré, the shade to be selected and reduce to the required shade with Lionoil, (which is the thinning property for all stains). Only stain small portions at a time, and rub off immediately with clean rag (cheese cloth).

NOTE: The painter must be careful to judge for himself the difference in the nature of the timber, and where soft of dark timber is met with, the stain must be thinned weaker (using Lionoil).
After staining use Sandpaper again with the grain, this time bringing out all the high lights.

2nd coat. Berry Bros. Bone drop bleached shellac, mixed with pure methylated spirits, 2 lbs. Shellac to 1 gallon spirits. Shellac must be used thin, and strained through butter cloth first.

Final. Then sandpaper (No. 0) with the grain. Apply Berry Bros. Dull gloss finish full and evenly.
(From Kenneth Milne's Notebook)
Computerised images indicating colour schemes

Sand Dollar

Covered Bridge

Wind White

Lign Camell

Courtesy: Dulux

Colours represented may vary from actual paint colours

Painting of Older Buildings
The colours shown may differ slightly from the actual paint colour due to the laminate and printing process.

**CBT 1** - 2nd scheme

- Navajo White
- The Beach
- Historic Tan
- Slate Grey
- Deep Onyx

**CBT 2** - 3rd scheme

- Almond Petal
- Navajo White
- The Beach
- Historic Tan
- Wood Smoke
- Charcoal

Courtesy: Dulux

Colours represented may vary from actual paint colours.

Painting of Older Buildings
The colours shown may differ slightly from the actual paint colour due to the laminating and printing process.

Cream  Historic Tan  Red Oxide  Mid Brunswick Green

Courtesy: Dulux

Colours represented may vary from actual paint colours
Appendix 10.2 Addresses

- ‘Lead Alert’. Available from:
  Commonwealth Environment Protection Agency,
  40 Blackall St. Barton ACT 2600.
  South Australian Environment Protection Authority.
  Telephone: (08) 8204 2000.

- Computer-generated Colour Previews are available
  (upon payment of a fee) from:
  The Dulux Colour Bureau, PO Box 60, Clayton
  South, Victoria, Australia 3169.

Appendix 10.3 Further items of interest

Durability

An article relating to durability of colours appears in a 1921 gazette (South Australian), headed ‘Choice of Colours’:

The subject of colours for outside work is a subject of much importance, especially with respect to street doors. Although the painter sometimes has the opportunity of advising as to the colour of such doors, it more often happens that the colour is chosen by the occupier, and green is the favourite colour for this purpose. Now green is very apt to blister, as are most of the dark colours, because of their excessive absorption of heat. Lighter colours have not this advantage: yet strangely enough, black is probably the most durable of all pigments. It may be objected that a front door painted black looks rather funereal, but this appearance may be avoided by painting the mouldings a decorative colour, or gilding them. The reason for this superior permanency of black is that the black absorbs more oil than the white. Pure and brilliant pigments should be used for outside work.

Intensity

Toned colours known under such names as art green, ort blue, art brown, and so on. These are low-toned colours, generally lowered by the addition of complementaries. For example, a blue of greenish tone may be lowered by adding red, and the resultant colour will differ in tone from the one subdued by the addition of black. Art greens may be made by adding the complementary red to the bright green in such quantity as to produce a clear quiet tone of colour.

Wedgwood greens and blues are mixtures of the three primaries, red, yellow, and blue; with Wedgwood blue, the blue is in excess, with the green, the green is in excess. Art greys may be compounded from white, and the three primaries, the grey being yellow, red, or blue, according to which one predominates.

Source: (pp. 128-9) Practical Painter and Decorator

Colour mixing

The Practical Painter and Decorator, 1949 edited by Geeson Williams, in discussing colour mixing, says:

Whatever tint is selected from a colour card, except for simple preservative painting, there will always be required of the painter a knowledge of colour tone and harmony. This can never be possessed if there is not previously the skill to mix and to match the generality of tints. (p. 123)

Red! What is red, so far as pigment is concerned? It may be a red inclined to scarlet, or a blush red tending to crimson; and so with the blue, greenish or purplish in tone. In practice it will be found that vermillion is unsuitable for crimson tones, ultramarine for green tones. (p. 124)
Old Paint Chart

Reproduction from a collection of old Paint Charts.

Borthwicks

REINFORCED

is made from the finest known paint bases—Lead and Zinc REINFORCED with Tin Oxide, and mixed in specially prepared oils.

Paint reinforced with Tinum Oxide excels in covering capacity and colour permanency, and definitely ensures maximum protection of the surface over the longest period. Paint reinforced with Tinum Oxide does not crack or peel—peels or peels. It wears like a rock and endures for years—giving years of service.

“AB” Reinforced is more economic to use than most paints, because every gallon will cover more square feet.

Borthwicks

VELVETONE

FLAT OIL PAINT

A delightful mat finish that is washable and extremely durable on all interior surfaces—plaster walls and ceilings, metal ceilings and paneling, woodwork, wall boards, etc. Walls coated with Velvetone aid the correct diffusion of light and provide an ideal background for the furnishings of any room.

Velvetone is self-leveling, so that laps and brush marks do not show and the amateur does not experience any difficulty in coating large surfaces. Range of 16 delightful shades.

REINFORCED

There is extra strength in every beautiful
Manufactured by Borthwicks Pty. Cey.
Sydney—Melbourne—Brisbane.

12/37

AB is REINFORCED

<table>
<thead>
<tr>
<th>Colour</th>
<th>Shade</th>
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<td>Tobacco Brown</td>
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"AB" Wears Like A

Courtesy: Alan Feder, Solver Paints
Reproductions of old articles from The Builder and from Building World

The Use of Ready-made Paint

As is now generally known, several manufacturers have laid themselves out to supply the painting and decorating trades with ready-made paints. This is not a new idea; many years ago a number of these ready-made paints were sold in the United States. In England there has been a great amount of experimentation and competition, and although ready-made colored paints are now the vogue, and for many years past manufacturers would attempt to make their own, yet in the case of oil paint for ordinary application the majority of painters still mix up their own materials. The advantages claimed for the ready-made paints are, first, economy, and second, the ease with which they are used. After all, these are probably the two main advantages of ready-made paint.

Paint to Suit Various Conditions

The practical painter bases his chief objection to ready-made paint in the argument that each batch of paint needs to be made to suit certain conditions, which causes that the proportions of pigment, oil, thinnings, and driers will vary with circumstances. Of course, if paints of varying qualities are demanded, the manufacturer must provide for them, but it may easily be asked whether the jealousies of varying the quality of the paint is not defeated less expensively.

There are painters and painters, and while some must be relied upon to mix a paint that will suit the conditions under which it is to be applied, a great number of the men employed in the trade have neither the technical knowledge nor the experience of mixing up a paint to suit the conditions that the manufacturer must often supply. The practical painter, therefore, insists that ready-made paint is more suitable for his trade by the fact that he is able to paint his work with a better quality of paint, and therefore ready-made paint is not likely to be put upon the market by the manufacturer who is not willing to supply the material in a suitable form.

Mixing at the Job

It is always advisable to have ready-made materials on hand and not depend on the manufacturer. It is necessary that all paint should be mixed in the manner in which the workman is accustomed to do it, and where they are not mixed and taken as such, and unless the manufacturer is willing to supply the material in a suitable form, the workman is not likely to use it.

At the Building World 243

Building World

Painting of Older Buildings
The Advantages and Disadvantages of Washable Distempers

Below we give the concluding portion of our report of the discussion on "The Advantages and Disadvantages of Washable Distempers," which took place recently at a meeting of the Paint and Varnish Society. The first instalment appeared in No. 4.1.

In concluding his remarks, Mr. Cruckshank-Smith, who opened the discussion, said that no inconsiderable part of the popularity of certain tempera paints has been due to the fact that neither in their composition nor in the results of their application and use can they be considered as other than strictly hygienic and sanitary materials. It is interesting in this connection to note that at least one tempera paint in Britain is, I believe, accepted by the factory inspection department of the Home Office as a "paint" in the sense that walls treated with it need be repainted only once in three years instead of once every twelve or fourteen months, as is the case when a distemper is used.

Mr. J. Russell Thornbury observed that a great detriment to water paint as a material of lasting consumption, to be universally accepted by the trade, was the cutting of prices and the consequent putting on the market of rubbish which would prejudice any dear article: perhaps more had been done in this direction with water paints to spoil the reputation than with any other material. The fact that water paints could be applied to new plaster or cement work was a great advantage.

In a brief speech Mr. Jennings said, in comparing water paint and wall-papers: The plain flat surface has become very popular during the last few years, and I must confess to being an admirer of it myself. Paste water paints are a great preventative of blistering to oil paints. For instance, some doors were carefully burnt off and given two coats of water paint, two coats of oil paint and two coats of varnish, the result being quite satisfactory; the doors which had previously blistered are now quite free from this trouble. Whilst admiring a plain wall surface, I can quite appreciate the advantage from some points of view of a quiet design, and here undoubtedly wall-paper scores over distemper from an economical aspect.

Mr. Scrutton said that in the case of a very porous wall, a first coat and warm and thin paint should be laid on, followed by a thick coat. The medium of a good water paint is an oil emulsion, and success lies in the care with which this is made, and also with the manner in which the pigments are ground with it. In a properly made water paint each particle of pigment is surrounded and held in place by a film of oil, and there is no excess of medium to form a film over the surface of the work, as in the case of an oil paint. I would like, in conclusion, to refer to casual preparation of the surface that is generally thought sufficient for painting a wall in water paint. Compare, for instance, the care with which the surface of a door is prepared for painting to that which is deemed sufficient in the case of a wall; in reality, a wall surface requires much more careful preparation to ensure a thoroughly good job.

Mr. G. Line said: I anticipate that the good points and the proper use of plain paint in the decoration of residences are likely to be increasingly recognised, and that the use of paints will increase, but that such increased use of those materials is not likely to affect the use of wall papers to any very marked degree. I am more inclined to that view because in the decoration of the average house, in these days, the questions both of time and of cost are of considerable importance. If it could be anticipated that paint manufacturers and distributors, wholesale and retail, would be enabled to supply paints at such low prices, and to apply them with such despatch as to compare very favourably against the same costs incurred in the use of wall-papers, then I should regard the prospects of a largely increased adoption of paint as correspondingly brighter.
Group 3—Lake Colors.

In the case of the yellows there is little or no need to be so fastidious as to the choice and color of the lakes to use in mixtures where lead chromate is not required, as in sulphur containing atmospheres.

Butter Lakes are not of much account as paint colors, as all shades may be obtained from Prussian and ultramarine blues. But they are much more numerous for we have vermiliones, permanent reds, scarlet, crimson lakes, &c. The most permanent are undoubtedly those made from Helio R.L., smalt or bluish, baryts, orange, and red lead. The color is of vermilion shade, and when used with any white to give pale flesh color, it is found that even this pair shade will remain permanent for years.

Permanente Red and Lake are also made from madder lakes with orange lead, and are inclined to deepen considerably in the course of time. Vermillionettes may be had in very bright shades, but are only suitable when used out of reach of direct sunlight.

Madder Lakes are very safe colors for either outside or inside work, and also are suitable for tinting, but have all a tendency to deepen.

Buccol and Crimson Lakes are all more or less fugitive, and should be painted over with a permanent red so that the change of color would not be so noticeable.

Para Red or Bright Turquoise Reds are gradually losing their place in the paint trade on account of their inferiority in all known as "bleeding." Rose Flesh as a color is of little use, as it fades very rapidly.

Violet Lakes may now be obtained. They are quite permanent, but there is not much demand for them.

Mahogany Lakes are suitable for certain purposes, such as the manufacture of oil varnishes, stains, but are not permanent.

We now come to the white manufactured products, and must, of course, commence with White Lead. Without a doubt the white lead made by the Stack process is the best, though not the whitest (the Chamber and Precipitated processes both being whiter), but in the working under the brush there is something about Stack process lead which makes it beloved of the painter. One thing is certain, that it will stand far further reduction with oil before it becomes unworkable than either the Chamber or the quick process. For general work and outside work it is unrivalled.

White Zine Oxide. There is nothing to equal this for enamel or a gloss finishing coat. With oil it gives a very hard surface to the paint, but unfortunately does not wear well on outside jobs. It is the purest white obtainable.

Lithopone. This is a most useful pigment for decorative work, or inside work of an everyday nature, and forms the basis of the cheap ordinary liquid paints in the trade. It has a good body and spreading power, but has many defects which require care on the part of the user. In many cases it has been known to become a slate color in the absence of light, which color becomes white on exposure. It occasionally goes off color with direct sunlight, and when in composition with white lead becomes black, owing to the chemical action. It cannot be used safely on outside work, and is of no use where there is vibration, as this causes the paint to peel into strips. As a dilacerator color, and in oil-egg forced paints, it is very useful.

Tinum or Vantine Oxide. This is one of the new pigments, being exploited in cases of white lead abatement. Up to the present nothing very favorable can be said as to its reliability, and it certainly has some very objectionable features which, however, may in due course be overcome.

Titan White or Tintinium Oxide is certainly one of the best whites recently put on the market. It has magnificent hiding, and spreading properties, and is of good color. However, it is too soon to give any verdict as regards its usefulness, as this, alone will bring out its defects or good points.

Before passing from the whites, we would advocate the use of mixed white pigments, such as white lead and white oin, which has greater hiding and spreading power than either, and is also a better preservative for outside work, but the white one must not be more than 50 per cent.

(Concluded.)
Bone Black or Drop Black, the finest qualities of which are made from ivory, is the blackest of all the carbon blacks, and is used chiefly for its color. It is ground and thinned in gilders' and turpentine, and the dried paint then varnished. It may also be used in conjunction with chrome and light greens, to give the richest bronze greens.

Vine Black or Blue Black is used as a distemper black, and when ground with harses forms the basis of ordinary black paints. Its color, however, is not intense enough, but that is remedied by the addition of best gun carbon black.

Lamp Black is a poor color as a black, but has excellent tinting qualities, and when mixed with white produces blue-gray shades. It is a very soft black, and takes twice as much water to the oil as ground, so that when ground few particles escape the grinding and in consequence it mixes readily with white and does not show a single streak. This oil-absorbing quality together with the fact that it dries well, renders it highly suitable for use in making turpentine covers, which is its largest use.

On Carbon Black, by far the strongest of all the blacks, should never be used alone, as the particles do not seem to be well enough ground out, which in some measure prevents its drying uniformly. However, when ground with about 30 per cent hares', vine black, or other extender, it is the black paint which is in general use.

Lamp Black and Carbon Black are of no use as water colors, as they always contain small quantities of mineral oil which prevents their mixing well with water.

Group 3.

We have now for consideration the chromatic colors.

Ultramarine blue and the lower grade of the same, bone blue, are prepared by fusing together in definite quantities (clay, soda, glimmer salt, sulphur, carbon and silica).

Ultramarine blue is a favorite color with the signwriter and used in conjunction with aluminim is well in evidence on advertise-
ments. It is used to distemper colors on account of being withstand by lime, &c.

Prussian blue or Chinese Blue is, in the great qualities, and Brunswick and Celestial blue in the reduced qualities, the main in composition and behaviour. In oil they are very permanent, but cannot be used as distemper colors, being, as they are, de-
composed by lime and alkali. They may, however, be added to zinc or lead chromates in all proportions, to give greens colors.

When used on jewelry, Prussian blue is a fine protection for the iron, as it prevents rusting. It can also be used with all kinds of whites, to give light blue tints, which are very permanent. A large proportion of point d'viree should never be used with Prussian blue colors, as it reduces the blue to a lavender shade.

Chrome of Lead vary from the pale prussian to the deepest orange, and even to red, via Paris red or American vermilion. All are very suitable for general painting, but not well made will sometimes blacken considerably. They also blacken when exposed to sulphated hydrogen in the at

mOSPHERE, and are on that account not very suitable for outdoor work in town, or as distemper colors. The Persian red or basic chrome is alleged to be the finest rust preventer yet discovered.

Zinc Chromate may be used as a Distemper color, or as an oil paint, but on the whole lacks body. However, it is more per-

manent than the lead chromes. When mixed with Prussian blue it gives a clear bright green.

Cadmium Yellow may be had in various shades, but all are sublimes of cadmium. The cadmium yellows are very permanent unless acted upon by strong chemicals. They are used for painting cars, &c., but are too expensive for ordinary purposes.

In the green pigments we have the chromo-

greens, which have already been mentioned with the chrome and blues.

Emerald Green is an extremely bright green color, but is also fugitive and easily decom-

posed. Its use is found in painting yachts as an anti-fouling.

Red Lead is the well known oxide of lead used for painting iron work to prevent rust-

ing. When properly applied with raw and

blackened lead or oil, it gives splendid results. But the red lead should again be coated with an inert pigment, to protect the red lead from being destroyed by impure atmospheric condition.

The quantity of oil should not be more than four gallons of oil to one hundredweight of red lead. Red lead ready for chrome may be obtained, but that simply means using a non or semi-drying oil in place diminged, or by using red lead oxidized to its fullest capacity and linseed oil. Nei-

ther is to be compared to the mixing of ordinary dry red lead and linseed oil, as its great virtue lies in the fact that it sets hard when brushed out.

Varnish or Sublimes of Nitro is not now much used as a paint color, because for more reliable results are obtainable from permanent reds. Vermilions is, however, still sometimes used for lining.

(To be continued.)
Colours may be looked upon as divided into three groups—

1. Earth Colours, such as ochre,umber, red-oxide.

2. German Colours, such as chrome yellows, greens, &c.

3. Ledge Colours, including all pigments made by precipitation, such as vermiculite and permanent reds.

Earth Colours. The common or French ochres are used in distemper work on account of their extreme softness, lightness, and brightness of color, and sometimes also in oil paints, but as a rule lack covering power, containing, as they do, about 19 per cent. silica, which is transparent.

Spanish Ochres. This is very hard to grind but has good body, and may be used equally well as a straight color or for tinting. The shade of the tint remains extremely constant.

Italian Ochres or Sardinian Earth have ground in oil is known as Italian Yellow, and gives the brightest and palest yellow tints of all the ochres, but has the slight disadvantage of the tint deepening in the course of time.

Raw Siennas used for graining are also sometimes used for tinting, but the tint develops even more than in the case of Italian Yellow. This deepening is due to the presence of hydrated water in the sienna, which gives it its transparency, but when the sienna becomes dehydrated the deepening takes place.

Burnt Sienna is the raw sienna burnt, and is used for graining and tinting. The brighter and more transparent it is, the better its use for graining. In Australia its thin-ting power to a great extent determines its value, and with white lead should give from siennas to reddish brown tones.

Umbers, Raw and Burnt, are largely used by all the finest qualities coming from Cyprus. The real value of an umber lies in the fineness of its grinding and purity. Both the raw and the burnt umbers change their tone considerably when exposed to light, especially when used as disstempers colors, whilst when used as tints in oil colors they develop considerably.

Red Oxides are of two kinds, the natural pigments such as iron; one and the oxides obtained by roasting cooperas (i.e., sulphate of iron). The percentage of FeO3 (ferric oxide) is never an indication of the value of the oxides, either in the case of the natural or the manufactured product. The brightness of all the natural oxides is the Persian Gulf red oxide, which has a ferric oxide content of approximately 80 per cent, whilst some Spanish oxides have 88 per cent, the tone of the latter being not nearly so valuable as the Persian Gulf oxide.

In the case of manufactured oxides, it has been found that some of the 55-60 per cent oxides made from waste liquors in the galvanizing process were not fit to be used in paints, and when painted over iron caused rust to appear in a few days' time.

The strong bright red oxides, such as Venetian red of good quality, stand extremely well, and so also do the Indian reds, both of which are manufactured from ferric oxides. None of the bright iron oxides, such as Venetian reds, red oxides, and Indian reds, can be looked upon as protecting iron from rusting, but afford a good protection for the iron so long as the paint remains in good condition.

Black Oxide of Iron is not much used as a paint color, being only a very dark bluish-oxide with no particular virtue.

Graphite or Plumbago is crystalline carbon, and is used as a paint color to some extent. Its chief properties are its everlasting spreading and acid resisting power, but it cannot be used alone on iron work, as it causes rusting.

Mineral Black is a black form of slate, and is, like black oxide or iron, too poor in color to be of much interest.

Cassel Brown or Vandyke Brown is used for staining wood and graining, but has little value as a paint color, apart from that on account of its transparency.

We have come to the manufactured black, Bone black, vine black, lamp or vegetable black, go acid black.
Value exercise

Example of an exercise sheet from the NCS Colour System.

Colours represented may vary from actual paint colours

Detail from chart:
Pick out the eight achromatic colour samples and arrange them in a scale from white (W) to black (S). Then take one chromatic colour sample at a time and compare this colour with the scale from white to black. Where the border line between the samples is minimally distinct the chromatic colour sample has the same lightness as the grey sample. Mount the chromatic samples in horizontal columns out from the corresponding grey sample.

Painting of Older Buildings
Appendix 10.4 Recipes

Lime wash recipes

Gehrig, 1985, p. 59 lists the following as good recipes for exterior lime washes:

1. 3.5 lbs of rock lime; and
   9.5 gallons of sea water

2. 3.5 lb of rock lime;
   3 lb of powdered glue, dissolved in water;
   7 lb of zinc oxide;
   4 lb of salt; and
   10 gallons of water.

3. 3.5 lbs of rock lime:
   24 lbs of whiting;
   2 lbs of powdered alum;
   2 lbs of powdered glue dissolved in water;
   0.5 gallon of linseed oil; and
   10 gallons of water.

4. 3.5 lbs of rock lime;
   7 lbs of zinc oxide;
   1 lb of dripping; and
   10 gallons of skim milk.

From a publication published in New Zealand by:
'The N.Z. Dairy Produce Exporter' Newspaper Company, Ltd. (Undated) Do It Yourself: [A complete, concise manual, containing hundreds of practical ideas and simple instructions for making improvements to the home, carrying out repair jobs of all descriptions, making indoor and outdoor furniture, and erecting buildings about the home.]

Chocolate paint for houses and barns

It is possible to get dull brown paints from white lead and added hints, but a much more satisfactory chocolate paint, particularly suitable for sheds and farm buildings, can be made from a mixture of Indian Red and oils. This has the added advantage of being considerably cheaper to make than lead paint. Here is a mixture which gives a rich, dark chocolate colour.

- 1 cwt. Indian Red
- 1 gallon raw linseed oil
- 1 pint terebene (driers)
- 1.4 lb. black in oil
(Above quantities make about 8 gallons of paint.)

Hints on using whitewash

If it is possible to do so, whitewashes will be better for being applied hot. If you can heat the whitewash in a benzine tin, and keep it hot, you will get much better results.

To prevent whitewash dusting off after a time, it is a good plan to add 1 oz. of alum for each gallon of whitewash. Where flour paste is used in a recipe it serves the same purpose, but it is a good idea then to add a little sulphate of zinc as well, to prevent the flour decaying.

You can obtain a glossy surface with whitewash by mixing with it a small quantity of ordinary laundry soap. Flake the soap, then heat until dissolved. The quantity needed varies considerably, but a trial with a board or two will soon give you the gloss you require.

Whitewash may be coloured. The best colours to use are those which are used for colouring cement, but dry pointer’s colours such as yellow ochre, red oxide, lampblack, raw and burnt umber and raw and burnt sienna may be added to the whitewash. This needs to be done carefully so that the colour may be thoroughly well incorporated. Chrome yellow, chrome green and Prussian blue must not be used with whitewash as they are adversely affected by alkali.

Painting of Older Buildings
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OTHER PUBLICATIONS

INFORMATION LEAFLETS
These provide up to date information on legislation, regulations, available funding and criteria for entry in the State Heritage Register.

1.1 Definitions and guidelines
1.2 Guidelines to approaches for conserving heritage places
1.3 Planning for conservation management
1.4 Criteria for inclusion of places in the State Heritage Register
1.5 Summary of Heritage Act 1993
1.6 Summary of Development Act 1993
1.7 Entering a place in the State Heritage Register
1.8 Heritage Funding in South Australia
1.9 Archaeological sites and artefacts
1.10 South Australian Architecture: a reading list

GUIDELINES
These booklets provide information and promote awareness on a wide range of design matters related to heritage, ranging from new development to signage and fences.

2.1 Model brief for the preparation of conservation plans
2.2 Advertising signs on heritage buildings in South Australia
2.3 Fences in South Australia
2.4 Alterations and additions
2.5 Gardens in South Australia 1840 - 1940

TECHNICAL NOTES
These booklets provide mainly technical information to assist in the maintenance and conservation of old buildings.

3.1 An owner’s guide to the maintenance of historic buildings
3.2 Check it! The maintenance and housekeeping of historic places
3.3 Early bricks and brickwork in South Australia
3.4 Removal of paint from masonry
3.5 Cleaning of masonry
3.6 Stone masonry in South Australia
3.7 Painting of older buildings in South Australia
3.8 Rising damp and salt attack